

BHSF - Therapeutic Hypothermia for Comatose Survivors of Cardiac Arrest - Critical Care / ICU Admission Orders

1. Inclusion, exclusion criteria and baseline neurologic assessment must be reviewed and documented (see therapeutic hypothermia progress note).
2. All orders to be deleted are to be crossed out with a single line and initialed by the physician.
3. All blanks and check boxes must be filled in by the physician.

If patient meets criteria then admit: to Critical Care / Intensive Care Unit as an Inpatient

Condition: Critical

Diagnosis: Ventricular Fibrillation with ROSC or Non-Ventricular Fibrillation (ASY or PEA) with ROSC (please check initial rhythm or first known rhythm only)
 In-Hospital/In-Patient Cardiac Arrest or Out- of Hospital/Out Patient Cardiac Arrest (please check one)

Height: _____ **Estimated weight** (ED only): _____ Kg **Measured weight:** _____ Kg

Allergies: No known allergies Listed below:

Physicians of Record:

Attending Physician: _____

Consult the following Physicians STAT (Therapeutic Hypothermia Management)

Consult: _____ for central venous catheter placement (place **presep™** catheter if available) or for PICC Placement (STAT) (if not done in ER) *must have central line in place.*

Consult: _____ for arterial line placement (STAT) (if not done in ER) *must have A-line in place.*

Pulmonary / Critical Care (ventilator/hypothermia) management:

Consult: eICU

Cardiology: _____

Neurology: _____

Other: _____

Other: _____

For in-hospital Cardiac Arrest notify all consultants ASAP

STEMI Protocol: Do not deviate from standard STEMI protocol

1. Follow Heparin standing protocol for Acute MI
2. Continue Therapeutic Hypothermia during cardiac catheterization

Intake/Output: Insert Foley Catheter and maintain strict I & O call Physician/eICU if urine output is less than 0.5 milliliters per kilogram times 2 hours.

Diet: NPO except medications

Nutrition Consult within 48 hours for enteral/parenteral feeding

Activity: Bed rest during TH

Sports bed rotate as tolerated

Gastric Tube Placement:

1. Place oro-naso esophageal temperature probe and attach to Arctic Sun.
2. Place oro-naso gastric tube, connect to low, intermittent suction or clamp.

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Sedation/Paralysis Baseline:

1. Apply Bispectral Index (BIS) monitor and maintain BIS between 50-70
2. Establish *baseline supra maximal stimulus using (TOF) prior to starting paralytic and document. 4 twitches at _____ MA. (consider removing based on BSAS scores)*

Analgesia:

1. **Bolus Fentanyl (Sublimaze)** _____ micrograms IV (STAT) (recommended dose is 0.35 to 1.5 mcg/kg) then:
2. Initiate **Fentanyl (Sublimaze)** continuous infusion at 50 micrograms per hour; titrate every 15 minutes up to a maximum of 200 micrograms per hour for a BIS reading of 50-70

Sedation:

1. **Bolus Midazolam (Versed)** _____ milligrams IV (STAT) (recommended dose is 1-5 mg) then:
2. Initiate **Midazolam (Versed)** continuous infusion at 0.5 milligrams per hour; titrate every 10 minutes up to a maximum of 10 milligram per hour for a BIS reading of 50-70.
3. No sedation holiday while the patient is hypothermic.

For Shivering Prophylaxis and Treatment

1. For Magnesium less than 3 mEq/L give **Magnesium** two grams IVPB over one hour STAT and notify the physician (Goal 3.0 mmol/L - 4.0 mmol/L). **(may consider sliding scale)**
2. **Meperidine (Demerol)** 25 milligrams IV bolus times 1 STAT (at the start of induction only). **(may consider removing because of SZ)**
3. **BusPar** 30 milligrams via oro-naso gastric route every 8 hours times 5 doses then discontinue.
4. **Tylenol elixir** 650 milligrams via oro-naso gastric route every 8 hours times 72 hours.
5. External extremities counter warming using either K-pads or warm blankets to the feet & hands.

