

WINTER WORRIES: HYPOTHERMIA AND COLD INJURIES

Patrick Kirk



Why Worry About The Cold?

With the arrival of winter, many forest workers begin to face cold wet days working in the rain and wind for extended periods of time. Apart from the natural discomfort associated with this, there are many injury related aspects that go largely unnoticed by many workers. The true impacts of cold weather on the worker's performance, safety and overall health and well-being are sometimes unrecognised by either the worker or their boss. As a result, worker productivity, profitability and health frequently suffer.

This report aims to provide some insight into this process, give some explanations of why and how the body reacts to cold, and presents some simple and effective solutions that can be used in every day work situations.

Key Points to Remember

- Wear clothes that are warm but breathable (wool or polypropylene) against the skin
- Replace wet clothes with dry ones as soon as possible, especially at the end of the working day
- Have plenty of hot drinks and high energy foods throughout the working day
- Use rest breaks as a way to recover from the physical effects of the cold
- Wear a warm hat as you lose 30% of your body heat through your head



PO BOX 2244, ROTORUA, NEW ZEALAND
TELEPHONE: 07 348 7168 FAX: 07 346 2886
Email: pat@liro.fri.cri.nz

The Amazing Human Body

When our bodies get cold they have an amazing ability to go into automatic self-preservation without any conscious help from us at all. The body has one main objective in life and that is to stay alive at any cost. To do this, it does some pretty amazing things in terms of generating heat and moving warm blood around the body to protect some organs (such as heart, lungs) at the expense of other body parts that it decides it can survive without (nose, fingers, ears and so on).



In cold weather, the body automatically conserves heat in two ways. First, it constricts blood vessels near the body's surface, which decreases heat loss through the skin and increases warm blood flow to vital organs. Later, the body produces waves of muscle contractions (shivering), which increases body metabolism and heat production by up to five times the resting rate. How fast your body cools depends on many factors such as air temperature, wind speed, level of activity, the degree of insulation in your clothing, the dryness of the clothing, health, nutrition, degree of fatigue, age and the use of medications and alcohol.

Hypothermia

The main concern with forest workers operating in cold wet conditions is hypothermia. This is particularly so when there is a strong wind blowing, as the wind chill factor created by the wind passing over wet clothing can prove fatal in extreme cases, as the heat is rapidly lost from your body.

Hypothermia occurs when your core body temperature falls below 35°C . Most cases of hypothermia develop in air temperatures between -1°C and $+10^{\circ}\text{C}$.

Warning Signs

Mild hypothermia sets in as core body temperature drops to 35°C . The body responds with intense shivering. The person is alert and can still walk and talk, but with less coordination. The coldness causes pain and numbness.

Moderate hypothermia occurs at a core body temperature of 32°C . The person becomes drowsy, confused and irritable, speech becomes slurred, coordination impaired and breathing shallow. Violent shivering gives way to no shivering as the muscles fatigue. The skin, by this time, is pale and numb.

Severe hypothermia occurs when core body temperature falls below 32°C . The skin is cold and blue and the person is very weak, with slow breathing and pulse rate. At a body temperature below 30°C , the person may be mistaken for dead as the pulse may be undetectable, breathing is in occasional gasps and the pupils of the eyes are dilated. Heart failure is the eventual cause of death in severe hypothermia.



Treatment

Treatment of mild hypothermia requires moving the person to a warm area, removing wet clothes, wrapping in a warm blanket and giving warm drinks (not coffee or alcohol). Moderate hypothermia requires more active warming with hot packs or

electric blankets. People with severe hypothermia require experienced medical treatment in a hospital. This involves administering warm oxygen and warm intravenous solutions, active warming with hot packs and monitoring heart function.

Common Local Cold Injuries

Less dramatic, but just as large a concern, are what are termed local cold injuries. The cheeks, nose, ear lobes, fingers, toes, hands and feet are the body areas most susceptible to cold injury. People with previous cold injuries, diseases affecting blood circulation, and smokers are at greatest risk. Circulation to these areas diminishes as the body constricts surface blood vessels to prevent heat loss.

