Therapeutic Hypothermia Following Cardiac Arrest

Admit/Dischg/Transfer

- Physician Consult Provider to notify Intensivist: CCU/CSU admission for Therapeutic Hypothermia.

Vital Signs

- Vital Signs: Every 1 Hour Interval, MAP goal is greater than 75 mmHg
- Temperature: Every 1 Hour
  1. Monitor core body temperature continuously (bladder or esophageal preferred)
  2. Monitor a second temperature source continuously (bladder, rectal or PA)
  3. Document core temperature every 1 hour

Patient Care

- Bedside Glucose Monitoring: Every 2 Hours, while patient is hypothermic and rewarming.
  Initiate Critical Care Insulin Infusion Protocol if glucose is greater than 150 mg/dL
- Head of Bed Elevation: Elevate head of bed 30 - 45 degrees
- Foley Cath: Reason for Insertion: Accurate Output Measure With Critical Pt, Insert Foley with temperature probe if esophageal temperature probe not in place for core temperature monitoring
- Saline Lock: Insert 2 large bore IVs, if not already in place
- Cooling System: Arctic Sun Device: PRIOR TO INITIAL COOLING, SEDATIVE, ANALGESIA IS STARTED
  1. Apply size appropriate Arctic Sun pads to patient
  2. Attach Foley, esophageal or rectal probe temperature sensor to Arctic Sun
  3. Set Arctic Sun target temperature at 35 C and start cooling
  4. Record Arctic Sun water temperature every hour
  5. After 28 hours of hypothermia, re-warm patient to 37 C over the next 5 hours
  6. Once patient temperature is 37 C, leave pads on with Arctic Sun set at 37 C for at least 24 hours to avoid rebound hyperthermia or post-cooling fever
- Provider Communication: Therapeutic Hypothermia:
  1. Stop all Potassium administration 8 hours prior to re-warming if the serum Potassium is greater than 3.8 mEq/L
  2. If Arctic Sun water temperature is less than 20 C with target temp = 35 C on neuromuscular blockade notify Intensivist and obtain the following: (view excluded components to order):
    Blood Culture-Adult Standard STAT, Urine Culture STAT, Culture Lower Respiratory and Gram Stain STAT
- Notify If: target temperature not achieved within 4 hours

Continuous Solutions

- Sodium Chloride 0.9% Tot Vol: 1,000 mL, 80 mL/hr, Soln, IV
- Lactated Ringers Tot Vol: 1,000 mL, 80 mL/hr, Soln, IV

Medications

- oculur lubricant (Lacri-Lube S.O.P. ophthalmic ointment) 1 APP, Ointment, BOTH EYES, Every 4 Hours
  For eye dryness/ lack of blink while on neuromuscular blocking agent
- oculur lubricant (Lacri-Lube S.O.P. ophthalmic ointment) 1 APP, Ointment, BOTH EYES, PRN, PRN
  For eye dryness/ lack of blink while on neuromuscular blocking agent
- Potassium Protocol IV Adult for Critical Care Units (SUB)*
- Insulin Infusion Critical Care Adult (SUB)*
- chlorhexidine topical (chlorhexidine topical 0.12% mucous membrane liquid) 15 mL, Liquid, PO, Every 12 Hours, while on ventilator
- pantoprazole (Protonix) 40 mg, IVP, Daily

Provider Signature: ___________________________ Print Name: ___________________________

Date: ______________ Time: ______________

PROVIDERS MUST EXERCISE INDEPENDENT CLINICAL JUDGMENT WHEN USING ORDER SETS
**VTE Prophylaxis**

VTE Prophylaxis if patient NOT receiving Heparin Infusion for other reasons:

- **Heparin**
  - 5,000 Units, SUBCUTANEOUS, Every 12 Hours, 30 Days, patient weight 70 kg or LESS
  - 5,000 Units, SUBCUTANEOUS, Every 8 Hours, 30 Days, patient weight greater than 70 kg

- **Lovenox** 40 mg, Soln, SUBCUTANEOUS, Daily

**Sedatives**

- **Propofol** 1000mg/100mL Infusion: Tot Vol, 100 mL, Titrate, Emulsion, IV
  1. Initiate prior to starting hypothermia and neuromuscular blocking agents
  2. Start at 5 mcg/kg/min IV
  3. Titrate up in 5 mcg/kg/min IV increments every 10 minutes until desired sedation achieved. BIS goal is 50
  4. 5 - 50 mcg/kg/min IV is the usual dose - higher doses may be needed
  5. Wean propofol when patient temperature has rewarmed to 36 C

- **LORazepam** (Ativan) 2 mg, IVP, Every 1 Hour Interval, PRN, Sedation, May repeat once in 30 minutes if dose ineffective.

