

Guideline



CCHMC Trauma Service Guidelines

Title: Severe Traumatic Brain Injury Guideline

Effective Date: 11/2019

Number: TR-29

Page: 1 of 4

1.0 SCOPE

- 1.1. Care of the Trauma Services patient at CCHMC.
- 1.2. This guideline provides the clinical guidance of care for any patient with a severe traumatic brain injury (TBI).

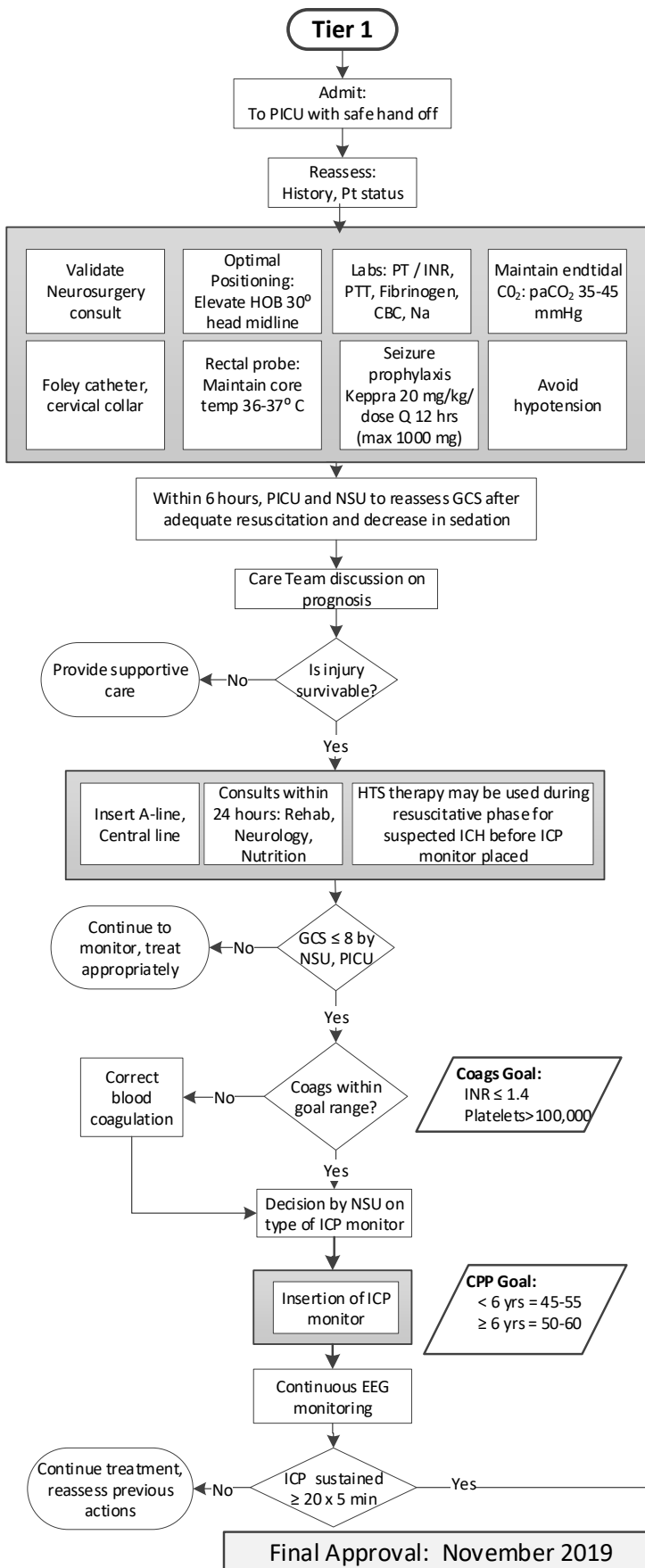
2.0 DEFINITIONS

- 2.1. **Severe Traumatic Brain Injury:** Inclusion Criteria:
 - 2.1.1. Abnormal CT scan with hematomas, swelling, herniation, compressed basal cistern, or diffuse axonal injury AND either #1 or #2 below
 - 2.1.1.1. Traumatic brain injury (TBI) with GCS \leq 8 (field, transport, or ED)
 - 2.1.1.2. TBI patient admitted with GCS $>$ 8, with deterioration to GCS \leq 8
- 2.2. Exclusion Criteria:
 - 2.2.1. Hypoxic ischemic injuries.
 - 2.2.2. Patient that is deemed non-salvageable after discussion / agreement by clinical care team
 - 2.2.3. Infants with open fontanelles

