Barnes Jewish Hospital/Washington University
Trauma Service
Critical Pathway for Management of Patients with Severe Traumatic Brain Injury 2015 (Reviewed 9/19)

General parameters for ALL patients

- Insert an arterial line and central venous catheter
- Maintain systolic BP > 90 mmHg Or use MAP >85 with transducer leveled at the phlebostatic axis
- Utilize attached protocol to manage hemodynamic status
- Keep hemoglobin > 10
- Maintain serum Sodium > 140
- Encourage use of $ETCO_2$ monitoring
- Initiate nutrition as soon as medically appropriate
- Initiate anticonvulsants for the first 7 days after injury; Keppra is the agent of choice
- Consult neurosurgery prior to patient extubation

Initial Interventions

- Establish airway, breathing and circulation
- Ventilate to maintain paCO2 to 35-38 mmHg
- Provide supplemental O2 to keep paO2 > 70mmHg or spO2 >94%
- Maintain normothermia
- Maintain head of bed to optimize CPP and minimize ICP (30° HOB elevation works best for most patients)
- Ensure good head and neck alignment
- Reduce unnecessary noxious stimuli
- See sedation algorithm

* When patient has an unexplained ICP elevation or there is a change in mental status:
  - Contact Neurosurgery
  - Check the ABG to ensure paO2 and paCO2 are in the desired range
  - Evaluate that the patient's position is not limiting ventilation or causing increased ICP
  - Check C-collar/trach ties
  - Contact Neurosurgery to troubleshoot monitor
  - A combination of ICP, CPP, PbrO2, clinical assessment and CT scan findings should be used to determine need for treatment.

Insert ICP monitor as clinically indicated (See ICP placement guideline)

Maintain CPP ≥60 mmHg (see Hemodynamic Management protocol below)

Intracranial hypertension? > 20 mmHg or > 25 mmHg after Decompressive craniectomy

