Developed by the British Columbia Provincial Nursing Skin & Wound Committee in collaboration with NSWOCs/Wound Clinicians from:

Quick Reference Guide
Wound Management for Frostbite Injury

Frostbite is a thermal injury arising from an exposure to a cold environment and occurs when skin temperature falls to -2°C or less. Tissue injury is due to the formation of extracellular ice within the tissues; the toes, fingers, ears and nose being the first to be injured. The injury's severity can change within the first few days post injury and it may take 3 to 4 weeks before the full extent of the frostbite injury is known.

This Quick Reference Guide, along with its Guideline, provides direction for wound care of a frostbite injury for adults & children. In accordance with health authority (HA)/agency policy, they can be used with the HA/agency's frostbite protocol/Prescribers Pre-Printed Orders or the Yukon Hospitals' Frostbite Protocol/Physician's Pre-Print Orders.

The generic term 'client' is used to describe the person in either the acute care or community care setting.

Initial Care: Re-Warming & Wound Care

1. When there is no chance of the injured areas re-freezing, initiate rapid rewarming of extremities. *Rapid rewarming is necessary to reverse some of the cold injury.*
   - Re-warming process can be very painful; ensure client has an analgesic, (e.g., NSAIDs or morphine) to manage the pain. *NSAIDs may also provide systemic blocking of both prostaglandins and thromboxane; but are **not** to be given if client is receiving alteplase and enoxaparin.*
   - Remove, if possible, any jewelry from injured area(s). If clothing, such as socks or mittens, have adhered to the skin, leave in place as the bath will loosen the material allowing for easier removal.
   - For extremities, prepare 1000 ml of hot tap water (39-40°C maximum) in a clean basin, bucket or tub. Add 30ml of 2% Chlorhexidine Gluconate (CHG) with 4% Isopropyl Alcohol. Check water temperature with a thermometer.
     - Immerse affected area(s) in the bath, cover bath container with a towel or blanket to conserve the water temperature. Soak until frostbite areas becomes soft and pliable, appropriately 30 minutes. Additional hot water may need to be added to maintain the water bath temperature at 39°-40°C temperature.
     - Remove extremity(s) from the bath. Air or pat dry; do NOT rub.
   - For nose and ears and/or areas of the body, apply gauze/cloth(s) well-dampened with hot (39-40°C maximum) tap water to the area(s) for approximately 30 minutes or until the area(s) become soft and pliable. Cover with towel to maintain the heat. Re-dampen the gauze/cloths frequently. Air or pat dry; do NOT rub.
2. Identify the location and the grade of each injury(s).
   - Use the Frostbite Quantification & Grading Assessment Form, or similar HA/agency assessment, to describe the skin changes of the injured area(s) and the grade of severity for each, according to Cauchy, E. et al, 2016 grading system.
   - According to HA/agency documentation standard, take photos and document the wound assessment.
3. The presence and severity of blistering is dependent upon the extent of the tissue injury.
   - **Clear serum blisters:** Exposure to thromboxane and prostaglandins found within the serous exudate of the clear blisters can cause further tissue damage and **should be debrided** or **aspirated** by a health care professional who is competent to perform Conservative Sharp Wound Debridement (e.g., Physician, NP, NSWOC, Wound Clinician or RN with additional training).
   - **Hemorrhagic blisters:** Blood-filled blisters are an indication of deep tissue and deep vessel injury and should be left intact; **do not debride**.
4. Manage toe or finger web spaces.
   - Use 2x2 or 4x4 non-woven rayon/rayon-polyester gauze or thin foam padding or transfer sheet between the digits to separate them and manage moisture. *Rayon-based gauze is less likely to adhere to the wounds.*
5. Apply an aloe vera-based product, (e.g., Aloex) to all frostbitten areas. *Aloe vera may inhibit production of thromboxane at the local level.*
   - Use cotton tip applicator to apply the aloe product in a 3mm layer (approximate) to all frostbitten areas.
   - Cover areas with non-adherent contact layer, such as Adaptic, then lightly wrap the areas with gauze dressing and Kling.
   - Ears and nose may need to be left exposed and may need repeat application every few hours during waking hours.
6. Elevate affected limb(s) and protect from trauma.
   - Elevate limb(s) above the level of the heart to minimize edema.
   - Consider foot cradle to keep bed linens off the injured areas, (e.g., toes, feet, fingers or hands).
   - Client should not ambulate if foot injury(s) involves more than the distal toes.
7. Initiate referrals.
   - Refer to OT/PT to splint the extremities and/or provide ROM exercises to prevent or minimize contractures.
   - Refer to Registered Dietitian for wound healing nutritional support.
   - Refer to Social Work for assistance with any housing issues and/or connection to community care services.