Bolus one of the following STAT (please check one):

Cisatracurium Besylatev (Nimbex) dose of 0.2 milligrams \times _____ kilograms (patient's weight) = _____ IV bolus dose may repeat in 20 minutes times 1 *(use only if the patient is adequately sedated BIS 50-70).*

OR

Zemerone (rocuronium) dose of 0.6 milligrams \times _____ kilograms (patient's weight) = _____ IV bolus dose may repeat in 20 minutes times 1 *(use only if the patient is adequately sedated BIS 50-70).*

Then start a continuous infusion of either (please check one):

Initiate **Cisatracurium Besylatev (Nimbex)** continuous infusion at 0.5mcg/kg/minute may titrate to a maximum dose of 10mcg/kg/minute titrate for *shivering by using the Bedside Shivering Assessment Scale (BSAS)- goal is 0*

OR

Initiate **zemerone(rocuronium)** continuous infusion at 1mcg/kg/minute may titrate to a maximum dose of 16mcg/kg/minute titrate for *shivering by using the Bedside Shivering Assessment Scale (BSAS)- goal is 0*

6. **TOF q 1 hr** until dose is stable \times 4 (maintain 2 or 3 out of 4 twitches) - Repeat as needed if dose needs to be titrated up or down. **(consider removing based on BSAS)**
7. **Lacrilube ointment** each eye ever 4 hours while on Cisatracurium Besylatev (Nimbex) infusion.
8. **Docusate** 100 milligrams liquid via oro-naso gastric route every 12 hours.

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IF NOT DONE IN ED: Order STAT the following

1. **Lab work prior to induction:** (order TH lab panel number [xyz coming soon](#)) to include the following: Serum Pregnancy Screen (females of childbearing age only), comprehensive metabolic profile, complete blood count, magnesium, phosphorus, prothrombin time, partial thromboplastin time, fibrinogen, D-dimer, ionized calcium, troponin, CK and CK-MB, BNP, type and screen, urine toxicology screen, arterial lactate acid, creatine clearance and ABG.
2. PCXR line placement: (ETT, esophageal temperature probe, oro-naso gastric, central line)
3. 12- LEAD EKG left and right sided.
4. CT-Brain without contrast; if trauma suspected then CT of C-Spine

Vital Signs:

1. **During the cooling phase**, monitor and record vital signs as follows: Blood pressure, mean arterial pressure (MAP), O₂ saturation, E_T-CO₂ (if available), cardiac rhythm documenting QT interval and temperature every 15 minutes during induction of hypothermia then every 30 minutes once goal temperature of 33°C is achieved.
2. **If using the Arctic Sun device monitor and record water temperature every 60 minutes and PRN.**

Ventilator Management:

Goals: maintain P_aO₂ 80-110 mm Hg, P_aCO₂ 35-40 mm Hg

1. Ventilator settings of: _____
2. Treatments of: _____
3. Replace heated air circuit on ventilator with HME (Heated Moisture Exchange).
4. No ventilator weaning while patient is hypothermic.

