

# Simulation Scenario Template

## Section 1: Case Summary

<b>Scenario Title:</b>	<b>Frost Bite</b>
Keywords:	Hypothermia, environmental exposure
Brief Description of Case:	Intoxicated male found outside in cold temperature with frost bite on hands

<b>Goals and Objectives</b>	
Educational Goal:	Management of Frost Bite Injuries
Objectives: (Medical and CRM)	<b>CRM: Situational awareness</b> and still perform primary and secondary surveys. Treat any other injuries/hypothermia. <b>Call for Help Early</b> , once frost bite recognized, seek help early. <b>Medical:</b> Local treatments for severe frostbite and adjunctive therapies.

<b>Scenario Development</b>	
Date of Development:	February 26, 2023
Scenario Developer(s):	Dr Jeanne Macleod
Affiliations/Institutions(s):	RTVS/PHC
Contact E-mail:	<a href="mailto:jmacleod@providencehealthcare.bc.ca">jmacleod@providencehealthcare.bc.ca</a>
Last Revision Date:	
Revised By:	
Version Number:	



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## Section 2A: Initial Patient Information

A. Patient Chart					
Patient Name: Terry Lee		Age: 38	Gender: male	Weight: 70kg	
Presenting complaint: My hands hurt					
Temp: 35	HR: 110	BP: 130/86	RR: 18	O <sub>2</sub> Sat: unable to read	FiO <sub>2</sub> :
Cap glucose: 6			GCS: (E3 V4 M6 )		
Triage note: Patient found intoxicated outside in snowbank. Complaining of bilateral hand pain. Unknown how long he was outside. Brought in by EHS. Noted to be incontinent of urine and no hat or gloves. It is currently - 5 and snowing.					
Allergies: unknown					
Past Medical History: Hx of ETOH use disorder			Current Medications: nil		



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## Section 5: Scenario Progression

Scenario States, Modifiers and Triggers				
Patient State/Vitals	Patient Status	Learner Actions, Modifiers & Triggers to Move to Next State	Facilitator Notes	
<p><b>1. Baseline State</b>                      Rhythm: sinus                      HR: 90                      BP: 110/90                      RR: 18                      O<sub>2</sub>SAT: <b>can't read</b>                      T: 34°C                      GCS: Disoriented and slurred speech, opens eyes to voice. GCS=13</p>	<p><i>Left index finger is numb and appears to have blue/grey discoloration with no doppler pulses</i></p>	<p><u>Expected Learner Actions</u></p> <p><input type="checkbox"/> place on monitor</p> <p><input type="checkbox"/> Rewarming-remove wet clothes/jewellery/warm blankets, warm IV fluids.</p> <p><input type="checkbox"/> Primary survey</p> <p><input type="checkbox"/> Secondary survey- make sure to log roll and look for other injuries-fully expose. Look for signs of head injury and C Spine injury.</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	<p><u>Make sure to measure CORE Temperature</u>-TM thermometer NOT adequate</p> <p>-Make sure to get adequate History of Past Med Hx, tetanus status, other meds or allergies.</p> <p><b>NOTE In order to obtain O2 sat'n need to place on forehead to obtain or once hands are warmed.</b></p> <p><b>Should check for glucose if not then patient will become more confused and obtunded and glucose=2</b></p>	<p>Show pictures of hands</p> <p>Note that left index finger is particularly dusky in appearance- can try to get doppler to assess for arterial pulses which are absent. Place hands in 40 degree celcius bath for 20min.</p> <p>Pain management ibuprofen 400mg/ketorolac IV/narcotics IV.</p> <p>Depending on location of patient order CT head/C spine/contact Plastic surgery/Interventional radiology. OR if in rural area start thinking early transfer.</p>
<p><b>2. Rest of vitals remain similar If re warming then repeat Temp= 35.6 if NO attempt at rewarming, patient starts to shiver and core temp drops to 33 due to exposure and cold IV fluids.</b></p>		<p><u>Expected Learner Actions</u></p> <p><input type="checkbox"/> Core Temperature monitoring and management.</p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p> <p><input type="checkbox"/></p>	<p>-</p> <p>-</p> <p><u>Wound care:</u>                      Provide tetanus                      Do NOT de roof blisters                      Non adherent (mepilex) dressing                      Antibiotic phx's.                      Pentoifylline 400mg Po TID ( adjust for renal failure)</p>	



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<p><b>3. Temp=36</b>  <b>O2 sat'n= 95%</b>  <b>RR=18</b>  <b>BP= 120/80</b>  <b>HR=70</b></p> <p><b>GCS improving to 14</b></p>		<p><u>Expected Learner Actions</u></p> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p><u>Modifiers</u></p> <p>-</p> <p>-</p> <p>-</p> <p><u>Triggers</u></p> <p>-</p> <p>-</p>	<p><u>Early recognition of third degree frostbite</u></p> <p>Urgent Transfer to a site with potential for intra arterial tPA by interventional radiology.</p> <p>OR if unable to transfer then refer to document below for options to treat with Iloprost.</p>
<p><b>4.</b></p>		<p><u>Expected Learner Actions</u></p> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<p><u>Modifiers</u></p> <p>-</p> <p>-</p> <p>-</p> <p><u>Triggers</u></p> <p>-</p> <p>-</p>	



