



Implementing Exertional Heat Stroke Policies: From Research to Reality

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Disclaimer

I DO NOT have a financial interest, arrangement or affiliation with any products that could be perceived a real or apparent conflict of interest in the context of the subject of this presentation.

Top 4 Causes of Sudden Death

- Sudden Cardiac Arrest
- Exertional Heat Stroke
- Traumatic Brain and Neck Injuries
- Exertional Sickling

The NATA Inter-Association Task Force for Preventing Sudden Death in Secondary School Athletics Programs: Best- Practices Recommendations. *Journal of Athletic Training*. 2013;48(4):546-553.



Secondary Schools

Heat Acclimatization Guidelines

Area of Practice Modification	Practices 1-5		Practices 6-14
	Days 1-2	Days 3-5	
# of Practices Permitted Per Day	1		2, only every other day
Equipment	Helmets only	Helmets & Shoulder Pads	Full Equipment
Maximum Duration of Single Practice Session	3 hours		3 hours (a total maximum of 5 hours on double session days)
Permitted Walk Through Time (not included as practice time)	1 hour (but must be separated from practice for 3 continuous hours)		
Contact	No Contact	Contact only with blocking sleds/dummies	Full, 100% live contact drills

NOTE: warm-up, stretching, cool-down, conditioning, and weight-room activities are Included as part of practice time

Preseason Heat-Acclimatization Guidelines for Secondary School Athletics. J Athl Train. 2009;44(3):332-333.

Heat Acclimatization Policy Success Rate

- NFL Football
 - 0 deaths since policy implementation
- NCAA Football
 - 1 preseason death since 2003
- High School Football
 - 0 deaths in all states implementing policy



Roadblocks and Resources

Roadblocks

- Coaches
- Complacent State Athletic Associations
- Athletic Trainers



Resources (EZ Pass)

- Parents
- Media
- State Athletic Associations' SMAC
- Professional Organizations (NATA, KSI, etc...)
- Athletic Trainers



Exertional Heat Illness in American Football Players: When Is the Risk Greatest?

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Context: Knowledge about the specific environmental and practice risks to participants in American intercollegiate football during preseason practices is limited. Identifying risks may mitigate occurrences of exertional heat illness (EHI).

Objective: To evaluate the associations among preseason practice day, session number, and wet bulb globe temperature (WBGT) and the incidence of EHI.

Design: Descriptive epidemiology study.

Setting: Sixty colleges and universities representing 5 geographic regions of the United States.

Patients or Other Participants: National Collegiate Athletic Association football players.

Main Outcome Measure(s): Data related to preseason practice day, session number, and WBGT. We measured WBGT every 15 minutes during the practice sessions and used the mean WBGT from each session in the analysis. We recorded the incidence of EHIs and calculated the athlete-exposures (AEs).

Results: A total of 553 EHI cases and 365 810 AEs were reported for an overall EHI rate of 1.52/1000 AEs (95%

confidence interval [CI] = 1.42, 1.68). Approximately 74% (n = 407) of the reported EHI cases were exertional heat cramps (incidence rate = 1.14/1000 AEs; 95% CI = 1.03, 1.25), and about 26% (n = 146) were a combination of exertional heat syncope and heat exhaustion (incidence rate = 0.40/1000 AEs; 95% CI = 0.35, 0.48). The highest rate of EHI occurred during the first 14 days of the preseason period, and the greatest risk was during the first 7 days. The risk of EHI increased substantially when the WBGT was 82.0°F (27.8°C) or greater.

Conclusions: We found an increased rate of EHI during the first 14 days of practice, especially during the first 7 days. When the WBGT was greater than 82.0°F (27.8°C), the rate of EHI increased. Sports medicine personnel should take all necessary preventive measures to reduce the EHI risk during the first 14 days of practice and when the environmental conditions are greater than 82.0°F (27.8°C) WBGT.

