

# JOINT TRAUMA SYSTEM



## FROSTBITE AND IMMERSION FOOT CARE

### CLINICAL PRACTICE GUIDELINE (CPG) TRAINING

*Joint Trauma System Trauma Care Educational Program*



# DISCLOSURE/DISCLAIMER



- ◆ No financial disclosures
- ◆ The view(s) expressed herein are those of the author(s) and do not reflect the official policy or position of Brooke Army Medical Center, the U.S. Army or Air Force Medical Department, the U.S. Army or Air Force Office of the Surgeon General, or the Department of Defense or the U.S. Government.

# AGENDA



- ◆ Purpose
- ◆ Summary
- ◆ Background
- ◆ Clinical Identification
- ◆ Frostbite
- ◆ Immersion Foot
- ◆ Performance Improvement (PI) Monitoring
- ◆ References
- ◆ Appendices
- ◆ Contributors

# PURPOSE



- ◆ These slides are based on the JTS Frostbite and Immersion Foot Care CPG which presents a standardized approach to providers in the evaluation and treatment of patients with cold injuries including the role of intravascular therapy.
- ◆ Date of CPG publication: 26 Jan 2017
- ◆ JTS CPGs are evidence-based guidelines developed by subject matter experts in the military and civilian communities. CPGs are compiled from DoD Trauma Registry data, health data abstracted from patient records and after action reports.
- ◆ Information contained in this presentation is only a guideline and not a substitute for clinical judgment.

# SUMMARY



- ◆ Patients with frostbite should have the affected extremity rapidly rewarmed in 104-108°F water for 15-30 minutes.
- ◆ Thrombolytic therapy should be considered if available.
- ◆ Patients with immersion foot should be treated with dry heat.

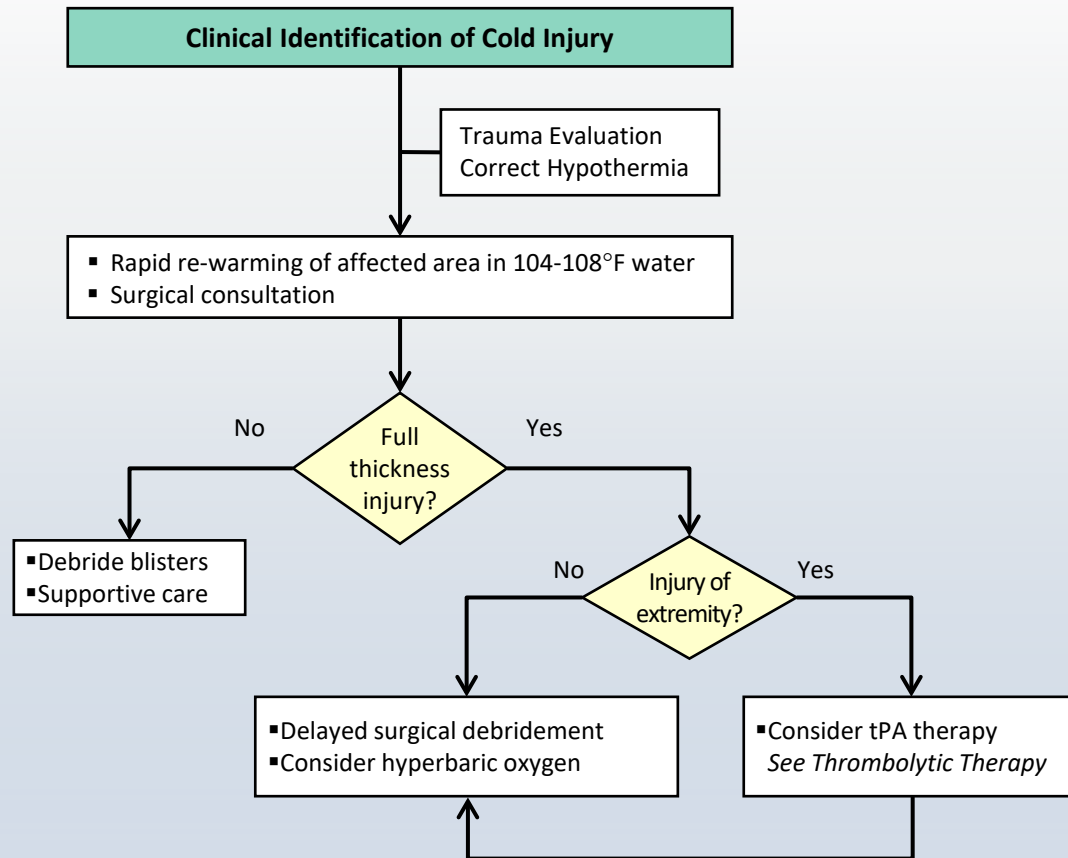
# BACKGROUND



## Cold Injury/Frostbite

- ◆ Can be described as superficial and full thickness similar to burns.
- ◆ Extent of injury is not easy to know immediately. The ultimate grade will not be known until treatment has been attempted and time has passed.

