



Employee Safety

## Winter Safety: The Signs, Symptoms and Prevention for Cold Stress

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### What You Need to Know:

Seasonal-related illnesses are extremely serious—even more so in the wintertime when symptoms might not be as apparent as they are in warm months.

Cold stress occurs under four conditions: cold temperatures, high or cold wind, dampness and cold water.

There are three major conditions associated with cold stress, including hypothermia, trench foot and frostbite. All are associated with varying levels of severity.

Businesses need to equip their employees with the proper PPE and training to ensure sickness associated with the cold weather is avoided.

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Working in the wintertime isn't just uncomfortable—it can be deadly serious. And worst of all, it might not be as easily identifiable for the victim as other weather-related illnesses. Here's a primer on cold stress to help keep your employees safe and warm this season.

Dangers, just like the seasons, are omnipresent in the workplace. Between machines that can cut and amputate, to the slips, trips and falls that can occur on a manufacturing floor, there's no shortage of potential hazards—no matter what time of year it is. Add in Mother Nature's unpredictable and occasionally cruel cold, wind and freezing winter temperatures to the mix, and those hazards (and subsequent costs) tally up quickly.

Enter cold stress. Colder weather months were directly associated with a higher likelihood of seasonal-related illnesses and accidents, resulting in an \$8.4 billion loss for businesses, according to a 2015 *study* from SmartAsset. Marc Ciaramitaro, director of field operations at *Windover Construction*, explains in an interview with *ConstructionDive* that there might be an even simpler explanation for seasonal uptick in injuries and harm in the winter: discomfort.

"I think [workers] feel it more," he says. "Working in the cold is more uncomfortable." Fingers and hands aren't as flexible when temperatures drop. Bulky outerwear might also decrease flexibility for legs and arms. Signs and symptoms of cold stress (which can vary, depending on the type of illness you're experiencing) aren't as readily apparent as illnesses associated with heat exhaustion or heat

stroke.

To make matters even more complex for manufacturers, while ANSI does have a standard in place for cold weather protection (*ANSI/ISEA 201-2012*), OSHA does not. The responsibility to protect workers falls primarily in the hands of the employers themselves—which can be problematic if they are underprepared.

“There’s an old adage: There’s no bad weather, just bad equipment,” explains John Castellani, research physiologist at the U.S. Army’s Research Institute of Environmental Medicine, in an interview with *Science News for Students*.

Here, we outline what exactly cold stress is, how to identify it, and most importantly, how to prevent it.

## What Is Cold Stress—and How Does It Occur?

When it comes to the words hypothermia and frostbite, it’s common to associate these illnesses with Antarctic explorers or off-trail skiers and snowboarders—but seldom simply a frigid day at the workplace. But as *Princeton University Environmental Health and Safety* emphasizes, weather that leads to cold stress can occur under varying conditions.

As the university body goes on to explain, there are four major factors that contribute to cold stress: cold temperatures, high or cold wind, dampness and cold water. Weather that directly causes cold stress could ultimately be a concoction of one, two or all four of these factors. As *OSHA* explains, the definition of “extreme cold” could be different across the country. For example, a day that dips below freezing in Atlanta could bear the same severity as a workday in Wisconsin where freezing rain and wind run rampant.

Regardless of the circumstances in which cold stress occurs, however, the signs are fairly universal. As *New Mexico Mutual* explains, when the body’s temperature dips from 98.6 degrees Fahrenheit to below 95 degrees Fahrenheit, that’s when symptoms start to appear. That heat leaves the body through respiration, evaporation, radiation, convection and conduction. In other words, we lose heat from our body when coming into direct contact with the cold minus the protection of clothing or equipment barriers. And during that process, most of the body’s energy is funneled into keeping the core warm—leaving the extremities farthest from the heart most susceptible to illness, highlights OSHA.

“Your body is trying to maintain the same temperature you normally maintain, which is 98.6 degrees,” explains Dr. Julius Kato, a cardiologist at St. Rita’s Medical Center in Ohio, in an interview with *Hometown Stations*. “When the temperature drops, your mechanism of increasing your heart rate increases. Your heart starts pumping harder to try to increase the blood flow and really try to increase the flow of the warm blood.”