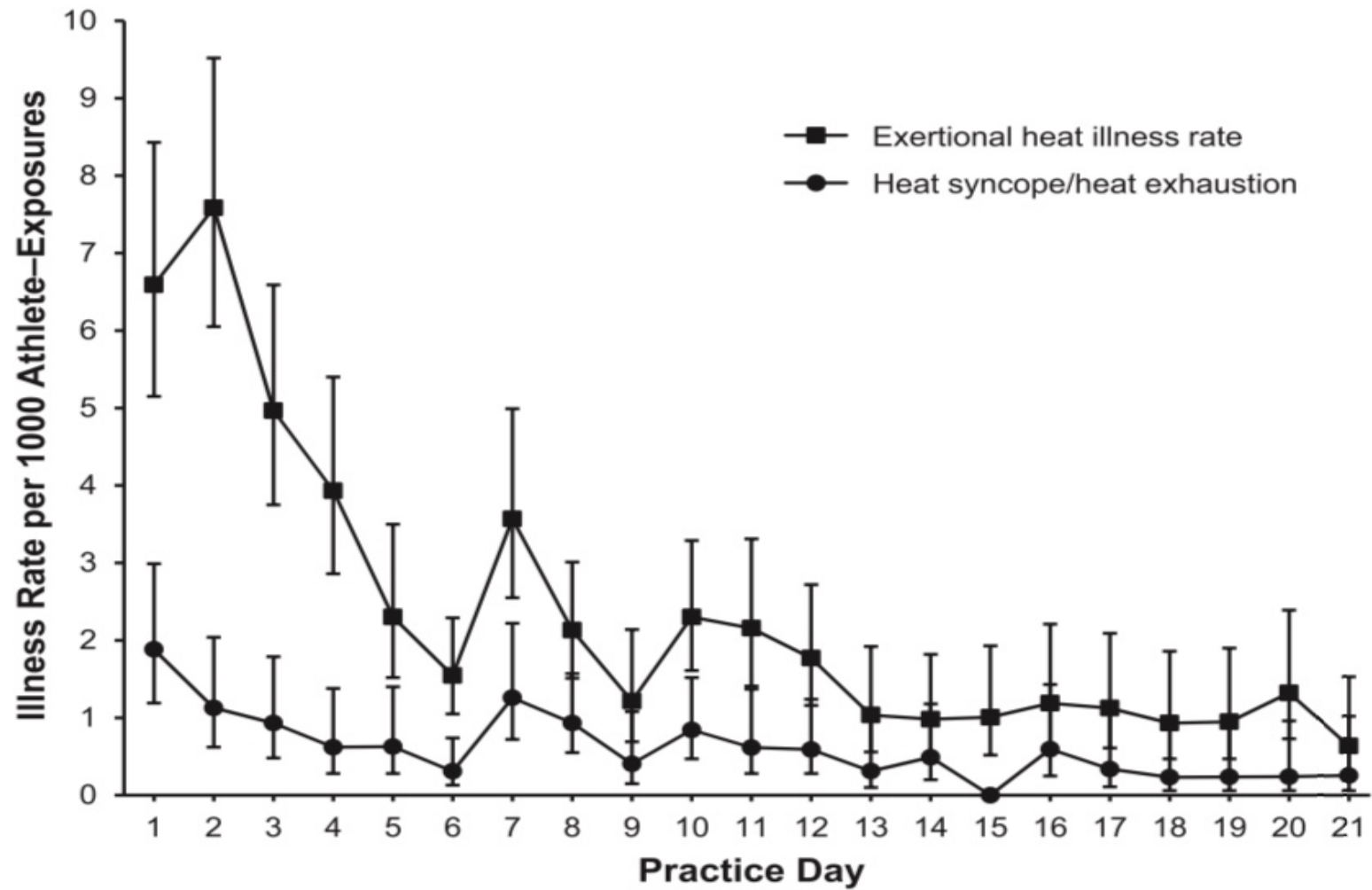
Key Words: environmental conditions, heat injuries, weather monitoring, wet bulb globe temperature

