1 HYPOTHERMIA INDUCTION PHASE OF PROTOCOL
   a. **Diagnosis:** S/P Cardiac Arrest with Return of Spontaneous Circulation (ROSC). Time of ROSC: __________________
   b. **Condition:** Critical

2 Inclusion Criteria (All must be present)
   a. Non Traumatic Cardiac Arrest (V. Fib, V. Tach, Asystole, PEA) with ROSC.
   b. Age greater than 16.
   c. Core Temperature greater than 30°C (93°F) at presentation.
   d. Comatose: GCS less than 6 intubated (total of eye and motor since no verbal).
   e. Time to initiation of hypothermia is less than 6 hours.
   f. Negative HCG if childbearing potential.

3 EXCLUSION CRITERIA (ALL MUST BE ABSENT)
   a. Non cardiac arrest etiology for coma (Status epilepticus, trauma, intracerebral hemorrhage).
   b. Uncontrolled GI bleeding or known coagulopathy.
   c. Conflict with Advanced Directives or DNR status.
   d. Uncontrollable arrhythmias.
   e. Sepsis suspected as cause of cardiac arrest.
   f. Major intracranial, intrathoracic, or intra-abdominal surgery within 14 days.
   g. Pregnancy.

4 RELATIVE CONTRAINDICATION: Prolonged arrest time greater than 60 minutes.

5 NURSING INSTRUCTIONS
   a. BP, MAP, HR, O₂, saturation, ETCO₂ (if available) q 15 minutes.
   b. Record core temp. q 15 min. until core temp. goal of 32°C-34°C (90°F-93°F) is achieved, then q 30 min.
   c. **Do NOT cool patient to less than 32°C (90°F)**
   d. Insert OGT and place to intermittent low wall suction.
   e. Maintain one-to-one nurse-to-patient assignment during induction and re-warming phases.

6 SET-UP PLACEMENT WITH CENTRAL LINE BUNDLE
   □ Arterial line (prior to inducing hypothermia if possible).
   □ Central line

7 LABS
   a. CBC w/Auto Diff., PT/PTT/INR, CMP, Magnesium, Phosphorus, Lactate q 6 hours.
   b. CPK, CK MB
   c. UA dip and microscopic.
   d. Urine HCG for all women of child-bearing age.
**INDUCTION COOLING PHASE** (Goal is core temp to 32°-34°C (90°-93°) within 6 hours of onset of arrest)

- Document Date and Time Cooling Initiated: __________________________
- Perform and document neurological exam prior to administration of sedation/NMBA.
- Keep head of bed at 30 degrees.
- Remove all of patient’s clothing.
- Insert temperature-sensing Foley catheter (primary core temperature source unless oliguria present).
- Insert secondary core temperature monitoring source.

**SEDATION** (Always sedate prior to initiating hypothermia and/or administering NMBA)

- Midazolam 2 mg IV bolus and then start infusion at 2mg/hr. May bolus 2 mg IV q 15 minutes PRN and increase infusion by 2 mg/hr. q 15 minutes to a maximum of 10 mg/hr. for shivering and/or agitation, unexplained tachycardia and/or hypertension.

For signs of insufficient sedation at 10mg/hr, contact Intensivist for further instructions.

**NEUROMUSCULAR BLOCKING AGENT (NMBA)** (Following adequate sedation/analgesia and prior to initiating hypothermia)

- Vecuronium (Norcuron) _____mg IV bolus (usual dose 0.1mg/kg) and then begin infusion at 1 mcg/kg/min until temperature of 33°C is achieved. Once goal temperature has been achieved, discontinue the IV infusion. Obtain and document train of four (TOF) prior to administration of medication.

**COOLING INSTRUCTIONS**

- Always use a barrier between cooling blankets and/or ice packs and patient’s skin. If using Arctic Sun, place pads directly on bare skin.
- Document skin assessment q 2 hours during hypothermia period.
- Initiate Gaymar cooling blankets X 2 in auto mode. (Set goal temperature to 33°C).
- Apply ice packs to neck, axilla and groin.
- Once patient’s core temperature has reached goal of 32°-34°C, remove all ice packs and maintain cooling blankets X 2 at 33° C.
- If unable to achieve goal core temperature, administer 4°C NS at 30 ml/kg over 1 hour through central line.
- If goal temperature not achieved after cold saline infusion, notify Intensivist.
- Document Date and Time that core temperature goal is achieved: __________________________

**PHYSICIAN’S SIGNATURE**

**PHYSICIAN MUST INITIAL ALL PAGES THAT ARE NOT SIGNED:**

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**Induced Hypothermia for Post-Cardiac Arrest Patients - Emergency Medicine**
MAINTENANCE PHASE OF HYPOTHERMIA PROTOCOL

a. Goal temperature is 32°-34°C for 24 hours from initiation of protocol.
b. Obtain CMP and ABG once goal temperature has been reached.
c. Repeat CMP every 6 hours until normothermic. Obtain Troponin q 4 hours X 3.
d. Continuous pulse oximetry with forehead sensor.
e. Follow BHS Endo-tool Orders to maintain glucose at 110-140 using:
   - D10W at 60 mL/hr. IV
   - D51/2NS at 125 mL/hr. IV
   - Other fluids with equivalent 6.15 gm/hr. carb. Content:
   - Obtain blood cultures X2 from separate sites 12 hours after initiation of hypothermia.