# CLINICAL IDENTIFICATION





# EVALUATION - COLD INJURY

Risk factors for cold injury include a combination of:

- ◆ Low absolute temperature
- ◆ Duration of exposure
- ◆ Racial background
- ◆ Smoking
- ◆ Altitude





# EVALUATION-COLD INJURY

- ◇ Evaluation for cold injury/frostbite
  - ◆ Identification of injury
  - ◆ Injury expected to have occurred when there is pain and swelling or gross signs of ischemia or skin injury.
- ◇ Evaluation includes:
  - ◆ Standard trauma evaluation.
  - ◆ Identifying and correcting underlying hypothermia.
  - ◆ Preventing refreezing of suspected cold injury.

# EVALUATION-COLD INJURY



## 4 Broad Categories

- ◆ **1<sup>st</sup> Degree:** Superficial skin injury; pain on re-warming, numbness, hyperemia, occasional blue mottling, swelling and superficial desquamation (desquamation starts at about 5 days)
- ◆ **2<sup>nd</sup> Degree:** Partial thickness injury to skin; in addition to 1<sup>st</sup> degree findings, vesiculation of the skin is surrounded by erythema and edema (appears around day 2).
- ◆ **3<sup>rd</sup> Degree:** Entire thickness of skin extending into subcutaneous tissue; bluish to black and nondeformable skin, hemorrhagic blisters, vesicles may not be present, eventual ulcerations can be expected; area will likely be surrounded by 1st or 2nd degree injury
- ◆ **4<sup>th</sup> Degree:** Similar to third degree, but full thickness damage including bone. Area may be cold to touch and may feel stiff or woody.



# TREATMENT - FROSTBITE

- ◆ Rapid rewarming at 104-108°F (40-42°C) for 15-30 minutes
  - ◆ *Temperature is important. DO NOT just place in warm-to-touch water*
  - ◆ Warm water and verify temperature; too hot will cause burns.
- ◆ Liberal pain control is imperative with combination of narcotic and non-steroidal medications as rewarming will be very painful.
- ◆ No tobacco or nicotine.
- ◆ If possible, transfer any full thickness injuries to higher level of care. Mild injury can likely be managed at site of injury.

# TREATMENT - FROSTBITE



- ◆ Thrombolytic therapy
  - ◆ Should be attempted within 24 hours of the start of injury for severe injuries with evidence of circulatory compromise (ischemic discoloration of distal digits/absent pulses, etc.).
  - ◆ Should only be done at a location capable of dealing with bleeding complications.
- ◆ Additional measures can include:
  - ◆ Topical aloe vera
  - ◆ Hyperbaric oxygen
  - ◆ Whirlpool therapy with exercise
- ◆ Surgical debridement should not be performed in the operational environment.



# EVALUATION - IMMERSION FOOT

## ◆ Presentation

- ◆ Immersion foot is also known as trench foot.
- ◆ Water logging of the foot.
- ◆ Prolonged exposure results in hyperemic, mottled, painful and edematous foot which can progress into hypoperfusion, ulceration and gangrene

## ◆ Risk factors

- ◆ Continuous moist environment
- ◆ Low absolute temperature
  - ◇ Cold temperature: approximately 12 hours before onset
  - ◇ Warm temperature: approximately 48 hours before onset



# TREATMENT - IMMERSION FOOT

## Treatment of Immersion Foot

- ◆ In contrast to frostbite, air dry extremity at room temperature.
- ◆ Do not routinely provide antibiotics, but if concerned for infection treat for streptococcal, staphylococcal and *P. aeruginosa* based on local antibiogram.
- ◆ Pain control and debridement of necrotic tissue may be required.

# PI MONITORING



## ◆ Population of Interest

All patients diagnosed with cold injury (frostbite) or immersion foot.

## ◆ Intent (Expected Outcomes)

- ◆ Patients with diagnosis of frostbite have rewarming of affected extremities with 104-108° F (40-42° C) water.
- ◆ Patients with severe cold injury (frostbite with tissue necrosis) AND who undergo rewarming within 24 hours of the start of cold injury receive TPA, unless documented contraindication.
- ◆ Patients with immersion foot have dry heat administered.

# PI MONITORING



## ◆ Performance/Adherence Measures

- ◆ Number and percentage of patients in the population of interest who have documentation of treatment with water heated to 104-108° F (40-42° C).
- ◆ Number and percentage of patients with severe cold injury (frostbite with tissue necrosis) AND who undergo rewarming within 24 hours of the start of cold injury who receive TPA.
- ◆ Number and percentage of patients with severe cold injury (frostbite with tissue necrosis) AND who undergo rewarming within 24 hours of the start of cold injury who receive TPA or have a contraindication documented.
- ◆ Number and percentage of patients with immersion foot who have documentation of dry heat administered.

## ◆ Data Source

- ◆ Patient record
- ◆ Department of Defense Trauma Registry



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# APPENDICES IN CPG



- ◆ **Appendix A: Clinical Identification of Cold Injury**
- ◆ **Appendix B: Additional Information Regarding Off-label Uses in CPGs**

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