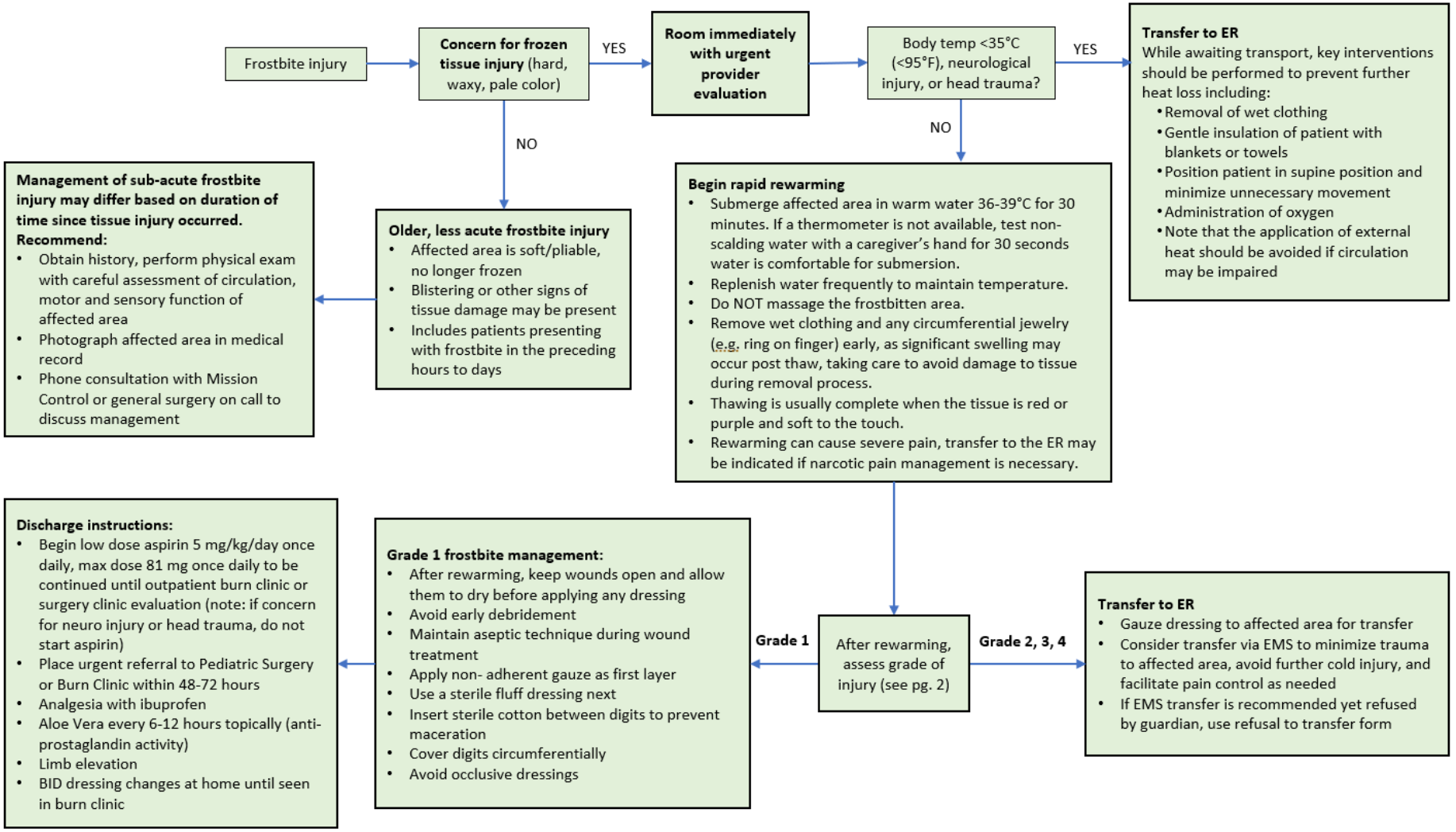
Urgent Care Frostbite Management



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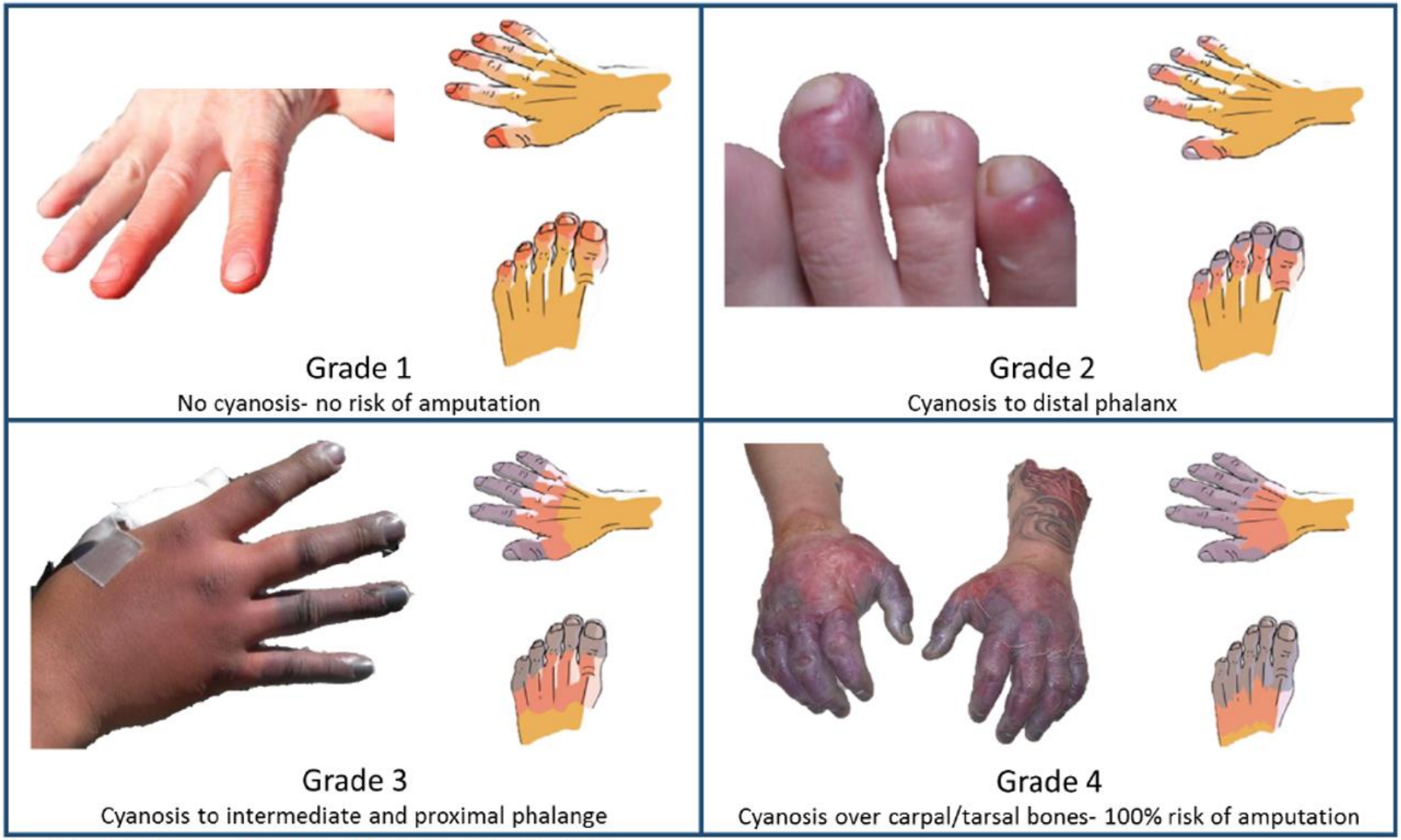
Children's Wisconsin

Urgent Care Frostbite Management: Grading Frostbite After Rapid Rewarming



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Purpose: To evaluate and initiate treatment of frostbite.