✓ Initiate induced hypothermia ASAP

✓ Goal: INDUCE HYPOTHERMIA TO 33°C FOR 24 HOURS

✓ 24 HOURS BEGINS ONCE 33°C HAS BEEN ACHIEVED

1. Bolus two liters of 4°C 0.9% normal saline over 30 to 60 minutes STAT, if not already completed
 - a. Can be started as part of ACLS or immediately following ROSC
2. Time cooling started (time the above was started): _____
3. Obtain Arctic Sun and gel pads, pick appropriate size by using sizing chart on QRG (Quick Reference Guide – side of Arctic Sun), apply all four pads (two back and two leg). If patient is more than 220 pounds, you may apply 1-2 Universal pads over belly circumference pending size of patient to cover 40% of patient's body surface.
4. Set Arctic Sun to a goal temperature of 33°C at the maximum rate (default).
5. Monitor and record water temperature every hour. If the water temperature drops down to less than 10°C (for one hour) once the patient is at target temperature, first assess for shivering. If there is no evidence of shivering then call Physicians to rule out infectious process.
6. If patient is to travel outside of the unit, travel time less than 45 minutes, purge water and disconnect tubes from manifold. Leave console in the unit ON. If greater than 45 minutes transport the arctic sun with the patient separately.
7. **If Arctic Sun not available:** Place cooling blankets on top and underneath patient. Do not place blankets directly on patient's skin.
 - Set temperature to 5°C. Apply towel covered ice packs to patient's head, axilla, torso, and groin – change/replace as needed.
 - When patient's core temperature is 34°C, set cooling blanket to 33°C and remove ice packs.
 - If temperature is greater than 34°C reapply towel covered ice packs to patient's head, axilla, torso, and groin – change/replace as needed.

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Hemodynamic monitoring (if available):

1. Attached arterial line to FloTrac Sensor™; using the Vigileo™ monitor – record the following: continuous cardiac output (CCO/CCI), stroke volume (SV/SVI), stroke volume variation (SVV), and systemic vascular resistance (SVR/SVI).
2. If presep™ catheter in place; using the Vigileo™ monitor – record the central venous oxygen saturation (ScvO2).

BP & Volume Management: after the initial 2 liters of 4°C 0.9% normal saline is administer.

Fluid Resuscitation: Begin immediately in patients with MAP less than 70 or elevated serum lactate greater than 4 mmol/L

- ✓ **Goal:** MAP 70 - 100, CVP greater than 12 mm Hg, lactate acid less than 4 and SVV less than 13% (if available).
- ✓ Record (CVP), (SVV), (SV/SVI), (CCO/CCI), (SVR/SVI) and (ScvO2). - every 30 minutes until goal met, then every hour.
- ✓ Notify Physician/eICU if CVP/SVV remains less than goal after volume replacement.
- ✓ Initiate 0.9% normal saline continuous infusion at _____ milliliters per hour.
 - Normal saline IV bolus _____ milliliters (20 mL/kg) q 30 minutes until CVP/SVV goal met or up to 4 liters administered.
(if temperature greater than 34°C then use 4°C NS).
 - Lactated Ringer's IV bolus _____ milliliters (20 mL/kg) q 30 minutes until CVP/SVV goal met or up to 4 liters administered.
(if temperature greater than 34°C then use 4°C LR)
 - Hespan: 500 milliliters IV bolus every 30 minutes until CVP/SVV goal met or up to 2 liters.
 - Albumin 5%:500 milliliters IV bolus every 30 minutes until CVP/SVV goal met or up to 2 liters.
 - If Hemoglobin less than 9 give one unit PRBC if less than 8 give two units of PRBC

1. **If MAP** is less than 70 after the 4 liters crystalloids or 2 liters colloids are administered (NOT Including the initial 2 liters of 4°C 0.9% normal saline at the start of cooling) then start one of the following and call the physician/eICU:
 - Levophed (Norepinephrine) continuous infusion at 2 micrograms per minute may titrate every 5 minutes up to a maximum of 200 micrograms per minute for MAP of greater than 70. (Consider for SVI between 40-50 or EF is or suspected to be greater than 40%)
OR (please check one)
 - Start dobutamine (Dobutrex) continuous infusion at 2.5 micrograms/kg/minute may titrate every 15minutes to a maximum of 10 micrograms/Kg/Min for MAP greater than 70. (Consider for SVI less than 40 or EF is or suspected to be less than 40%)
2. **If MAP remains** less than 70 after volume and maximum pressor or inotropic support then draw arterial lactate acid STAT and call the Physician/eICU with result.

Stress Ulcer Prophylaxis:

1. famotidine (Pepcid) 20 milligrams IV bolus every 12 hours.
OR (please check one)
 pantoprazole Sodium (Protonix) 40 milligrams IVPB every 24 hours.

