

# ICY PROTOCOL

## LEGACY HEALTH SYSTEM

### *Patient Care*

Protocol: LCC 000.048 Post Cardiac Arrest Hypothermia Protocol

Effective Date: 10/05

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**SUBJECT:** Post Cardiac Arrest Hypothermia Protocol - Use of the ICY Catheter and CoolGard 3000

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**PURPOSE:** To guide the health care team in the post cardiac arrest initiation and management of induced hypothermia.

### **CRITERIA FOR INITIATION AND DISCONTINUATION**

- A. Initiation Criteria: Immediately upon admission to the Intensive Care post cardiac arrest.
  - 1. Cardiac arrest in which the presenting rhythm is ventricular fibrillation
- B. Exclusion Criteria:
  - 1. Patient has regained consciousness after return of spontaneous circulation
  - 2. Pregnancy or possible pregnancy
  - 3. Mean arterial pressure less than 60 mm Hg
  - 4. Pre-existing coagulopathy or thrombocytopenia
- C. Discontinuation Criteria: 24 hours post initiation or upon physician's order.

**RESPONSIBILITIES:** Physicians, Critical Care Registered Nurses, Respiratory Care Practitioners and Pharmacists

### **TOPIC/INSTRUCTIONS:**

#### **A. MONITORING**

- 1. Continuously monitor patient's core body temperature per bladder temp probe, . Document temperature approximately every 1 hour.
- 2. Monitor blood pressure every 15 minutes for the first hour and at least hourly to detect changes with cooling or rewarming.
- 3. Monitor for signs of shivering, including involuntary skeletal muscle movement, or ECG artifact
- 4. Laboratory Data: K+ every 4 hours; Phosphorous every 8 hours, Platelet count, PT/INR, PTT every 8 hours.

#### **B. INITIATION OF COOLING**

- 1. In the emergency department cooling should be initiated using a fan, or avoiding blankets and any efforts to rewarm patient.
- 2. Intubate and begin mechanical ventilation, if not done already.

3. Begin passive cooling:
  - a. Apply ice packs around head, neck, axilla and groin.
  - b. Apply cooling blanket over torso and limbs.
4. Provide analgesia, sedation and neuromuscular blockade:
  - c. Fentanyl 2 mcg/kg bolus then continuous infusion at 50-100 mcg/hr
  - d. Midazolam 5 mg bolus then infusion 3-5 mg/hr sedate to Riker score of -2 or -3
  - e. Once analgesia and sedation is achieved begin neuromuscular blockade. Vecuronium 0.08 mg/kg bolus then continuous infusion 0.8-1.2 mcg/kg/min, titrate to TOF response of 2:4
5. Once sedation and paralysis achieved begin active cooling:
  - a. Place ICY catheter in the femoral vein.
  - b. Attach to the CoolGard 3000 thermal regulation system which monitors catheter performance and measures temperature via a connection to the bladder
  - c. Set target temp to 33°
  - d. Cool for 18 –24 hours once target temperature of 32-34° C is reached, not to exceed 24 hours total

## **B. REWARMING**

1. Begin rewarming 18-24 hours after target temperature is reached (or once 24 total hours of cooling has occurred)
2. Set the CoolGard temp to slowly rewarm the patient to 36.5° C. Set rate at 0.5 to 0.65° C/hour
3. When > 36°C, discontinue neuromuscular blockade first and then taper sedation.

*KEYPOINT: Rapid rewarming may potentially lead to respiratory acidosis, hyperkalemia, and cause sudden vasodilation and severe hypotension. Rapid rewarming or temperature greater than 37°C may be detrimental to neuro status.*

## **C. POTENTIAL ADVERSE EFFECTS OF COOLING**

1. Shivering – shivering increases the metabolic demands of the brain. Avoid shivering by sedating and chemical paralyzing patient prior to aggressive cooling. Maintain sedation and chemical paralysis until temperature is 36°C.
2. Bradycardia - bradyarrhythmias are common and may not be symptomatic. Treat first with an IV chronotrope infusion; Dopamine 5-20 mcg/kg/min or Epinephrine 2-10 mcg/min. Consider transcutaneous pacing or transvenous pacing if patient symptomatic.
3. Alterations in fluids and electrolytes;
  - a. Diuresis – cooling cause inhibition of antidiuretic hormone, resulting in diuresis. Monitor urine output and replace fluids as needed.

- b. Hypokalemia/hyperkalemia – cooling causes potassium to shift intercellularly. While cooling administer potassium to maintain serum K<sup>+</sup> at 3.5mmol/L. Once warming is begun potassium will shift into the extracellular space.
  - c. Hypophosphatemia - Phosphate also shifts intercellularly with cooling. Replace phosphate as needed.
4. Hyperglycemia – maintain CBG 90-110 mg/dl using the Critical Care Intensive Insulin Protocol.
  5. Coagulopathy – the biochemical and enzymatic reactions of the coagulation cascade are temperature dependent, hypothermia also alters the functioning of platelets. Monitor for signs of bleeding, platelet count, PT/INR and PTT. Administer platelets and clotting factors as indicated.

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References:

Bernard, S. A., Buist, M. (2003) Induced hypothermia in critical care medicine: A review. Critical Care Medicine; 31(7)

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Polderman, K.H. (2002) Therapeutic hypothermia after cardiac arrest. New England Journal of Medicine; 347(1) 63-5.

University of Chicago Hypothermia after Cardiac Arrest Protocol