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## Appendix A: Laboratory Results

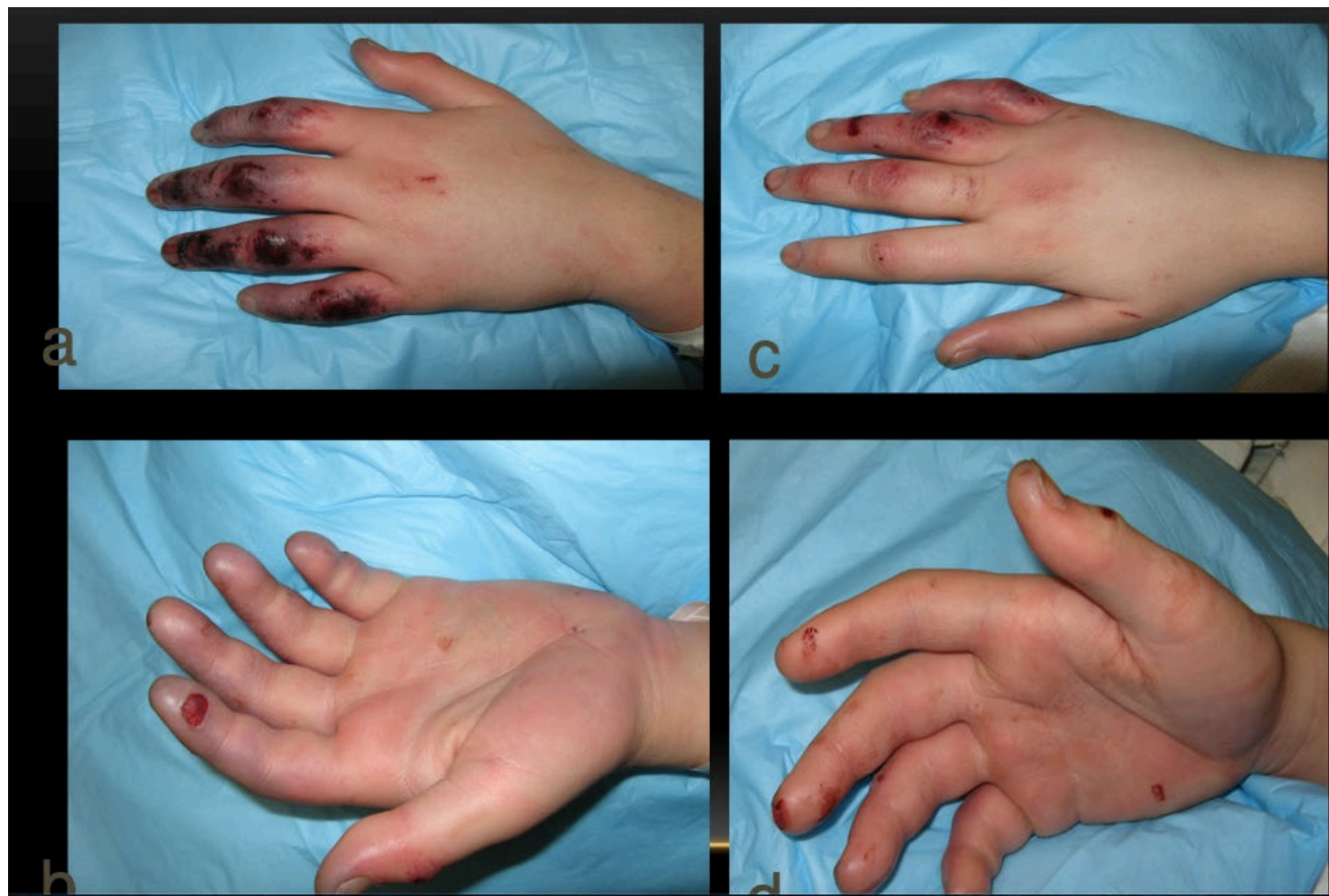
<p><u>CBC</u> WBC- 17 Hgb - 120 Plt- 75</p> <p><u>Lytes</u> Na= 141 K=3.9 Cl= 105 HCO<sub>3</sub> = 24 AG=17 Urea= 2.4 Cr= 100 Glucose=6.4</p> <p><u>Extended Lytes</u> Ca=1.12 Mg PO<sub>4</sub> Albumin TSH</p> <p><u>VBG</u> pH pCO<sub>2</sub> pO<sub>2</sub> HCO<sub>3</sub> Lactate</p>	<p><u>Cardiac/Coags</u> Trop D-dimer INR aPTT</p> <p><u>Biliary</u> AST ALT GGT ALP Bili Lipase</p> <p><u>Tox</u> EtOH = 75 ASA Tylenol Dig level Osmols</p> <p><u>Other</u> B-HCG</p>
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## Appendix B: ECGs, X-rays, Ultrasounds and Pictures

*Paste in any auxiliary files required for running the session. Don't forget to include their source so you can find them later!*