If patient awakens and follows commands at any time during the protocol, discontinue and allow the patient to passively re-warm.

MEDICATIONS

a. Continue Midazolam infusion at current rate or bolus 2 mg IV X 1 and begin infusion at 2mg/hour. May bolus 2mg IV q 15 minutes PRN and increase infusion by 2 mg/hr. q 15 minutes to a maximum of 10 mg/hr. for shivering and/or agitation, unexplained tachycardia and/or hypertension.
b. Ocular lubricant to both eyes q 8 hours while on paralytics.

IF SHIVERING OCCURS ONCE THE GOAL TEMPERATURE HAS BEEN REACHED:

a. Maximize Midazolam boluses and infusion for 1 hours to a maximum dose of 10 mg/hr. Then
b. Administer Vecuronium 0.1mg/kg IV X 1 and start infusion at 1 mcg/kg/min. Continue Vecuronium infusion until the re-warming phase begins. Titrate for TOF of 2/4.
c. Call Intensivist if shivering continues despite additional Vecuronium use.

ELECTROLYTE REPLACEMENT (Avoid Dextrose-containing fluids and do not use standard BHS Electrolyte Replacement protocols. Call physician if ESRD.)

a. Replace potassium if serum potassium level is less than 3.5 mEq/L with Potassium Chloride 20 mEq IV in 100 ml sterile water (premix) over 1 hour. Repeat potassium level 2 hours after completion of replacement dose. Repeat IV potassium replacement until serum potassium level of 3.5 mEq/L is achieved.
b. Replace magnesium if serum magnesium level is less than 2 mg/dl with Magnesium Sulfate 2 gm IV in 100ml NS over 1 hour. Repeat magnesium level 2 hours after completion of replacement dose. Repeat IV Magnesium Sulfate replacement until serum magnesium level of 2 mg/dL or greater is achieved.
c. Replace phosphorus if serum phosphorus is less than 2.5 mg/dL with Sodium Phosphate 20 mEq in 250 ml NS over 4 hours. Repeat phosphorus level 2 hours after completion of replacement dose. Repeat IV Sodium Phosphate replacement until serum phosphorus level 2.5 mg/dL or greater is achieved.
d. Discontinue all potassium-containing solutions 6 hours prior to re-warming.

Date & Time Rewarming to Begin: ___________________ Date & Time Rewarming Completed: ___________________

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Induced Hypothermia for Post-Cardiac Arrest Patients - Emergency Medicine
16 PASSIVE REWARMING PHASE (To begin 24 hours after protocol initiated)
   a. 24 hours after cooling initiated (see 8.a.), remove all cooling blankets, ice pack, and any wet linens. Keep Arctic Sun pads (if available) in place for up to 48 hours and use system PRN to maintain core temp. no greater than 37°C.
   b. Continue Midazolam infusion at current rate. May bolus 2 mg IV q 15 min. PRN and increase infusion by 2mg/hr q 15 min. to a maximum of 10 mg/hr. for shivering and/or agitation, unexplained tachycardia and/or hypertension.
   c. Discontinue Vecuronium infusion, if running.
   d. Allow patient to slowly and passively re-warm over 6-12 hours at a rate of no faster than 0.5°C per hour.
   e. Do not allow core temperature to increase to greater than 37°C (98.6°F) for 72 hours after re-warming started.
   f. Acetaminophen 650 mg PR q 4 hours PRN temperature greater than 37°C (98.6°F).
   g. Maintain normothermia 72 hours using cooling blankets PRN temperature greater than 37°C.

17 IF SHIVERING OCCURS DURING THE RE-WARMING PHASE:
   a. Continue Midazolam infusion at the current rate.
   b. Administer Vecuronium 0.1mg/kg IV X 1 and restart Vecuronium infusion at 1 mcg/kg/min.
   c. Notify Intensivist if shivering continues despite Vecuronium administration.
   d. Once temperature has reached 35°C, titrate Vecuronium to achieve 1-2 out of 4 twitches with PNS.
   e. Discontinue Vecuronium when temperature reaches 36°C.
   f. Continue Midazolam infusion until temperature reaches 37°C and 4/4 twitches observed with PNS.