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 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 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 on-line 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 ILLNESS & HYDRATION

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 pre-season 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., 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 years.
    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.

HEAT ILLNESS & HYDRATION

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 signed 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 activation the Emergency Medical System**. On-site rapid cooling 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 on-site 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 effective 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 ILLNESS & HYDRATION

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 ENVIROMENTAL 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 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. Source: National Oceanic and Atmospheric Administration

RECOMMENDED MODIFICATIONS TO THE ATHLETE PARTICIPATION BASED ON THE HEAT INDEX

APPARENT TEMPERATURE	HEAT STRESS RISK WITH PHYSICAL ACTIVITY AND/OR PROLONGED EXPOSURE
90°-104°	Heat cramps or heat exhaustion possible ***Modify practice; take water breaks every 15 to 20 minutes***
105°-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.***
>125°	Heatstroke highly likely. ***Recommend NO PRACTICE!***

HEAT ILLNESS & HYDRATION

HYDRATION STRATEGIES TO PREVENT BEAT ILLNESS

Proper HYDRATION and ACLLIMATIZATION practices stand out as 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 do not 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 they it may be too late.
- Athletes should be weight before and after warm weather practices. They need to drink appropriate amounts of fluid for the amount of weight lost. Also, use a urine color weight (see back page) to determine hydration levels for activity.
- Encourage hydration choices: water, sport drinks with low sodium and carbohydrates: Avoid: soda, fruit juices, carbonated beverages and caffeine.
- Encourage drinking fluids, not pouring them. Dumping fluids 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 4-16 oz. of fluid every 15-20 minutes
After Exercise	Drink 24 oz. of fluid every (one) pound lost during exercise within 6 hours of stopping the activity. This is to achieve normal fluid state and not begin the next practice dehydrated.
Fluid counter	24 oz. of fluid = 100% 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

HEAT ILLNESS & HYDRATION

HEAT ILLNESS SIGNS/SYMPTOMS & MANAGEMENT

Heat illness is a general term used to describe may different conditions that can result from physical activity in an environment of extreme heat and/or humidity. These conditions are a result of the body becoming dehydrated and/or losing the ability to cool itself. The signs and symptoms of heat illness do NOT necessarily run on a continuum. This means that a person could suffer from heat stroke without showing less sever heat illness conditions such as a heat cramps. Please keep this in mind when evaluating the signs and symptoms of your athletes.

Heat Cramps – Signs and Symptoms	Heat Cramps – Management
• Cramping that occurs in active muscles • Cramping in the abdominals and legs most common	• Rest in a cool place • Gentle stretching and massage muscles • Drink WATER
Heat Syncope – Signs & Symptom	**Heat Syncope – Management**
• Weakness • Fatigue • Fainting	• Lay athlete down in cool shady area • Drink WATER • Athlete is NOT allowed back to activity • Should be seen by a physician
Heat Exhaustion – Signs and Symptoms	**Heat Exhaustion – Management**
• Rapid weight loss (water) • Muscle cramps • Nausea/vomiting • Headache • Reduced sweating (clammy skin) • Dizziness/fainting	• Treat heat exhaustion as an emergency • Call for emergency medical assistance & move patient to shade/cool building • Remove clothing and immerse torso in ice/cold water • Place ice bags over pulse points (armpits, groin & neck) • If conscious give WATER slowly
Heat Stroke – Signs and Symptoms	**Heat Stroke - Management**
• No sweating • Hot, dry skin • Nausea/vomiting • Seizures • Disorientation • Loss of consciousness	• Heat stroke is life-threatening! • Call for emergency medical assistance move patient to shade/cool building • Remove clothing and immerse torso in ice/cold water • Place ice bags over pulse points (armpits, groin & neck) • Do **NOT** give WATER (fluids)!

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Casa DJ, Csillan D. Preseason heat-acclimatization guidelines for secondary school athletics. *Journal of Athletic Training.* 2009; 44(3): 332 333. National Federation of State High School Assocations. Fluid replacement and dehydration. *Sports Medicine Handbook, 4th Edition.* 2011; 64-66.

