



Avoiding Heat Illness

Everyone should be aware of the risks, symptoms, and prevention methods related to heat illness. Heat illnesses fall into different categories and often progress from one category to another, depending on symptom severity. Heat cramps and heat syncope are less severe illnesses that can serve as early warning signs to the much more serious heat exhaustion and heat stroke. Being aware of the signs and symptoms of heat illness can greatly reduce the risks and can save a life.

Dehydration plays a major role in the progression of heat illness, especially when a person is subjected to high temperatures for extended periods of time without the replenishment of fluids. Symptoms can be noticeable after 2% of the body's normal water content is depleted. Dehydration can cause electrolyte imbalances, which in turn can lead to abnormal functioning of the heart, the kidneys, and the nervous system.

When the heat index (the temperature and humidity it feels like to the body) exceeds 90 degrees there should be an unlimited amount of fluids available to athletes. Athletes should not start drinking when they feel thirsty; by the time thirst develops they are already a little dehydrated. Drink enough water or sports drinks throughout the day and during practice to keep from getting thirsty. Athletes should avoid drinking fruit juices, carbonated drinks, and drinks containing caffeine because these can lead to further dehydration.

Heat cramps

Heat cramps can occur while active in high temperatures. Heat cramps are extremely painful muscle spasms that are seen most often within the calf and abdomen, although any muscle in the body can be affected. Heat cramps are most commonly related to excessive water and electrolyte loss. Electrolytes include sodium, potassium, magnesium, and calcium, but the most common loss is sodium. Electrolytes are essential for normal muscle function. The person most likely to develop heat cramps is one who is in fairly good condition but overexerts themselves in the heat. You can replenish some electrolyte loss by eating bananas to add potassium, add a little salt to your food, eating or drinking dairy products to replenish calcium, and drink plenty of water and sports drinks. If heat cramps occur, drink plenty of water or a sports drink and stretch and ice massage the muscle.

Heat syncope

Heat syncope, or orthostatic dizziness, results from blood pooling and can be a scary experience for everyone involved. A fainting spell usually happens after a sudden change in position (i.e., from a sitting position to standing) or after a period of prolonged standing. Early symptoms

Fig. 1. Heat illness progression chart

Heat Cramp	Dehydration
	Decreased water intake (thirst)
	Loss of 2% body water (sweating)
Heat Syncope	Loss of electrolytes
	Fatigue
	Tunnel vision
	Pale or sweaty skin
	Decreased heart rate
Heat Exhaustion	Dizziness
	Lightheadedness
	Fainting
	Body temperature $\leq 102^{\circ}$ F
	Headache
	Nausea
Heat Stroke	Diarrhea, urge to defecate
	Pallor, cool, and clammy skin
	Weakness
	Hyperventilate
	Body shuts down
	Skin flush
	Body temperature $\leq 104^{\circ}$ F
	Dry, hot skin (no longer sweating)
Rapid heart rate	
Shallow breathing	
Drowsiness	
Confusion and/or irritable	
Vomiting	
Loss of consciousness	

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Items listed from the initial reactions to most severe

include lightheadedness and weakness in a person who is dehydrated and not accustomed to the heat. After relocating to a shady area, you should help the individual lie down, elevate their feet above the heart, and encourage them to drink some fluids.

Heat exhaustion

The onset of heat exhaustion usually occurs because the athlete neglected to replenish the fluids lost through sweating. Athletes who become a victim of heat exhaustion will often collapse and will be profusely sweating with pale skin and an elevated body temperature of around 102 degrees Fahrenheit. Once the athlete is responsive, he or she can be extremely dizzy, can hyperventilate, and have a rapid pulse. This illness is most often seen in individuals in poor physical condition who attempt to exercise in the heat. If an athlete is suspected of heat exhaustion get them to a cool environment and have the athlete drink as much fluid as possible. In some cases intravenous fluid replacement is required. The body temperature must continuously be monitored to ensure the athlete does not go into heat stroke.



Heat stroke

Heat stroke is a life threatening emergency. The specific cause of heat stroke is unknown, although it is thought that as people work out in the sun for prolonged periods of time their bodies produce an extreme amount of internal heat, so much so that the cooling system shuts down resulting in the body producing dangerous levels of heat. Normally, the body cools its self through sweating and radiating heat from the skin. When the temperatures exceed a certain level the body is unable to work hard enough and eventually shuts that system down. Immediate medical attention should be given to athletes who fall victim to heat stroke. These athletes tend to suddenly collapse and usually lose consciousness. Upon examination their skin will be flush and typically dry because the sweating has stopped. The athlete will have shallow breathing with a strong rapid pulse. The most vital indicator of heat stroke is the athlete's core body temperature will be elevated above 104 degrees Fahrenheit. Heat stroke can occur suddenly without warning. If an athlete goes down on the field and heat stroke is suspected, decrease the body temperature by transporting him or her to a cool environment, pack the athlete's armpits, groin, abdomen, and neck with ice and call 911. If the body temperature is lowered back to normal within 45 minutes, it will greatly reduce the possibility of death.

As the summer temperatures begin to rise be sure to stay well hydrated. Athletes should drink approximately 2 to 3 cups of water before practice, 3 to 4 cups during practice, and 2 cups for every pound of weight lost after practice to maintain hydration levels and avoid heat illness. Coaches and athletic trainers need to be aware of the weather conditions to ensure athletes are getting enough fluid replacements throughout the day. Never should water breaks be taken away as punishment, for this can greatly increase the risks of heat illnesses.

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Water: Don't overdo it

Proper hydration is always a challenge for athletes who are involved in prolonged exercise, but did you know you can drink too much water? Most often, dehydration is the concern of athletes and coaches and it is often the culprit in an athlete's inability to stay fit during competition. However, top performance can be lost when the pendulum swings the other way and an athlete actually drinks too much water and experiences the serious effects of hyponatremia.

Hyponatremia, or water intoxication, is a fluid-electrolyte disorder that can occur when the sodium level in your blood drops below normal. It is caused by a combination of excessive drinking and large sweat-sodium losses. Blood sodium between 136 to 142 mEq/L is normal and any measurement below 136 mEq/L is considered hyponatremic. A normal blood sodium level is critical for the body to function because sodium plays a key role in body-fluid balance and in the conduction of electrical impulses along nerves and across cardiac and skeletal muscle.

Hyponatremia is dangerous because it can disrupt the fluid balance across the blood-brain barrier which can result in a rapid influx of water into the brain. When this happens the brain can swell and other severe neurological responses such as headache, confusion, seizure, and coma can occur. If the sodium level is not brought back to a normal range, death can occur. The faster and lower the blood sodium falls, the greater the risk of fatality.

In athletes, hyponatremia is usually caused by the combination of excessive drinking, sodium loss in sweat, and the kidneys' limited capacity to excrete water. Most adults can drink 2 quarts of fluid or more an hour, but the most we can lose in urine is about 1 quart an hour. Athletes should drink fluids that contain electrolytes such as those found in sports drinks if they have consumed an excessive amount of water prior to competition or prolonged exercise. Everyone is different and will need a different hydration plan, but most athletes should drink 2 to 3 cups of fluid 2 to 3 hours before exercise and drink 5 to 10 ounces about a 1/2 hour before exercise.

A bloated stomach, puffy fingers and ankles, a bad headache, and confusion are warning signs that you have consumed an excessive amount of water. You may also weigh more after practice than you did before practice. Dehydration should be avoided by following a fluid replacement plan, but you must make sure you find a good balance so you don't overdo it.

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