Exertional Heat Illness Information

The prevention, recognition and treatment of Exertional Heat Illnesses (EHI) are core components of sports medicine services at all levels of sport. The risk of EHI is ever present during exercise in the heat but can also occur in 'normal' environmental conditions.

Definitions of Exertional Heat Illnesses

Exercise-Associated Muscle Cramps (EAMCs) are sudden or sometimes progressively and noticeably evolving, involuntary, painful contractions of skeletal muscles during or after exercise.

Heat Syncope, or Orthostatic Dizziness, often occurs in unfit or heat-unacclimatized persons who stand for a long period of time in the heat or during sudden changes in posture in the heat, especially when wearing a uniform or insulated clothing that encourages and eventually leads to maximal skin vasodilation.

Heat Exhaustion is the inability to effectively exercise in the heat. This condition is manifested by an elevated core body temperature (usually less than 105ºF) and is often associated with a high rate or volume of skin blood flow, heavy sweating and dehydration. It occurs most frequently in hot or humid (or both) conditions, but it can also occur in normal environmental conditions with intense physical activity. Heat Exhaustion most often affects heat-unacclimatized or dehydrated individuals.

Exertional Heat Stroke (EHS) is the most severe heat illness. It is characterized by neuropsychiatric impairment and a high core body temperature, typically greater than 105ºF. This condition is when the thermoregulatory system becomes overwhelmed due to excessive heat production and inability of the body to naturally cool itself. Although this illness is most likely to occur in hot and humid conditions, it can occur with intense physical activity in the absence of extreme environmental conditions. The first sign of EHS is often central nervous system dysfunction (i.e. collapse, aggressiveness, irritability, confusion, seizures and/or altered consciousness). A medical emergency, EHS can progress to a systemic, inflammatory response and multi-organ system failure unless promptly and correctly recognized and treated.

NEISD Treatment for Exertional Heat Stroke (EHS)

For any EHS patient, the goal is to lower core body temperature to less than 102.8ºF within 30 minutes of collapse. Body cooling serves two purposes: returning blood flow from the skin to the heart and lowering core body temperature by reducing the hyper metabolic state of the organs. All patients suspected of EHS should be cooled first and transported second.

When EHS is suspected, the patient's body (trunk and extremities) should be quickly immersed into a pool or tub. Excess clothing and equipment will be removed to enhance cooling by maximizing the surface area of the skin. However, because removing excess clothing and equipment can be time consuming, cold water immersion (CWI) should begin immediately and equipment can/should be removed while the patient is in the tub (or while temperature is being assessed or the tub is being prepared).

If full-body CWI is not available, partial-body immersion (i.e., torso) with a small pool or tub and other modalities, such as wet ice towels rotated and placed over entire body or cold-water dousing with or without fanning, may be used but not as effective as CWI.

Vital signs should be monitored during cooling every five (5) to ten (10) minutes. When the equipment is available, core temperature should be monitored as well. The athletic staff should implement and continue cooling athlete until medical assistance arrives.

The following practices and precautions are recommended for the athletic staff during practices/games:

1. Each athlete must have an annual physical exam with a medical history prior to any athletic participation.
2. Coaches should know the physical condition of their athletes and set practice schedules accordingly.
3. Implement a gradual acclimatization to hot weather.
4. Water must be on the field/court readily available to the athletes at all times. Water breaks should be given every half hour of heavy exercise. Water should be available in unlimited quantities.
5. Salts should be replaced daily. Modest salting of foods or consumption of a sports drink after practice or games will accomplish this purpose. Salt tablets are not recommended.
6. Know both temperature and humidity. The greater the humidity, the more difficult it is for the body to cool itself.
7. In extreme hot and humid weather reduce the amount of clothing covering the body as much as possible.
8. Pre and post workout weigh-ins each day and recorded on weight charts to ensure athletes are properly replacing weight lost due to sweat.
9. Observation of athletes carefully for signs of trouble.
10. Know what to do in the case of an emergency. Refer to the emergency action plan and be familiar with immediate first aid practices and prearranged procedures for obtaining medical care, including ambulance service
    a. Heat Stroke – This is a medical emergency. DELAY COULD BE FATAL. Immediately cool body to core body temperature of 102.8ºF while waiting to transfer to a hospital. Do not transfer before core body temperature reaches threshold of 102.8ºF Remove clothing and submerge in cold tub. If cold tub not available place ice bags on neck, axilla (armpit), and groin area.
    b. Heat Exhaustion – Obtain medical care at once. Cool body immediately as you would for heatstroke while waiting for transfer to hospital. Give fluids if athlete is conscious and able to swallow.

Sources:
National Athletic Trainers' Association: Heat Illness
National Athletic Trainers' Association Position Statement: Exertional Heat Illnesses

Clinical Distinctions of Exertional Heat Illnesses

Characteristics	Exercise-Associated Muscle (Heat) Cramps	Heat Syncope	Heat Exhaustion	Exertional Heat Stroke
Description	Acute, painful, involuntary muscle contractions presenting during or after exercise	Collapsing in the heat, resulting in loss of consciousness	Inability to continue exercise due to cardiovascular insufficiency	Severe hyperthermia leading to overwhelming of the thermoregulatory system
Physiologic Cause	Dehydration, electrolyte imbalances, and/or neuromuscular fatigue	Standing erect in a hot environment, causing postural pooling of blood in the legs	High skin blood flow, heavy sweating, and/or dehydration, causing reduced venous return	High metabolic heat production and/or reduced heat dissipation
Primary Treatment Factors	Stop exercising, provide sodium-containing beverages	Lay patient supine and elevate legs to restore central blood volume	Cease exercise, remove from hot environment, elevate legs, provide fluids	Immediate whole-body cold-water immersion to quickly reduce core body temperature
Recovery	Often occurs within minutes to hours	Often occurs within hours	Often occurs within 24 h; same-day return to play not advised	Highly dependent on initial care and treatment; further medical testing and physician clearance required before return to activity