



HEAT ILLNESS & HYDRATION

Heat illness in athletes is a serious situation, and if not handled properly can have catastrophic consequences. Because of the wide variance of situations in which heat illness and hydration becomes an issue, and because of the need for local individualized judgment, absolute wide ranging rules regarding heat illness related matters may not be the best or most effective approach. At the same time, heat illness is a very serious matter and the Kansas State High School Activities Association wishes to provide its member schools information that may be useful in establishing or refining an individualized heat acclimation plan or policy. One such piece of information is the **Heat Acclimatization and Heat Illness Prevention Position Statement** authored by the National Federation of State High School Associations and its Sports Medicine Advisory Committee. The substance of the position statement provides as follows:

Heat Acclimatization and Heat Illness Prevention Position Statement

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

Exertional Heatstroke (EHS) is the leading cause of preventable death in high school athletics. Students participating in high-intensity, long-duration or repeated same-day sports practices and training activities during the summer months or other hot-weather days, as well as those with sickle cell trait, are at greatest risk. Football has received the most attention because of the number and severity of exertional heat illnesses. Notably, the National Center for Catastrophic Sports Injury Research reports that **35 high school football players died of EHS between 1995 and 2010**. EHS also results in thousands of emergency room visits and hospitalizations throughout the nation each year.

This NFHS Sports Medicine Advisory Committee (SMAC) position statement is the companion piece to the NFHS's online course *A Guide to Heat Acclimatization and Heat Illness Prevention*. **This position statement provides an outline of "Fundamentals" and should be used as a guiding document.** Further and more detailed information can be found within the NFHS online course, the 4th Edition of the NFHS Sports Medicine Handbook, the NFHS SMAC "Position Statement and Recommendations for Hydration to Minimize the Risk for Dehydration and Heat Illness" and the resources listed.

Following the recommended guidelines in this position statement and *A Guide to Heat Acclimatization and Heat Illness Prevention* can reduce the risk and incidence of EHS and the resulting deaths and injuries in high school athletics. The NFHS recognizes that various states and regions of the country have unique climates and variable resources, and that there is no "one-size-fits-all" optimal acclimatization plan. However, it is recommended that all of the "Fundamentals" be incorporated into any heat acclimatization plan to improve athlete safety. In addition, *A Guide to Heat Acclimatization and Heat Illness Prevention* should be required viewing for all coaches.

Heat Acclimatization and Safety Priorities:

- Recognize that EHS is the leading preventable cause of death among high school athletes.
- Know the importance of a formal preseason heat acclimatization plan.
- Know the importance of having and implementing a specific hydration plan, keeping your athletes well-hydrated, and encouraging and providing ample opportunity for regular fluid replacement.
- Know the importance of appropriately modifying activities in relation to the environmental heat and stress and contributing individual risk factors (e.g., sickle cell trait, illness, obesity) to keep your athletes safe and performing well.
- Know the importance for all members of the coaching staff to closely monitor all athletes during practice and training in the heat, and recognize the signs and symptoms of developing heat illnesses.
- Know the importance of, and resources for, establishing an emergency action plan and promptly implementing it in case of suspected EHS or other medical emergency.

FUNDAMENTALS OF A HEAT ACCLIMATIZATION PROGRAM

1. Physical exertion and training activities should begin slowly and continue progressively. An athlete cannot be “conditioned” in a period of only two to three weeks.

- A. Begin with shorter, less intense practices and training activities, with longer recovery intervals between bouts of activity.
- B. Minimize protective gear (helmets only, no shoulder pads) during the first several practices, and introduce additional uniform and protective gear progressively over successive days.
- C. Emphasize instruction over conditioning during the first several practices.

Rationale: The majority of heat-related deaths happen during the first few days of practice, usually prompted by doing too much, too soon, and in some cases with too much protective gear on too early in the season (wearing helmet, shoulder pads, pants and other protective gear). Players must be allowed the time to adapt safely to the environment, intensity, duration and uniform/equipment.

2. Keep each athlete’s individual level of conditioning and medical status in mind and adjust activity accordingly. These factors directly affect exertional heat illness risk.

