

Induced Hypothermia

Patient Information:



INDUCED HYPOTHERMIA SCREENING DATA - Date: _____ Time: _____

INDICATIONS :

- Time of cardiac arrest : _____ (greater than 6 hours post-cardiac arrest)
- GCS now : E ___ V ___ M___ (greater than 10 total or M less than 4 if intubated)
- Blood Pressure now : _____ (patient able to maintain a blood pressure, with or without pressors, after CPR)

EXCLUSION CRITERIA LIST :

• **If any answers are YES, patient is excluded. If all answers are NO, induced hypothermia may be initiated.**

CT scan showing hemorrhage in patients with major head trauma

- Yes
- No

Major surgery within the last 14 days

- Yes
- No

Suspicion of systemic infection / sepsis

- Yes
- No

Patient in coma from other causes (drug intoxication, pre-existing coma prior to arrest)

- Yes
- No

Patient with known bleeding disorder, or with active ongoing bleeding

- Yes
- No

Pregnancy

- Yes
- No

PRIOR TO INITIATING INDUCED HYPOTHERMIA :

Laboratory

- **Urine HCG should be ordered for all women of childbearing age.**

- HCG urine

Diagnostic Tests

- **CT, head or brain should be ordered for patients with possible head injury to rule out intracerebral hemorrhage.**

- CT, head or brain, without contrast

INDUCTION PHASE : IF Screening Data Complete, AND Patient Fits CRITERIA

Notifications

- Initiate Critical Care Admission orders
- Notify primary medical physician or NITS if lipase result is greater than 2000 units/L and/or transaminases are greater than 500 units/L.

Nursing Orders - Prepare Patient :

- Central venous catheter insertion (femoral line, left sided preferred). If using COOLGUARD 3000, insert ICY catheter into the left femoral vein, if using COOL LINE catheter, insert into the subclavian vein
- Intubation
- Ventilator management per Mechanical Ventilator/Respiratory Care to manage order set; use HME instead of warm humidity with ventilation circuit
- NG/OG to low continuous suction
- Arterial line (radial or brachial preferred)
- CVP monitoring and maintain greater than 8 mmHg
- Foley catheter with bladder thermistor
- Cardiac monitor
- Neuromuscular blockade monitoring using train of four (TOF) with goal therapy 2 of 4

Diet

- NPO during induced hypothermia and rewarming phases.

IV Fluids

- Sodium Chloride 0.9% 500 milliliter bolus if CVP drops below 8 mmHg. If CVP remains less than 8 mmHg after bolus, contact managing intensivist for further orders.

Medications

midazolam (Versed)

- 0.05 milligram/kilogram intravenous bolus with a maximum of 5 mg, followed by 0.1 mg/kg/hr infusion not to exceed 10 mg/hr (Administer prior to use of cisatracurium)

fentanyl (Sublimaze)

- 50 micrograms intravenously every 15 minutes as needed for sedation / shivering.
- Initiate continuous infusion in ICU at 25 mcg/hr and titrate to terminate shivering (Administer prior to use of cisatracurium)

cisatracurium (Nimbex) -

Patient must be intubated and be given midazolam and fentanyl before administration of cisatracurium

- 0.15 milligram/kilogram intravenous bolus
- Initiate continuous infusion in ICU at 0.5 mcg/kg/min, which may be increased to 10 mcg/kg/min to help terminate shivering.

norepinephrine (Levophed)

- 2 - 12 micrograms/minute by continuous infusion to maintain MAP greater than 90 mmHg after a temperature of 33.5 degrees Celsius is reached. If unable to maintain MAP greater than 90 mmHg, then add phenylephrine infusion.

phenylephrine (Neo-Synephrine)

- Initiate infusion at 10 micrograms/minute and titrate to maintain MAP greater than 90 mmHg. Maximum infusion rate 200 microgram/minute.
- Initiate Insulin, Continuous Infusion, Critical Care order set

Laboratory

- CBC (HGB, HCT, WBC, RBC, Platelet) now and daily
- Magnesium (Mg) now and daily
- Phosphorus level now and daily
- Prottime/INR & PTT now, every 4 hours during hypothermia therapy, then daily
- Creatine kinase, total (CK-total) now, every 6 hours x 2, then daily
- Troponin-I now, every 6 hours x 2, then daily
- Type and screen now
- Basic metabolic panel now, every 4 hours during hypothermia therapy, then daily
- Arterial blood gases every 4 hours during hypothermia therapy
- Lactate, serum every 4 hours during hypothermia therapy
- Glucose, serum every 4 hours during hypothermia and re-warming (do not do fingerstick)
- Liver Profile 12 hours after starting hypothermia therapy
- Lipase 12 hours after starting hypothermia therapy

Diagnostic Tests

- 12-lead ECG on admission and daily

Consults

- Consult Intensivist : _____
- Neurology Consult (for patients 12 hours after hypothermia protocol terminated, and those patients with stroke under the induced hypothermia protocol)
- Neurology Consult for isolated head injury with comatose state
- Consult to enterostomal therapist for skin care recommendations
- Consult : _____

