PREVENTING EXERTIONAL HEAT STROKE (EHS) IN HIGH SCHOOL FOOTBALL LINEMEN

National Federation of State High School Associations (NFHS)
Sports Medicine Advisory Committee (SMAC) Task Force

June 2026

THE PROBLEM:

- Exertional heat stroke (EHS) is the No. 1 cause of preventable death in youth, high school and collegiate football players, with an average of nearly three deaths per season.
- 100% of high school and collegiate EHS football deaths occur during sustained, high-intensity conditioning sessions, usually within the first week of practice, with 97% of those fatalities being linemen.
- Recommended guidelines for EHS (uniform reduction, WetBulb Globe Temperature (WBGT) scales, acclimatization periods, hydration, etc.) - although still important - have been insufficient in preventing fatality, as these do not account for the intensity of exertion nor linemen at risk.
- Linemen's physiological response to exertion and environmental heat differs from other players as they heat up faster and cool down slower, contributing to their increased risk for EHS.

SOLUTIONS:

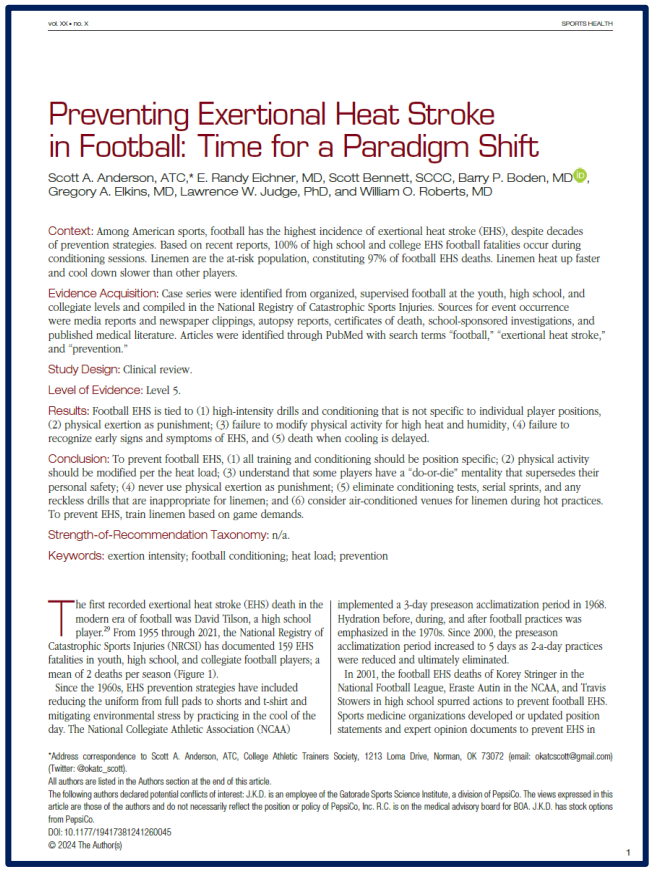
- Establish a paradigm shift on how to train and condition football linemen.
- Training and conditioning should be position-specific, with a gradual and paced progression in intensity and duration, particularly during the first week of any new conditioning or preseason program.
- Continue to implement well-established guidelines for heat acclimatization, hydration, WBGT scales with appropriate practice modifications to reduce the risk of exertional heat illness.
- Encourage preseason strength and conditioning to enhance player preparedness.
- Linemen are excluded from certain preseason performance testing, such as mile runs, serial sprints, etc., during the first few weeks of practice as several deaths have occurred in this setting. Post-practice sprinting puts linemen at greater risk for exertional heat illness.
- Exertion drills are never used as punishment as this accounts for 37% of football EHS deaths.
- A struggling athlete is immediately withdrawn from training and conditioning for evaluation and treatment.
- Coaches' written plan for training and conditioning workouts include types of drills that match how linemen play the game, with appropriate work/rest ratios, intensity and duration, with focus on skill development.
- Rehearse the EHS Emergency Action Plan (EAP) with rapid cooling protocols.
- EHS is predominantly exertional rather than environmental; therefore, control exercise intensity, particularly in linemen, to prevent EHS.

REFERENCES:

Anderson SA, et al. **Preventing Exertional Heat Stroke in Football: Time for a Paradigm Shift**. *Sports Health.* 2025 May-Jun 14;17(3):484-490. **doi: A 10.1177/19417381241260045**

PREVENTING EXERTIONAL HEAT STROKE IN FOOTBALL

- 100% of high school EHS deaths in football occurred during conditioning sessions
- Linemen are the at-risk population (97% of football EHS deaths)
- Paradigm Shift:
  - Position specific training
  - Transition period protocols
  - Recognize high risk situations
  - Eliminate punishment drills



vol. XX • no. X SPORTS HEALTH

Preventing Exertional Heat Stroke in Football: Time for a Paradigm Shift

Scott A. Anderson, ATC,* E. Randy Eichner, MD, Scott Bennett, SCCC, Barry P. Boden, MD, Gregory A. Elkins, MD, Lawrence W. Judge, PhD, and William O. Roberts, MD

Context: Among American sports, football has the highest incidence of exertional heat stroke (EHS), despite decades of prevention strategies. Based on recent reports, 100% of high school and college EHS football fatalities occur during conditioning sessions. Linemen are the at-risk population, constituting 97% of football EHS deaths. Linemen heat up faster and cool down slower than other players.