<https://mitrauma.org/wp-content/uploads/2015/06/Wagner-frostbite-.pdf>



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## Appendix C: Facilitator Cheat Sheet & Debriefing Tips

*Include key errors to watch for and common challenges with the case. List issues expected to be part of the debriefing discussion. Supplemental information regarding any relevant pathophysiology, guidelines, or management information that may be reviewed during debriefing should be provided for facilitators to have as a reference.*

[https://www.wemjournal.org/article/S1080-6032\(19\)30097-3/fulltext](https://www.wemjournal.org/article/S1080-6032(19)30097-3/fulltext) (2019 reference)

### **Table 2 Summary of initial hospital management of frostbite**

1. Treat hypothermia or serious trauma.
2. Rapidly rewarm in water heated and maintained between 37 and 39°C (98.6 and 102.2°F) until area becomes soft and pliable to the touch (approximately 30 min).
3. Ibuprofen (12 mg·kg<sup>-1</sup> per day divided twice daily).
4. Pain medication (eg, opiate) as needed.
5. Tetanus prophylaxis.
6. Air dry (ie, do not rub at any point).
7. Debridement: selectively drain (eg, by needle aspiration) clear blisters and leave hemorrhagic blisters intact.
8. Topical aloe vera every 6 h with dressing changes.
9. Dry, bulky dressings.
10. Elevate the affected body part if possible.
11. Systemic hydration.
12. Thrombolytic therapy: consider for deep frostbite at the distal interphalangeal joint or proximal if less than 24 h after thawing; use angiography for prethrombolytic intervention and monitoring of progress. Consider intravenous thrombolysis if angiography is not available.
13. Iloprost therapy: consider for deep frostbite to or proximal to the proximal interphalangeal joint, within 48 h after injury, especially if angiography is not available or with contraindications to thrombolysis.
14. Clinical examination (plus angiography or technetium-99 bone scan if necessary) to assist determination of surgical margins. Evaluation by an experienced surgeon for possible intervention.

Clear or cloudy blisters contain prostaglandins and thromboxanes that may damage underlying tissue. Hemorrhagic blisters are thought to signify deeper tissue damage extending into the dermal vascular plexus. Common practice is to drain clear blisters (eg, by needle aspiration) while leaving hemorrhagic blisters intact. Although this approach to frostbite blister management is recommended by many authorities, comparative studies have not been performed and data are insufficient to make absolute recommendations.

Frostbite is not an inherently infection-prone injury. Therefore, antibiotic administration specifically for preventing infection during or after frostbite injury is not supported by evidence. Some authorities reserve antibiotics for situations when edema occurs after thawing because of the notion that edema increases skin susceptibility to infection by gram-positive bacteria.

However, this practice is not based on evidence. Systemic antibiotics, either oral or parenteral, should be administered to patients with significant trauma, other potential infectious sources, or signs and symptoms of cellulitis or sepsis.

When considering using a thrombolytic, a risk-benefit analysis should be performed. Only deep injuries with potential for significant morbidity (eg, extending into the proximal interphalangeal joints of digits) should be considered for thrombolytic therapy. Potential risks of tPA include systemic and catheter site bleeding, compartment syndrome, and failure to salvage tissue. The long-term, functional consequences of digit salvage using tPA have not been fully evaluated.





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Thrombolytic treatment should be undertaken in a facility familiar with the technique and with intensive care monitoring capabilities. If a frostbite patient is being cared for in a remote area, transfer to a facility with tPA administration and monitoring capabilities should be considered if tPA can be started within 24 h of tissue thawing. Time to thrombolysis appears to be very important, with best outcomes within 12 h and ideally as soon as possible. **Recent work from Hennepin County has found that each hour of delay of thrombolytic therapy results in a 28% decrease in salvage.**

**Iloprost, a prostacyclin (PGI<sub>2</sub>) analogue, is a potent vasodilator that also inhibits platelet aggregation, down-regulates lymphocyte adhesion to endothelial cells, and may have fibrinolytic activity.**

Intravenous iloprost should be considered first-line therapy for grade 3 and 4 frostbite <72 h after injury, when tPA is contraindicated, and in austere environments where tPA infusion is considered risky or evacuation to a treatment facility will be delayed.

**No evidence supports use of low molecular weight heparin or unfractionated heparin for initial management of frostbite in the field or hospital,**

Pentoxifylline, a methylxanthine-derived phosphodiesterase inhibitor, has been widely used for treatment of peripheral vascular disease and yielded promising results in animal and human frostbite. Hayes et al recommend pentoxifylline in the controlled-release form of one 400 mg tablet 3 times a day with meals, continued for 2 to 6 wk. Controlled studies of pentoxifylline in management of frostbite have not been performed.

## References

1. [https://www.wemjournal.org/article/S1080-6032\(19\)30097-3/fulltext](https://www.wemjournal.org/article/S1080-6032(19)30097-3/fulltext)
2. [https://www.bcemergencynetwork.ca/sim\\_cases/hypothermia/](https://www.bcemergencynetwork.ca/sim_cases/hypothermia/)
- 3.