OSHA also states that the risk factors associated with cold stress are multiplied when an individual is exposed to extreme wetness or is predisposed to certain health conditions or simply poor physical conditioning.

According to *Princeton University Environmental Health and Safety*, there are three major types of cold stress: trench foot, frostbite and hypothermia. Although the three illnesses are associated with differing circumstances, level of wetness, air temperature and wind speed, they can occur in any type of workplace that fails to protect its employees from the cold.

## Trench Foot Symptoms and Causes

**Trench foot** occurs when the foot has been immersed in cold water for an extended period of time. And

while it's similar to frostbite, it's also less severe. You can typically identify trench foot by a tingling, itching or burning sensation (accompanied by blisters). Aside from removing feet from the cold water, individuals with suspected trench foot should soak their feet in warm water, wrap their dry feet with cloth bandages, and drink a warm, sugar-laden drink.

### Frostbite Symptoms and Causes

**Frostbite**, on the other hand, is a much more severe case. Requiring amputation in some of the most severe cases, the ailment occurs when the actual skin freezes. Similar to trench foot, frostbite is typically caused by an individual coming into contact with an extremely cold object for long periods of time. It's an especially dangerous condition for metalworkers, as the university emphasizes: Frostbite occurs most when touching metal objects because the heat is so rapidly transferred from skin to metal. The cold stress-related illness is usually identified by cold, tingling, stinging or aching, followed by numbness, blisters, a waxy feeling, and skin discoloration to red, purple or pale white, according to *OSHA*.

**"There's no bad weather, just bad equipment."**

John Castellani

Research Physiologist, U.S. Army Research Institute of Environmental Medicine

### Hypothermia Symptoms, Categories and Causes

**Hypothermia**, as defined by *New Mexico Mutual*, can be separated into four categories, based on severity—mild, moderate, severe and critical:

**Mild hypothermia** occurs when the body temperature dips to 93 degrees Fahrenheit, signified by shivering, numbness in limbs, loss of dexterity and clumsiness. **Moderate hypothermia** occurs when the shivering ceases, but mental confusion or impairment begins, followed by an inability to walk or stand and reduced breathing. By the time an individual is experiencing **severe hypothermia**, core body temperature has plummeted to 82 to 90 degrees Fahrenheit and muscular rigidity and slurred speech—to the point of unconsciousness—is common.

At its most severe state (or **critical hypothermia**), the body's temperature is below 82 degrees Fahrenheit. The individual is on the brink of death—breathing is little to nonexistent, the pulse has decreased exponentially, eyes are dilated, and the body is rigid.

In the initial stages of hypothermia (mild and moderate), although seeing a doctor is highly advised, the illness can typically be alleviated by warm, sugary liquids, exposure to a heat source and keeping the head and neck covered, as *New Mexico Mutual* describes. But once seriousness has elevated to severe or critical, the individual is in trouble and should be transported to the hospital immediately.

### Using the Right PPE Clothing and Outerwear to Help Prevent Cold Stress

Aside from removing an individual from the cold exposure, there are a number of precautions businesses can take to ensure employees don't contract any cold stress-related illnesses.

First and foremost, employers must suit their workers with the right gear. Although OSHA only specifies guidelines for PPE when it comes to fall protection, it strongly encourages that businesses select the proper **outerwear** for their unique task and environment, be it winter coats, jackets, gloves, boots or hats. OSHA suggests that employees wear at least three layers of loose-fitting clothing, including an inner layer of wool, silk or synthetic, a middle layer of that same material, and an outer layer that shields against wind or rain. Additionally, all clothing (especially hats and gloves) should be slightly

loose to allow circulation. The key is understanding what environmental conditions your employees might face, and how to dress properly to protect against them.

Additionally, *New Mexico Mutual* suggests performing outdoor work in the warmest parts of the day (if possible) and providing frequent breaks so employees don't become tired or fatigued. Calorie-dense foods and warm beverages (but not those containing caffeine) can also help keep the body's core temperature stable. Princeton recommends adopting a "buddy system" where employees can keep an eye on each other's health throughout the workday, as victims themselves might not recognize hypothermia as easy as an onlooker would.

***What does your shop do to protect associates from cold stress? Do you know what the symptoms are? We want to know in the comments below.***

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