Interior Health

FROSTBITE – ADULT

Initial Management Grades 1-4
Emergency Department

Weight (kg)

Bulleted orders are initiated by default, unless crossed out and initialed by the physician / prescriber. Boxed orders (☐) require physician / prescriber check mark (☑) to be initiated.

1. ALLERGIES: see #826234 – Allergy and Adverse Reaction Record

2. CODE STATUS / MOST

☐ Refer to completed Medical Orders for Scope of Treatment (MOST) #829641

3. ADMISSION INSTRUCTIONS *(IF ADMISSION REQUIRED)*

☐ Admit to _____ MRP _____

4. CONSULTS

☐ General surgery
☐ Intensivist
☐ Plastic surgery
☐ NSWOC wound referral

5. DIET

☐ High Calorie High Protein diet / regular texture
☐ Other _____

6. ACTIVITY

- Activity as tolerated

☐ Non weight-bearing affected limb(s)

7. MONITORING

- Temp, BP, HR, RR: Q15M for 2 hours then Q 30M while iloprost infusing

8. LABORATORY

☐ CBC, Lytes4, creatinine (incl. GFR), INR, PTT, AST, ALT

9. INTRAVENOUS THERAPY AND HYDRATION

☐ Saline lock
☐ IV normal saline (warmed) at _____

10. INITIAL MANAGEMENT – ALL GRADES

- Remove jewelry or other extraneous material from affected area
- Initiate rapid rewarming immersing the affected area in 1,000 mL water heated 39°C with 30 mL chlorhexidine gluconate 2% / isopropyl alcohol 4% until area becomes soft and pliable (30 minutes)
- Grading of frostbite (see reverse)
- Elevate affected extremity if possible and provide general wound care and dressing
- Let skin air dry, do not rub. Protect from direct trauma

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FROSTBITE PROTOCOL

Rapid rewarming of extremities in hot water (39°C)
with chlorhexidine and isopropyl alcohol for 30 minutes

↓

Assessment of severity (Grade 1-4) (see table below)
Documentation of severity for comparison after therapy
(Use "Quantification of Frostbite Injury" sheet)

Grade 1

Hydrotherapy whirlpool daily
Debridement and aspiration of clear blisters

Refer to **Wound Care Management for Frostbite Injuries Quick Reference Guide**
Ibuprofen every 6 hours
Elevation of affected parts
Avoid tobacco and alcohol
Tetanus-diphtheria immunization

Grade 2-3

If less than 72 hours since rewarming:

↓

Management as per Grade 1
+
Iloprost IV infusion for 6 hours daily for 5 days

Grade 4

If less than 72 hours since rewarming:

↓

Management as per Grade 1
+
Iloprost IV infusion for 6 hours daily for 5 days

↓

If less than 24 hours since rewarming:

↓

Add:
Alteplase IV infusion once and enoxaparin SC for 72 hours

Grading of Frostbite Injury				
	Grade 1	**Grade 2**	**Grade 3**	**Grade 4**
Extent of initial lesion at day 0 prior to rewarming	Absence of initial lesion	Initial lesion in distal phalanx	Initial lesion on intermediary (and) proximal phalanx	Initial lesion on carpal / tarsal
Blisters at day 2	Absence of blisters	Clear blisters	Hemorrhagic blisters on the digit	Hemorrhagic blisters over carpal / tarsal region

Reference: Cauchey et al. Wilderness and Environmental Medicine. 2001, 12: 248-55.

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11. INITIAL MANAGEMENT –MEDICATIONS: ALL GRADES

- ☐ **ibuprofen 600 mg PO Q6H** (Do NOT give if alteplase and enoxaparin ordered)
  Note: ibuprofen is the NSAID of choice in the managment of frostbite for its prostaglandin effect in addition to analgesia
- ☐ **pantoprazole 40 mg PO DAILY** (if ibuprofen ordered)
- ☐ **acetaminophen 500 to 1,000 mg PO Q6H PRN** for pain
- ☐ **HYDROmorphone 1 mg to 2 mg PO Q4H PRN** for pain
- ☐ **HYDROmorphone 0.5 to 1.0 mg IV Q15MIN PRN** for pain
- ☐ **fentaNYL 25 mcg to 50 mcg IV Q5MIN PRN** for pain (maximum dose 150 mcg / hour)
- ☐ **Tetanus-Diphtheria Toxoid Vaccination 0.5 mL IM × 1 dose**
- ☐ Other: _____

