



POSITION STATEMENT AND RECOMMENDED GUIDANCE EXERTIONAL HEAT STROKE and HEAT EXHAUSTION RECOGNITION AND TREATMENT

Information in this document is adapted from the sources listed in references and based on current best practices recommended by the opinions of those considered experts in the field. Each case of heat illness is individual, and this document is meant to aid in the education of providers about best practices current to the time of publication but does not supersede the providers clinical judgement in each individual circumstance or any other guidance or updates from relevant sources.

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Exertional Heat Illness comprises several different conditions that are related and most likely on a spectrum. These conditions include Heat Cramps, Exertional Heat Exhaustion, Exertional Heat Injury (hyperthermic organ injury without neurologic involvement), and most severe Exertional Heat Stroke. This document focuses mostly on the most severe conditions including severe Heat Exhaustion (EHE), and Heat Stroke (including organ damage from Heat Injury) (EHS).

"Exertional heat stroke (EHS) is a life-threatening condition characterized by central nervous system disturbances and hyperthermia, usually $>40^{\circ}\text{C}$ (104°F) rectal (core) temperature. The term "heat stroke" reflects the presence of focal "stroke-like" symptoms associated with warm environments and hyperthermia, although the symptoms in most victims are more global than focal." (Roberts W. O., April 2023)¹.

Exertional Heat Exhaustion (EHE) if not recognized and treated can progress to EHS. In EHE Core temperatures are generally 101°F to $<104^{\circ}\text{F}$ without mental status or neurological changes. Athletes are typically still coherent but may show other signs of heat illness and can develop organ injury in some cases.

Example Signs and Symptoms of EHE/EHS:

Exertional Heat Illness/Exhaustion	Exertional Heat Stroke
Dizziness	Persistent mental status changes
Headache	Personality changes (frontal lobe)
Nausea	Inappropriate behavior or aggressiveness
Unsteady walk	Delirium
Generalized weakness	High rectal temperature, $>40^{\circ}\text{C}$ (104°F)
Muscle cramps	Loss of ambulatory function (ataxia)
Fatigue	Flaccid muscles or persistent rigidity
Chills	Stool incontinence
Eyes closed	Seizure
Missing assigned tasks (cognitive function)	Coma
Sweaty skin (not dry), warm or cool to touch	Recurrent vomiting
Skin color varies from pale to flushed	
Tachycardia	
Systolic hypotension	
Weak or rapid pulse	

Current research shows that most individuals recover within a few weeks if the EHS was recognized quickly, and rapid cooling occurred. However, more serious cases can take months to recover from and the athlete may never be able to safely return to sports due to permanent organ system dysfunction. This document is intended to serve as guidance to assist the treating provider in determining when, in that provider's opinion, an athlete can safely Return to Play (RTP).

Please refer to the [KHSAA/KMA Sports Safety Course](#) for more information on the recognition and treatment of Exertional Heat Illness. Information can also be found about the policies and procedures for requirements for heat monitoring and for preparedness for treatment on the [KHSAA website](#).

The references at the end of this document also have additional information that can be useful to review.

Basic tenets of Recognition and Treatment of Exertional Heat Exhaustion (EHE) and Exertional Heat Stroke (EHS)

1. Early detection and treatment are key to best outcomes. If an athlete collapses while exercising in the heat and cardiac issues are not suspected as the primary cause then EHS should be at least suspected (always remember basic life support (BLS) protocols and to check Airway, Breathing and Circulation and treat accordingly).
2. If an athlete has severe or progressive symptoms or is unconscious or has mental status changes and EHS suspected, then core (rectal) temperature should be obtained if possible.

3. If EHS suspected and athlete is unconscious or has mental status changes or if EHS is confirmed (core temp > 104° F) then move to shaded area, remove excess equipment and clothing, start rapid cooling with Cold Water Immersion (tub) or TACO method, (KHSAA regulations state it is mandatory that one or the other be prepared and ready to use if WBGT is 82.1° or above and available at all times in case conditions change).
4. For EHS, aggressive cooling with Tub or TACO method is recommended to be initiated immediately on site prior to transport. It is recommended that the affected individual should be cooled to a core temp of 102°F then transported for definitive care as soon as possible. If core (rectal) temp is not available, then cooling should occur for 10-15 minutes before transport.
5. If athlete is conscious and coherent but exertional heat exhaustion (EHE) is suspected, then remove from activity, move to shaded area, remove excess equipment and clothing, hydrate with cool fluids, use cooling techniques such as iced towels and depending on severity of clinical situation can obtain core temperature if possible and use Cold Water Immersion or TACO method for progressive or more severe or persistent cases.
6. Once an athlete suffers an EHS (core temp > 104, mental status changes) or if has more than just mild symptoms of EHE (i.e. if suffers from collapse, mental status changes, or any symptoms that don't improve rapidly with cooling and rest) or if has any signs of organ damage or if they had to be cooled in tub/TACO method then it is recommended they be evaluated by an MD/DO prior to return to activity. This gives an opportunity to assess for any organ damage that can present as a consequence of EHE/EHS and to evaluate for modifiable risk factors to prevent future episodes of EHE/EHS.
7. Return to activity after EHS or severe EHE should be individualized based on the severity of condition and based on organ systems involved. After an initial rest period of at least 7 days and evaluation by physician for fitness to start a return to activity, then an individualized gradual progression should occur with monitoring for symptoms or signs of any recurrent issues. Steps should also be taken to reduce risk factors for recurrence of heat illness. When reintroducing activity steps should be taken to gradually acclimatize the athlete to exercise in hot environments. This typically should occur over the course of at least 2-4 weeks and sometimes can be months for more severe cases.