**Analgesics**

- **FentaNYL (Sublimaze)** mcg, IVP, ONCE, Administer IV over 1 - 2 minutes; Initiate prior to starting hypothermia and neuromuscular blocking agents

- **FentaNYL** 2500 mcg/250mL NS (PREMADE), Tot Vol: 250 mL, Titrate, IV
  1. Initiate prior to starting hypothermia and neuromuscular blocking agent
  2. Dose range = 25 - 125 mcg/hr IV
  3. Increase infusion by 25 - 50 mcg/hr every 30 minutes until desired analgesia achieved
  4. Recommend 1-2 mcg/kg IVP prior to each increase in rate

**Shivering Prophylaxis**

- **Acetaminophen (Tylenol)** 500 mg, Liquid, NG-TUBE, Every 6 Hours, 48 hr
- **BusPirone (BuSpar)** 30 mg, Tab, NG-TUBE, Every 8 Hours, 48 hr, Total daily dose of 90 mg x 2 days is acceptable for shivering prophylaxis
- **Magnesium Sulfate** 1 gm, IVPB, Every 1 Hour Interval, 2 Doses/Times; 1 gram per 100 mL D5W IV
  For shivering prophylaxis; hold if serum magnesium 2.5 or greater
- **Provider Communication**: Skin Counter-Warming Measures, Place warm blankets to patient’s head, hands and feet or place Bair Hugger over Arctic Sun Pads

**Shivering Management**

- **Meperidine (Demerol HCl)** 12.5 mg, IVP, Every 5 Minute Interval, PRN, Shivering
  1. Administer during maintenance and re-warming phase if shivering score 1 or greater
  2. Maximum dose = 50 mg/24 hours

- **Dexmedetomidine (Precedex)** 400mcg/100mL NS, Tot Vol: 100 mL, Titrate, IV Start with infusion: 0.3 - 1.5 mcg/kg/hr TITRATE TO EFFECT
  1. Administer during maintenance and re-warming phase if shivering score 2 or greater and shivering not controlled with Demerol
  2. Avoid use if HR less than 50 bpm
  3. Discontinue Precedex if vecuronium started

- **Vecuronium (Norcuron)** 0.1 mg/kg, IVP, Every 10 Minute Interval, PRN, 3 Doses/Times, Shivering Initial bolus: Administer over 1-2 minutes. May repeat after 10 minutes if shivering recurs
  1. Administer during the induction phase when trying to reach target temperature for any shivering
  2. Administer during maintenance and re-warming phase if shivering score 2 or greater and shivering not controlled with Demerol and Precedex
  3. Discontinue Precedex if vecuronium started
  4. Obtain baseline TOF prior to first bolus dose
Norcuron 100mg/100mL Sodium Chloride 0.9%, Tot Vol: 100 mL, Titrate, IV
(1) Initiate if boluses not effective in shivering control
(2) Start at 0.8 mcg/kg/minute IV; Maximum infusion rate 1.5 mcg/kg/minute IV
(3) Use Peripheral Nerve Stimulator to monitor TOF response per DD
(4) Titrate infusion up or down in increments of 0.2 mcg/kg/minute IV
(5) Use smallest effective dose
(6) The drip should be titrated down, and may be turned off, if patient does not have a 2/4 TOF
(7) Monitor levels of paralysis by ventilator synchrony and assessment of shivering; if patient shivering or vent asynchrony, increase sedative and/or analgesia dose prior to increase in vecuronium
(8) Discontinue neuromuscular blockade if infusing when patient re-warmed to 36 C

Protocols
- calcium chloride 500 mg, Soln, IVP, PRN
  (1) Give IV push slowly for Ionized Calcium 1.1-1.2
  (2) Recheck Ionized Calcium in 4 hours
  (3) Repeat order as often as needed
- calcium chloride 1,000 mg, Soln, IVP, PRN
  (1) Give IV push slowly for Ionized Calcium less than 1.1
  (2) Recheck Ionized Calcium in 4 hours
  (3) Repeat order as often as needed

Laboratory
- If Arctic Sun temperature is less than 20 C with target temperature = 35 C and on neuromuscular blockade, select blood, sputum and urine culture orders
  - Blood Culture - Adult Standard(SUB)*
  - Culture Urine URINE-CATH, Stat
  - Culture Lower Respiratory & Gram Stain SPUTUM, Stat
  - ABG (Blood Gases Arterial) Expedite
  - Comprehensive Metabolic Panel BLOOD, Expedite, Nurse Collect
  - Basic Metabolic Panel BLOOD, Timed Study, Every AM, Nurse Collect
  - Magnesium Level BLOOD, Timed Study, Start T;N, Nurse Collect, every 12 hrs while patient hypothermic
  - Ionized Calcium BLOOD, Timed Study, Start T;N, Nurse Collect, every 12 hrs while patient hypothermic
  - CBC without Differential BLOOD, Expedite, Nurse Collect
  - CBC without Differential BLOOD, Timed Study, Every AM, Nurse Collect, while patient hypothermic
  - Potassium [K+] Level BLOOD, Timed Study, Start T;N, Every 6 Hours, Nurse Collect, While patient hypothermic
  - Chest Pain Biomarker (Troponin) Protocol(SUB)*

Tests/Procedures
- EEG Monitoring w/Video Gr Than 12hrs Therapeutic Hypothermia

Respiratory
- Vent Settings (Conventional) Mode PRVC, Protocol Adult Mechanical Vent Protocol
  Adjust temp on inspired air on ventilator to room temp during hypothermia; no spontaneous breathing trial until patient temperature 37 C and propofol discontinued

Provider Signature: ___________________________  Print Name: ___________________________
Date: ______________  Time: ______________

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