Yukon-Kuskokwim HEALTH CORPORATION

Clinical Guideline

Hypothermia

Hypothermic patient.

- Palpate for a pulse for a full minute.
- If able, use ultrasound to assess for cardiac activity. If cardiac contractions seen, do not do CPR, as this can provoke a lethal arrhythmia.

Pulse or cardiac contractions present

- Obtain core temperature. Insulate to prevent further heat loss.
- Remove cold/wet clothing. Consider placing defibrillator pads.
- POC glucose and labs. Insert large bore IVs.

No pulse or cardiac contractions

- No obvious lethal injury.
- Chest not too stiff for chest compressions.
- No clear history of arrest before hypothermia.

Mild

32 – 35 °C
(89.6 – 95 °F)

- Passive external rewarming.
- If trauma present, give volume resuscitation per ATLS and add active external rewarming.

Moderate

28 – 32 °C
(82.4 – 89.6 °F)

- Passive and active external rewarming.
- Consider warm IV fluids and oxygen.
- Volume replacement.

Severe

< 28 °C
(< 82.4 °F)

- Place defibrillator pads.
- ET intubation.
- Volume replacement.
- Active external rewarming.
- Active internal rewarming.
- If hemodynamically unstable, rewarm to 30 °C, then re-evaluate.

Initiate ACLS:
CPR, ET intubation, rhythm check.
Place large-bore IVs.
POC glucose and labs.

- If VT/VF, defibrillate once at 200 J.
- Administer one round of ACLS drugs.

- If no ROSC, initiate active internal rewarming to 30 – 32 °C (86 – 89 °F), then re-evaluate.
- No further meds or shocks until temp >30°C (86°F).
- When temp 30 – 35 °C (86 – 95 °F), resume defibrillation per ACLS and give ACLS medications at regular doses but double the typical interval between administration.
- When temp >35, resume regular dosing intervals.
- If ROSC, rewarm per pathway to left.

Village/SRC Management

- Hypothermia with a pulse: Passive external rewarming. Add Bair Hugger if SRC. POC glucose. Consider medevac for moderate or severe.
- Hypothermia with no pulse: Perform CPR for at least 30 minutes (or longer per team discretion).

Core Temperature

Esophageal probe preferred over rectal in intubated patients. Place after intubation and verify placement with CXR. Preferred location is distal third of esophagus. Estimate insertion length using OG landmarks but end at mid-sternum rather than xyphoid. Oral insertion route preferred.

Contact

ANMC Trauma Surgeons are the consultants of choice. Contact them via Tiger Connect ANMC On-Call General Surgery/Trauma Attending.

Rewarming Methods

If goal rewarming rate not met after one hour, escalate to next level.

Rewarm trunk first and minimize movement (especially of extremities) to avoid increasing the return of cold blood to central circulation, which can lead to hemodynamic instability and cardiac arrest (known as core afterdrop).

- Passive external rewarming: Remove cold stress and wet clothing. Place in warm, dry environment. Provide insulation with warm blankets. Allow shivering.
  Goal increase 0.5 °C/hour (~1 °F/hour).
- Active external rewarming: Add exogenous heat via forced-air rewarming device (Bair Hugger™), external temperature control system (Arctic Sun™), or radiant warmer for young children.
  Goal increase 2 °C/hour (~3.5 °F/hour).
- Active internal rewarming:
  - Warm IV fluids: Use normal saline and not LR, as hepatic metabolism of lactate is impaired. IVF should be 40 – 42 °C (104 – 107 °F). If no warmer available, place a 1L bag of NS in a conventional microwave for 30 second intervals until temperature 40 °C/104 °F. Do not do this with blood products, dextrose-containing fluids, or glass bottles.
  - **Thoracic cavity lavage**
  - **Peritoneal lavage**

When to Cease Resuscitative Efforts

- If potassium >10.
- If temperature >32°C (89°F) and no ROSC.

Decision to continue resuscitative efforts must be based on clinical judgment and available resources. Providers are encouraged to contact the CD on call or clinical ethicist early in resuscitative efforts for guidance. In a mass casualty event or when the number of critically ill patients requiring treatment exceeds the capability of the available staff and resources, consultation with CD on call and the clinical ethicist should occur promptly.

Pitfalls & Pearls

- Avoid transporting in hospital until patient is rewarmed to 30 – 32 °C (86 – 89 °F).
- If passive external rewarming fails to rewarm a mildly hypothermic patient, strongly consider antibiotics, as infection can contribute to slowed/failed rewarming.
- Pupils can be fixed and dilated below 27 °C (80 °F) without associated neurologic deficit.
- Bradycardia is expected in moderate or severe hypothermia. Normal heart rate should be considered relative tachycardia in these patients.
- Hyperkalemia can be present without EKG changes. Potassium levels can fluctuate rapidly during rewarming.
- If placing CVL, femoral line preferred to avoid irritating heart.
- YKHC ventilators cannot warm air. High-flow nasal cannula, BiPAP, and CPAP can warm air.