Key Points

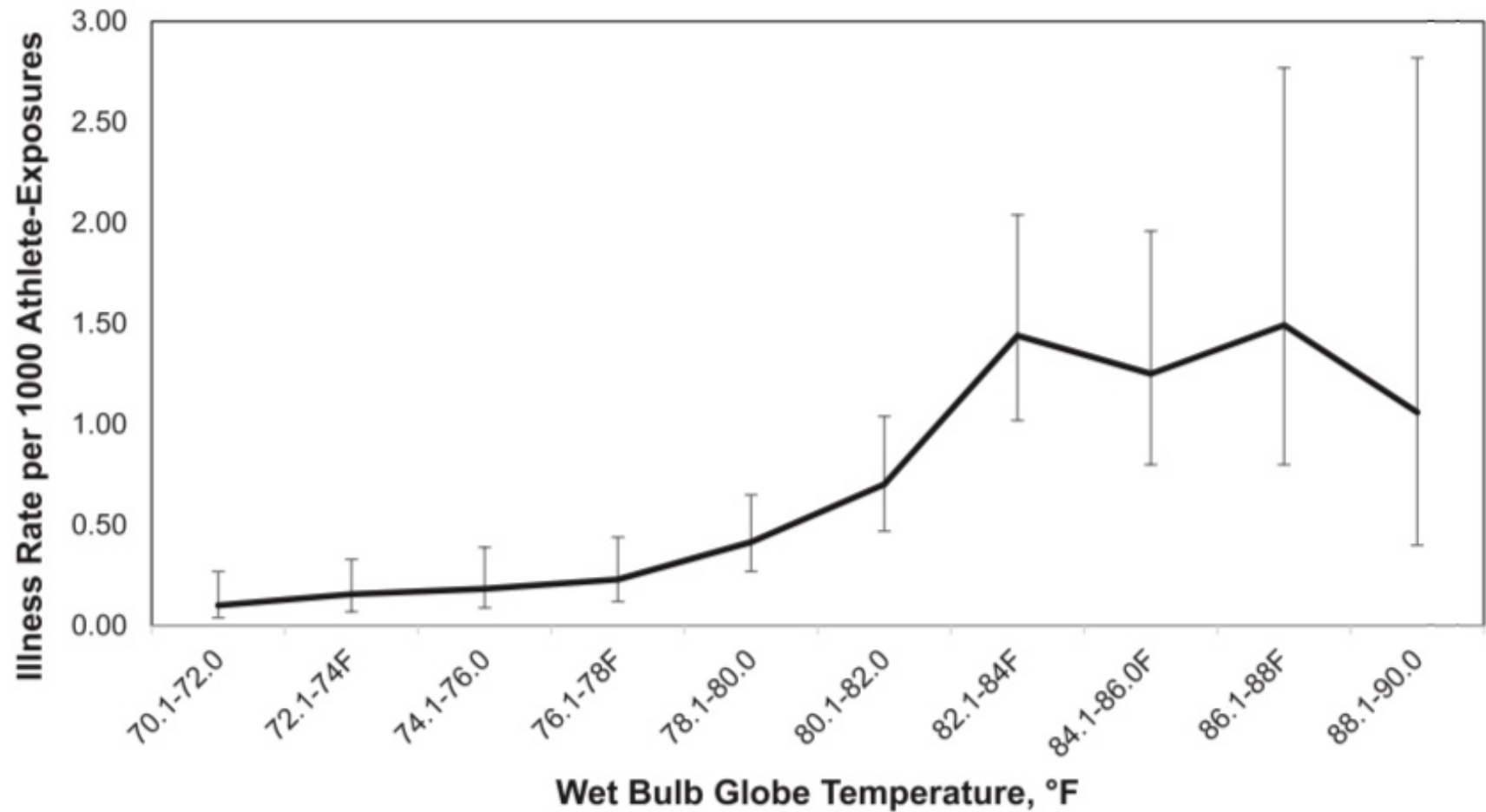
- The greatest risk of exertional heat illness (EHI) among American collegiate football players occurred during the first 14 days of preseason practice.
- The rate of EHI was related to the number of practice sessions held during the preseason period.
- The relative risk of EHI was low when wet bulb globe temperature was less than 82.0°F (27.8°C) and increased when it was between 82.0°F and 86.0°F (30.0°C).

