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Neuro-ICU Normothermia Protocol

Purpose

In the acute neurologically injured patient, early control of fever is an ideal target for therapy to prevent secondary brain injury. Maintaining normal patient temperature (normothermia) is paramount to preventing unnecessary morbidity and mortality.

Inclusion Criteria

- Ischemic Stroke, Hemorrhagic Stroke, Traumatic Brain Injury, Spinal Cord Injury, Subarachnoid Hemorrhage with a core body temperature ≥ 37.5°C for > 1 hr
- Please allow initial fever to rise to maximum of 101°F (or 38.3°C) before treating to ensure appropriate non-neurogenic causes of fever are evaluated and treated

Exclusion Criteria

- Fevers occurring within 48 hrs of a planned surgery are considered procedural related and do not warrant protocol management unless temperature is ≥ 39°C
- Active cardiac dysrhythmia with hemodynamic instability
- Significant cutaneous injuries excludes surface cooling
- Known hematological dyscrasias which affect thrombosis (cryoglobulinemia, sickle-cell disease, serum cold agglutinins)
- Diagnosis of sepsis syndrome

Goal

Maintain normothermia, core body temperature 98.6°F (37°C) - 99.5°F (37.5°C) for > 4 consecutive hrs

1. Monitoring
   a. Place invasive continuous temperature monitor (brain temperature catheter is preferred). In order of most accurate to least: esophageal > bladder > rectal
   b. Send cultures – blood, urinalysis, CXR and BAL and CSF if clinically indicated

Developed by: Shaheryar Hafeez, MD, Neurocritical Care
Approved by Neuro-ICU CMT: January 2017
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2. Treatment

   a. **1st line therapy**

      Acetaminophen 650 mg q4 hrs (max daily dose is 4000 mg) scheduled for only 48 hrs; reassess every 48 hrs. If scheduled acetaminophen is ordered, LFTs q3 days is recommended.

   b. **2nd line therapies**

      Apply external cooling blanket and ice packs to the groin, axilla, and neck

   c. **3rd line therapies**

      After 2 doses of acetaminophen 650 mg, application of external cooling blanket, and ice packs

      i. Cold saline gastric lavage every 4 hrs

      ii. Intravenous cold sodium chloride 0.9% bolus of 500-1000 mL through large bore peripheral IV (14-20g AC) for refractory high grade fevers

   d. **4th line therapy**

      If Tm ≥ 99.5°F or 37.5°C after 10 hrs of initial therapies → place on surface cooling device – Arctic Sun or Innercool device

Duration of protocol

- Significant Cerebrovascular Injury = 7 days
- Subarachnoid Hemorrhage = At least 7 days with high consideration for 14 days
- Traumatic Brain Injury = 7 days
- Acute Spinal Cord Injury = 7 days

*After 7 days of normothermia protocol, please page house officer when Tm is ≥ 101°F or 38.3°C

When to contact house officer

-Call house officer if 2nd line therapies have failed

-Call house officer if significant shivering is noted via bedside shivering index > 1 and initiate shiver protocol.

-Call house officer if cardiac arrhythmias are noted or significant bleeding is noted.

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How to wean off Normothermia protocol

- Scheduled antipyretics should be re-evaluated every 48 hrs for necessity and obtaining measurement of maximum fever.
- If fever curve is decreasing: remove cooling gel pads → cooling blanket → reduce antipyretics to q8 hrs → antipyretics as needed.

Frequency of vital signs

- Monitor temperature every 1 hr until target temperature is reached and then every 2 hrs once at target temperature.

Infection Surveillance

- If fever reaches Tm ≥ 101°F or 38.3°C send blood, urine, CSF, and BAL (if applicable)
- White blood count (WBC) will be followed daily during the period of induced normothermia. A rise in the WBC by 20% from the time of initiation of induced normothermia is considered significant and will prompt an infection workup.
- Additional cultures will be sent every 72 hrs if an infectious source is suspected but not identified. The need for additional cultures prior to 72 hrs is left to the discretion of the treating intensivist.