12. MANAGEMENT – GRADE 2- 4 (SEE BACK OF PAGE FOR ILOPROST CONTRAINDICATIONS AND PRECAUTIONS)

- ☐ **Iloprost 0.2 mcg / mL IV infusion for 6 hours daily × 5 days (start within 72H of rewarming)**
  Iloprost is a Special Access Program (SAP) medication requiring documentation on a SAP form. Contact pharmacy as soon as possible to arrange iloprost stock (not available on-site at many locations). Follow iloprost IV monograph for mixing and administration.

☐ 40 to 50 kg	Start infusion at 10 mL / hour (2 mcg / hour) and increase rate by 10 mL / hour (2 mcg / hour) every 30 minutes to a maximum of 30 mL / hour (6 mcg / hour)
☐ 51 to 74 kg	Start infusion at 10 mL / hour (2 mcg / hour) and increase rate by 10 mL / hour (2 mcg / hour) every 30 minutes to a maximum of 40 mL / hour (8 mcg / hour)
☐ 75 kg or more	Start infusion at 10 mL / hour (2 mcg / hour) and increase rate by 10 mL / hour (2 mcg / hour) every 30 minutes to a maximum of 50 mL / hour (10 mcg / hour)

May decrease infusion rate for tolerability (see dose-dependent adverse effects on back of page 2)

Continue infusion until at least 1 bag given AND for a minimum of 6 hours (may require an additional bag)

Repeat infusion daily for a total of 5 days. If infusion well tolerated on Day 1 and 2, may initiate infusion at maximum infusion rate on Day 3 to 5.

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Iloprost Contraindications

- Known hypersensitivity to iloprost or its exipients
- Pregnancy, lactation
- Conditions where the effect of iloprost on platelets might increase risk of hemorrhage (e.g. active peptic ulcers, trauma, intracranial hemorrhage)
- Severe coronary heart disease or unstable angina
- Myocardial infarction within the last 6 months
- Acute or chronic congestive heart failure (NYHA II-IV)
- Severe arrhythmias

Iloprost Special Precautions

- Surgery should not be delayed in patients requiring urgent amputation (e.g. in infected gangrene)
- Iloprost elimination is reduced in patients with hepatic dysfunction and in patients with renal failure requiring dialysis, dose reduction required in this population
- In patients with low blood pressure care should be taken to avoid further hypotension and patients with significant heart disease should be closely monitored
- Monitor for possible orthostatic hypotension in patients getting up from the lying to an upright position after the end of administration
- For patients with a cerebrovascular event (e.g. transient ischemic attack, stroke) within the last 3 months a careful benefit-risk evaluation should be undertaken
- Currently only sporadic reports of use in children and adolescents are available
- Oral ingestion and contact with mucous membranes must be avoided. On contact with the skin, iloprost may provoke long-lasting erythema

Iloprost Dose-dependent Adverse Effects

- If headaches, tachycardia (heart rate greater than 100 beats per minute), palipitations, hypotension (systolic blood pressure less than 90 mmHg), nausea, vomiting or facial flushing occur decrease the infusion rate by 10 mL / hour and reassess 30 minutes later.
- These are dose-related side effects and usually disappear with dose reduction.