Exertional heat illness (EHI) is one of many conditions with which athletic trainers (ATs) must contend when supervising the participation of collegiate student-athletes in preseason football practice sessions. Specifically, 2 EHI categories, exertional heat stroke (EHS) and heat exhaustion (HE), are serious illnesses that can be debilitating and potentially life threatening if appropriate prevention strategies and treatment regimens are not used (Table 1). From 1960 to 2009, 123 cases of heat-related deaths were reported among American football participants in the United States.² Heat-related deaths increased substantially since 1975: 24 deaths

were reported from 1975 to 1994, but over the next 15 years (1995 to 2009), 42 deaths occurred.³ In fact, the 5-year period from 2005 to 2009 included the greatest number of heat-related deaths (n = 18) in high school and collegiate sports for any 5-year period over the previous 35 years.³ From 1988 to 2004, the National Collegiate Athletic Association (NCAA) Injury Surveillance System⁴ reported 1687 EHI occurrences that resulted in time-loss injuries for athletes during fall (August to October) football practices. Whereas the NCAA data did not specifically identify EHI occurrences as heat cramps, HE, or EHS, they showed that over the 16-year period, an average of 104.3 EHIs per year



Exertional heat illness rate by preseason practice day.



Heat syncope/heat exhaustion rate by every 2°F of wet bulb globe temperature.

Groundbreaking Case

Commonwealth of Kentucky v. Jason David Stinson

- August 20, 2008, secondary school football player, Max Gilpin collapses on football field.
- 3 days later he dies from septic shock, organ failure and heat stroke.
- This was first reported criminal case brought against a coach in connection with a player's on-field death.

Administrative Changes

- State legislatures, state athletic associations and school boards examine their policies and procedures.
- Athletic Directors and School Districts should evaluate their programs to ensure that the lessons from the Stinson case have been heeded.

The UGA Study

Georgia suffered more heat-related deaths among high school and college football players between 1994 and 2009 than any other state.

Participants:

23 secondary schools, 2009 – 2011, August - September

Conclusion:

GA Coaches and athletic directors are expected to utilize the Wet

Bulb Globe Temperature (WBGT) index, not the heat index, when assessing whether practice conditions are safe.

Schools found in violation of the new mandates face fines of up to \$1,000.

The UGA Study

Modifications:

An increase in rest breaks

An increase in hydration periods

Equipment modifications

Shorten duration of practice as heat stress (WBGT) rises

“This provides schools, medical staff and coaches with flexibility in designing their practice to be as safe as possible”.



Michael Ferrara, PhD, ATC, Co-Director of The Georgia Study: The Risk of Exertional Heat Illness in High School Players.

Heat Index vs WBGT

What does the **Wet Bulb Globe Temperature (WBGT)** mean and how is this different from the **Heat Index**?

Heat Index

The Heat Index is a measurement of ambient temperatures and relative humidity while resting in the shade. It is intended to provide outdoor restrictions for the elderly and adolescents during times of elevated temperatures. It is not relevant to an athletic practice setting.



WBGT

The Wet Bulb Globe Temperature (WBGT) is a measurement of ambient temperature, relative humidity, radiant heat from the sun and wind speed. When outdoor activities are conducted in the direct sun, the WBGT is the most pertinent to use.

Although read in degrees, it does not reflect degrees of air temperature. A WBGT reading of 92 F may equate to a Heat Index reading of 104 – 105 degrees F.



WBGT READING	FLAG	RISK FOR HEAT ILLNESS	ACTIVITY GUIDELINES AND REST BREAK GUIDELINES
80.0 F – 85.0°F	Green	Very Low	Normal activities – Provide at least three separate rest breaks each hour of minimum duration of 3 minutes each during workout.
85.1 F – 88.0°F	Yellow	Low	Use discretion for intense or prolonged exercise; watch at-risk players carefully; Provide at least three separate rest breaks each hour with a minimum duration of 4 minutes each.

WBGT READING	FLAG	RISK FOR HEAT ILLNESS	ACTIVITY GUIDELINES AND REST BREAK GUIDELINES
85.1 F – 88.0°F	Orange	Moderate	Maximum practice time is 2 hours. <u>For Football, Lacrosse and Field Hockey:</u> All helmets and shoulder pads must be removed for practice and conditioning activities. If the WBGT rises to this level during practice, football players may continue to work out wearing football pants without changing into shorts. <u>For All Sports:</u> provide at least four separate rest breaks each hour with a minimum duration of 4 minutes each.