Rationale: Athletes begin each season’s practices and training activities at varying levels of physical fitness and varying levels of risk for exertional heat illness. For example, there is an increased risk if the athlete is obese, unfit, has been recently ill, has a previous history of exertional heat illness or has sickle cell trait.

3. Adjust intensity (lower) and rest breaks (increase frequency/duration), and consider reducing uniform and protective equipment, while being sure to monitor all players more closely as conditions are increasingly warm/humid, especially if there is a change in weather from the previous few days.

Rationale: Coaches must be prepared to immediately adjust for changing weather conditions, while recognizing that tolerance to physical activity decreases and exertional heat illness risk increases, as the heat and/or humidity rise. Accordingly, it is imperative to adjust practices to maintain safety and performance.

Use the heat index chart on the following page as a general guide in determining when activity modifications are necessary.

4. Athletes must begin practices and training activities adequately hydrated.

Rationale: While proper hydration alone will not necessarily prevent exertional heat illness, it will decrease risk.

See the hydration strategies in this document to use as a guide for hydrating your athletes.

5. Recognize early signs of distress and developing exertional heat illness, and promptly adjust activity and treat appropriately. First aid should not be delayed!

Rationale: An athlete will often show early signs and/or symptoms of developing exertional heat illness. If these signs and symptoms are promptly recognized and the athlete is appropriately treated, serious injury can be averted and the athlete can often be treated, rested and returned to activity when the signs and symptoms have resolved.

6. Recognize more serious signs of exertional heat illness (clumsiness, stumbling, collapse, obvious behavioral changes and/or other central nervous system problems), immediately stop activity and promptly seek medical attention by activating the Emergency Medical System. Onsite rapid cooling should begin immediately.

Rationale: Immediate medical treatment and prompt rapid cooling can prevent death or minimize further injury in the athlete with EHS. Ideally, pools or tubs of ice water to be used for rapid cooling of athletes should be available onsite and personnel should be trained and practiced in using these facilities for rapid cooling. Ice water baths are the preferred method for rapid cooling; however, if ice water pools or tubs are not available, then applying ice packs to the neck, axillae and groin and rotating ice water-soaked towels to all other areas of the body can be helpful in cooling an affected athlete.

Review the heat illness signs and symptoms information in this document.

7. An Emergency Action Plan with clearly defined written and practiced protocols should be developed and in place ahead of time.

Rationale: An effective emergency action plan (EAP) should be in place in case of any emergency, as a prompt and appropriate response in any emergency situation can save a life. The EAP should be designed and practiced to address all teams (freshman, junior varsity, varsity) and all practice and game sites.

HEAT INDEX CHART

Use the chart below to assess the potential severity of heat stress. **The chart should be used as a *guideline only* – individual reactions to the heat will vary among your athletes!**

1. Across the top of the chart, locate the **ENVIRONMENTAL TEMPERATURE** i.e., the air temperature
2. Down the left side of the chart, locate the **RELATIVE HUMIDITY**.
3. Follow across and down to find the **APPARENT TEMPERATURE (HEAT INDEX)**. The apparent temperature is the combined index of heat and humidity. It is an index of the body's sensation of heat caused by the temperature and humidity (the reverse of the "wind chill factor").

HEAT INDEX											
ENVIRONMENTAL TEMPERATURE (F°)											
	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°
Relative Humidity	Apparent Temperature *										
0%	64°	69°	73°	78°	83°	87°	91°	95°	99°	103°	107°
10%	65°	70°	75°	80°	85°	90°	95°	100°	105°	111°	116°
20%	66°	72°	77°	82°	87°	93°	99°	105°	112°	120°	
30%	67°	73°	78°	84°	90°	96°	104°	113°	123°		
40%	68°	74°	79°	86°	93°	101°	110°	123°			
50%	69°	75°	81°	88°	96°	107°	120°				
60%	70°	76°	82°	90°	100°	114°					
70%	70°	77°	85°	93°	106°	124°					
80%	71°	78°	86°	97°	113°						
90%	71°	79°	88°	102°	122°						
100%	72°	80°	91°	108°							

* Combined index of heat and humidity... what it "feels like" to the body. Reproduced from the National Weather Service.