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13. MANAGEMENT – MEDICATIONS: GRADE 4 (IF LESS THAN 24 HOURS SINCE REWARMING)

☐ **alteplase 0.15 mg / kg _____ IV over 15 minutes then**

alteplase 0.9 mg / kg _____ IV over 6 hours then discontinue (Total maximum dose 100 mg)

If ALTEPLASE given:

- Give enoxaparin within 30 minutes of starting alteplase infusion
- Enoxaparin as per dosing chart below:

Patient Weight (kg)	eGFR 30 mL / min or greater*
☐ 35 to 45	60 mg subcut once daily × 72 hours
☐ 46 to 59	80 mg subcut once daily × 72 hours
☐ 60 to 72	100 mg subcut once daily × 72 hours
☐ 73 to 88	120 mg subcut once daily × 72 hours
☐ 89 to 100	150 mg subcut once daily × 72 hours
☐ 101 to 114	100 mg subcut Q12H × 72 hours
☐ 115 to 139	120 mg subcut Q12H × 72 hours
☐ 140 to 160	150 mg subcut Q12H × 72 hours
☐ greater than 160	See IH medication manual for dosing guidance
*For patients with eGFR less than 30 mL / min see IH medication manual for enoxaparin dosing guidance or use site specific unfractionated heparin infusion PPO	

ALTEPLASE ABSOLUTE CONTRAINDICATIONS (Do not use if any of the following are present)	**ALTEPLASE RELATIVE CONTRAINDICATIONS**
• History of any intracranial hemorrhage • History of ischemic stroke within the preceding three months (exception: acute ischemic stroke within 4.5 hours, treated with thrombolytic therapy) • Presence of a cerebral vascular malformation • Known primary or metastatic intracranial malignancy • Symptoms or signs suggestive of an aortic dissection • A bleeding diathesis or active bleeding, with the exception of menses • Significant closed-head or facial trauma within the preceding three months • Intracranial or intraspinal surgery within 2 months • Uncontrolled hypertension at presentation (unresponsive to emergency treatment)	• History of chronic, severe, poorly controlled hypertension • Uncontrolled hypertension at presentation (blood pressure greater than 180 mmHg systolic and / or 110 mmHg diastolic) • History of ischemic stroke more than three months previously • Dementia • Traumatic or prolonged (greater than 10 min) CPR • Any known intracranial disease that is not an absolute contraindication • Major surgery within the preceding three weeks • Recent (2 to 4 weeks) internal bleeding • Active peptic ulcer • Noncompressible vascular punctures • Pregnancy • Current use of anticoagulants

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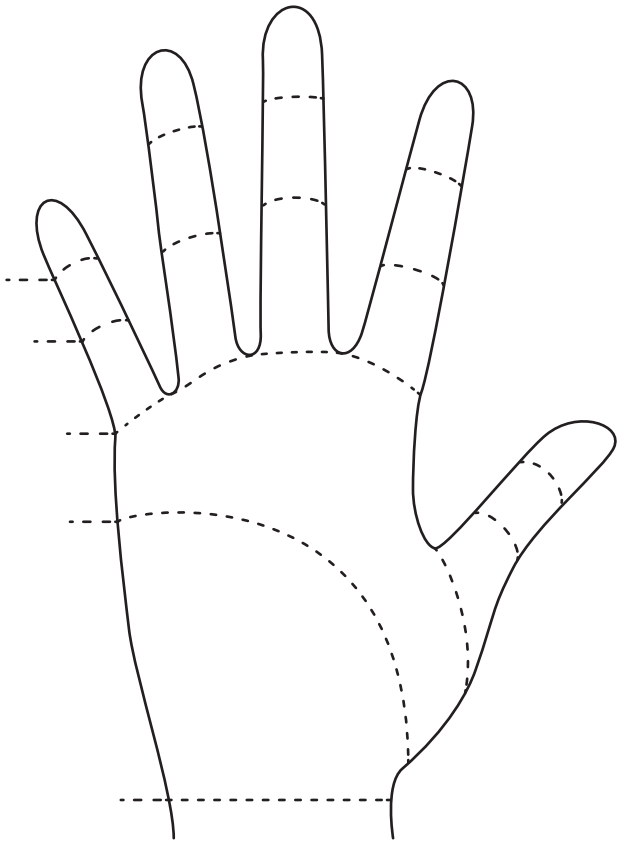
FROSTBITE PROTOCOL QUANTIFICATION OF FROSTBITE INJURY

- Mark with a dark pen the extent of the injury after rewarming. Note skin changes and indicate any evidence of cyanosis and hemorrhagic blisters.
- This sheet can also be used to monitor progress and change



