

## ► Ready for Review

- When a person is surrounded by air or water cooler than body temperature, the body loses heat.
- Humans protect themselves from cold primarily by avoiding or reducing cold exposure through the use of clothing and shelter.
- Nonfreezing cold injuries can occur when conditions are cold and wet and the hands and feet cannot be kept warm and dry.
- Freezing cold injuries can occur whenever the air temperature is below freezing.
- Hypothermia is a life-threatening condition in which the body's core temperature falls below 95°F.

## ► Vital Vocabulary

**frostbite** The damage to tissues as a result of prolonged exposure to extreme cold.

**frostnip** The superficial local tissue destruction caused by freezing; it is limited in scope and does not destroy the full thickness of skin.

**hypothermia** Decreased body temperature.

## ► Assessment in Action

You are on a winter hike with five friends high in the mountains. The snowshoeing has been great but it is very cold. At the trailhead, the temperature was 15°F (−9°C) and it has not warmed up much during your hike. One of your friends wore only tennis shoes but has not been complaining. When you return to the trailhead and begin to warm up in your car, your friend begins to complain of tingling and aching in his toes.

**Directions:** Circle Yes if you agree with the statement; circle No if you disagree.

- Yes No 1. It is difficult to determine if your friend has frostnip or frostbite.
- Yes No 2. Frostbite requires freezing temperatures (below 32°F [0°C]).
- Yes No 3. The skin and underlying tissue affected by superficial frostbite feel hard and solid.

- Yes No 4. As long as there is no danger of refreezing, you could begin warming his toes in warm water.
- Yes No 5. If you do not have warm water, you could rub his toes to increase circulation.

## ► Check Your Knowledge

**Directions:** Circle Yes if you agree with the statement; circle No if you disagree.

- Yes No 1. Shivering is a signal that clothing and shelter are inadequate to protect the body from the cold.
- Yes No 2. Up to 100% of the body's total heat production can be lost by radiation through a person's unprotected head.
- Yes No 3. Physically unfit people are more susceptible to cold injury.
- Yes No 4. Frostnip is caused when water on the skin surface freezes.
- Yes No 5. Shivering produces body heat.
- Yes No 6. Rub a frostbitten part to rewarm it.
- Yes No 7. Rewarm a hypothermic victim quickly in a hot shower or with chemical heat packs.
- Yes No 8. Replace any wet clothing with dry clothing for a hypothermic victim.
- Yes No 9. Seek medical care for a severe hypothermic victim.
- Yes No 10. Below-freezing temperatures are required for hypothermia to occur.



# Heat-Related Emergencies

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## chapter *at a glance*

▶ **Heat-Related Emergencies**

▶ **Heat Illnesses**

### Heat-Related Emergencies

When the temperature goes up, a multitude of problems can—and do—arise. Given the right (or wrong) conditions, anyone can develop heat illness. Some victims are lucky enough to have only heat cramps, but less fortunate people could be laid low by heat exhaustion or devastated by heatstroke.

### ▶ Heat Illnesses

Heat illnesses include a range of disorders **Table 1**. Some of them are common, but only heatstroke is life threatening. Untreated heatstroke victims always die.

### Heat Cramps

**Heat cramps** are painful muscle spasms that occur suddenly during or after vigorous exercise or activity. They usually involve the muscles in the back of the leg (calf and hamstring muscles) or the abdominal muscles. Some experts state they are caused by water and electrolyte losses during times of excessive sweating. Victims might be drinking fluids without adequate salt content. However, other experts disagree because the typical American diet is heavy with salt.



**Table 1 Heat Illnesses**

Condition	Symptoms	What to Do
Heat cramps	Painful muscle spasms Sweaty skin Normal body temperature	1. Sit or lie down in the shade. 2. Drink cool, lightly salted water or a sports drink. 3. Stretch affected muscles.
Heat exhaustion	Profuse sweating Flulike symptoms Clammy or pale skin Dizziness Nausea, vomiting Rapid pulse Thirst Normal or slightly above normal body temperature	1. Treat mild cases the same way as heat cramps (but do not stretch the muscles). 2. If persistent, gently apply wet towels and call 9-1-1.
Heatstroke	Unresponsiveness (if responsive, victim will be confused, stagger, be agitated) Hot skin, which can be dry or wet	1. Move person to a half-sitting position in the shade. 2. Call 9-1-1. 3. If humidity is below 75%, spray victim with water and vigorously fan. If humidity is above 75%, apply ice packs on neck, armpits, and groin.