No → Slowly remove treatment for ICP

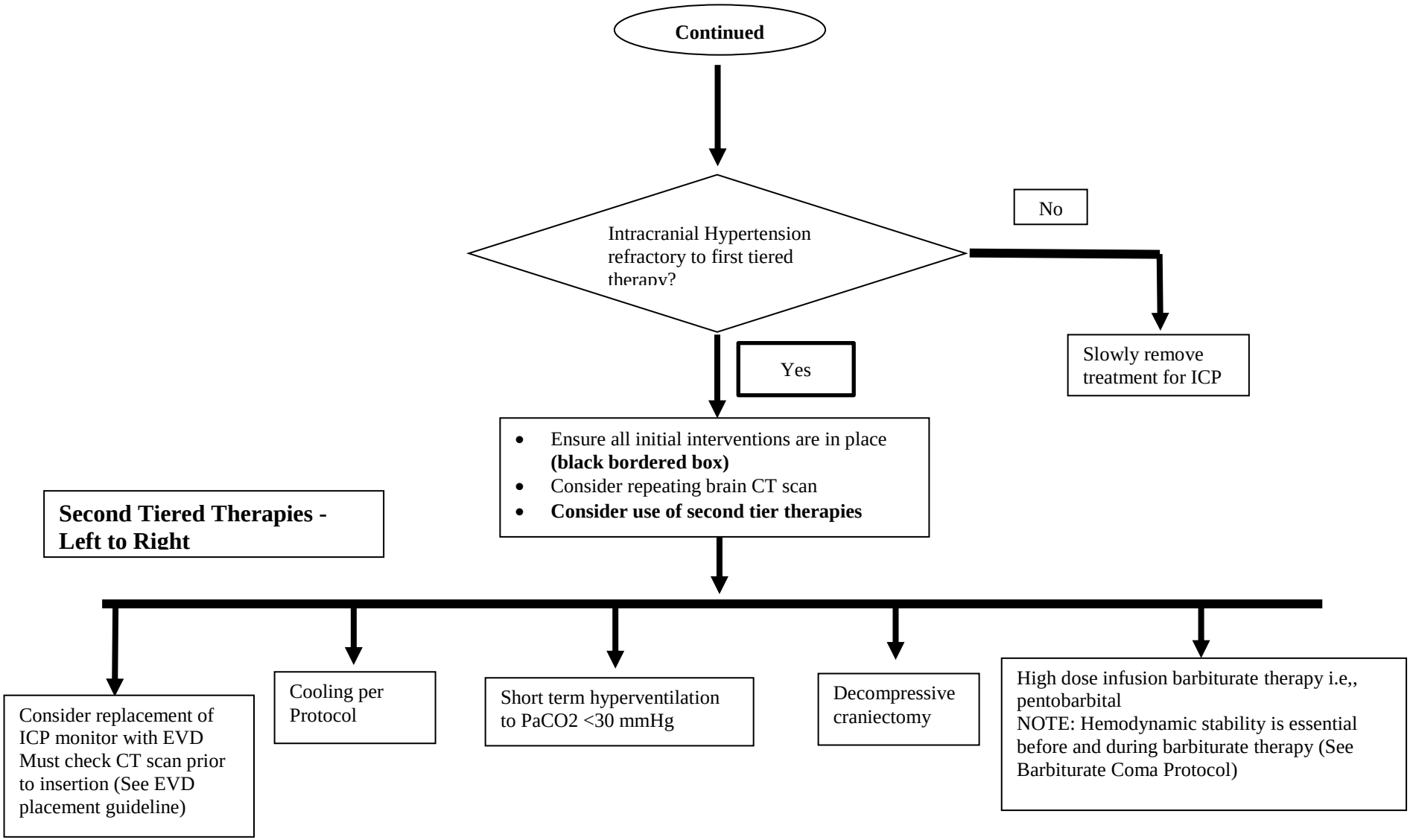
Yes

First Tier Therapies -Left to Right

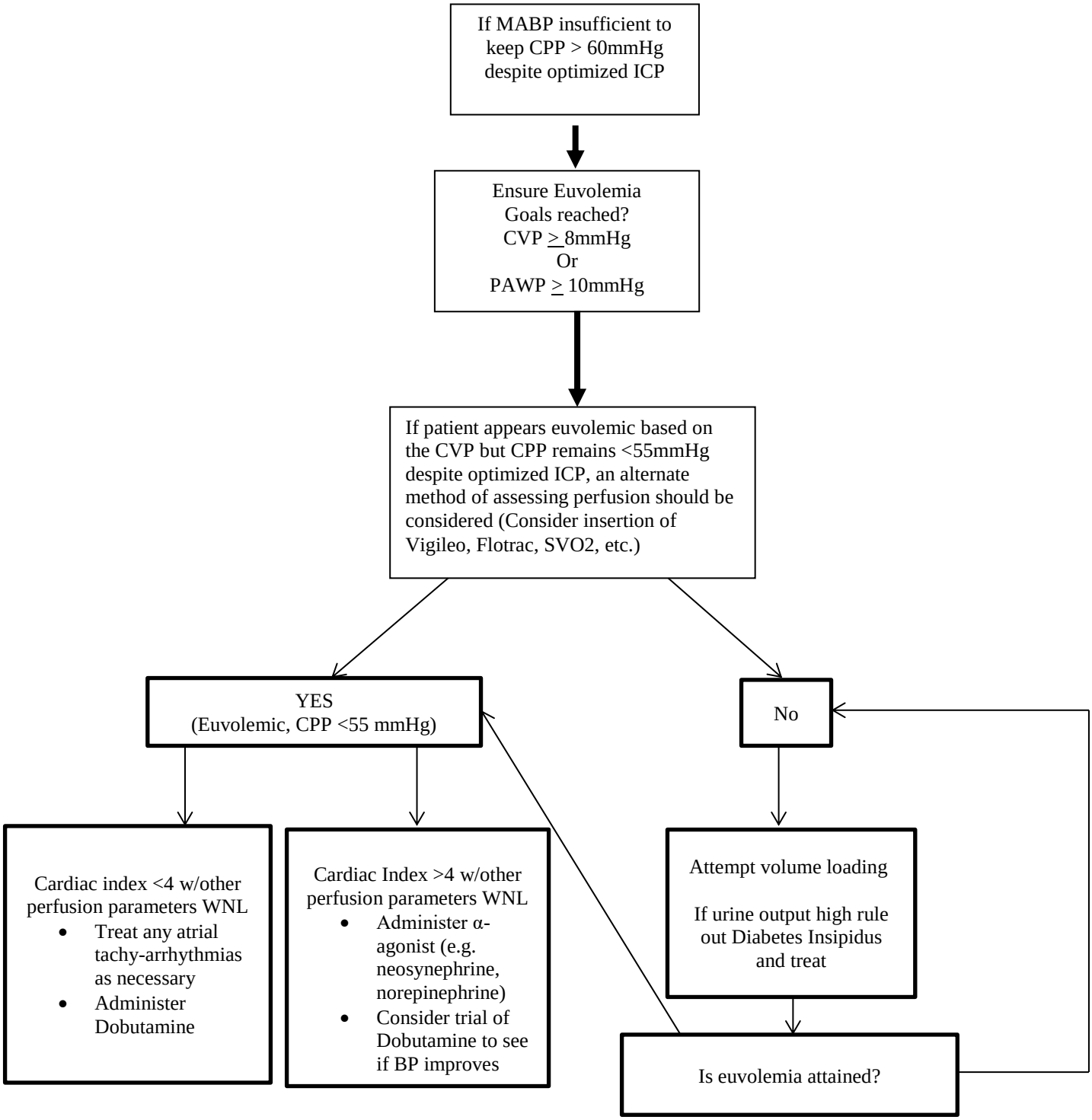
- **See black bordered box ***
- Administer sedation (see TBI sedation protocol at bottom)
- Consider repeating a brain CT scan