Laboratory Studies and Tests

The following labs and tests may be used by the treating provider to assess the condition of the athlete and assess for any signs of end organ damage. They can also aid in determining when to begin the RTP protocol and/or return to sport:

ECG	Creatinine kinase
CBC	PT & aPTT
Comprehensive Metabolic Profile (to include BUN/ Cr, Glucose, Electrolytes, Liver function Profile, LDH)	Fibrinogen/Fibrinogen Degradation Products
Serum calcium & phosphorus	Blood & urine myoglobin
Serum lactate	Urinalysis
Serum uric acid	Arterial Blood Gases

Clinical judgement should be used to determine which of the above needs to be done based on the severity of symptoms and any known end organ damage diagnosed at the time of EHS to establish return to baseline.

Risk Factors for Heat Illness that can possibly be modified or monitored¹

Medications and drugs	Health conditions
Diuretics	Viral or bacterial infections
Anticholinergics	Fever
Adrenergic blockers	Diarrhea or vomiting
Antihistamines	Skin disorders (rash, large area of burned skin)
Antidepressants	Diabetes mellitus
Stimulants (amphetamines, cocaine, ecstasy, ephedra)	Cystic fibrosis/trait
	Cardiovascular disease

Environmental Factors	Individual factors	Behavioral
Warm-hot weather conditions	Age (infants, older adults)	Self-imposed motivation to excel
Unusually hot for region and season	Overweight, high body mass index	Leadership or organizational structure
Heat wave defined as >3 d of >32°C (90°F)	Poor physical fitness	Peer or coach pressure to excel
Wearing heavy clothes, equipment, or uniforms	Inappropriate work to rest ratios	
	Inadequate heat acclimatization for current conditions	
	Heat stress in the previous 1 to 3 days	
	Hypohydration	

Return To Play Activity/Conditioning Guidelines.

Below is an example return to play guideline. This may need to be individualized to the circumstances of the athlete, severity of illness, sport, and current medical condition.

Stage	Aim/Responsibility/Goal	Activity	Duration/Intensity	Example: HS Cross Country Runner
1	Medical recovery Physician guided Organ system recovery	Activities of daily living for 1 to 2 wk	Gradual increase in home activities without fatigue	Home rest and return to school
2	Medical Recovery Physician Guided Sustain minimal aerobic fitness and develop confidence	Self-paced comfortable walk in low heat stress conditions (e.g., an air-conditioned gymnasium)	20 to 60 min at Maximal Intensity of HR < 100 or <50% Age Adjusted maximal HR	Return to practice and walk through the warm-up and practice, if the environmental conditions are not stressful. If not, use an air conditioned area of the school
3	Early Exercise Adaptation Athletic trainer guided with physician Gradually improve aerobic exercise capability	Walk at 3.5 mph in low heat stress conditions	60 min at HR < 140 bpm or <70% of age adjusted Maximal HR	Warm up & cool down with team, 1 of 4 reps at half speed
4	Mid Exercise Adaptation Athletic Trainer Guided with Physician Gradually improve aerobic exercise capability & fitness	Walk & run in low heat stress conditions	60 min of progressively increasing run to walk ratio until constant run for 60 min	1 of 3 reps, half speed 1 of 2 reps, ¾ speed
5	Heat Acclimatization Athletic Trainer Guided Gradually improve heat Acclimatization status	Run in ambient warm or hot conditions	60 min of progressively increasing run until constant run for 60 min;	All reps, ¾ speed
6	Sports-specific acclimatization/training Athletic trainer and/or coach guided Improve sport-specific heat acclimatization & fitness	Participate in practice in ambient conditions	Initially participate in sports-specific drills with sports-specific equipment then progress to training and scrimmage.	All reps, full speed
7	Return to Sport Athletic trainer monitors during warm up and game	Normal game or competition participation in ambient conditions		Meet 1—run to finish the race Meet 2 — race to place in the race

References

1. [Roberts, William O. MD, MS, FACSM1; Armstrong, Lawrence E. PhD, FACSM2; Sawka, Michael N. PhD, FACSM, FAPS3; Yeargin, Susan W. PhD, ATC4; Heled, Yuval PhD, FACSM5; O'Connor, Francis G. MD, MPH, FACSM, FAMSSM6. ACSM Expert Consensus Statement on Exertional Heat Illness: Recognition, Management, and Return to Activity. Current Sports Medicine Reports 22\(4\):p 134-149, April 2023. | DOI: 10.1249/JSR.0000000000001058](#)
2. [Casa, D.J, et all. \(Sept 2015\) National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses](#)
3. [KHSAA Heat Policy](#)
4. [Korey Stringer Institute Heat Stroke Prevention and Treatment](#)