**FYI****World Record: Highest Body Temperature**

The person with the highest body temperature who lived to tell about it is Willie Jones. On July 10, 1980, a day when the temperature reached 90°F (32.2°C) with 44% humidity, Mr. Jones was admitted to Grady Memorial Hospital, Atlanta, Georgia, with heatstroke. His temperature was 115.7°F (46.5°C). The record temperature was taken after he had been immersed for 25 minutes in cold water. The attending physician said that his body temperature may have exceeded 120°F when he first arrived at the hospital. After 24 days in the hospital, he was discharged. Body temperatures of 109°F can be fatal.

Source: *Guinness Book of World Records*. Bantam. 2008, page 112.

**Recognizing Heat Cramps**

Heat cramps have the following characteristics:

- Painful muscle spasms that happen suddenly
- Affect the muscles in the back of the leg or abdomen
- Occur during or after physical exertion

**Care for Someone With Heat Cramps**

To relieve heat cramps (it could take several hours), follow these steps:

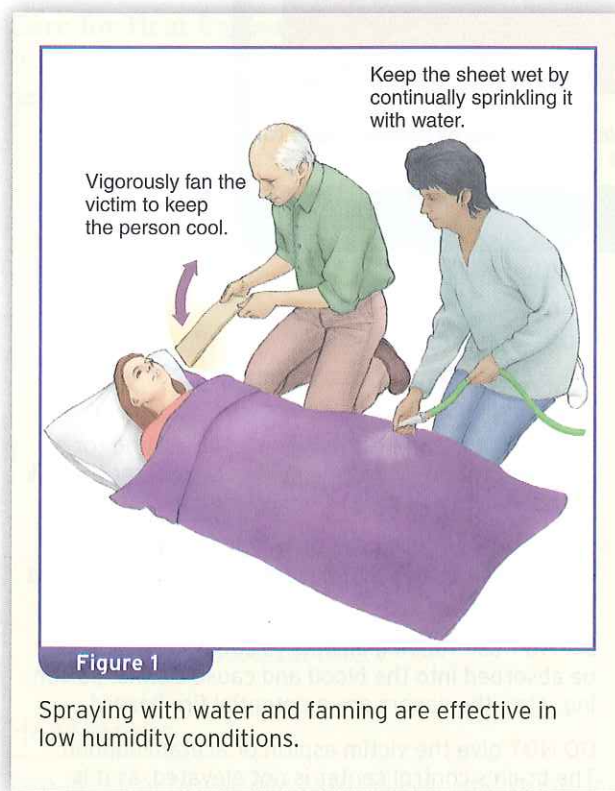
1. Have the victim rest in a cool place.
2. Have the victim drink lightly salted, cool water (dissolve ¼ teaspoon salt in 1 quart of water) or a commercial sports drink. (A commercial sports drink is easier to absorb if diluted to half strength to reduce the sugar content.)
3. Stretch the cramped calf muscle. Place an ice bag (over a towel or cloth, to protect the skin) on the painful muscle. Also, try an acupressure method: pinch the upper lip just below the nose.

**Heat Exhaustion**

Heat exhaustion is characterized by heavy perspiration with a normal or slightly above-normal body temperature. Heavy sweating cause water and electrolyte losses. Some experts believe that a better term would be *severe dehydration*. Heat exhaustion affects workers and athletes who do not drink enough fluids while working or exercising in hot environments. The affected person often mistakenly believes he or she

3. Keep the victim's head and shoulders slightly elevated.
4. Call 9-1-1 immediately even if the victim seems to be recovering.
5. The only way to prevent damage is to cool the victim quickly and by any means possible. Cooling methods include the following:
  - Spraying the victim with water and then fanning **Figure 1**. This method is not as effective in high humidity (more than 75%) conditions.
  - Applying cool, wet sheets or cloths.

- Placing ice bags against the large veins on the groin, armpits, and sides of the neck; this cools the body, regardless of humidity.
- Placing the victim in an ice bath; this cools a victim quickly, but it requires a great deal of ice—at least 80 pounds—to be effective. The need for a big enough tub also limits this method.
- Placing the victim in a cool water bath (less than 60°F) can be successful if the water is stirred to prevent a warm layer from forming around the body. This is the most effective method in high humidity (greater than 75%) conditions.