Several types of injury may occur, depending on whether ice crystals form within the body tissues:

Frostnip is the freezing of the top layers of skin. The skin is white, waxy and numb. The top layer is hard but the deeper tissues remain soft. Frostnip typically occurs on the cheeks, earlobes, fingers and toes. It is generally reversible. To treat frostnip, move to a warm area, dry the affected areas and gently re-warm them by placing them next to a warmer part of the body (for example, placing the hands in the armpits). Do not rub the affected areas since this may further damage tissues.

Immersion or trench foot results from prolonged exposure of the feet to cool, wet conditions. At the time of exposure, the feet are cold, numb, swollen and waxy white. Two to three days after exposure, there is intense pain in the feet and they become red, swollen, and hot. There may be blistering, bleeding and tissue death. After 10 to 30 days, the feet develop tingling sensations and cold sensitivity, which may persist for years. To treat this condition at the time of injury, elevate the feet and gently re-warm them.

Frostbite is an injury to the skin and sometimes the deeper tissues of the body due to freezing or the formation of ice crystals in the tissue cells. Frostbite usually only develops when the air temperature is below -12°C , but may occur at a temperature nearer 0°C when other factors, such as high winds, dampness or hypothermia are present.

Preventing Hypothermia and Cold Related Injuries

There are a number of things you can do to minimise the risks associated with working in the cold.

Wear the right clothes

Insulated clothing that does not retain moisture will reduce the risk of hypothermia. Conversely, inadequate clothing, wet clothing, and tight garments or boots that impede circulation will increase the risk of cold injury.



If possible, wear three layers of clothing:

1. An inner layer of wool or polypropylene against the skin that allows ventilation and escape of moisture.
2. A middle layer of wool, down or synthetic pile that absorbs perspiration and retains its warmth when wet.
3. An outer layer that breaks the wind and allows some ventilation.

A warm hat is also important because 30% of heat loss is through the head.

Prevent overheating when performing strenuous work in extreme cold by wearing several thin middle layers of clothing that can be removed or put on as necessary. Replace clothes that are wet from perspiration or rain with dry clothes as soon as possible, especially if you have finished working.

Use heated shelters or wind shields to protect against the wind and cold. If possible, work should be modified so that it is performed in a low wind area or at a time when there is less wind. Set up a buddy system to check on each other frequently for early symptoms of hypothermia (shivering, slurred speech, confusion, drowsiness

and weakness). If **any** of these symptoms occur, the affected worker should immediately return to a warm shelter.



Handy Hints

Have plenty of hot drinks and high energy foods

Hot drinks (soup, water, milo...) will replace the fluid lost from sweating, while the high calorie foods (bread, pasta, potatoes...) will provide the body with fuel for heat production. Alcohol should be avoided as it causes the surface blood vessels to dilate, removing warm blood from the body core.



Develop worker experience

Limit new employees' exposure to the cold during their first few days of employment, to allow them to become accustomed to the working conditions and clothing requirements. Alternatively, educate workers about the clothing required and how to adapt to the conditions through structured induction courses.

Rest breaks

Rest breaks are a simple and effective way to reduce the impact of cold weather, especially if the person is able to warm themselves during the break. The best way of doing this is by eating a hot meal or having a hot drink. The benefits of such breaks can be maximised by sheltering from the weather. Taking breaks in this way enables the person's body to recover from both the effects of hard physical work and cold.

Job rotation

Job rotation is another effective way of minimising a person's exposure to the cold. Take note of which workers are taking the brunt of the weather (skid workers, breaker-outs...) and, if at all possible, rotate them at set periods during the day to other jobs (felling, machine operator...). This way, instead of bearing the brunt of the cold weather for the entire day, the workers are exposed for a shorter period of the day.