If the child has hypothermia, extensive injuries, an injury that requires narcotics for pain management, or has deep frostbite, initiate treatment and begin transfer to the Emergency Room.

Definitions:

Frostbite: the freezing of tissue that causes crystal formation and cellular destruction. This may result in tissue dehydration, local oxygen depletion, small vessel thrombosis, and eventually gangrene.

For the purposes of this guideline:

- Acute frostbite: the presence of tissue that is acutely frozen
- Sub-acute frostbite: tissue injuries that present post tissue thawing and do not require rapid rewarming

Frostnip: cold induced paresthesias that resolve with rewarming and do not cause any permanent tissue damage.

Guideline

Subjective Data/History

- Early symptoms of frostbite include blanched skin with a stinging or burning sensation. These are followed by a dull, aching sensation with the loss of flexibility, and this may progress to a loss of pain sensation. (Zafren, 2024)
- Assess history of injury that may suggest additional trauma, specifically neurologic injury or head trauma which may warrant higher level of care.
- Determine timing of injury: if frozen tissue present, patient needs urgent evaluation and treatment (frozen tissue may be present if the injury occurred recently without a rewarming period)

Objective Data/Physical Exam

Frozen tissue appears gray/white, hard and waxy in texture.Blistering may occur from 1-24 hours after the injury. Cyanosis or necrosis of affected tissue may be present. (Zafren, 2024)

- Assess for presence of hypothermia (T<35°C)
- Assess for additional injuries beyond frostbite, especially presence of neurologic injury or head trauma

Diagnostic Studies - *none indicated*

Treatment: Urgent transfer to the ER is appropriate for patients with hypothermia (T<35°C/95°F), neurological injury, head trauma, or additional injuries outside the scope of Urgent Care

- While arranging transport for hypothermia, prevent further heat loss by:
    - Removal of wet clothing
    - Gentle insulation of the patient with blankets or towels
    - Position the patient in a supine position and minimize unnecessary movement
    - Administer oxygen if needed
    - The application of external heat should be avoided if circulation may be impaired
    - Do not rub areas of frostbite
    - Do not walk on frostbitten feet (Corneli H. &., 2024)

Acute frostbite: rapid rewarming is the cornerstone of acute frostbite management

- Submerge affected area in warm water, 37-39°C (Mcintosh S. &, 2019), for 30 minutes. If a thermometer is not available, use non-scalding water that the area may comfortably be submerged in.
- Gentle active range of motion may be used, but avoid rubbing the area or traumatizing area by bumping into walls of container.
- Thawing is complete when the tissue is red or purple and soft to the touch.
- Rewarming of the area may be extremely painful and may require narcotic pain medication. Arrange transfer to ED for pain control if necessary, but do not discontinue rewarming once initiated as rapid rewarming offers the best outcome.
- Remove any circumferential jewelry (e.g. ring on finger) early, as significant swelling may occur post thaw, taking care to avoid damage to tissue during removal process. (Zafren, 2024)

Grading of frostbite of the extremities following rapid rewarming assists in determining management (see chart on page 2).

- Grade 1: No cyanosis present following rewarming (predicts no amputation or sequelae)
- Grade 2: Cyanosis isolated to distal phalanx only (predicts soft tissue amputation and/or fingernail or toenail sequelae)
- Grade 3: Cyanosis to middle or proximal phalanx (predicts bone amputation of the digit)
- Grade 4: Cyanosis to the carpal bones (hand) or tarsal bones (foot) (predicts bone amputation of the limb) (Zafren, 2024)

Grade 2, 3, or 4 frostbite requires transfer to the Emergency Room

- Many patients will require admission for pain management and observation as tissue damage may evolve over time
- Dress area of frostbite with simple gauze dressing, consider transfer by EMS to minimize risk of trauma to affected area, avoid further cold injury, and aid in pain management as necessary