Evidence Acquisition: Case series were identified from organized, supervised football at the youth, high school, and collegiate levels and compiled in the National Registry of Catastrophic Sports Injuries. Sources for event occurrence were media reports and newspaper clippings, autopsy reports, certificates of death, school-sponsored investigations, and published medical literature. Articles were identified through PubMed with search terms "football," "exertional heat stroke," and "prevention."

Study Design: Clinical review.

Level of Evidence: Level 5.

Results: Football EHS is tied to (1) high-intensity drills and conditioning that is not specific to individual player positions, (2) physical exertion as punishment; (3) failure to modify physical activity for high heat and humidity, (4) failure to recognize early signs and symptoms of EHS, and (5) death when cooling is delayed.

Conclusion: To prevent football EHS, (1) all training and conditioning should be position specific; (2) physical activity should be modified per the heat load; (3) understand that some players have a "do-or-die" mentality that supersedes their personal safety; (4) never use physical exertion as punishment; (5) eliminate conditioning tests, serial sprints, and any reckless drills that are inappropriate for linemen; and (6) consider air-conditioned venues for linemen during hot practices. To prevent EHS, train linemen based on game demands.

Strength-of-Recommendation Taxonomy: n/a.

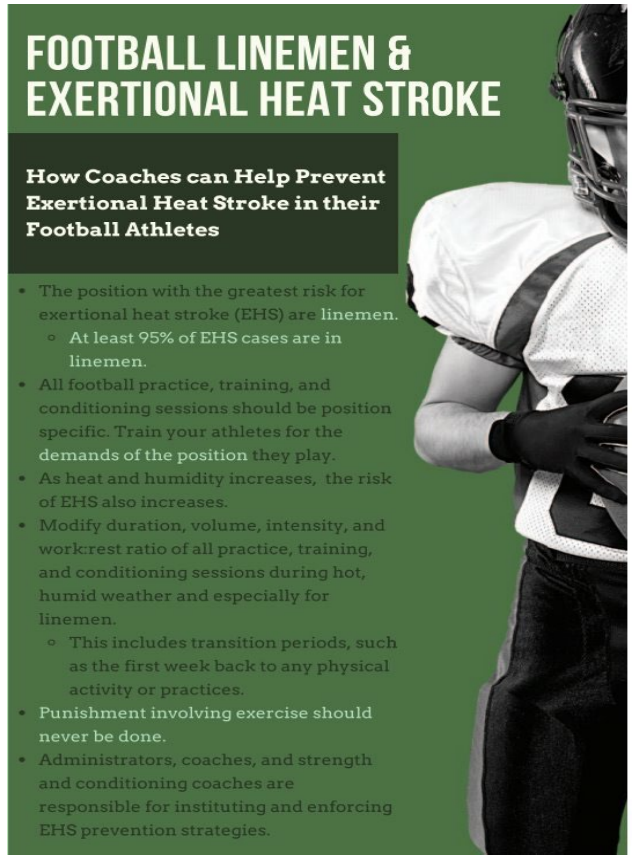
Keywords: exertion intensity; football conditioning; heat load; prevention

The first recorded exertional heat stroke (EHS) death in the modern era of football was David Tilson, a high school player.[29] From 1955 through 2021, the National Registry of Catastrophic Sports Injuries (NRCSI) has documented 159 EHS fatalities in youth, high school, and collegiate football players; a mean of 2 deaths per season (Figure 1).

Since the 1960s, EHS prevention strategies have included reducing the uniform from full pads to shorts and t-shirt and mitigating environmental stress by practicing in the cool of the day. The National Collegiate Athletic Association (NCAA) implemented a 3-day preseason acclimatization period in 1968. Hydration before, during, and after football practices was emphasized in the 1970s. Since 2000, the preseason acclimatization period increased to 5 days as 2-a-day practices were reduced and ultimately eliminated.

In 2001, the football EHS deaths of Korey Stringer in the National Football League, Eraste Autin in the NCAA, and Travis Stowers in high school spurred actions to prevent football EHS. Sports medicine organizations developed or updated position statements and expert opinion documents to prevent EHS in

*Address correspondence to Scott A. Anderson, ATC, College Athletic Trainers Society, 1213 Loma Drive, Norman, OK 73072 (email: okatcscott@gmail.com) (Twitter: @okatc_scott).
All authors are listed in the Authors section at the end of this article.
The following authors declared potential conflicts of interest: J.K.D. is an employee of the Gatorade Sports Science Institute, a division of PepsiCo. The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of PepsiCo, Inc. R.C. is on the medical advisory board for BOA. J.K.D. has stock options from PepsiCo.
DOI: 10.1177/19417381241260045



Sports Health, May-June 2025

NFHS PLAY. PERFORM. COMPETE. TOGETHER.