## FYI

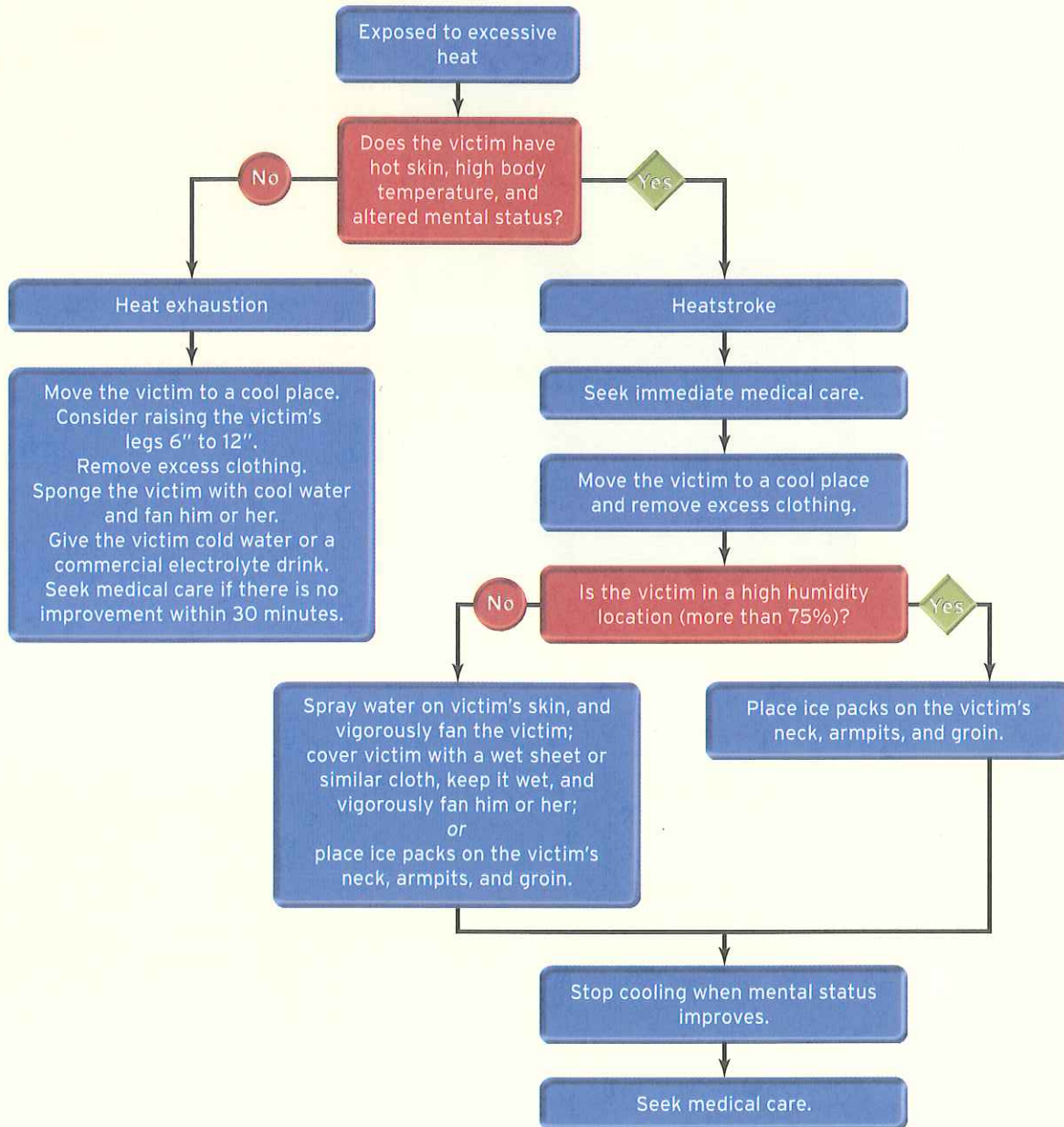
### Other Heat Illnesses

Less serious heat illnesses include heat syncope, heat edema, and prickly heat.

- Heat syncope, in which a person becomes dizzy or faints after exposure to high temperatures, is a self-resolving condition. Victims should lie down in a cool place and, if not nauseated, drink water. Syncope may be associated with heat exhaustion.
- Heat edema, which is also a self-resolving condition, causes the ankles and feet to swell from heat exposure. It is more common in women who are not acclimatized to a hot climate. It is related to salt and water retention and tends to disappear after acclimatization. Wearing support stockings and elevating the legs could help reduce the swelling.
- Prickly heat, also known as a heat rash, is an itchy rash that develops because of unevaporated moisture on skin wet from sweating. Treat by drying and cooling the skin.



