

HYPOTHERMIA/CARDIAC ARREST SURFACE COOLING ORDERS

Cooling /Rewarming Protocol (Equipment is located in medication room of the DOC- door code 40369)

- Initiate cooling with iced saline gastric lavage and ice packs on patient's axilla and groin until cooling blankets started.
- Lay a single layer sheet on top of each cooling blanket.
- Wrap patient in 2 cooling blankets/sheet (sheet side to patient) by "log-rolling" patient.
—1 blanket wrapped around torso and the other around the pelvis and legs
- Select the "MANUAL" mode on cooling machine and set the set point temperature on the cooling unit to 5⁰ C.
- Once patient temp of 33⁰ C is achieved (will take about 3-8 hrs), select the "AUTO" mode on the cooling machine and set target temperature to 33⁰ C.
- After 24 hours at 33⁰ C, rewarm passively to 36.5⁰ C by setting the cooling unit to "MANUAL" mode and re-set unit by increasing target temp by 1⁰ C every 4 hours.
- If experiencing difficulty rewarming as above, use heated ventilator air to provide core rewarming.
- **Stop all potassium administration 8 hours prior to rewarming. DC all potassium in runs and IVF.**
- At end of cooling, order 2 cooling blankets and send all equipment to **DOC, NOT** Central Supply.
- **In order for patients to achieve and maintain target hypothermia of 33⁰C complete sedation AND paralysis must be achieved with continuous infusion of appropriate medications (see below).**

Sedation

- Propofol initiated at 5 micrograms/kg/minute IV and titrated by 5 micrograms/kg/min IV every 5 minutes to a goal of 30 - 50 micrograms/kg/min or as tolerated by blood pressure
- Midazolam initial dose 0.01 – 0.03 mg/kg IV, then 0.02 mg/kg/hr IV titrate up to 0.1 mg/kg/hr IV. If Midazolam is started in ER, switch to Propofol once in CCU
- **Titrate to sedation as observed by hemodynamic parameters**

Paralysis

- Pancuronium 0.1 mg/kg bolus then 1 microgram/kg/minute
- Vecuronium 0.1 mg/kg bolus then 1 micrograms/kg/minute
- Titrate to 1-2/4 TOF q1h to suppress shivering
- Keep head of bed at 30⁰ while receiving paralytics
- Lacrilube to eyes q8h while receiving paralytics
- Discontinue paralytics after patient is warmed to 36.5⁰ C

Blood Pressure and Volume Management

- Target systolic BP > 90, MAP > 80 mmHg to maintain cerebral perfusion
- Goal CVP > 4-6 mmHg or PCWP > 8 mmHg

DVT Prophylaxis (if patient not receiving heparin drip for other indication)

- Heparin 5000 units SQ q12h for patients weighing ≤ 70 kg
- Heparin 5000 units SQ q8h for patients weighing > 70 kg

SUP Prophylaxis

- Famotidine 20 mg IV q12h
- Famotidine 20 mg per NG/NJ q12h
- Lansoprazole 30 mg per NG/NJ qD

Physician's Signature and pager/contact no.: _____ Date/Time: _____

HYPOTHERMIA/CARDIAC ARREST SURFACE COOLING PROTOCOL

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Cooling Protocol:

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- Lay a single layer sheet on top of each cooling blanket
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- Select the "MANUAL" mode on cooling machine and set the set point temperature on the cooling unit to 5⁰ C
- Once patient temp of 33⁰ C is achieved (will take about 3-8 hrs), select the "AUTO" mode on the cooling machine and set target temperature to 33⁰C

In order for patients to achieve and maintain target hypothermia of 33⁰C complete sedation AND paralysis must be continued with continuous infusion of appropriate medications (see below).

- After 24 hours at 33⁰ C, rewarm passively to 36.5⁰ C by setting the cooling unit to "MANUAL" mode and re-set unit by increasing target temp by 1⁰ C every 4 hours
- At end of cooling, order 2 cooling blankets and send all equipment to **DOC, NOT** Central Supply

Sedation Protocol:

- IV Propofol initiated at 5 micrograms/kg/minute and titrated by 5 micrograms/kg/min every 10 minutes as needed to achieve sedation **OR**
- IV Versed initial dose 0.01-0.03mg/kg over 3-4 min, then 0.02mg/kg/hr titrate up to 0.1 mg/kg/hr to achieve sedation (if Versed is started in ER, switch to Propofol once in CCU)

Paralytic Protocol: Titrate to 1/4 TOF

- Pancuronium 0.1 mg/kg bolus then 0.05 mg/kg/hr **OR**
- Vecuronium 0.1 mg/kg bolus then 0.8-1.2 micrograms/kg/minute to prevent shivering

Paralytics and sedation may be discontinued once patient is rewarmed

Blood Pressure: Target systolic BP > 90, MAP > 80 to maintain cerebral perfusion

Volume Management: Goal CVP > 4-6 mmHg or PCWP > 8 mmHg using Normal Saline (CVP or PCWP monitoring not mandatory).

DVT Prophylaxis: Heparin 5000 units SQ Q12 hrs (or Q 8hrs if pt >70kg)

General Principles of Hypothermia

Clinical Effects of Hypothermia

Below 35⁰ C and above 33⁰ C

- Sensation of cold, skin cold to touch
- Slurred speech, shivering, incoordination, amnesia
- Intense vasoconstriction, cold-induced diuresis
- Bradycardia

Below 33⁰ C and above 27⁰ C

- Cyanosis, respiratory alkalosis, rigidity
- Arrhythmias, particularly A-fib

Below 27⁰ C

- Fixed/dilated pupils, very faint vital signs
- Risk of V-fib

Phases and Goals to reach 33-35⁰ C—Surface Cooling

Induction Phase

- Paralyze/Sedate
- Reach target quickly
- Avoid overshoot

Maintenance Phase

- Maintain temp
- Maximize physiology
- Avoid complications

Rewarming Phase

- Return to stable normothermia
- Avoid rebound hyperthermia

Induction Phase: Reach target temperature rapidly

- Don't rewarm patient in ambulance or in ED
- Place cooling pads, ice bags, etc for maximal surface contact
- Use large gradient between blanket water and pt (pt 37⁰ C, blanket 4⁰ C); decrease gradient as patient approached target
- Paralyze and sedate
- Use techniques for core cooling
 - Iced gastric lavage
 - Room temperature ventilator gas

Maintenance Phase: Physiology of hypothermia

- Vasoconstriction: Diuresis→low MAP
- Cardiac depression: Bradycardia, ECG changes, arrhythmias
- Electrolyte fluctuations: Intracellular shift of K, possible hyperglycemia
- Prolonged PT and PTT

Maintenance Phase: Avoid complications

- Skin care to avoid cold-related injury
- Frequent suctioning and pulmonary toilet
- Basic nursing care to avoid complications of immobility (DVT, UTI, skin breakdown)

Preparation for Rewarming

During rewarming the patient will:

- Vasodilate
- Shift cooler blood from the core as extremities warm → afterdrop

At the end of the maintenance phase:

- Volume load ~6-8 hours before rewarm starts
- Stop all KCl
- Allow patient to begin drifting upward

Rewarming Phase: Return to stable normothermia

- Warm no faster than 1°C in 4 hours
- Use small temp gradients
- Apply blankets if needed
- Warm ventilator air
- Continue to support MAP and CPP
- Avoid afterdrop