

A Chilling Situation

How to Recognize and Respond to Cold Weather Injuries

By Pamela Schumacher, MS, Prosci, RYT

From cold exposure to hypothermia, cold weather injuries (CWIs) are among the oldest documented forms of trauma and can cause severe, potentially life-altering damage.[1] Although outdoor workers are at risk, CWIs can affect anyone, particularly people participating in recreational activities, individuals with certain medical conditions, infants, older adults, and people experiencing homelessness. Prompt recognition, careful assessment, and appropriate treatment are essential to reduce the risk of serious complications, including loss of limbs and death.

The Cold, Hard Facts

Cold weather injuries are divided into nonfreezing injuries, which occur when the ambient temperature is above freezing, and freezing injuries. They include everything from cold stress and frostnip to the three stages of hypothermia.[2]

"Cold stress is when your body temperature is still in the normal range, but you're shivering. Your body is telling you that you're cold, and you're trying to generate more heat," Nadia Kimmel, MS, RN, WEMT, CEO of Desert Mountain Medicine, which provides wilderness medical training with an emphasis on risk assessment and prevention. "The big difference between cold stress and hypothermia is that [with cold stress,] you still have your mental faculties and can make good decisions. You have the ability for self-care such as telling yourself, 'I'm cold—I'll put on a jacket or start a fire.' Once you hit mild hypothermia, self-care starts to diminish. As you go through the stages of hypothermia, self-care goes to zero. One test is to ask somebody to zip their jacket. If they're having difficulty, their fine motor skills are diminishing and hypothermia has progressed."

"Hypothermia occurs when the external temperature and environment exceed the body's ability to maintain a minimum core temperature," says Molly O'Shea, MD,

©2026 American Association of Medical Assistants

CWI Symptoms

Here are key symptoms of commons CWIs[9]:

- **Frostnip**
  - Usually affects the face, ears, or fingertips
  - May cause numbness or blue-white skin color
  - Normal feeling and color return quickly when warmed with no permanent tissue damage
- **Frostbite**
  - Feeling of pins and needles
  - Freezing of the skin and the tissues beneath it because of temperatures below freezing
  - Skin feels cold, numb, and stiff or rubbery to the touch and may blister
  - Potentially unable to tell extent of injuries until skin has been rewarmed
- **Mild hypothermia**
  - The person is cold, shivering, and shows signs of impaired physical ability like stumbling and inability to care for themselves.
  - Their core body temperature is likely to be 91 to 95 F.
  - They may show some signs of altered mental state, like slurred speech.
  - Their pulse may be quite rapid, although it will slow as they cool.
- **Moderate hypothermia**
  - The person feels cold, but their shivering is weak or has stopped.
  - They cannot care for themselves and may be confused, make odd decisions, show excessive hunger, and have irregular or slow heartbeat and breathing (less than 12 breaths per minute).
  - Their core body temperature is likely to be 83 to 90 F.
- **Severe hypothermia**
  - The person is likely unconscious, experiencing decreasing strength, decreasing pace and regularity of heartbeat, slow and irregular breathing, no nervous reflexes, and no pain responses.
  - Their core body temperature is likely to be 75 to 82 F.
  - Below a core body temperature of 74 F, signs of life continue to decline. This includes eyes not responding to light, a decreasing heartbeat, and eventually a loss of brain activity or heartbeat.

FAAP, an American Academy of Pediatrics media spokesperson. "In other words, the body can't keep up with the demands of generating enough heat to keep the body warm due to the harsh external environment, and as a result the body's core temperature falls. Cold exposure on the other hand is when the core temperature is maintained, but exposed parts of the body are injured due to the harsh environment."

"The risk in cold weather is most likely to be frostbite," says Gordon Giesbrecht, PhD, professor emeritus at the University of Manitoba. "You can get frostbite in a short amount of time in a lot of different conditions."