Quick Reference Guide
Wound Management for Frostbite Injuries

On-Going Wound Care for all Grades of Frostbite

1. Cleanse frostbitten areas.
   - Immerse affected extremity(s) in warm tap water (as per client's comfort, 36-37°C); CHG/alcohol are not required.
   - For nose, ears or body area(s), apply gauze/cloth(s) well-dampened with warm (36-37°C tap water to the area(s).
   - Air or pat dry; do NOT rub.

   Water bath supports removal of debris, cleansing of open areas, mobility of the joints and comfort. Length of immersion, frequency and timeframe for immersion to be determined by care team, (e.g., 30 min. daily for first 1-2 weeks) based upon the progression of the injury, (e.g., development of eschar). May need to use a clean basin, bucket or tub for the immersion.
2. Assess and grade severity of all areas daily for the first week, then weekly for the next 3-4 weeks. *Over time, an injury may become more severe.*
   - For extremities, use the Frostbite Quantification & Grading Assessment Form, or similar HA/agency assessment.
   - For nose, ears or body, use HA/agency wound assessment form.
3. Assess the areas for infection, edema, moisture associated skin damage (MASD).
   - If S&S of infection noted, consult Physician or NP.
   - If edema is interfering with ROM, consult PT or OT.
   - If MASD noted, use an absorbent cover dressing instead of gauze.
4. Manage digit web spaces.
   - Use 2x2 or 4x4 non-woven (rayon or rayon-polyester) gauze, thin foam padding or transfer sheet between the digits. *Padding separates the digits and manage moisture in the toe or finger webs. Rayon-based gauze is less likely to adhere to the wounds.*
5. Manage blisters as needed.
   - **Clear serum blisters:** Exposure to thromboxane and prostaglandins found within the serous exudate of clear blisters can cause further tissue damage and **should be debrided** or **aspirated** by a Physician, NP, NSWOC, Wound Clinician or RN with additional education who is competent to perform Conservative Sharp Wound Debridement.
   - **Hemorrhagic blisters:** Blood-filled blisters are an indication of deep tissue and deep vessel injury and should be left intact; **do not debride**. If needed, blisters that impinge upon the joints may be aspirated after the first week of care.
6. For at least the first five days of the post-injury phase, apply aloe vera-based product, (e.g., Aloex) has aloe-vera may assist with local inhibition of thromboxane.
   - Use cotton tip applicator to apply the aloe product in a 3mm layer (approximate) to all frostbitten areas.
   - Cover areas with a contact layer, such as Adaptic, and lightly wrap areas with gauze dressing and Kling. If exudate management is needed, consider using Aquacel Extra as the contact layer.
7. Wound progress:
   - Injuries with a low grade of severity should heal with moist wound healing; use of aloe vera-based product, (e.g., Aloex) be continued or alternatively, use a hydrogel, such as, Intrasite Gel.
   - Injuries with a higher grade of severity due to the vascular damage will most likely will develop eschar:
     - If area is developing, or has developed an eschar, keep areas dry. Cover with gauze dressing/ Kling to support and protect the drying or dried eschar from trauma.
     - If client has arterial insufficiency, is a diabetic or has a client specific risk for infection, consider local antimicrobial treatment, (e.g., 10% povidone iodine) which will also promote drying of the frostbitten areas on toes and/or feet. Consult NSWOC/Wound Clinician.

   Wound(s) may heal under the eschar. If digits mummify, digits may self-amputate (fall off) over time. Frostbite area(s) may require surgical amputation, but the decision is not made until several weeks following the injury to allow the full extent of the injury to be determined.
8. Elevate affected limb(s) and protect from trauma.
   - Elevate limb(s) above the level of the heart to minimize edema.
   - Consider foot cradle to keep bed linens off the injured areas, (e.g., toes, feet, fingers or hands).
   - Initially, client should not ambulate if foot injury(s) involves more than the distal toes; once injury(s) has stabilized, and only then ambulate with the foot well-protected from trauma.
9. Support wound healing.
   - As per OT or PT, encourage ROM exercises and splint digits and/or extremity(s) to prevent or minimize contractures. Avoid compression.
   - Monitor effectiveness of pain management; if pain management not effective, consult Physician or NP.
   - Encourage fluid intake and a high protein, high calorie diet according to RD.
   - Client should avoid tobacco and alcohol as these can cause additional vasoconstriction of the extremities. Encourage client to consider a non-nicotine substitution and non-alcohol-based drinks.