

PROTOCOL FOR: Hypothermia Protocol for Resuscitated Cardiac Arrest

- POLICY:**
1. Patients will be screened post-cardiac arrest for eligibility for hypothermia protocol per defined criteria.
 2. Cooling should be initiated as soon as possible after return of spontaneous circulation, preferably within 4 hours of ROSC, and can be initiated pre-hospital EMS or in the Emergency Department.
 3. Patients should be cooled as quickly as possible with a target goal of 32 to 34 degrees Celsius achieved within 4 hours of initiation of hypothermia. Overall treatment plan is to maintain goal temperature for 24 hours, counting from the initiation of cooling efforts.
 4. Prior to initiating cooling, patient must be intubated and mechanically ventilated.

INCLUSION

- CRITERIA:**
1. The adult (>18 yrs) pre-hospital or ED arrest patient whose initial arrest rhythm is ventricular fibrillation or pulseless VT (other rhythms such as asystole or PEA have not been studied and should be cooled at the discretion of the treating EM physician).
 2. Following CPR, return of spontaneous circulation (ROSC) within 60 minutes of collapse, and able to maintain blood pressure with or without pressors.
 3. Persistent coma following ROSC, defined as: not following commands, no speech, no eye opening, no purposeful movements to noxious stimuli (brainstem reflexes and pathological posturing movements are permissible).
 4. Thrombolysis, anti-platelet agents, or anticoagulants, as deemed necessary to treat a primary cardiac condition, are **not** a contraindication to cooling.

EXCLUSION

- CRITERIA:**
1. Shock refractory to vasopressors is a relative contraindication to therapeutic hypothermia.
 2. Therapeutic hypothermia **should not** be initiated in patients with:
 - a. Persistent life-threatening arrhythmias
 - b. Pulseless for >60 minutes
 - c. Significant head trauma or any ICH (if clinical suspicion for either is present, obtain non-contrast head CT prior to cooling)
 - d. Any other significant trauma, particularly of neck or trunk
 - e. Pregnancy (if clinical suspicion, obtain urine hCG)
 - f. Primary coagulopathy
 - g. Sepsis as an etiology of arrest
 - h. Coma due to causes other than cardiac arrest (i.e. drug overdose,

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stroke, pre-existing coma)

- i. Isolated pulmonary arrest
- j. DNR/DNI status

EQUIPMENT: temperature probe Foley, monitor module & cable (obtain from ICU)
ice packs
1-2 liter bags of chilled NS

PROCEDURE:

ACTION

POINTS OF EMPHASIS

- | | |
|---|--|
| <p>1. Confirm ventilator's heated humidifier is off.</p> <p>2. Confirm that patient is sedated per LIP order. Medication recommendations are:</p> <ul style="list-style-type: none">a. Midazolam - bolus 1-4 mg, followed by 1-7 mg/hr continuous infusion <p style="text-align: center;"><u>AND/OR</u></p> <ul style="list-style-type: none">b. Fentanyl - bolus 50 mcg, followed by 25-400 mcg/hr continuous infusion <p style="text-align: center;"><u>AND/OR</u></p> <ul style="list-style-type: none">c. Propofol - start at 5 mcg/kg/min, range 5-80 mcg/kg/min continuous infusion | <p>2. Caution: use of Propofol may result in hypotension and require aggressive hemodynamic management including fluid and vasopressors.</p> |
| <p>3. Administer neuromuscular blockade as ordered to prevent shivering during induction of hypothermia. Suggested:</p> <ul style="list-style-type: none">a. Vecuronium bolus 0.10 mg/kg over 5-15 seconds. Begin with a single Vecuronium bolus dose, re-evaluate the need and repeat bolus as ordered if required, OR follow initial bolus with infusion of 0.05-2.0 mcg/kg/min <p style="text-align: center;"><u>OR</u></p> <ul style="list-style-type: none">b. Cisatracurium bolus 0.15 mg/kg over 5-15 seconds. Begin with a single Cisatracurium bolus, re-evaluate the need and repeat bolus as ordered if required, OR follow with continuous infusion 0.5-5 mcg/kg/min. | <p>3. If neuromuscular blockade is necessary, use the minimum dose required to prevent shivering. A continuous infusion is not required if shivering is controlled with intermittent bolus administration.</p> |
| <p>4. Call the ICU immediately when cooling is initiated (either pre-hospital or in ED) to obtain temperature probe Foley, temp monitor module, and connecting cable.</p> | |
| <p>5. Begin cooling by infusing refrigerator chilled normal saline (0.9%) over 30 to 60 minutes through a peripheral or femoral venous line.</p> | <p>5. Infusion may have already been initiated in the field by EMS protocol and should be continued upon patient arrival in the ED.</p> |