Chill Factors

Infants and older adults are especially vulnerable to problems with cold exposure, often because they have a harder time regulating their body temperature. Even a small drop in the surrounding temperature or a short time spent outside in the cold can cause a large drop in body temperature in infants and older adults. Additionally, living in a poorly heated home can also cause hypothermia.[3]

"Hypothermia can happen acutely, such as in an accident, or it can happen over several days," says Kimmel. "One of the more common situations in an urban setting would be someone who doesn't have sufficient heat in their house, so over the course of several days they have been exposed to a cold environment. This can drop their body temperature too low. It could also be people who are homeless and living in and out of a shelter or in their car."

Risk factors for CWIs include[4]:

- Winter season
- No or inadequate shelter from the cold
- High wind chill factor
- Exposure at a high altitude
- Prolonged duration of exposure
- Prolonged exposure to a wet condition
- Altered mental status
- Unhealthy alcohol or drug use
- Malnutrition
- Immobilization
- Extremes of age
- Homelessness
- Presence of medical disorders like diabetes, hypothyroidism, peripheral vascular disease, stroke, or arthritis
- Being a smoker

"Children have a high surface area-to-body mass ratio so they will radiate heat," says Dr. O'Shea. "When placed in a cold environment, their bodies will radiate even more heat to raise their temperature. Frail, older people often have problems because responding to extreme cold requires a robust metabolism and the ability to mobilize several pathways, including shivering, movement, and others. Fat layers also insulate the body. Older people often have more sluggish metabolisms, peripheral artery disease, or other chronic illnesses, and therefore cannot generate heat very well."

Cold Cues

When exposed to the cold, the body can lose heat faster than it produces it. Over time, the body uses up its stored energy and body temperature begins to drop. Long-term exposure to the cold—especially if the body's core temperature falls below 95 degrees Fahrenheit—can lead to hypothermia, frostbite, and other problems. Determining stages of cold exposure is based on observing a person's behavior, sensations, and external symptoms:

- The sensation of cold
- The onset and progression of a shivering response, which is one of the ways a body rewarms itself
- The loss of ability to do normal physical activities like [zipping] zippers [and] walking without stumbling
- Impairment of mental ability as the brain cools, like slurred speech, disorientation, [and] sleepiness
- Degree of consciousness
- The decrease or absence of signs of life like breathing or heartbeat[5]

The most important warning sign of frostbite is numbness, says Giesbrecht: "When you get cold, you generally feel cold. If your skin and receptors get colder, you'll feel pain, and then you'll feel numbness because the receptors and nerves that bring signals to the spinal cord and brain are getting cold or not working. When you feel nothing, that means you're so cold that you can't even get poor signals. You're at imminent risk of freezing that tissue, and that means you can have tissue damage or loss."

"You can get frostbite and not have hypothermia. You can have hypothermia and not frostbite, or you could have both," says Kimmel. "Frostbite is freezing. Crystals form within your tissue layers. You could have superficial frostbite or deep frostbite. … You can only tell severity after the thaw.

"A patient's vitals, such [as] blood pressure, heart rate, and respiration, should be assessed, but taking a patient's temperature with an oral thermometer will not tell you if they are suffering from hypothermia because it doesn't get the core temperature," says Kimmel. "Instead, you assess hypothermia by level of responsiveness and shivering. Are they alert and oriented? Is confusion setting in? Are they unresponsive? Shivering can be mild, uncontrollable, or none."

"As you get progressively colder, you get what we call the 'umbles.' You gradually lose the ability to speak, think, and move; you grumble, mumble, fumble, stumble, and finally tumble," says Giesbrecht. "And shivering, of course, is the first sign that there's anything wrong. Shivering is a defense mechanism to produce heat so that you don't lose core temperature. You can be shivering for hours and still have a normal temperature. Shivering is not a sign of hypothermia, but it's a sign that you're losing more heat than you're gaining, and you need to do something about it."

Kimmel notes that the symptoms of hypothermia can mimic other conditions. "The cognitive issues of hypothermia might look like a stroke. Shivering might look like alcohol withdrawal. It could also look like seizure activity or essential tremors."

