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Policy Type:	Guideline
Applicability:	Shock Trauma Center

FEVER MANAGEMENT IN PATIENTS WITH SEVERE TRAUMATIC BRAIN INJURY

Indications:

1. Patient with a GCS motor score of < 6 at any time after resuscitation is complete with an anatomic lesion evident on CT scan or MRI

OR

2. Intracranial pressure monitor in place

Intended for the first 7 days after initial traumatic brain injury and longer than 7 days if, after discussion with Neurosurgery and Critical Care, intracranial hypertension or cerebral edema remains a concern.

Evaluate the patient daily to determine when the interventions can be discontinued. Consider ending targeted temperature management when:

1. Glasgow Motor score is greater than 5
2. Intracranial pressure monitoring device is discontinued
3. Over 7 days out from the time of injury
4. Attending physicians feel the adverse effects of cooling outweigh the potential benefits.

Criteria for reinstating targeted temperature management after stopping:

1. GCS motor score declines by 1 or more points
2. Intracranial pressure rises above 22 mmHg
3. Overall GCS declines by 2 or more points

Guidelines for monitoring core body temperature:

1. Core body temperature should be assessed using a temperature sensing bladder catheter, a rectal or esophageal probe or a pulmonary artery catheter. Oral or axillary temperatures are unacceptable.
2. In patients with severe traumatic brain injury core body temperature should be monitored continuously and recorded every 1-2 hours.
3. When a fluid filled cooling blanket or endovascular catheter is in use for targeted temperature management the temperature of the fluid bath should be recorded on the flowsheet every 1 hour.
4. Perform an infection evaluation (fever pack) per protocol every 72 hours, or if white blood cell count is elevated or below normal or if there is a drop in the bath water temperature by more than 10°C. (NOTE: A decrease in the bath temperature indicates the machine is working harder to maintain an afebrile state.)

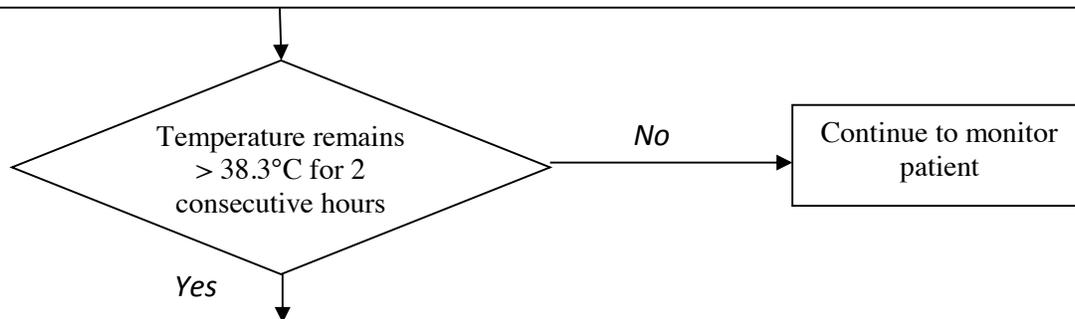
5. Patient shivering should be assessed hourly using the Bedside Shivering Assessment Scale. The shivering score should be recorded on the flowsheet every hour. **Target is a shivering score < 2.**

Goal of interventions in patients with severe traumatic brain injury is to aggressively management fever preferably keeping the patient normothermic (37°C). Fever is defined as a core body temperature greater than 38.3°C.

Goal: Aggressively management fever (core body temperature > 38.3°C) preferably keeping the patient with severe traumatic brain injury normothermic (37°C).

Initial interventions:

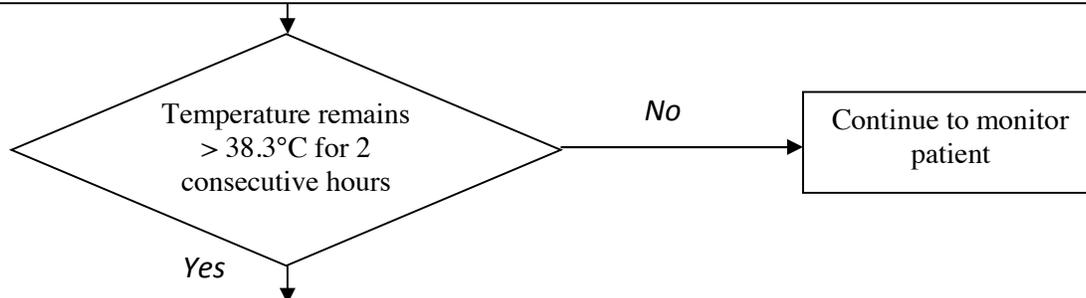
1. Administer prescribed antipyretic
 - Acetaminophen 650 – 1000 mg PO q 6h – (Scheduled NOT prn)
 - Note: Motrin should NOT be given without consent or approval of Neurosurgery in the presence of a new brain hemorrhage or if intracranial surgery is anticipated or bleeding is occurring elsewhere in the patient
2. Initiate antishivering interventions:
 - Apply Bair Hugger at maximal temperature (42°C) to the patient’s hands, feet and neck
 - Maintain Magnesium level of 3-4.
 - Administer scheduled (NOT PRN) buspirone 30 mg every 8 hours
 - Administer Meperidine (Demerol®) 12.5 mg IV scheduled every 8 hours (Contraindicated for patients on MAO inhibitors within the previous 14 days) with 25 mg IV every 6 hours PRN for shivering
3. Lower room temperature
4. If in use, lower temperature on CRRT circuit



Apply external cooling interventions

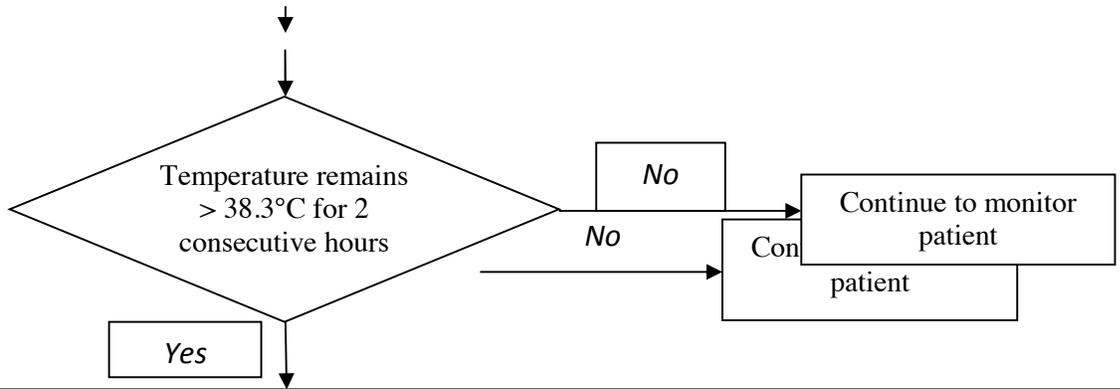
1. Apply cooling blanket
 - Apply the disposable Gaymar 7900 chest and leg wraps (if on back order can wrap a blanket around the chest and another under and around the thighs)
 - Hook the patient’s core body temperature probe to the cooling machine and set the machine on automatic to 1 degree less than the patient’s current temperature.
 - Continue to lower the patient’s temperature by 1 degree centigrade each hour until you get to 37°C, then maintain the device on automatic with the temperature set at 37°C.:
 - Hourly record the use of hypothermia, patient’s core body temperature, the bath temperature of the machine and the patient’s shivering score.
 - If the Gaymar device is ineffective in achieving desired temperature within 4 hours, if possible, switch to the Arctic Sun device
2. Ice packs on the groins, armpits and around the head
3. Cool tepid alcohol bath

Ensure shivering is controlled!



Ensure shivering is controlled!

Change IV solution to refrigerated saline and if patient requires a fluid bolus use cold refrigerated saline



Ensure shivering is controlled!
 Consider the following interventions:

- Institute CRRT
- Place and use an endovascular cooling catheter

Ins
 or
 Endovascular cooling catheter

Shivering should be controlled!

If shivering persists (shivering score > 2) after initial anti-shivering interventions in place, consider 1 or more of the following interventions:

STOP

- Increase Meperidine (Demerol®) to 12.5 mg IV every 4 hours as needed for shivering (Absolutely contraindicated for patients on MAO inhibitors within the previous 14 days). If shivering score continues to exceed 2 consider increasing Meperidine to 25 mg IV every 4 hours.
- Initiate Propofol
- Initiate dexmedetomidine (Precedex®)
- Consider reducing frequency of the neurologic exams

The Bedside Shivering Assessment Scale (Badjatia, N, et al. Stroke, Dec. 2008: 3242.)

(Target is a shivering score < 2)

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 the neck and thorax
3	Shivering involves gross movements of the trunk and upper and lower extremities

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