National Federation of State High School Associations Sports Medicine Advisory Committee, Heat acclimatization and heat illness prevention position statement, April2012.

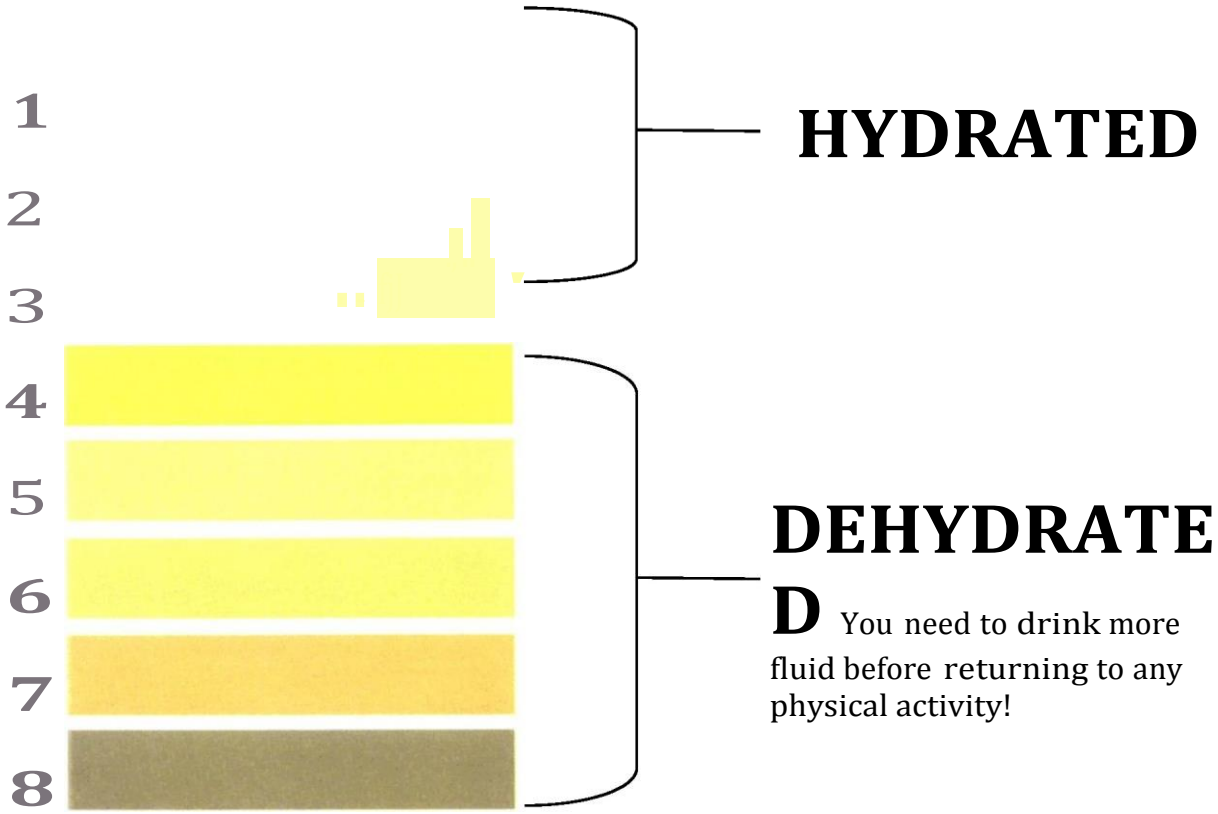
The information in this document is provided by the Kansas State High School Activities Association with content contribution from the Kansas Athletic Trainer's Society. The information is meant to provide general information and guidelines for schools to consider when creating or updating their school's heat/hydration policy.

Disclaimer: The information provided by the Kansas State High School regarding heat illness and hydration is not intended to be exhaustive or all of the relevant information on the subjects. The KSHSAAfeels 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.

HEAT ILLNESS & HYDRATION

How Hydrated Are You?

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



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