Grade 1 frostbite can be managed in Urgent Care with outpatient follow up in Burn Clinic or Pediatric Surgery Clinic

- Dress the wound
  - After rewarming, allow wounds to air dry before applying dressing
  - Maintain aseptic technique during wound treatment
  - Apply non-adherent gauze as first layer
  - Use a sterile fluff dressing next
  - Cover digits by wrapping around the circumference taking care to not wrap too tight
  - Insert sterile cotton between digits to prevent maceration
  - Avoid occlusive dressings
- Splint the area, as appropriate, to prevent contracture formation
- Avoid early debridement
- Provide Tetanus prophylaxis as appropriate (Zafren, 2024)
- **Home management of grade 1 frostbite**
  - Prescribe low dose aspirin 5 mg/kg/day (max 81 mg per dose once daily), continue until burn/surgery clinic follow up
  - Recommend ibuprofen for pain control and anti-inflammatory effects
  - Topical Aloe Vera applied Q 6-12 hours (due to its anti-prostaglandin activity) with dressing changes
  - Continue dressing changes at least twice daily with non-adherent gauze and sterile fluff
  - Elevate limb
  - Prophylactic antibiotics are not indicated. However, patients with any sign of infection should be admitted for parenteral antibiotics. Topical antibiotics may cause maceration and should be avoided. (Handford, 2014)

Sub-acute frostbite

- Patients with sub-acute frostbite may have variable findings on exam based on the length of time since the injury occurred, and the degree of tissue damage. Expected findings may include blistering, tissue breakdown, cyanosis or necrosis.
- These patients do not require rapid rewarming, as tissue thawing has already occurred.
- Perform careful exam, paying attention to sensory and motor function, as well as circulation to affected area.
- Include photographs of affected area in medical chart.
- Consult CW ED or Pediatric Surgery on call to discuss management plan as treatment

recommendations may vary based on time since injury and degree of tissue damage.

Follow up

- All patients with Grade 1 frostbite should receive urgent follow up in burn clinic or pediatric surgery clinic, ideally within 48-72 hours
- If signs or symptoms of infection develop (increased pain, redness, swelling, drainage or fever), the child should be evaluated urgently

Education of Patient/Family

- To help prevent frostbite, take care not to stay out in the cold for too long and dress warmlywith layers of clothing, especially covering higher risk areas.
- *Patients with a history of frostbite have an increased susceptibility to frostbite.* (Zafren, 2024)
- Cold exposure is contraindicated for 6 months after minor injury and for at least 12 months after significant cold injury.
- Special precautions to protect previously injured tissue may need to be taken indefinitely to prevent further damage. (Zafren, 2024)

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Treatment information also provided by Lynn Calaway, PA, General Surgery, Children's Wisconsin, and David Gourlay, MD, General Surgery, Trauma Director, Children's Wisconsin (personal communication, November 2021).

Treatment information also provided by Danielle Leranth, PA, General Surgery, Children's Wisconsin, (personal communication, May 2025).

Urgent Care Evidence Based Guideline: Frostbite

Approved by Urgent Care Clinical Practice Council and Medical Directors 6/2025

Medical Disclaimer

This Clinical Practice Guideline (CPG) is designed to provide a framework for evaluation and treatment. It is not intended to establish a protocol for all patients with this condition, nor is it intended to replace a clinician's judgement. Adherence to this CPG is voluntary. Decisions to adopt recommendations from this CPG must be made by the clinician in light of available resources and the individual circumstances of the patient. Medicine is a dynamic science; as research and clinical experience enhance and inform the practice of medicine, changes in treatment protocols and drug therapies are required. The authors have checked with sources believed to be reliable in their effort to provide information that is complete and generally in accord with standards accepted at the time of publication. However, because of the possibility of human error and changes in medical science, neither the authors nor Children's Hospital and Health System, Inc., nor any other party involved in the preparation of this work warrant that the information contained in this work is in every respect accurate or complete, and they are not responsible for any errors in, omissions from, or results obtained from the use of this information.

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