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# Cold stress

By Andrew M. Pawuk

## Before you begin

Ask employees to describe cold work conditions that may exist at their workplaces.

Typical answers may include working:

- Outdoors during the winter;
- On roofs;
- In open or unheated cabs;
- In refrigerated rooms, vessels or containers.



## Introduction

Cold stress or hypothermia can affect workers not protected against it. When the body cannot maintain its warmth, serious cold-related illnesses and injuries can occur. This may lead to permanent tissue damage or even death.

It is natural for your body to try to maintain its core temperature (chest and abdomen) of approximately 97.6° F (37° C) by reducing heat loss and increasing heat production. To accomplish this, blood vessels on the skin, arms and legs constrict, which decreases the blood flow to your extremities. This minimizes the blood from cooling and keeps the inner organs warm. Reducing the blood flow to the skin, however, results in a lower skin temperature and increases the risk of frostbite.

Another factor that contributes to cold stress is wind chill — the combined factor of wind speed and air temperature on exposed skin. Extreme wind chill can cause flesh to freeze.

## Hypothermia

Hypothermia, which means low heat, can occur when the body loses more heat than it can replace by constricting blood vessels. The body attempts to increase heat production by shivering, which begins when the body temperature falls to 95°F (35°C). Hypothermia can occur in below freezing temperatures, but it can also happen when temperatures are above freezing and a strong wind produces a dangerous wind chill.

Hypothermia can progress from mild to moderate to severe. Symptoms for each level include:

- Mild – shivering, stomping of feet, poor coordination, blue lips and fingers;
- Moderate – mental impairment, confusion, poor decision making, disorientation, inability to take precautions from the cold, heart and breathing slows;
- Severe – This stage may resemble death, unconsciousness, and the heart slows down. (The pulse may be irregular or difficult to find.) No shivering or no detectable breathing.

### First-aid steps

First-aid measures should stop further body cooling. Move the victim to a warm area, remove any wet clothing and help the person stay active. With moderate symptoms, call for medical assistance and cover the person's extremities. With severe symptoms, call 911 for medical treatment and transport the victim to a medical facility. Treat the victim very gently. Do not attempt to re-warm him or her since this is best done in a hospital setting.

### Frostbite

Exposing skin to severe cold causes frostbite. When tissue freezes, blood vessels become damaged and the reduced blood flow may cause gangrene. Frostbite often occurs on the face, ears, fingers and toes. The skin will look waxy and feel numb. When the skin becomes hard, frostbite is a medical emergency.

First-aid measures for frostbite include slowly warming the affected area and avoiding rubbing this area. If the tissue freezes, seek medical treatment before thawing the skin. Seek medical follow-up care for all frostbite conditions. You should not warm or thaw the frostbitten area if there is risk of the area refreezing because the damage will be worse if that occurs.

In addition to hypothermia and frostbite, exposure to cold temperatures may increase your risk factors for other health-related conditions, such as heart disease, asthma/bronchitis, diabetes and white finger syndrome.

### Cold-stress controls

Be prepared for cold temperatures and be alert for any signs of cold stress. Employees must recognize the early stages of cold stress in themselves and others. The first warning sign may be pain in the extremities. The onset of shivering should warn you that you need to come out of the cold.

Workers in cold conditions should:

- Be medically fit for the cold exposure;
- Eat a balanced diet that includes increased carbohydrates to burn more fuel and increase your body heat. Carbohydrates burn faster than protein and give you quicker energy;
- Understand the risk imposed by the chill factor and be prepared for the conditions;
- Avoid caffeinated or alcoholic drinks that increase water loss and blood flow to the extremities;
- Have a back-up plan when working in isolated areas or use a buddy system to keep an eye on each other and watch for signs of cold stress.

Clothing should be suited for the cold and your level of physical activity. Here are tips to remember when working in the cold.

- Wear several levels of clothing to capture insulating air between the layers;
- To allow for ventilation, wear cotton or synthetic layers next to the skin;
- Wear waterproof or water-repellant outer clothing when working in wet conditions;
- To prevent hypothermia, remove any wet clothing.
- Protect your head from heat loss. When you do not cover your head, you can lose 40 percent of your body heat. Use hats, hoods or hard-hat liners;
- In case your work clothes become wet, keep a change of clothing available.

### Conclusion

Cold environmental conditions can affect your body. Be aware of the signs or symptoms caused by hypothermia or frostbite and take appropriate action to correct the situation. If you take action quickly, the effects of cold stress may be controlled and lessened.

**Quiz** (Circle T for true or F for false.)

1. The body naturally tries to maintain its core body temperature. T or F
2. Wind chill has no effect on body temperature. T or F
3. Frostbite occurs when the skin freezes. T or F
4. Wet clothing should be removed as quickly as possible in cold conditions. T or F
5. Employees should recognize hypothermia's signs and symptoms for themselves and their co-workers. T or F

Answers: 1-T; 2-F; 3-T; 4-T; 5-T.

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