Generally, 1-2 liters will be infused.

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The amount of fluid infused may be limited if issues of volume overload are present.

The safety of infusion of chilled IV fluids via IJ/subclavian sites is unclear.

6. Apply ice packs surrounding head and neck and bilateral axillae and groin.
7. Transfer patient to ICU or Cardiac Cath Lab as expeditiously as possible.

DESIRED PATIENT

- OUTCOMES:**
1. Target temperature of 32 - 34 degrees centigrade will be achieved within 4 hours of initiation of hypothermia.
 2. Cardiac output and cerebral perfusion pressure will be maintained during hypothermia.

**CLINICAL
ASSESSMENT AND**

- CARE:**
1. Document that the patient's pre-hypothermia neurologic status is comatose, as defined in Inclusion Criteria.
 2. Obtain baseline troponin, CPK, CPK MB, Lactate, electrolytes, glucose, magnesium, ionized calcium, ABG, PT/PTT, and CBC per order.
 3. Continuously monitor the patient's core body temperature from temperature probe Foley while awaiting transfer to ICU or Cardiac Cath Lab. Document the **core temperature** every **15 minutes**.
 4. Monitor patient's cerebral perfusion pressure for target MAP 70-80 mmHg or per order. In the setting of increased ICP or diffuse cerebral edema documented by imaging, the ED physician should consider increasing the goal MAP to ≥ 90 so as to maintain cerebral perfusion.
 5. Document the **vital signs** at least every **30 minutes** until the patient is transported to the ICU or Cardiac Cath Lab. During the initial cooling, peripheral vasoconstriction will cause an increase in heart rate and blood pressure. Shivering, if allowed to occur, can also contribute to the increased heart rate. Once the patient is controlled with a sedative analgesic and an optional continuous infusion of neuromuscular blockade, the heart rate may progress to bradycardia. Bradycardia in this setting may be refractory to atropine.
 6. Document the **initial QTc** with an EKG; continue to monitor until transfer. If $QTc > 500$ ms, attending physician should be notified immediately. $QTc > 500$ is associated with Torsades, and is a relative contraindication to continued therapeutic hypothermia.
 7. Monitor **blood glucose** every hour. Insulin resistance, sometimes severe, may develop with hypothermia. If hyperglycemia develops, continue to monitor blood glucose every hour and use insulin infusion

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to maintain blood glucose <150, preferably 80-130. **DO NOT** use standard insulin protocol while the patient is hypothermic.

8. Observe for intravascular volume depletion due to hypothermia induced diuresis which may be accompanied by serum hypokalemia.
9. Continue standard supportive care for mechanically ventilated, chemically paralyzed patients, including head of bed elevated >30 degrees.
10. If time permits before transfer to the ICU or Cardiac Cath Lab, insert Salem sump tube via orogastric route and check for ileus; consider intermittent low suction if ileus suspected. Limit medication via OG tube during cooling.
11. Monitor for potential complications, including hyperglycemia, hypoglycemia, coagulopathy, pneumonia, sepsis, and rhabdomyolysis.

APPROVAL: 9/09

EFFECTIVE DATE: 9/09

REVISION DATES: