



Medicine for Managers

Dr Paul Lambden BSc MB BS BDS FDSRCS MRCS LRCP DRCOG MHSM

Frostbite

In 2000 Sir Ranulph Fiennes attempted to reach the North Pole solo. He failed and suffered severe frostbite to the fingers of his left hand. A doctor recommended leaving the dead fingertips for several months to allow healthy tissue to regrow. He cut them off himself with a fretsaw! For Finnish Olympic cross-country skier Remi Lindholm, perhaps even worse, during the race his penis froze. He said the pain was unbearable as it later defrosted!

Frostbite occurs when any body tissue is exposed to temperatures below freezing (32°F or 0°C). Any part of the body can be affected but classically it is the extremities of the body (fingers, toes and nose) that are most vulnerable.

It occurs simply because, at low temperatures, there is a deprivation of oxygen which can cause damage to or death of cells.

The tissue cooling results in constriction (narrowing) of the blood vessels supplying the area as they attempt to conserve heat.

This in turn results in slowing and stagnation of the blood and, if the cold environment is maintained over a long period, the tissues and

the blood in the vessels freeze. Ice crystals form with the result that severe damage and destruction of tissues, blood vessels and red blood cells occurs.



At this stage the damage is irreparable and the result is that gangrene develops in the affected area.

Therefore, the severity of the damage to any area will depend on the degree of the cold and the duration of the exposure.

Symptoms:

- Initially cold, pricking skin
- Numbness
- Throbbing pain
- Changing skin colour which may be red, white, blue or purple.
- Skin becomes hard and immobile as it freezes

Frostbite most commonly affects peripheral structures; fingers, toes, ears, nose, and also the chin and cheeks, and even the penis and scrotum.

Stages of frostbite:

- ***Frostnip*** is the mildest form of frostbite. As the skin warms, it may tingle or cause pain, but there is no permanent damage.
- ***Superficial Frostbite*** causes changes in skin colour. After exposure and as the skin warms, it appears mottled and burns or stings. It swells and fluid-filled blisters may form.
- ***Deep Frostbite*** is most severe affecting skin and all the tissues. All sensation is lost in the area. Large blisters form as it rewarms and the skin turns black as the whole affected area dies.

The classification is somewhat arbitrary because the exact extent of the damage will not be known until the affected area thaws out. Blistering occurs but the most severe damage will only be recognised if the area turns black.

Skin freezing should always be avoided at all costs.

Obviously exposure to extremes of cold weather is the most common cause, aggravated by wearing inappropriate clothing or staying in the cold for too long.

Risk of frostbite rises rapidly in temperatures of -15°C (5°F) for longer than a few minutes.

A variety of risk factors increase the risk of suffering frostbite and they include:

- Some medical conditions, such as poor blood flow, diabetes, exhaustion or dehydration
- Smoking (interferes with blood flow to limbs)
- Alcohol or drug use
- Previous frostbite damage
- The young and the elderly

The complications of frostbite include:

- Severity with recurrence of frostbite
- Excessive sweating
- Skin colour changes which are a predictor for the severity of the episode
- Nail changes or loss
- Infection of the damaged area
- Gangrene
- Hypothermia
- Loss of peripheral body parts

Management of Frostbite

Any evidence of skin change following exposure to low temperatures, should result in an urgent medical review. X-rays, a bone scan or an MRI scan may be used to determine the severity of any frostbite injury.

Treatment of Frostbite

Frostnip is common and is not associated with permanent damage and can be managed with simple first-aid treatment.

For frostbite, the treatment will depend on the location, severity and whether there is

associated hypothermia. Amongst the treatments are:

- **Rewarming** often with the use of a warm water-bath
- **Protection** of the damaged area with sterile dressings as the area rewarms
- **Analgesia** is often necessary to combat the pain as the rewarming occurs and is administered orally or by



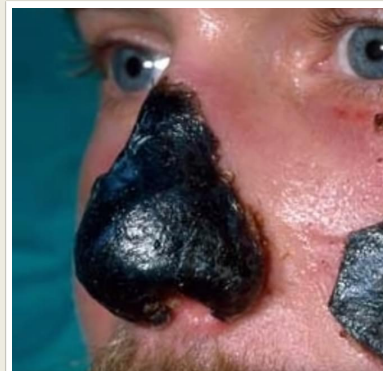
injection according to the severity of the pain

- **Antibiotic** may be prescribed if there are infected blisters or other evidence of infection
- **Anticoagulant drugs** may be used to improve blood flow to the damaged area

Healing of frostbitten areas is aided by removal of damaged, infected or dead tissue.

The process of debridement may be undertaken at any time from two weeks to three months

after the damage was sustained, once it is clear where the demarcation of healthy and diseased tissue can be distinguished.



More extensive surgery may be required in due course in those people who have suffered

severe frostbite and may involve amputation of areas with remaining damage or disease.

In such cases plastic surgery may be required to restore function and cosmetics.

With energy supplies in crisis and winter coming on, let us all hope that this winter is one of the more mild ones to minimise the risks to those who must be outside in cold weather.

paullambden@compuserve.com