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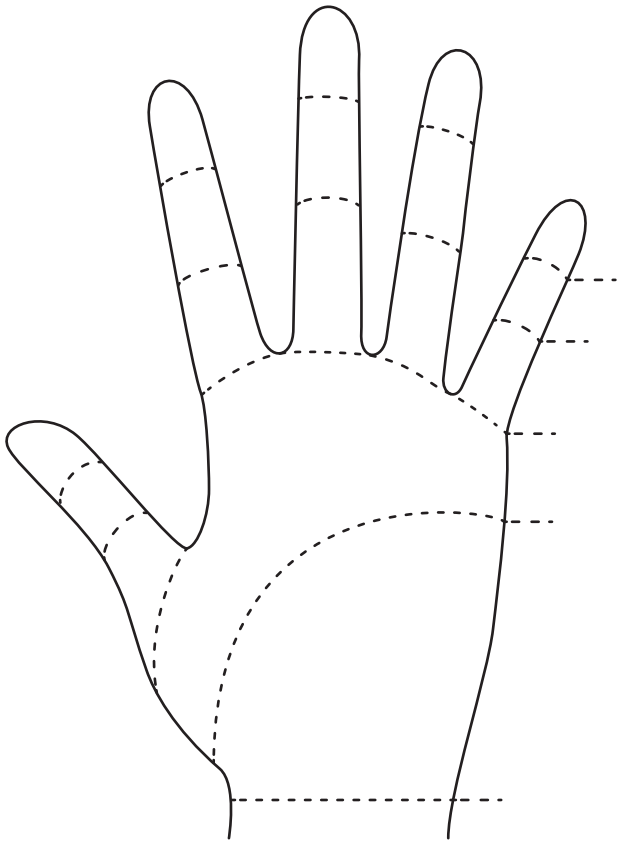

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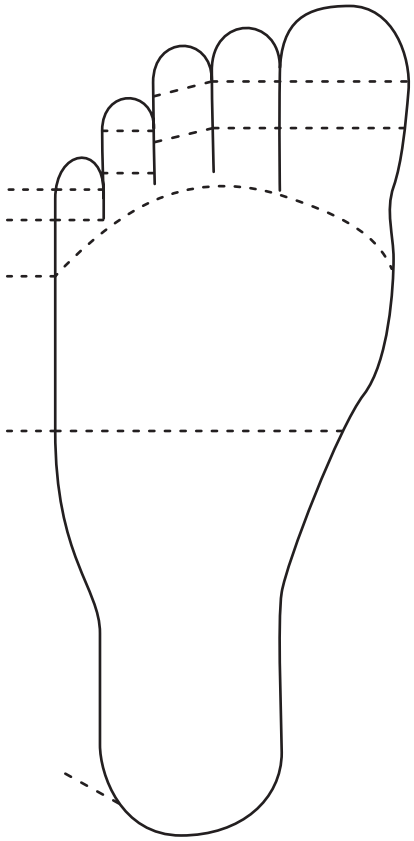

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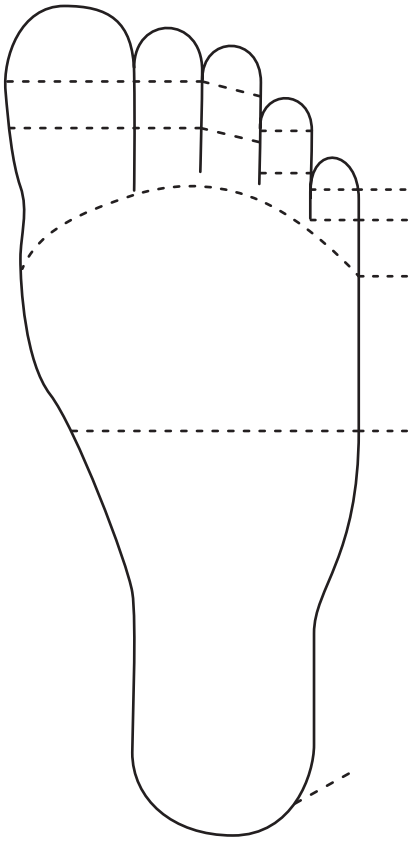

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