# Heat-Related Emergencies



## ► Emergency Care Wrap-up

Condition	What to Look For	What to Do
Heat Cramps	Painful muscle spasm during or after physical activity Usually lower leg affected	Move victim to cool place. Stretch the cramped muscle. Remove excess or tight clothing. If the victim is responsive, give water or sports drink.
Heat Exhaustion	Heavy sweating Severe thirst Weakness Headache Nausea and vomiting	Move victim to cool place. Have victim lie down. Apply cool, wet towels to head and body. If victim is responsive, give water or sports drink. Seek medical care if no improvement within 30 minutes.
Heatstroke	Extremely hot skin Dry skin (may be wet at first) Confusion Seizures Unresponsiveness	Move victim to cool place. Call 9-1-1. If unresponsive, open airway, check breathing, and provide appropriate care. Rapidly cool victim by whatever means possible (cool, wet sheets; ice or cold packs against armpits, side of neck, and groin).



## ► Ready for Review

- Given the right conditions, anyone can develop a heat illness.
- The human body is constantly dispersing the heat that it produces.
- Heat illnesses include a range of disorders from heat cramps to heatstroke. Heatstroke is life threatening.

## ► Vital Vocabulary

**heat cramps** A painful muscle cramp resulting from excessive loss of salt and water through sweating.

## ► Assessment in Action

You decide to watch your local high school football team practice before its first game in late August. The coach has the defense running sprints for the last 30 minutes without rest breaks. At the end of the sprints, all but one player walk over to the water station. That player falls to the ground and you are the first to respond. The victim is responsive and his skin is moist and clammy.

**Directions:** Circle Yes if you agree with the statement; circle No if you disagree.

- Yes No 1. The victim is most likely suffering from heatstroke.
- Yes No 2. The first thing you should do is to help the coach and athletic trainer move the victim out of the heat and to a cool place.
- Yes No 3. The victim should drink cool water or a sports drink.
- Yes No 4. Giving several salt tablets, if available, should always be considered.
- Yes No 5. Removing the player's jersey, shoulder pads, and helmet and sponging him with cool water is recommended.
- Yes No 6. The coach and/or athletic trainer should seek medical care if there is no improvement within 30 minutes.

## ► Check Your Knowledge

**Directions:** Circle Yes if you agree with the statement; circle No if you disagree.

- Yes No 1. For heat cramps in the legs, stretch the cramped muscle.
- Yes No 2. Commercial sports drinks can be given to victims of heat-related emergencies.
- Yes No 3. Move victims of heat-related illness to a cool place.
- Yes No 4. Victims of heatstroke need immediate medical care—it is a life-threatening condition.
- Yes No 5. Cool heatstroke victims rapidly, including the use of ice packs applied to the neck, armpits, and groin.
- Yes No 6. Fruit juices are digested quickly and rehydrate the body most rapidly.
- Yes No 7. You can drink too much water and cause water intoxication.
- Yes No 8. Humidity cannot significantly reduce evaporative cooling.
- Yes No 9. Certain medications predispose to heatstroke.
- Yes No 10. Heat exhaustion can feel like the flu.



# Rescuing and Moving Victims

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## chapter *at a glance*

- ▶ **Victim Rescue**
- ▶ **Triage: What to Do With Multiple Victims**
- ▶ **Moving Victims**

### Victim Rescue

#### ▶ Water Rescue

Reach-throw-row-go identifies the sequence for attempting a water rescue. The first and simplest rescue technique is to reach for the victim. Reaching requires a lightweight pole, ladder, long stick, or any object that can be extended to the victim. Once you have your “reacher,” secure your footing and have a bystander grab your belt or pants for stability. Secure yourself before reaching for the victim.

You can throw anything that floats—an empty picnic jug, an empty fuel or paint can, a life jacket, a floating cushion, a piece of wood, or an inflated spare tire—whatever is available. If there is a rope handy, tie it to the object to be thrown so you can pull the victim in, or, if you miss, you can retrieve the object and throw it again. The average untrained rescuer has a throwing range of about 50 feet.

If the victim is out of throwing range and there is a rowboat, canoe, motor boat, or boogie board nearby, you can try to row to the victim. Maneuvering these craft requires skill learned through practice. Wear a personal flotation device for your own safety. To avoid capsizing, never pull the victim in over the side of a boat; instead, pull the victim in over the stern (rear end) or tow the victim to safety.