Exclusion Criteria:
The post cardiac arrest patient should NOT be cooled if any of the following are present:
1. More than 8 hours since the return of spontaneous circulation (ROSC)
2. Patient is able to follow verbal commands
3. Life-threatening bleeding
4. Patient not able to follow commands at baseline (pre-cardiac arrest)
5. Coma is secondary to non-anoxic injury (such as subarachnoid hemorrhage)
6. MAP can not be maintained > 65 mmHg (the use of vasopressors is permissible)

Induction of Hypothermia

Date/time cooling started: ____________________  Time at goal: ____________________

☐ Infuse 2000 mL chilled NSS IV over 1 hour, if not done in ED. Obtain from pharmacy.
☐ Apply external cooling methods and place temperature probe.
☐ Follow manufacturer's directions for the cooling device to cool patient to 32 - 34°C.
  See instructions on machine for further details.
☐ If cooling device not available, apply ice packs to axillae, groin, and neck, and apply 2 cooling blankets above and below patient.
☐ Goal temperature is 32 - 34°C.
☐ Maintain goal temperature for 24hrs then begin rewarming
☐ Target time to reach goal temperature is no longer than 6 hours.
☐ Continuous temperature measurement with probe: ☐ Bladder ☐ Esophageal ☐ Rectal.
  No other modality acceptable.
☐ Place NG/OG tube to intermittent wall suction
☐ Place "Therapeutic Hypothermia" sign on door.
☐ Document temperature and vital signs every 15 minutes until goal temperature is reached, then hourly.
☐ Assess and document neurological status on admission and every 2 hours.
☐ Monitor and document skin condition prior to applying device, and every 4 hours while being cooled.
☐ Keep room cool and overhead lights off until rewarming is complete.
☐ If patient receives hemodialysis, cool dialysate to 32 - 34°C. Notify dialysis nurse.
☐ Ventilator humidifier must be OFF while cooling, if applicable, and until rewarming complete.

Notify respiratory.
☐ All ABG's must be temperature corrected. Notify respiratory of temperature.
Sedation and control of shivering

☐ DO NOT use Sedation Protocol while cooling patient - give NO sedation holiday.

☐ Administer analgesic & sedative agents PRIOR to NMB (neuro muscular blocking) agent.

☐ Goal Ramsey of 6 or RASS of -5 during cooling and until rewarming complete.

☐ Evaluate for shivering every 30 to 60 minutes and document on flow sheet with “+” (shivering) or “Ø” (no shivering):
   – Visualize the patient for shivering and palpate the patient’s masseters (jaw), pectoralis, and deltoids evaluate for fine fluctuations on patient’s cardiac rhythm tracing.

☐ Notify the physician if the patient is shivering

Medications for control of shivering

☐ Fentanyl infusion, start at ______ mcg/hour; titrate as needed for shivering control to a maximum of ______ mcg/hour. (usual dose range 25 mcg/hr to 300 mcg/hr)

☐ Propofol infusion, start at ______ mcg/kg/minute; titrate by 5 mcg/kg/minute as needed for shivering control (maximum of 80 mcg/kg/minute).

Choose 1:

☐ Vecuronium 0.1 mg/kg every one hour as needed for shivering

☐ Cisatracurium ________ mg (0.1 mg/kg) IV bolus over one minute, then start infusion at 1 mcg/kg/minute.

   Increase as needed to control shivering during the cooling phase. Maximum = 10 mcg/kg/minute (use if the patient has renal insufficiency). Titrate to control shivering. Record train of 4 and place BIS (Bispectral index) monitor. Titrate sedation for BIS of 40-60.

Discontinue paralytic when temperature is ≥ 35.5°C upon rewarming.

☐ Acetaminophen 650 mg via tube or per rectum every 6 hours around the clock for 24 hours

☐ Other:

Labs/Diagnostics

☐ CBC with diff, PT/INR/PTT Q 12 hours X 48 hours

☐ BMP/Mg/Phos Q 6 hours X 48 hours

☐ Urine Analysis ☐ Urine tox screen

☐ EEG ☐ EKG in am ☐ 2D Echo with dopplar in am re: cardiac arrest

☐ CK,CKMB, Troponin, Q6 X 2 sets

☐ Culture Sputum, Blood X 2 sets, and Urine

☐ ABG 30 minutes after paralyzing

☐ Serum Cortisol, TSH next lab draw

☐ LFT’s Lipase, Lipids, in am

☐ Portable CXR in am re intubation

☐ CT Head without contrast re: cardiac arrest ☐ CT chest without contrast re: cardiac arrest (consider prior to hypothermia)

Emergency Physician: ___________________________ Date ________ Time ________

Admitting Physician: ___________________________ Date ________ Time ________

RN noted: ___________________________ Date ________ Time ________ UC noted: ___________________________ Date ________ Time ________

REGULATIONS REQUIRE THAT ALL ORDERS CONTAIN A DATE, TIME, SIGNATURE, AND IDENTIFIER (PAGER, PRINTED NAME, ETC.)
Rewarming
(Begin 24 hours after goal temperature reached)

☐ Increase patient target temperature by 0.3°C per hour until temp = 36°C.