WBGT READING	FLAG	RISK FOR HEAT ILLNESS	ACTIVITY GUIDELINES AND REST BREAK GUIDELINES
88.1 F – 90°F	Red	High	Maximum length of practice is 1 hour. For Football, Lacrosse and Field Hockey: No protective equipment may be worn during practice and there may be no conditioning activities. For All Sports: there must be 20 minutes of rest breaks distributed throughout the hour of practice.
Over 90°F	Black	Very High	NO OUTDOOR WORKOUTS. Delay practice until a cooler WBGT level is reached.

How to Use a Heat Stress Tracker

- On site
- Full sun
- 30' prior to activity
- 10' to stabilize
- Notify coaches (verbal, flag, etc...)
- Re-check every 30' – 1 hr
- Bluetooth alerts





Heat Participation Policy Record Chart

School _____ Sport _____

Date	Time	Temp	Hum	WBGT	Activity Revision	Signature

Guidelines for Hydration and Rest Breaks

- Rest time should involve unrestricted access to fluids (e.g. water or electrolyte beverages).
- With sports requiring helmets (e.g. football, lacrosse, field hockey), helmets should be removed during the rest time.
- The site of the rest time should be in a shaded area.
- When the WBGT reading is >85.0 F
Ice towels, spray bottles filled with ice water or equivalent should be available to aid in the cooling process within the shaded area.

Wet Bulb Globe Temperature (WBGT)

FAQs



Is the *Heat and Humidity Policy* just for football in the fall preseason?

The *Heat and Humidity Policy* must be followed by all sports and has no specific ending date. Athletic trainers and coaches must follow the policy anytime the Wet Bulb Globe Temperature (WBGT) readings are at an elevated level.

During this time, practices should be held in accordance with the recommendations on the *NJSIAA Hot Environment and Record Chart*.

How frequently should WBGT readings be taken during practice?

WBGT readings should be taken on the practice site a minimum of every hour, beginning 30 minutes before the beginning of practice. All readings should be recorded on the *NJSIAA Hot Environment Measurement and Record Chart*.

Why does the *Heat and Humidity Policy* apply to practices and not games?

The *Heat and Humidity Policy* applies to both practices and games. At least 30 minutes prior to the start of a game, the officials must be informed of the on-site WBGT reading and the recommended modifications (ie. built-in water breaks). Keep in mind that scrimmages take place during the preseason acclimatization period and are considered practices; therefore, must also follow the *Heat and Humidity Policy* guidelines.

Who carries out the policy?

The aforementioned policy must be carried out by the Athletic trainer, certified designee or individual as appointed by the athletic director which includes any individual (e.g. coaches) responsible or sharing duties for making decisions concerning the implementation of modifications or cancellation of practice and contests based on the WBGT.

Compliance Checks

In accordance with the current school compliance checks, the compliance monitors checklist will include items specific to:

- Presence of a WBGT heat stress tracker device / WBGT Chart
- Documentation of all practices/games/contests requiring modification on the NJSIAA Hot Environment Modification/Cancellation Log
- Proof of written and signed off Heat Participation Policy document

Why are there discrepancies between the NJSIAA WBGT Guidelines and those on the NATA and KSI websites?

The NJSIAA WBGT Guidelines are region-specific to New Jersey and are based upon evidence-based practice and a collaborative effort between the Korey Stringer Institute and the NJSIAA; therefore, should not be compared with any other WBGT guidelines or templates.

National Federation of State High School Association (NFHS)



“The National Federation of State High School Associations supports the guidelines but has no authority to enforce them. The states have wanted to set their own guidelines. We applaud what NATA is trying to do. We'll share the information with the states.”

Bob Colgate, Head of NFHS Football Rules Committee, USA Today, 6/17/2009

AAP Policy Statement

Climatic Heat Stress and Exercising Children and Adolescents

- The American Academy of Pediatrics recommends that youth sports program administrators implement comprehensive strategies to safeguard against heat illness.
- "Most healthy children and athletes can safely participate in outdoor sports and activities in a wide range of warm to hot weather, but adults sometimes create situations that are potentially dangerous. Heat illness is entirely preventable if coaches and other adults take some precautions to protect the young athletes".

Stephen G. Rice, MD, Co-author of statement and President AAP Pediatrics, DOI: Sept, 10.1542/peds.2011-1664

The Military



Determine hydration breaks



**Monitor environment
for
exercise modification**

Kark, J.A., Labotka, R.J., Gardner, J.W., and Ward, F.T. Prevention of exercise-related death unexplained by preexisting disease (EDU) associated with sickle cell trait (SCT) without hemoglobin (Hb) screening or Hb specific management. Blood (ASH Annual Meeting Abstracts). 2010; 116: 945

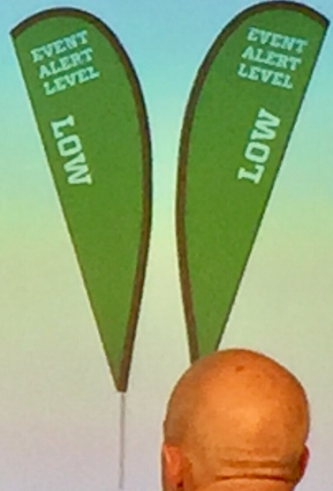
Courtesy of The Korey Stringer Institute

TCS NYC Marathon

Command and Control

- Event Alert System Flags

ALERT LEVEL	EVENT CONDITIONS	RECOMMENDED ACTIONS
EXTREME (Black)	Event Cancelled/Extreme and Dangerous	Participation Stopped/Follow event official instructions
HIGH (Red)	Potentially Dangerous	Slow down/Observe course change/Follow event official instruction/Consider stopping
MODERATE (Yellow)	Less Than Ideal	Slow down/Be prepared for worsening conditions
LOW (Green)	Good	Enjoy the event/Be alert




In The News

CNN

Live TV



Rule change tries to cool players in 'nightmare' heat at US Open

By Ashley Strickland, CNN

Updated 6:17 PM EDT, Thu August 30, 2018



The New York Times

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Scorching Day at the U.S. Open Raises Questions About Heat Policy

ESPN



SCORES



Tennis

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Hot topic: USTA needs common-sense heat policy at the US Open

Thursday, 30 August 2018

10:26 AM EDT



US Open implements Extreme Heat Policy



First Days of Preseason Practice Pose Big Heat Risks for College Football Players

Aug. 26, 2016, at 12:00 p.m.

By Alan Mozes
HealthDay Reporter

N.J. lawmaker: Student athletes shouldn't have to suffer from heat stroke. Here's what we can do about it.

Updated Jan 23;
Posted Jan 23



Deignan: We have the opportunity to pass legislation addressing high heat conditions and humidity levels present during practices and games. (AP



Athletics







WGBT CHART

In some instances when a WGBT monitoring device is unavailable, a chart like the one shown below can be used to estimate WGBT. It must be noted that these are estimates and are derived only from using temperature and relative humidity and the chart accounts for *full* sunshine and *light* wind conditions. Thus, depending on the radiant heat load from the sun and the wind, the actual WGBT reading could be different from what is on the chart.