- Ensure all initial interventions are in place *****
- Mannitol 0.50 – 1.0 gm/kg
- Hypertonic saline (3%-1-1.5 cc/kg/hour, 5% 3-4ml/kg/hour bolus); For acute ICP management consider a 30 cc bolus of 23.4% hypertonic saline (Administration limited to ED/ICU)
- Maintain serum Osmo 310 - 330 mOsm/L (Osm Gap <20) and **keep patient euvolemic**

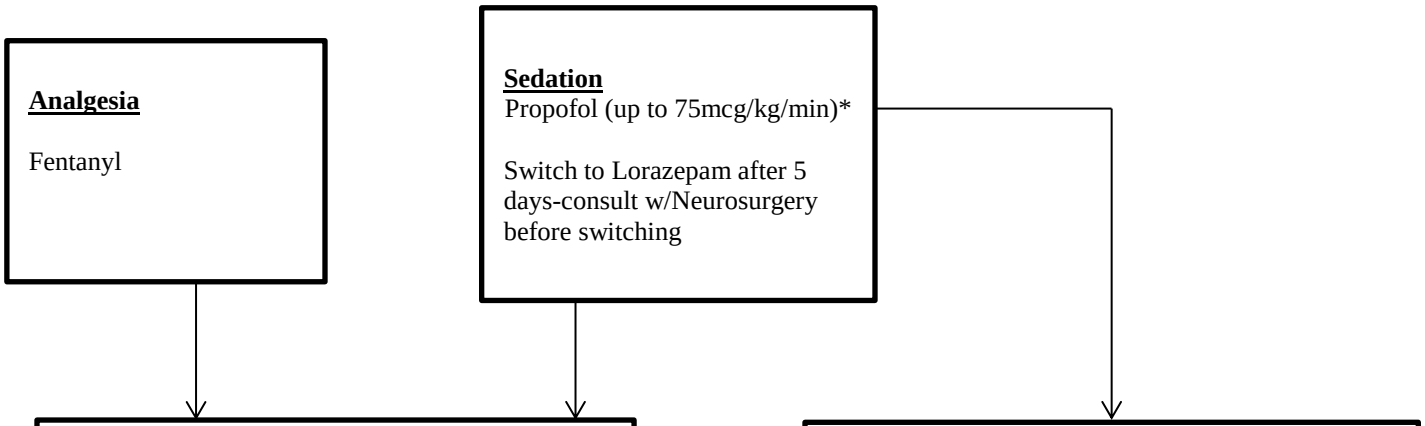
- Ensure hyperventilation all initial interventions are in place *****
- Short term to paCO2 to 30- 35 mmHg for < 4 hours
- AVOID hyperventilation in first 24 hours after injury when CBF is often critically reduced


Continued
Intracranial Hypertension refractory to first tiered therapy?
No
Slowly remove treatment for ICP
Yes
Ensure all initial interventions are in place (black bordered box)
Consider repeating brain CT scan
Consider use of second tier therapies
Second Tiered Therapies - Left to Right
Consider replacement of ICP monitor with EVD Must check CT scan prior to insertion (See EVD placement guideline)
Cooling per Protocol
Short term hyperventilation to PaCO2 <30 mmHg
Decompressive craniectomy
High dose infusion barbiturate therapy i.e,, pentobarbital
NOTE: Hemodynamic stability is essential before and during barbiturate therapy (See Barbiturate Coma Protocol)

Hemodynamic Management of Isolated Intracranial Hemorrhage



Traumatic Brain Injury Sedation Protocol



Premedication for Interventions:

Increase analgesia and/or sedation 25% 15 minutes prior to initiating treatment

Discontinue increased dose when treatment is complete

Sedation considerations:

If ICP/CPP permit, patients under sedation should have their sedation lightened every 4hrs in order to assess neurologic function

In cases of medically refractory intracranial hypertension, consider limiting reversal of sedation until control of ICP/CPP is obtained

If possible coordinate reversal of sedation with Neurosurgery team to facilitate evaluation of patient

Note: Individualized, Clinical Judgement Supercedes All Written Guidelines