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**Editorial**

# Preseason Heat Safety in Secondary School Athletics

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Exertional heat stroke (EHS), a leading cause of death in sport and physical activity, is of particular concern in secondary school athletes. Emergency department data[1] suggests that approximately 75% of heat-related illness visits are activity related, and most of these patients are participating in American football and endurance-running events. Specific epidemiologic data on heat-related illnesses in secondary school athletes indicate an incidence rate of 1.2 to 1.6 per 100 000 athlete-exposures; however, the likelihood of a heat-related illness is approximately 10 times greater during the preseason than during the regular season.[2] Although much attention has focused on heat-related illness and EHS in American football due to the timing of the sport season, the anthropometric characteristics of the athletes participating in this high-intensity sport, and the protective equipment requirement that impedes heat dissipation,[3] athletes in other secondary school sports are not immune to heat-related illness. Aside from athletes playing American football, female cross-country athletes were twice as likely to experience heat-related illness as those in any other secondary school sport.[4] Thus, the health and safety policies and procedures specific to heat-related illness must be comprehensive in nature and consider factors such as the type of sport, timing of the sport season, geographic location of the secondary school, and athlete sex to name a few.

Even though 66% of secondary schools in the United States had access to a health care provider for sanctioned athletics (ie, an athletic trainer) in 2019, only 34% had access to a full-time health care provider.[5] More alarmingly, 34% of secondary schools in the United States do not have any access to a health care provider to oversee the health and safety of student-athletes participating in school-sanctioned sports. This often leaves the coach, an individual with no medical expertise or credentialing, to make medical decisions when a student-athlete is injured. Specific to EHS, Adams et al[6] found that secondary school American football coaches were unable to identify predisposing risk factors and signs and symptoms of EHS. Furthermore, the case study of Max Gilpin[7] demonstrated the potential for a catastrophic outcome from EHS when onsite medical care is lacking and evidence-based policies and procedures to optimize athlete care are not in place.

The proper management and care of athletes with EHS can be considered in 2 categories: (1) prevention and (2) acute EHS management, which includes recognition, assessment, treatment, and advanced care.[8–11] At the secondary school level, the primary EHS-prevention strategies are heat acclimatization and environment-based activity modifications (increasing the number and frequency of rest breaks for hydration). In 2009, heat-acclimatization guidelines for secondary school athletes were published,[12] providing clinicians, coaches, and administrators with a guided series of steps to phase in the duration and intensity of activity as well as the protective equipment worn during the first 14 days of preseason practice to improve thermal tolerance in the heat. Kerr et al[13] observed that when states adopted all of the recommendations outlined in the 2009 document, the risk of heat-related illness fell by 55%. Furthermore, Cooper et al[14] noted that the risk of heat-related illness was reduced in the state of Georgia after evidence-based heat-acclimatization and environment-based activity-modification guidelines were adopted.

When EHS is suspected in a secondary school student-athlete, prompt recognition of the patient's mental status, assessment of internal body temperature using rectal thermometry, and onsite, whole-body cold-water immersion followed by transport to a medical facility are imperative to ensuring survival and reducing the potential for morbidity and mortality.[8–11] With EHS, time is of the essence, and the actions performed within the first 30 minutes of collapse dictate the likelihood of full recovery from this medical emergency. Large-scale mass-participation running events such as the Falmouth Road Race[15] have shown the success of this model. In other instances, when 1 or more aspects of the management and care lapsed, either recovery was prolonged or the event proved catastrophic.[7,16]

These EHS-management and -care strategies have proven effective in reducing the EHS risk and ensuring survival if an individual experiences EHS; however, noted gaps in the current evidence-based best practices warrant further exploration and development. For heat acclimatization, the published recommendations are specific to American football,[12] which may limit their direct application to other sports that require a different type of training (eg, cross-country). Furthermore, since 2009, substantial work has been conducted in the field of heat acclimatization and identifying the risk of heat-related illness, prompting new

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inquiries. Current position statements on heat-related illness[8–10] have called for the use of environment-based activity modifications based on the wet bulb globe temperature. Although the 2015 National Athletic Trainers' Association position statement on exertional heat illness[8] provides an example of wet-bulb globe temperature-based activity modifications from a policy adopted by the Georgia High School Athletics Association, no evidence-based recommendations are available to guide clinicians in implementing them. Also, given the geographic variability in climate across the United States,[17] using regional environmental conditions to develop appropriate work-to-rest ratio guidelines would be optimal. The recommendations in the 2015 position statement[8] are only meant to serve as an example and may not maximally mitigate the risk in the same way that regional guidelines might. Last, although proper management and care of patients with EHS has ensured 100% survivability, many secondary school athletic trainers were not using these techniques (ie, assessing body temperature via rectal thermometry, whole-body cooling with cold-water immersion, and cool first, transport second),[18] which is a disservice to the patients for whom they are charged with providing medical care.

Given these limitations and the current gaps in the scientific and medical literature on these topics, it is crucial that as evidence-based medicine regarding EHS continues to evolve, recommendations be developed to guide clinicians in optimizing patient outcomes. To this end, we held a roundtable meeting on May 28, 2019, in Orlando, Florida with the support of the National Athletic Trainers' Association, Korey Stringer Institute, and the American College of Sports Medicine, to convene 33 attendees with expertise in the management and care of EHS, thermal physiology, sports medicine, biometeorology, emergency medicine, and epidemiology to develop a consensus on preseason heat safety in secondary school athletes. Three specific aims guided the meeting attendees in the development of evidence-based recommendations pertaining to the global topic of preseason heat safety in secondary school athletes:

1. Provide best-practice recommendations for the development and implementation of heat-acclimatization strategies within secondary school athletics
2. Create best-practice recommendations on the use of thermal indices and environmental monitoring to determine work-to-rest ratios and facilitate further implementation of environmental monitoring during activity in the heat
3. Update secondary school–specific recommendations for the prehospital management and care of patients with EHS and supply actionable strategies for the implementation of these recommendations in the secondary school setting

From these aims, 3 consensus statements[19–21] were written. They are published in this issue of the *Journal of Athletic Training*. With clinical implementation in mind, we drafted these consensus documents to the previous consensus[22] document provide clinicians with evidence-based recommendations coupled with various approaches to optimize implementation within secondary school athletics. Secondary school clinicians must remain steadfast in their efforts to optimize the care they provide their patients by implementing the recommendations from these consensus statements in their clinical practice.

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