Wet Bulb Globe Temperature (WBGT) from Temperature and Relative Humidity																																																			
		Temperature (°C)																																																	
		20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50																			
Relative Humidity (%)	0	15	16	16	17	18	18	19	19	20	20	21	22	22	23	23	24	24	25	25	26	27	27	28	28	29	29	30	31	31	32	32																			
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80	23	24	25	26	27	28	29	30	32	33	34	36	37	38																																					
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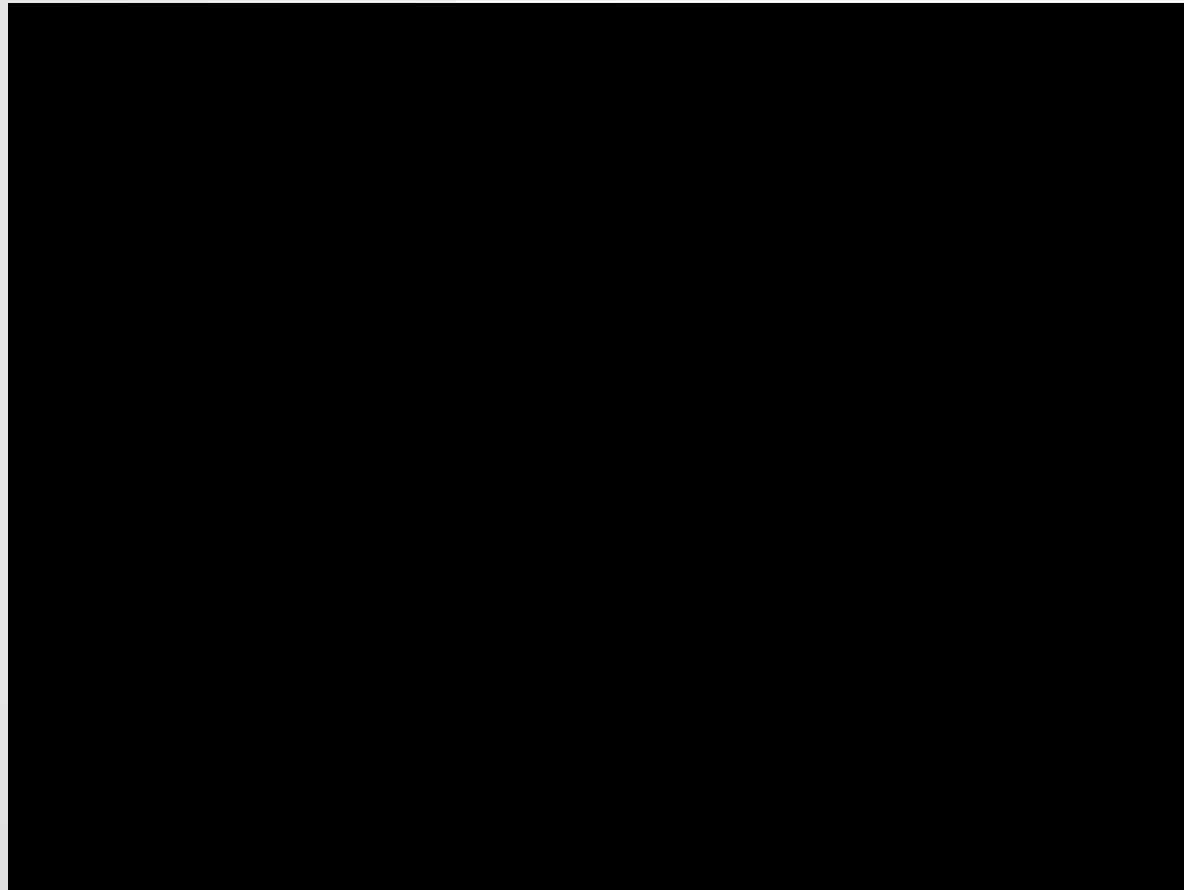
Note: This table is compiled from an approximate formula which only depends on temperature and humidity. The formula is valid for full sunshine and a light wind

Reference: The Korey Stringer Institute. <https://ksi.uconn.edu/prevention/wet-bulb-globe-temperature-monitoring/>



Falmouth Road Race

August 2019



Cold Water Immersion Tub Policy

When treating a potential Exertional Heat Stroke (EHS), schools should be properly *prepared and equipped* to initiate Cold Water Immersion (CWI) or other approved cooling technique. Cooling techniques should be implemented immediately, and concurrently EMS should be contacted. This **should be followed during all summer conditioning, pre-season practices/games on school grounds/school designated facility, or when a coach, paid or otherwise, is present. This includes the first 21 days of fall practice, and any day the temperature is greater than 80°F WBGT.**

WBGT READING	FLAG	COLD WATER IMMERSION TUB GUIDELINES
Under 80.0°F	Green	Mandatory alternative cooling measures of a cooler w/ ice & towels or a tarp (taco / burrito method) must be available at the practice/game site.
80.0 F – 85.0°F	Yellow	150 gallon cold water immersion tub (or a tarp (taco/burrito method) filled with water temperature of less than 60°F and accessible for cooling within 5-10 minutes of the practice/game site. Remove external clothing/equipment prior to cooling or immediately after entering tub. Aggressively stir water during cooling process.
85.1 F – 88.0°F	Orange	Same as Yellow.
88.1 F – 90°F	Red	Same as Yellow.
Over 90°F	Black	NO OUTDOOR WORKOUTS. Delay practice until a cooler WBGT level is reached. If the WBGT rises to this level during practice, same as Yellow.

TREATMENT OF EXERTIONAL HEAT STROKE

Medical Staff on-site

- ***Cool First, Transport Second***
- Use CWI / other approved cooling technique, until core temperature is at 103°F.

Medical Staff *Not* on-site

- Cool immediately until the athlete starts to shiver, or for a minimum of 20 minutes.

****** If an athletic trainer ***is not*** present, EMS assumes control of the exertional heat stroke athlete upon arrival and continues cooling for the minimum of 20 minutes or until rectal temperature is obtained.

The Taco Method



Stages of Cooling

= / > 104°F Immersion Tub



102°F – 103.9°F Cold Towel Rotation



< 102°F Hydrate with Cold Fluids



Take Home Messages

- Safety policies saves lives.
- EHI occurrence is, and the greatest risk for EHI occurs, during the first 1-5 days of practice.
- EHI risk was greatest when the WBGT was above 82° F
- WBGT can be monitored with minimal expense.
- Cool first, transport second.

Litigious Scenario

VA - Victim's Attorney

AD/AT - Athletic Director, Athletic Trainer

VA – Is your school a member of the New Jersey Interscholastic Athletic Association, also known as the NJSIAA?

AD/AT – Yes.

VA – Are you familiar with the National Athletic Trainers' Association, also known as the NATA?

AD/AT – Yes.

VA – Are you familiar with the Korey Stringer Institute, also known as the KSI?

AD/AT – Yes, I have heard of them.

Litigious Scenario

VA – Are you familiar with the American College of Sports Medicine, also known as the ACSM?

AD, AT – Yes.

VA – Is your school a member of the New Jersey State Interscholastic Athletic Association, also known as the NJSIAA?

ED – Yes, we are.

Litigious Scenario

VT – Have you ever heard of Wet Bulb Globe Temperature, also known as WBGT, and its role in the prevention of exertional heat stroke?

AD,AT – Yes, I have heard of it.

VT – Are you familiar with the NJSIAA Heat Participation Policy, which includes the WBGT?

AD,AT – I know they have a policy.

Litigious Scenario

VA – Has your school implemented the NJSIAA Heat Participation Policy?

AD, AT – Yes, but not in it's entirety.

VA – Is there any particular reason why?

AD, AT – No reason other than maybe difficulty in implementing it. With the small window of time to prepare our athletes and limited number of coaches, it's just not convenient.

Litigious Scenario

VA – Your honor, I offer Plaintiff's Exhibit 1: *NFHS Heat Acclimatization and Heat Illness Prevention Position Statement*.

Judge – Plaintiff's Exhibit 1 is admitted without objection.

VA – Please read line 4 in the opening paragraph of the NFHS Position Statement.

AD,AT – [Reading] "Notably, the National Center for Catastrophic Sports Injury Research reports that 35 high school football players died of EHS between 1995 and 2010".

Litigious Scenario

VA – Do you understand this is fact, not speculation?

AD, AT – Yes.

VA – Please read the Rationale on Page 2, under #3 of the same NFHS position statement.

AD/AT – [Reading] “...Accordingly, it is imperative to adjust practices and/or competitions to maintain safety and performance....follow guidelines for hot and humid weather including using Wet Bulb Globe Temperature (WBGT) readings”.

Litigious Scenario

VA – The NATA Position Statement on Exertional Heat Illnesses, KSI WBGT Monitoring Guidelines and ACSM Exertional Heat Illness During Conditioning and Training Position Stand all indicate that *“Event organizers should monitor the weather conditions before and during practice and competition. Ideally, heat stress should be measured at the event site for the most accurate meteorological data. Factors that affect heat injury risk include ambient temperature, relative humidity, wind speed, and solar radiant heat; as a **minimum standard**. The WBGT is used in athletic, military, and industrial settings to gauge heat risk.”*

Litigious Scenario

VA – So, we have secondary school athletes' death numbers based on fact, not speculation, and you **still** do not follow Wet Bulb Globe Temperature guidelines, which are only the **minimum** standard and recommended by the National Athletic Trainers' Association, the Korey Stringer Institute, the American College of Sports Medicine and the National Federation of State High Schools Association?

Litigious Scenario

AD,AT – [Pause]

AA – Answer the question, please.

AD,AT – No, we do not.