"If I saw a patient who was cold and shivering, and if the context were right, such as if it's winter, then I would suspect hypothermia and notify the care team and the physician," says Terrie Clark, CMA (AAMA), a medical assistant in Colorado Springs, Colorado. "I once had a patient who came in with frostbite, an older farmer who was recently diagnosed with type 2 diabetes. He said he didn't even notice his feet getting colder, so it's important to warn folks that it can sneak up on you, especially if you have certain medical conditions."

Keep Your Cool

Knowing how to treat CWIs is crucial for medical assistants.

To treat frostnip you can do the following[2]:

- Rewarm by immersing the affected part in a water bath of 105–110 F for 25–40 minutes.
- Monitor the temperature carefully with a thermometer, as higher temperatures can cause damage.
- Remove constricting clothing. Place the appendage in the water and maintain the water temperature by adding additional warm water. Do not add this warm water directly to the injury.
- Thawing is complete when the part is pliable and color and sensation have returned.
- Once the area is rewarmed, pain may be significant. Discontinue the warm water bath when thawing is complete.
- Do not use dry heat to rewarm. It cannot be effectively maintained at 105–110 F and can cause burns, further damaging the tissues.

Frostbite can damage tissue in two ways. First, ice crystals form inside the tissue, causing direct mechanical damage and reduced blood flow (ischemia). Second, rewarming the frozen tissue triggers reperfusion, creating an inflammatory and prothrombotic state that leads to further secondary injury.[4] To treat frostbite, take these actions[6]:

- Raise the patient's body temperature in lukewarm water or by applying warm, wet packs to their skin for up to 30 minutes.
- Apply wound dressings to frostbitten skin with sterile bandages, keeping fingers and toes separated to avoid rubbing.
- Test blood flow in the affected area of the body. If they have Stage 3 frostbite, you may need to connect the patient to a bag of warm IV fluid to improve circulation.
- Give antibiotics and pain relievers.
- Rehydrate by giving warm (not hot) water. (Frostbite dehydrates tissues.)
- Tell them not to walk on frostbitten feet or toes.

Cold Plunges

Heat loss can occur through several mechanisms[10]:

- Conduction: Physical contact with a cold object
- Convection: Air or water on the skin moves heat away from the body
- Evaporation: Water (e.g., sweat) vaporizes from the skin
- Radiation: Environment decreases heat

- Do not rub the frostbitten area.
- Avoid touching hot surfaces with the frostbitten area.

To rewarm a hypothermic patient, conserve the heat they have and replace the fuel they are burning. Everything should be done gently[7]:

- Dry the patient's skin.
- Change them into warm, dry clothing.
- Cover them with warm blankets.
- If the hypothermia is mild, have them drink hot beverages.
- Heat the core, the armpits, and trunk. Do not place heat sources directly on the skin; separate them with cloth or another insulator to avoid burns.
- If the hypothermia has progressed past mild, keep the patient horizontal and do not let them move. The movement will send cold blood from the limbs to the heart and could result in cardiac arrest.

Gentle handling is key because of the risk of complications:

- **Afterdrop** is the continued cooling of the deep core body temperature after getting out of the cold. It happens because blood vessels dilate and allow cold blood from chilled arms and legs to flow back into the body's core.
- **Rescue collapse (also called circum-rescue collapse)** is a sudden and dangerous drop in arterial blood pressure that can cause fainting, heart failure, or death right before, during, or after a rescue. It is triggered by the loss of water pressure (hydrostatic pressure) surrounding the body once a person is lifted out of cold water, combined with cardiovascular instability and moving from a horizontal to a vertical position.

"A patient's condition deteriorates even though they're no longer in the cold. It can range from simply falling down to fainting to sudden death. By the time a patient gets to a medical assistant, they should always look at that patient as a candidate for rescue collapse," says Giesbrecht. "Take care of them, but keep the patient horizontal."