☐ Maintain cooling device on patient to keep temperature at 36.5°C for total of 72 hours after initiation of therapeutic hypothermia.

☐ Stop all K+ containing solutions before rewarming and notify physician to adjust fluid order

☐ Other: ____________________________

Seizure & Other Medications

Choose 1 for seizure activity if indicated:

☐ Phenytoin 15 mg/kg IV times one then 100 mg IV every 8 hours

☐ Keppra 1000 mg IV times one, then 1000 mg IV every 12 hours

☐ Moisturizing ophthalmic ointment: apply ¼-inch ribbon to each eye every eight hours and as needed for dryness.

☐ Heparin 5000 units sq every 8 hours

☐ Aspirin 325 ngt daily

☐ Lovenox 40mg IV every 24 hours

☐ Protonix 40mg IV every 24 hours

☐ Sliding scale insulin (see sheet) if 2 consecutive glucose measurements greater than 180 start insulin infusion protocol

☐ Acetaminophen 650 mg via tube or per rectum every 6 hours prn temperature > 37.2°

Notification of Physician

☐ For temperature > 35°C for more than 2 hours, during maintenance phase, or temperature > 37.2°C on one reading.

☐ MAP < 65 mmHg

☐ During rewarming, if patient is receiving any potassium containing solution.

☐ For decerebrate or decorticate posturing, change in symmetry of pupils, or seizure.

☐ For persistent shivering that is not responsive to medications ordered below.

Emergency Physician: ____________________________ Date ____________ Time ____________
Admitting Physician: ____________________________ Date ____________ Time ____________
RN noted: ____________________________ Date ____________ Time ____________ UC noted: ____________________________ Date ____________ Time ____________
### Vasopressor and Fluids

- **If CVP <12**
  - 0.9 NSS IV bolus 2 liters over 1 hour then 250 ml/hour
  - Caution for any signs of pulmonary edema

- **If CVP >12**
  - then start maintenance fluids ___________ ml/hr
  - Caution for any signs of pulmonary edema

- **Norepinephrine Infusion**: Begin at 5mcg/min titrate for Mean arterial BP >70mmhg

- **Other**

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**Emergency Physician**: Date Time

**Admitting Physician**: Date Time

**RN noted**: Date Time **UC noted**: Date Time

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**REGULATIONS REQUIRE THAT ALL ORDERS CONTAIN A DATE, TIME, SIGNATURE, AND IDENTIFIER (PAGER, PRINTED NAME, ETC.)**
Attain goal temperature of 32-34°C as rapidly as possible, with a target time of under 6 hours.

**Phases of Induced Hypothermia**

**Induction Phase** -
- Reach target (32 - 34°C) quickly (within 6 hours); avoid overshooting target.
- Sedate or sedate and paralyze.
- Monitor for shivering and medicate to control.
- Avoid shivering and address rapidly if it occurs.

**Maintenance Phase** -
- Maintain temperature goal (32 - 34°C) for 24 hours once goal temperature reached.
- Monitor for shivering and medicate to control.
- Maximize physiology and avoid complications:
  - Vasoconstriction
  - Diuresis
  - Arrhythmias
  - Infection
  - Electrolyte abnormalities (low K+)
  - Complications of immobility
  - Skin breakdown
  - Coagulopathy

**Rewarming Phase** -
- Return to stable normothermia.
- Avoid rebound hyperthermia, warm not faster than 0.3°C every hour (use small temperature gradients).
- Patient will vasodilate as temperature rises and may develop severe hypotension.
- May develop hyperkalemia - replete potassium with extreme caution (if at all).

**Cooling**
- If shivering, deepen sedation and paralysis. If this is ineffective, notify physician.
- Keep room lights off when possible.
- Notify dialysis of hypothermia protocol, dialysate temperature should be 32 - 34°C.
- Notify respiratory of hypothermia protocol, and keep humidifier off, if applicable.
- If cooling device not available, apply ice packs to axillae, groin, and neck and apply cooling blanket above and below patient; with continuous temperature monitoring.

**Rewarming**
- Begin rewarming after 24 hours of induced hypothermia; the goal is to return the patient’s temperature to 36.5°C no faster than 0.3°C per hour.
- Discontinue paralytics when patient’s temperature reached 35.5°C. Do not discontinue sedation prior to discontinuation of paralysis.
- Rewarming may cause hyperkalemia, replete cautiously, if at all.
- Reprogram cooling machine for slow rewarming.

**Medications**
- In order to achieve and maintain target temperature of 32-34°C, complete sedation or sedation and paralysis must be achieved.
- Medications are used mainly to control shivering - patient should not be cooled if not comatose without medication.
- Sedation protocol MUST NOT be used while cooling. The patient should not have a sedation holiday.
- Administer analgesic & sedative agents prior to Neuromuscular Blocking (paralyzing) agents.
- Goal Ramsey of 6 or RASS of -5 during cooling and until rewarming complete.

### Celsius/Fahrenheit Temperature Conversion

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