Sources where heat and relative humidity information can be obtained:

KSHSAA website (www.kshsaa.org)

National Weather Service website (www.weather.gov)

Various weather websites and mobile applications

Use of a sling psychrometer

RECOMMENDED MODIFICATIONS TO ATHLETIC PARTICIPATION BASED ON THE HEAT INDEX

APPARENT TEMPERATURE	HEAT STRESS RISK WITH PHYSICAL ACTIVITY AND/OR PROLONGED EXPOSURE
80°-89°	Fatigue possible with prolonged exposure and/or physical activity. Monitor at-risk athletes closely.
90°- 103°	Heat cramps or heat exhaustion possible Modify practice; take water breaks every 15 to 20 minutes.
103°- 124°	Heat cramps or heat exhaustion likely, heatstroke possible Modify practice, NO HELMET OR SHOULDER PADS, t-shirt and shorts only; frequent (every 15 minutes) water and rest breaks.
>124°	Heatstroke highly likely Recommend NO PRACTICE!
<p>Note: This Heat Index chart is designed to provide general guidelines for assessing the potential severity of heat stress. Individual reactions to heat will vary. It should be remembered that heat illness can occur at lower temperatures than indicated on the chart. In addition, studies indicate that susceptibility to heat disorders tends to increase with age.</p>	

These modifications are not specific to football. All sports taking place in hot/humid environments should be prepared to make activity modifications based on the heat index, including indoor sports taking place in un-air-conditioned facilities. Factors such as surface (artificial turf vs. natural grass) need to also be considered as air temperature on artificial turf will typically be higher than on natural grass.

KSHSAA RECOMMENDED HEAT ILLNESS PREVENTION STRATEGIES

- + **HAVE AN EMERGENCY ACTION PLAN IN PLACE to deal with heat emergencies.** Call 911 and activate your emergency action plan when heat exhaustion or heat stroke is suspected. **When rapid onsite cooling is necessary, ALWAYS COOL THE ATHLETE FIRST AND TRANSPORT SECOND!** Be sure this protocol is rehearsed and reviewed with your coaches and local EMS personnel before practices begin each August.
- + **Coaches MUST ensure their athletes have unrestricted access to water.**
- + **A cooling area should be established and available at all times.**
 - This could be an area of shade, a tent or immediate access to an air conditioned facility.
 - A cold tub should be located in the cooling area. The water temperature should be 45-60 degrees and the tub should be large enough to submerge someone up to their torso in a seated position. An old whirlpool tub, a large children's swimming pool or a livestock tank could be used.
 - If a tub is not available, rotating wet ice towels over the entire body or dousing the person with cold water through a hose or shower could be other rapid cooling options.
- + **Coaches MUST know their at-risk athletes and modify their activity accordingly.**
 - Student athletes who have sickle cell trait, a previous history of exertional heat illness, are obese, are unfit or are recovering from a recent illness are all more susceptible to heat illness.
- + **NEVER allow student-athletes to consume nutritional supplements unless prescribed by a physician. Energy drinks should also NEVER be consumed by your student-athletes.** These substances create an even higher risk to athletes exercising in the heat.

HEAT ILLNESS SIGNS, SYMPTOMS & MANAGEMENT

The signs and symptoms of heat illness shown below do **NOT** necessarily run on a continuum. This means that a person could suffer from heat stroke without showing less severe heat illness conditions such as heat cramps.

HEAT CRAMPS – SIGNS & SYMPTOMS

- * Cramping in active muscles
- * Most common in abdominals and legs

MANAGEMENT

- ▶ Rest in the cooling area
- ▶ Gentle stretching and massage
- ▶ Drink **WATER** or a sports drink

HEAT SYNCOPE – SIGNS & SYMPTOMS

- * Fainting
- * Weakness and fatigue

MANAGEMENT

- ▶ Instruct athlete to drink **WATER** or a sports drink.
- ▶ Athlete should **NOT** be allowed back to activity until cleared by a physician.
- ▶ Move the athlete to the cooling area and immerse in cold tub (45-60 deg.) for 15 min. Rotate wet ice towels over the entire body or douse with cold water if a cold tub is not available.

HEAT EXHAUSTION – SIGNS & SYMPTOMS

- * Rapid weight loss (water)
- * Muscle cramps
- * Headache/nausea/vomiting
- * Reduced sweating (clammy skin)
- * Dizziness/fainting
- * Fatigue/weakness

MANAGEMENT

- ▶ Treat as an **emergency**, call 911.
- ▶ If conscious give **WATER** or a sports drink slowly.
- ▶ Move athlete to the cooling area and immerse in cold tub (45-60 deg.) for 15 min. Rotate wet ice towels over the entire body or douse with cold water if a cold tub is not available.

HEAT STROKE – SIGNS & SYMPTOMS

- * Loss of consciousness
- * Hot, dry skin – no sweating
- * Nausea/vomiting
- * Seizures
- * Disorientation

MANAGEMENT


- ▶ Heatstroke is **life-threatening**, call 911.
 - ▶ Do **NOT** give **WATER (fluids)**!
 - ▶ Move athlete to the cooling area and immerse in cold tub (45-60 deg.) for 15 min. Rotate wet ice towels over the entire body or douse with cold water if a cold tub is not available.
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HYDRATION STRATEGIES TO PREVENT HEAT ILLNESS

Proper **HYDRATION** and **ACCLIMATIZATION** practices stand out as the two primary prevention methods for decreasing the risk of heat illness. The following are some basic hydration principles to follow:

Appropriate hydration before, during and after exercise is important for maintaining peak athletic performance. Fluid losses of as little as 2% of body weight (less than 4 pounds in a 200-pound athlete) can impair performance by increasing fatigue. This is important because it's common for some athletes to lose between 5-8 pounds of sweat during a game or intense practice. So it's easy for athletes to become dehydrated if they don't drink enough to replace what is lost in sweat.

- Recognize and respond to early warning signs of dehydration.
- **DRINK EARLY** and **DRINK OFTEN** during activity. Do not let athletes rely on thirst. Schedule frequent fluid breaks for re-hydrating. If athletes wait until they are thirsty it may be too late.
- Athletes should be weighed before and after warm weather practices. They need to drink appropriate amounts of fluid for the amount of weight lost. **An athlete should not be allowed to participate if they are at a 2% or greater weight deficit from the beginning of their previous practice.** Also, use a urine color chart (see back page) to determine hydration levels before activity.
- Encourage GOOD hydration choices: **water, sport drinks with low sodium and carbohydrates,** *AVOID: energy drinks, soda, fruit juices, carbonated beverage, and caffeine.*
- Encourage drinking fluids, not pouring them. Dumping fluid over the head won't help restore body fluids or lower body temperature.
- Provide easily accessible fluids.

Before Exercise	Drink 16 oz. of fluid before activity/exercise (2 hours) Drink another 8-16 oz. of fluid 10-15 minutes before exercise
During Exercise	Drink 4 - 8 oz. of fluid every 15-20 minutes
After Exercise	Drink 16-20 oz. of fluid for every (one) pound lost during exercise to achieve normal fluid state and not begin the next practice dehydrated. Rehydration should take place over a safe and comfortable period of time. Excessive fluid intake over a short amount of time can be dangerous (see hyponatremia information below).
Fluid counter	 <ul style="list-style-type: none"> 24 oz. of fluid = 1 ½ of water bottle 16 oz. of fluid = 1 full water bottle 7 oz. of fluid = ½ full water bottle or 10 BIG gulps of water 4 oz. of fluid = ¼ full water bottle or 5 BIG gulps of water

Hyponatremia is a rare, but potentially deadly disorder resulting from the over-consumption of water or other low-sodium fluid (including most sports drinks). It is most commonly seen during endurance events, such as marathons, when participants consume large amounts of water or other beverages over several hours, far exceeding fluid lost through sweating. The water in the blood and the sodium content of the blood is consequently diluted to dangerous levels. Affected individuals may exhibit disorientation, altered mental status, headache, lethargy and seizures. A confirmed diagnosis can only be made by testing blood sodium levels. Suspected hyponatremia is a medical emergency and EMS (Emergency Medical Services) must be activated. It is treated by administering intravenous fluids containing high levels of sodium.

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The information in this document is provided by the Kansas State High School Activities Association's Sports Medicine Advisory Committee. The information is meant to provide general information and guidelines for schools to consider when creating or updating their school's heat/hydration policy.

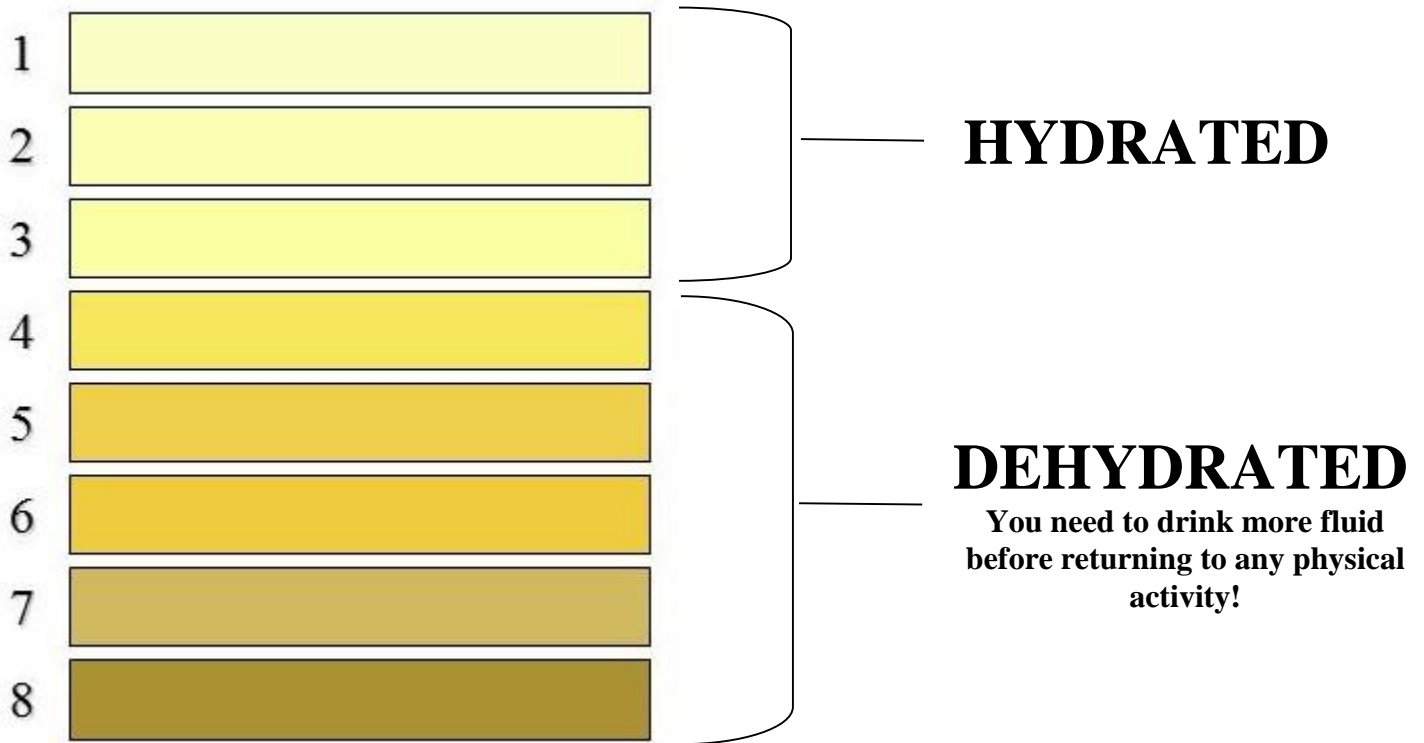
Disclaimer: The information provided by the Kansas State High School Activities Association regarding heat illness and hydration is not intended to be exhaustive or all of the relevant information on the subjects. The KSHSAA feels that the sources of the information provided above are very reputable and therefore will provide valuable source material to member schools. At the same time, schools may want to consider other available sources of relevant information and are encouraged to consult with health care professionals regarding these topics.

APPROVED KSHSAA SMAC, MAY 2015



How Hydrated Are You?

This urine color chart is a simple tool you can use to assess if you are drinking enough fluids throughout the day to stay hydrated.



Be Aware! If you are taking vitamin supplements they can change the color of your urine for a few hours, making it bright yellow or discolored.