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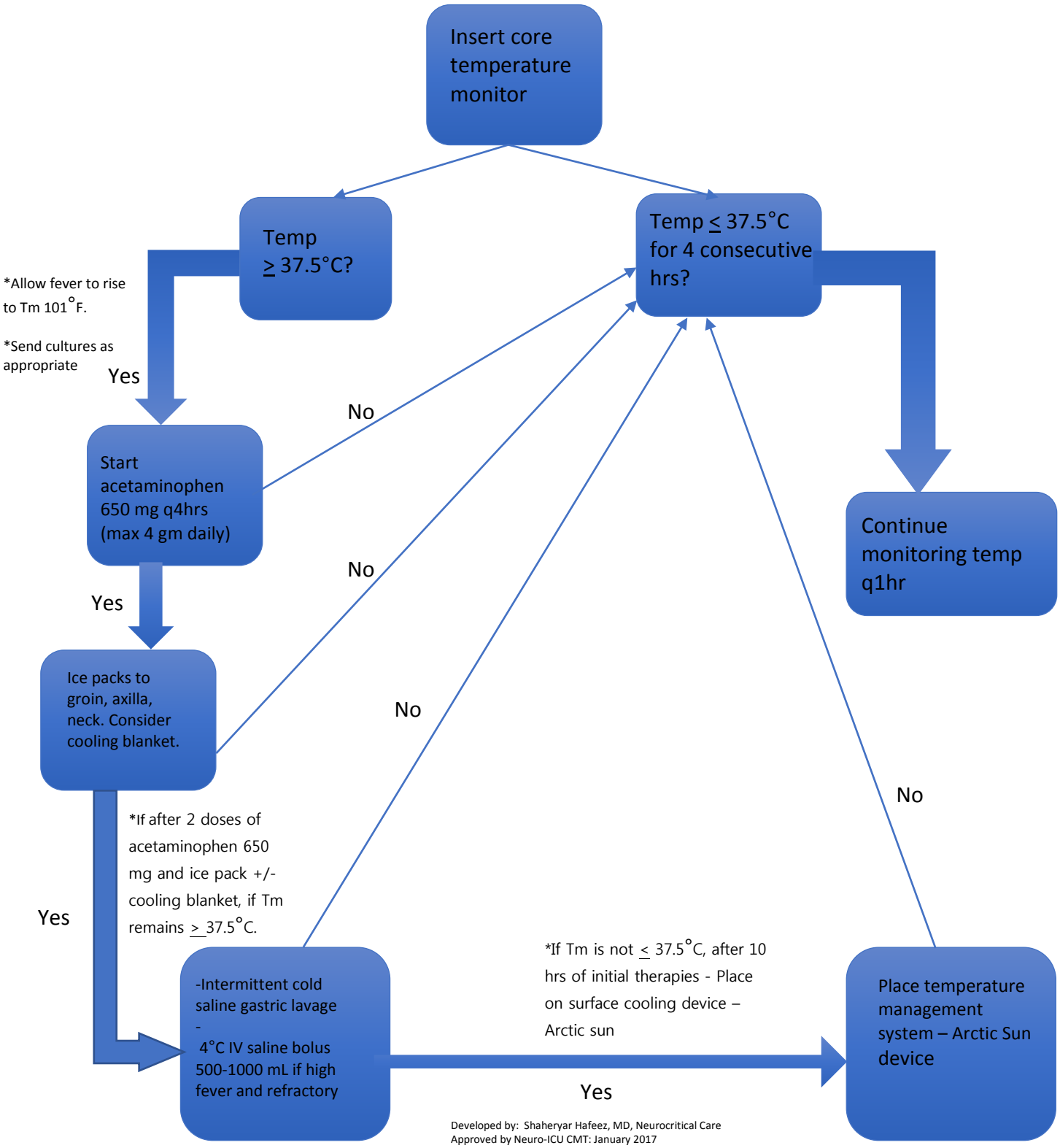
Protocol Flow Diagram

Initiation: Any patient admitted with acute neurologic injury with body temperature ≥ 37.5°C for > 1 hr



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