

FROSTBITE:

In conditions that can cause frostbite, individuals should:

- Find adequate shelter and shielding from the elements, look for "natural wind breaks" in the environment such as caves or hillsides.
- Layer up utilizing multiple layers of light, loose clothing, rather than just one bulky article. Layering traps air for insulation.
- Layer your hand protection as well, using lightweight gloves as your base layer and the mittens being your outer. Mittens are superior to gloves because they limit surface area exposure to the cold.
- Since Frostbite is commonly seen at the distal portion of our extremities, it only makes sense to layer these areas well. The importance of quality socks can't be stated enough. The same principle of a thin base with a thicker "outer shell" rings true.
- Cover the face and head, your ears and nose will suffer the affects first as blood to the distal areas of your face are drawn in.
- Do your research and find fabrics best suited for the cold such as fleece, polypropylene, wool, etc....
- You want to stay away from restrictive and tight clothing. These types of clothes can increase perspiration as well as reduce peripheral circulation. There are products out there that are tight fitting, but suitable for cold weather, Just do your homework.
- This one kind of goes without saying, but if it's cold outside you'll fair best by not getting your clothing wet.
- Being inactive and sedentary in the same position for prolonged periods will decrease your ability to maintain thermorégulation.

- Check skin every 10-20 minutes for frostbite. Vigilance on continuous Assessment for cold related injury signs and symptoms falls under prevention, and again, is paramount.

When assessing for signs and symptoms of frostbite, you should be alert to the following:

- At first, cold skin and a prickling feeling
- Numbness
- Red, white, bluish-white or grayish-yellow skin
- Hard or waxy-looking skin
- Clumsiness due to joint and muscle stiffness
- Blistering after rewarming, in severe cases

Frostbite is most common on the fingers, toes, nose, ears, cheeks and chin. Because of skin numbness, you may not realize you have frostbite until it's too late and the damage is already underway.

Generally speaking Frostbite tends to occur in stages:

- **FROSTNIP:** tends to be a mild form, or precursor, of frostbite. Extended exposure to the elements leads to numbness in the affected area. As your skin warms, you may feel pain and tingling but it doesn't permanently damage the skin.
- **SUPERFICIAL FROSTBITE:** presents as reddened skin that turns white or pale. You may notice your skin starts to feel warm, when this is taking place it's a symptom of major skin involvement. Attempts at rewarming during this stage may cause the surface of your skin to appear mottled. In addition there may be the presence of stinging, burning and swelling. In some cases fluid-filled blisters manifest 12 to 36 hours after rewarming the skin.
- **SEVERE/DEEP FROSTBITE:** Your skin turns white or bluish gray and you may experience numbness, losing all sensation of cold, pain or discomfort in the affected area. Joints or muscles may no longer work. Large blisters form 24 to 48 hours after rewarming. Afterward, the area turns black and hard as the tissue dies.

So you've identified the cold weather injury, you've determined the extent and severity of the frostbite. Now it's time to start the rewarming process. So I turned to "Reamy BV. Frostbite: review and current concepts. J Am Board Fam Pract", "Pubmed" and "Biomed" to cross reference and confirm the following treatments:

- Field rewarming should be started only if the time to arrival at a definitive care center exceeds 2 hours. As a general principle, always address the ABCs and treat any life-threatening conditions such as hypothermia first. Correct any systemic hypothermia to a core temperature of 34°C before treating the frostbite.
- Remove the patient from cold. Replace wet and constrictive clothing with dry loose clothing. Remove jewelry from the affected area. Dress the extremity in a manner that minimizes mechanical trauma.
- Rewarm the frostbitten area if no danger of refreezing is present. However, rewarming should be avoided if it cannot be maintained (freeze-thaw-freeze cycle). Walking on frozen frostbitten areas and risking tissue chipping and fracture is considered better than thawing and refreezing.
- Rapid rewarming is the single most effective management/intervention for the treatment of frostbite. Rapidly rewarm the affected area in circulating water at 37-39°C. The circulation of water allows a constant temperature to be applied to the affected area. Warming is continued for 15-30 minutes or until thawing is, by clinical assessment, complete (ie, when the distal area of the extremity is flushed, soft, and pliable). The addition of an antiseptic solution such as povidone-iodine or chlorhexidine to the bath may be beneficial.
- Avoid inadvertent slow rewarming or overheating. Encourage active gentle motion of the frostbitten area during the rewarming. Constantly monitor water temperature. Thawing takes about 20-40 minutes for superficial injuries and as long as 1 hour for deep injuries.
- The most common error in this stage of treatment is premature termination of the rewarming process because of reperfusion pain. Mechanical trauma (massaging or rubbing with ice or by hand) and rewarming at higher temperatures and for longer periods of time are detrimental to preserving viable tissue and should be avoided. Direct dry heating using fire or a heater can lead to burns secondary to loss of temperature sensation and so should be avoided.
- Partial thawing and refreezing generate more damage than does prolonged freezing alone, through the release of multiple inflammatory mediators. In patients who experience a refreezing injury of thawed areas, rewarming should be delayed until it can be maintained.