DVT Prophylaxis: Knee High Sequential Device and Knee high anti-embolic hose

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Ongoing LABS/diagnostics:

1. **Lab work:** Potassium & magnesium every 4 hours while patient is hypothermic:
2. Blood sugar by finger stick every hour and follow CCU/ICU standing insulin orders.
3. ****Do not replace potassium unless it is less than 3 mellequivalents per liter during cooling phase. Call Physician/eICU for specific replacement dose. Make sure time to rewarm phase is communicated.**
4. Call Physician /eICU if Magnesium less than 3.0 mmol/L (Goal 3.0 mmol/L - 4.0 mmol/L)
5. DO NOT USE PRE-EXISTING ELECTROLYTE REPLACEMENT ORDERS.
6. CK, CK-MB, Troponin every 8 hours times 3
7. Blood, urine and sputum cultures 12 hours after start of hypothermia.
8. Obtain DAILY in the AM (0600): CBC / BMP / Magnesium / ionized calcium / PT / PTT / ABG / PCXR / 12-Lead ECG/PCXR times 72 hours.

Nursing

1. Head of bed elevated 30 degrees.
2. Place defibrillator and emergency medications at patient's bedside. Place external defibrillation pads on patient. Inspect skin and document on skin condition every 2 hours for possible irritation caused by the arctic sun gel pads, cooling blankets and/or ice.
3. Check temperature with secondary source every shift (rectal or PA line temperature preferred).
4. Monitor and record, for shivering visually using a BSAS (Bedside Shivering Assessment Score) every 30 minutes as follows, and observe ECG / BIS-EMG monitor tracing for shivering.

The Bedside Shivering Assessment Scale

Score	Definition
0	None: no shivering noted on palpation of the masseter, neck, or chest wall
1	Mild: shivering localized to the neck and/or thorax only
2	Moderate: shivering involves gross movement of the upper extremities (in addition to neck and thorax)
3	Severe: shivering involves gross movements of the trunk and upper and lower extremities

Other orders related to inducing - maintaining hypothermia:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

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RE-WARMING PHASE:

1. Time cooling started : _____
2. Time Cooling Target temp of 33°C reached: _____
3. Re-warming to start at: Time: _____ Date: _____
4. Time Re-warming started: _____
5. Time Re-warming finished: _____
6. **Do not** re-warm faster than 0.25 °C per hour.
7. **Twenty-four hours after Target temp of 33°C achieved**, begin re-warming. Set target temperature to 37°C and rewarm at a rate of 0.25°C per hour with the Arctic Sun set in automatic mode (refer to quick reference guide on side of Arctic Sun for rewarming instructions).
8. **If Arctic Sun not used**, remove ice packs, cooling blanket, all wet bed linens and passively re-warm patient. May use heated air blanket on lowest temperature setting to slowly re-warm patient.
9. Continue lab work (Potassium, magnesium) every 4 hours while re-warming.
10. Enoxaparin Sodium (Lovenox) 40 milligrams or 30 milligrams (creatinine clearance less than 30) subcutaneously every 24 hours (if not on heparin drip)
11. **Monitor and record vital signs:** blood pressure, mean arterial pressure (MAP), O₂ Saturation, E_TCO₂ (if available), cardiac rhythm-QT interval and temperature every 15 minutes, then every 30 minutes for 2 hours once goal temperature of 37°C is achieved.
12. If MAP less than 70 during re-warming, may give Albumin 5% 250 milliliters intravenous over 15 minutes may repeat times 1 dose.
13. Maintain target temperature of 37°C with the arctic sun or a cooling blanket for 72 hours after cooling initiated.
14. Discontinue Cisatracurium Besylatev (Nimbex) once patient is rewarmed to 37°C.
15. Once patient has returned to their baseline TOF wean Fentanyl (Sublimaze) and Midazolam (Versed) drips to off, if tolerated, and notify the physician.
16. Call Physician /eICU for additional orders.

Other orders related to rewarming:

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____