Freeze Frame

Advise your patients to follow these steps to avoid problems with cold exposure[3]:

- Dress in layers.
- Wear warm clothing and waterproof shoes to protect the hands, feet, neck, and face.
- If going outside for any length of time, bring plenty of fluids and food high in protein and fat.
- For short trips outside, bring carbohydrates for quick energy boosts.
- Avoid alcoholic drinks because they make the body lose heat faster.
- Keep moving to stay warm, but avoid exhaustion.
- To avoid developing hypothermia indoors, place a rolled towel in front of doors to block drafts, make sure windows are weather-stripped or caulked if they have gaps, and keep indoor temperatures above 68 F. Get to a warm location if a home heating system fails.

"Get out of the cold if you can. It makes sense, but people get sucked into thinking, 'I'll be fine,' and they stay out there, and then they die. You can increase your physical activity to produce more heat, put on more clothing, or add more thermal protection. That's basically how you prevent cold weather injuries," says Giesbrecht.

"Clothing layers are key to preventing injury due to extreme weather," says Dr. O'Shea. "When working or exercising outside in the extreme cold, take breaks often and change clothes to keep the area near the skin dry. Wear sweat-wicking fabrics next to the skin and plan to change layers frequently to avoid dampness near the body during extreme cold. Wearing a hat and gloves, as well as insulated boots, can also help prevent heat loss. Children should always wear one more layer than adults since they radiate so much more heat."

To help patients avoid CWIs, medical assistants can ask them about home heating, water in the home, permanent living status, substance use, and access to warm clothes to ascertain the social and economic pressures facing their families, says Dr. O'Shea: "Understanding this and [offering support to] families in a compassionate way can make a big difference in reducing morbidity."

"If … I can tell [patients] need some help, I take out my little black book of community resources," says Clark. "I'll also advise the nurse and the physician that this is a case that maybe we should take a closer look at. If we can connect patients to resources available in the community, we can make a big difference in improving their lives." ✦

The CE test for this article can be found on page 26.



References

1. Guly H. History of accidental hypothermia. *Resuscitation*. 2011;82(1):122-125. doi:10.1016/j.resuscitation.2010.09.465
2. Nagpal BM, Sharma R. Cold injuries: the chill within. *Med J Armed Forces India*. 2004;60(2):165-171. doi:10.1016/S0377-1237(04)80111-4
3. Hypothermia and frostbite: easier to develop than you might think. NIH MedlinePlus Magazine. February 28, 2022. Updated January 16, 2024. Accessed September 9, 2026. https://magazine.medlineplus.gov/article/hypothermia-and-frostbite-easier-to-develop-than-you-might-think
4. Cindass R, Easton-Carr R. Frostbite. StatPearls. January 2026. Updated August 17, 2026. Accessed September 9, 2026. https://www.ncbi.nlm.nih.gov/books/NBK536914/
5. Downing JA. Hypothermia: understanding and prevention. Sea Grant Minnesota. Accessed September 9, 2026. https://seagrant.umn.edu/programs/recreation-and-water-safety-program/hypothermia
6. Frostbite. Cleveland Clinic. Updated February 22, 2023. Accessed October 15, 2026. https://my.clevelandclinic.org/health/diseases/15439-frostbite
7. Danzl DF. Hypothermia. Merck Manual. Updated August 2026. Accessed October 15, 2026. https://www.merckmanuals.com/home/injuries-and-poisoning/cold-injuries/hypothermia
8. Munatones S. The afterdrop, rewarming and post rescue collapse. World Open Water Swimming Association. December 6, 2016. Accessed October 15, 2026. https://www.openwaterswimming.com/the-afterdrop-rewarming-and-post-rescue/
9. Rathjen NA, Shahbodaghi SD, Brown JA. Hypothermia and cold weather injuries. *American Family Physician*. 2019;100(11):680-686. Accessed October 15, 2026. https://www.aafp.org/afp/2019/1201/p680
10. Shah A, Madhok M. Management of pediatric hypothermia and peripheral cold injuries in the emergency department. *Pediatric Emergency Medicine Practice*. January 1, 2019. Accessed October 15, 2026. https://www.ebmedicine.net/topics/toxicology-environmental/pediatric-hypothermia