Korey Stringer Institute
University of Connecticut
Preventing sudden death in sport

5 Pillars of Exertional Heat Stroke Prevention

- Hydration
  - Maintaining appropriate levels of hydration prior to, during, and post exercise will assist in attenuating large increases in core body temperature during intense exercise in the heat.
  - Evidence shows that for every 1% loss in body mass from water lost via sweat, core body temperature increases by 0.5°F (0.22°C).
  - To decrease the risk of exertional heat stroke, athletes are encouraged to minimize fluid losses during exercise. Fluid needs are individualistic depending on an athlete's sweat rate and a specific rehydration plan should be in place for every athlete
- Body Cooling
  - Body cooling can be an effective means of attenuating the rise in core temperature and can be done pre-exercise, during exercise, and post-exercise.
  - There are a number of cooling modalities that can be effective in assisting to keep the body cool during exercise in the heat and are applicable to most sports settings (equipment laden sports, sports with minimal or no rest time during activity, etc.).
  - For the equipment-laden athlete/laborer/soldier who may be at great risk of exertional heat stroke when exercising in the heat, a specific plan for utilizing cooling during rest breaks is imperative.
- Work to Rest Ratios
  - Having appropriate work-to-rest ratios (the amount of time spent involved in exercise versus the amount of time spent in recovery) should be modified, as environmental conditions become extreme and when athletes gain or lose fitness.
  - Environmental extremes should be measured using wet bulb globe temperature (WBGT). WBGT takes into account ambient temperature, relative humidity and the radiation from the sun to give an accurate measure of the heat stress that the athlete will be experiencing during exercise in the heat.
  - Modifications of work-to-rest ratios include increasing the number of rest breaks, the duration of rest breaks, and having unlimited access to hydration.
- Acclimatization
  - Heat acclimatization is a series of physiological adaptations the body uses to tolerate exercise in the heat and occurs over a period of 10-14 days.
  - Having athletes go through a heat acclimatization protocol at the start of exercise in the heat is one of the best ways to help prevent exertional heat stroke.
  - To have the full effects of the adaptations from heat acclimatization, it is imperative that athletes maintain an appropriate level of hydration.
- Education
  - Athletes, coaches, parents, athletic trainers, and other medical professionals should all be educated on the proper preventative strategies to prevent exertional heat stroke. Proper education will minimize the risk and incidence of exertional heat stroke.
  - Having proper education and knowledge of the signs and symptoms are also imperative to ensure appropriate treatment in the event of an athlete suffering from exertional heat stroke.
  - If medical care is present and exertional heat stroke is suspected cool first, and then transport second to ensure appropriate treatment.
  - If no medical care is available and exertional heat stroke is suspected, immediately active EMS (9-1-1) and begin cooling the athlete. For cooling immerse the athlete in whole body cold-water immersion, which is the gold standard for cooling, and exercising athlete.

3 Pillars of Exertional Heat Stroke Survival

- Recognition
  - Exertional heat stroke is defined as a body temperature greater than 104 °F in addition to signs of CNS dysfunction (dizziness, collapse, loss of consciousness, confusion, mood changes etc.).
  - Early warning signs of exertional heat stroke include headaches, dizziness and nausea. If these signs are detected early and the individual is allowed to bring their body temperature down, future problems may be avoided.
  - Any athlete experiencing signs of CNS dysfunction during intense exercise in the heat should be considered to be suffering from exertional heat stroke.
  - A rectal temperature is the only viable field option to assess body temperature in an exercising individual. Aural, oral, tympanic, axillary and forehead measurements have all been shown to not be effective for measuring body temperature in exercising individuals.
- Treatment
  - Cold-water immersion should be used to cool any exertional heat stroke patient due to its superior cooling ability.
  - To ensure survival, cooling tubs should be setup prior to any event involving exercise in the heat. This works best if tubs are filled with water with ice available nearby. Tubs should be large enough to accommodate the full-immersion of a large individual.
  - An individual with exertional heat stroke should be cooled to 102°F within 30 minutes. For many individuals they will start at 106-110°F and cool 1°F every 3 minutes, if cold-water immersion is utilized. Therefore, cooling can take up to 20 minutes, making rapid treatment decisions critical.
  - If cooling is available on-site the individual with exertional heat stroke should be cooled prior to transportation to a hospital.
- Return-to-play
  - An athlete who survives exertional heat stroke should be fully evaluated by a physician prior to return-to-play.
  - Prior to return-to-play the individual who suffered an exertional heat stroke should demonstrate the ability to tolerate exercise in the heat.
  - Athlete's who have sustained an exertional heat stroke likely had a predisposing factor at the time of their injury. Predisposing factors should be identified and remediated before returning an athlete to activity.
  - Return-to-play should be gradual and medically monitored throughout. When medically cleared, exercise should begin at a low intensity in a temperate environment. The athlete then can progress intensity in a temperate environment if no complications persist. The athlete should then perform the same progression of intensity in a hot environment before they are allowed to return-to-play.

Last updated: April, 2014