COOLING:

As directed by physician, follow either INTERNAL COOLING w/COOLGUARD 3000 or EXTERNAL COOLING protocol

Vital Signs

- Vital signs hourly, with particular attention to arrhythmia detection. Maintain MAP greater than 90 mmHg. Continuous temperature monitoring with every 1 hour documentation. Goal temperature is 32-34 degrees Celsius (89-93 F)
- Continuous SaO2 by pulse-oximetry

- Continuous CVP monitoring to maintain CVP greater than 8 mmHg; if CVP drops below 8 mmHg, give 500 ml fluid bolus



INTERNAL COOLING - COOLGUARD 3000

Check coolant level; plug in power cord and power up console

Start "System pre-cool"

Select catheter (pump rate)

Set target temperature and select "MAX POWER" ♦

Install start up kit tubing set

Connect temperature sensor and connect cooling catheter to the saline tubing from the COOLGUARD 3000

Turn on COOLGUARD 3000 and press RUN/STBY button, set target temperature at 32 degrees Celsius and maintain for 24-48 hours.

If using femoral ICY catheter start normal saline at 150 milliliter/hour

IF USING SUBCLAVIAN COOL LINE CATHETER: must infuse 15 milliliter/kilogram of 4 degrees Celsius (39 F) 0.9% normal saline over 30 minutes to a maximum of 1500 milliliters. This is done to start patient cooling, as this catheter can only cool the patient at 0.75 degrees Celsius/hour.



EXTERNAL COOLING - IV Fluids & Cooling Blanket

Sodium Chloride 0.9%

30 milliliters/kilogram at 4 degrees Celsius (39 F) infused over 30 minutes to maximum of 3 Liters

150 milliliters/hour maintenance

Cooling blanket

Place two cooling blankets to "sandwich" patient, with sheet between blankets and patient's skin for protection. Set the hypothermia unit in auto mode and temperature at 33 degrees Celsius.

Once target temperature of 32 - 34 degrees Celsius is reached, use cooling blankets to maintain temperature for 24 - 48 hours

REWARMING PHASE

Vital Signs

- Vital signs hourly. Monitor patient for hypotension. Continuous temperature monitoring with every 1 hour documentation. Goal temperature is 36 degrees Celsius (96.8 F) over 8 hours
- Continuous SaO2 by pulse-oximetry

Nursing Orders

- Initiate the rewarming process after 24 - 48 hours of continuous hypothermia for NEUROLOGICAL patients, or after 24 hours of continuous hypothermia for CARDIAC patients
- ACTIVE RE-WARMING WITH COOLGUARD 3000 :
(prepare COOLGUARD 3000 for patient re-warming)
Press "TARGET TEMPERATURE" button, change temperature from MAX to desired temperature (36 degrees Celsius), and enter temperature
Press "RATE DEGREE/HOUR" button and select 0.5 degrees Celsius, then enter selection
Press "STBY/RUN" button and re-start the pump
Notify PMB/Intensivist if patient has not reached 36 degrees Celsius after 8 hours of rewarming
If rewarming process exceeds greater 0.5 degrees Celsius/hour: initiate active internal cooling process and notify PMD/Intensivist
- PASSIVE RE-WARMING:
Rewarming should occur at a rate of 0.5 degrees Celsius per hour, over 12 hours.
Maintain the hypothermia unit in auto mode and increase temperature setting by 0.5 degrees Celsius every hour until target temperature of 36 degrees Celsius is reached.
Notify PMD if patient has not reached 36 degrees Celsius after 8 hour of rewarming.
If rewarming process exceeds > 0.5 degrees Celsius per hour initiate active external cooling process, and notify PMD.



ENDING TREATMENT WITH COOLGUARD 3000 :

Press "STBY/RUN" button

To remove COOL LINE or ICY catheter: disconnect IN and OUT balloon parts from the COOLGUARD cooling line and leave them uncapped

Aspirate each balloon lumen separately to remove residual saline from balloons

DO NOT reconnect the balloon parts to each other to allow residual saline within the circuit to be expressed during catheter withdrawal

Disconnect patient temperature probe from the COOLGUARD 3000 cables; select "END PROCEDURE" and turn off the machine

If ICY or COOL LINE catheter to remain in place for central IV access, disconnect IN and OUT parts of the balloon lumens from the COOLGUARD cooling lines and immediately connect them to each other. DO NOT ASPIRATE FLUID FROM BALLONS, AS THEY NEED TO REMAIN INFLATED TO PREVENT CLOT FORMATION. Catheter can be removed later using above steps.

Medications

- **Once patient temperature reaches 36 degrees Celsius, sedation, analgesia, and paralysis will be discontinued at the discretion of the managing physician**

- acetaminophen (Tylenol) 650 milligrams rectally once to assist with controlled rewarming of 0.5 degrees Celsius per hour

Physician Signature, Date and Time

Physician ID # _____

Critical Care Committee 11/07, 3/08, 7/08
Medical Executive Committee 11/07