

How to identify a victim of heat exhaustion or heat stroke

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Weeks before the solstice, summer 2024 started off hot with a wave of triple-digit temperatures in California, Texas and Nevada that set off a flurry of heat advisories and excessive heat warnings.

And more hot days are expected. [Meteorologists](#) are predicting that [summer temperatures](#) will run at least two degrees above historical averages for over half the country.

With an [Associated Press analysis](#) showing that summer 2023 set records for U.S. heat deaths, the forecast for this year carries more than a hint of ominousness.

Stephen P. Wood, director of Northeastern's Extreme Medicine Certificate Program, says it's important for people to recognize the signs of heat illness and how quickly heat exhaustion can progress to heat stroke, when immersion in cold water is necessary to save lives.

Heat exhaustion versus heat stroke

"Heat cramps are really the earliest sign and symptom of heat illness," Wood says. "That is really a sign that your body is losing fluids and losing electrolytes when you start to get [muscle cramps](#)."

"The next step is heat exhaustion. You're still alert, you're still mentally oriented, but you're sweating profusely," Wood says. "Your [heart rate](#) is increasing. Your blood pressure may decrease."

Heat stroke is when sweating and other compensatory systems that remove heat from the body no longer function, Wood says.

If there is any sweat on the skin, it dissipates and the skin becomes very dry, he says.

Heat stroke victims "may start to see a change in their mental status," Wood says.

"They're going to be confused, they may be delirious, even to the point

of hallucinating," he says. "Their heart rates are very high. Their blood pressure is very low. They've lost a lot of electrolytes.

"Heat can no longer be dissipated from the body, so we start to see multi-system organ failure. You see injury to the heart, cardiac dysfunction. We see kidney failure. We see liver failure. This can lead to death."

Why water is important, but isn't always enough

The evaporation of sweat cools the body down, but "in order to sweat, you need to be well enough hydrated that you can afford to lose that volume of water from your body," Wood says.

"Similarly, you need to have energy. And you need to have functioning enzymes, which are proteins that allow" important bodily functions to occur, he says.

Enzymes provide the body with instructions for what it needs to do, and when people lose energy and water, biochemical systems in the body start to fail, Wood says.

"It's like turning a switch on and things really start to go bad fairly quickly," he says.

With [heat stroke](#), people can go from a normal internal body temperature range of 95 to 99 degrees to 105, 106 and 107 degrees, Wood says. He says an internal bodily temperature of 101 to 104 is considered the range of [heat exhaustion](#).

Heat stroke is the most serious heat illness, Wood says.

"You've lost the ability to dissipate heat," he says. "Your body's lost its ability to regulate the temperature. You've actually reset the thermostat

in your brain. It's no longer functioning.

"It's like taking the batteries out of your thermostat. The temperature is just going to continue to rise and at some point that's going to lead to death," says Wood, who has worked as a nurse practitioner in the [emergency room](#). "That's when we really need to aggressively cool people off in an ice bath."

He says emergency providers working marathons, athletic events and police and fire training sessions have used everything from kiddie pools to garbage bags filled with ice, as well as chilled IV fluids, to cool people down.

High temps and humidity

A [British study](#) published in 2021 finds that the body stops functioning optimally when the air temperature hits 104 to 122 degrees.

Other factors including humidity, wind and people's ages and [medical conditions](#) play a role in heat illness as well, Wood says.

High humidity impedes the body's ability to sweat and cool off, while wind wicks sweat away, leaving the body feeling cooler. They are the reasons why the same temperature may feel a lot hotter in New Orleans than in Las Vegas, Wood says.

He says babies and [young children](#) are at particular risk of heat illness since they don't sweat as effectively as adults.

And elderly individuals may not recognize the need for additional water when it's hot because they can't thermoregulate their bodies as efficiently as younger people, Wood says.

Acclimatization is believed to play a role in avoiding heat illness, but the AP study found that people died last summer even in areas used to high temperatures.

[Some scientists](#) say summer 2023 was the hottest in 2,000 years because of climate change.

Tips to beat the heat

The [Centers for Disease Control and Prevention](#) advises people to drink a cup of water every 15 to 20 minutes during a heat wave but no more than 48 ounces, or one and a half quarts, per hour.

Wood says supplementing water with sports drinks containing electrolytes is a good idea for people working out, which also raises their body temperature.

He also advises people to check their urine color for signs of dehydration.

Clear or light yellow is better, while darker-tinged urine signals dehydration, Wood says.

"Or it could even mean that your muscles are so hot, they're breaking down and spilling something called myoglobin into your urine, which is very, very dark and can cause kidney dysfunction," he says.

Pouring [cold water](#) on parts of the body where people lose a lot of heat—the neck, the armpits, the groin and top of the head—can help people cool down fairly quickly, Wood says.

When he worked on a medical mission in Haiti, he got used to seeing people wrap their heads in water-soaked towels and throw ice down their

groin.

Coaches of children in [sports teams](#) or supervisors of outdoor activities should consider multiple factors including air temperature when scheduling workouts, Wood says.

If it's hot and humid with no wind, maybe it's better to move the activity inside where there is air conditioning, he says.

"If you decide to do things outside, make sure you're running only short episodes of exertion, stopping kids to make sure they're rehydrating not just with water but with electrolytes," Wood says.

The large outdoor fans seen at NFL games can help keep players cooler, as can misters, Wood says.

Wear hats and sunscreen, and limit any long-sleeved clothing to filmy cotton clothes, he says. Quick-dry materials also help wick sweat and heat away from the body.

"Regularly schedule breaks where you can go cool off," he says. "And keep an eye on each other."

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