3.0 GUIDELINE

- 3.1. Complete primary and secondary survey per guidelines.
- 3.2. Refer to Severe TBI flow diagram next page

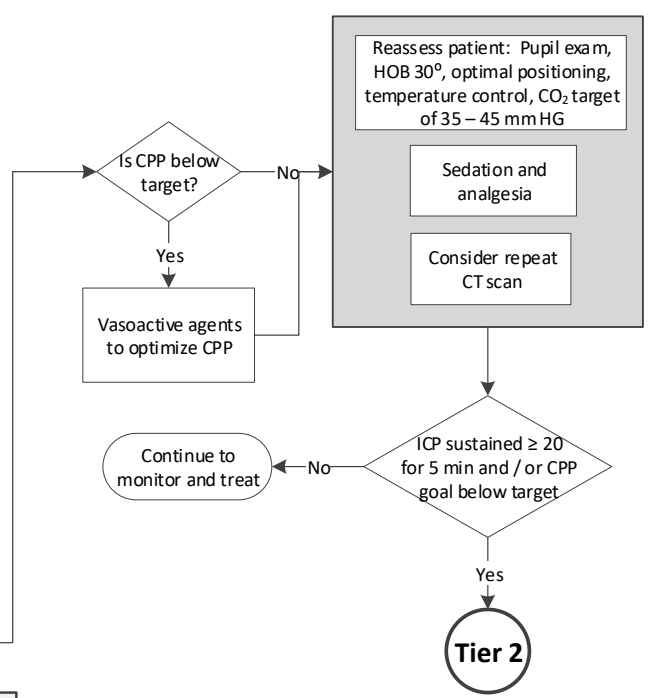
Severe Traumatic Brain Injury: Guideline for Management of ICH in PICU



Inclusion / Exclusion Criteria
<p>Inclusion:</p> <ul style="list-style-type: none"> Abnormal CT scan with hematomas, swelling, herniation, compressed basal cistern, or diffuse axonal injury AND either #1 or #2 below <ol style="list-style-type: none"> Traumatic brain injury (TBI) with GCS ≤ 8 (field, transport, or ED); TBI patient admitted with GCS > 8, with deterioration to GCS ≤ 8 <p>NOTE: a NORMAL head CT scan does not preclude the use of this guideline.</p> <p>Exclusion:</p> <ul style="list-style-type: none"> Hypoxic ischemic injuries Patient that is deemed non-salvageable after discussion / agreement by clinical care team Infants with open fontanelles
<p style="text-align: center;">Acute and Sustained Rise in ICP: Concern for impending Herniation</p> <p>Indicators:</p> <ul style="list-style-type: none"> Acute rise in ICP Pupil changes Bradycardia and hypertension <p>Actions:</p> <ul style="list-style-type: none"> Contact Intensivist, Neurosurgeon and Trauma Surgeon Hyperventilation (brief) to CO₂ level between 30-35 mmHg Add sedation / paralysis to treatment Give 3% HTS bolus at 4 mL/kg (max 500 ml) or Mannitol 0.25 gm-1 gm/kg Obtain I-Stat with electrolytes to assess sodium and CO₂

Additional Goals:

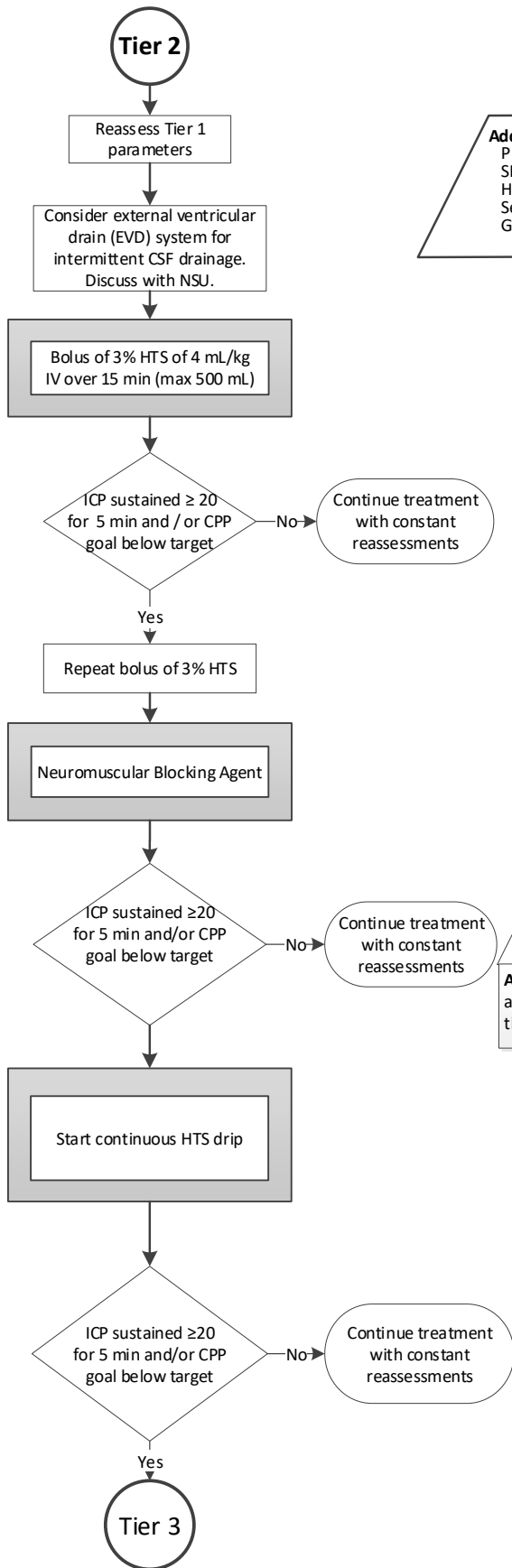
- Pulse O_x ≥ 92-99%
- SBP (appropriate for age)
- Hemoglobin ≥ 7 g/dl
- Serum Osmolality < 360
- Glucose 80-180 mg/dl



Final Approval: November 2019

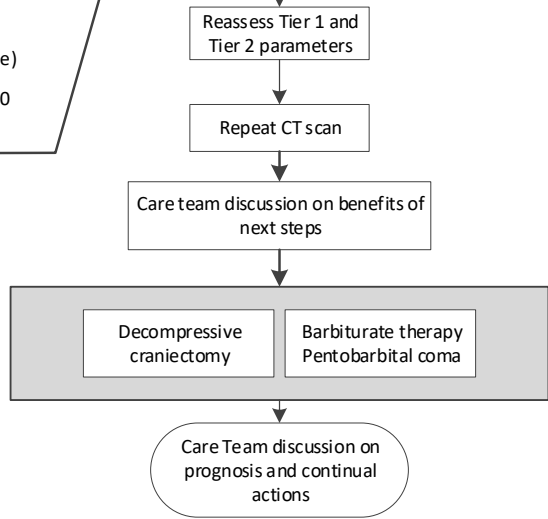
Tier 2: ICP Non Responsive to Tier 1 Therapy

Tier 3: ICP Non Responsive to Tier 2 Therapy



Additional Goals:
 Pulse Ox \geq 92-99%
 SBP (appropriate for age)
 Hemoglobin \geq 7 g/dl
 Serum Osmolality $<$ 360
 Glucose 80-180 mg/dl

Tier 3



Barbiturate Therapy

- Pentobarbital loading dose: 5 mg/kg over 30-60 minutes
- Continuous drip 0.5 – 1 mg/kg/hr; titrate in increments of 0.5 mg/kg/hr for burst suppression (max dose = 5 mg/kg/hr)

Hyperosmolar Therapy

- 3% HTS bolus, 4 mL/kg over 15 minutes (max of 500 mL)
- Typical range of 3% HTS continuous infusion, 0.1 – 1 mL/kg/hr; titrate to keep ICP $<$ 20
- Concentrate maintenance fluids where possible
- When treating with hyperosmolar therapy, serum sodium and serum osmolality should be assessed every 6 hours.
- Caution should be used if serum osmo exceeds 360 mEq/L
- Consider Mannitol, if osmo $<$ 320; maintain osmo $<$ 360

Avoid severe hyponatremia. Sustained ($>$ 72 hr) serum Na $>$ 160 mEq/L is associated with DVT; sustained serum Na $>$ 170 mEq/L is associated with thrombocytopenia and anemia.

* Based on Guidelines for the Management of Severe Traumatic Brain Injury 4th Edition

4.0 REFERENCES

- 4.1. Brain Trauma Foundation; American Association of Neurological Surgeons; Congress of Neurological Surgeons; Joint section of Neurotrauma and Critical Care, AANS/CNS, Bratton SL, Chestnut RM, Ghajar J, McConnell Hammond FF, Harris OA, Hartl R, Manley GT, Nemecek A, Newell DW, Rosenthal F, Schouten J, Shutter L, Timmons SD, Ullman JS, Videtta W, Wilberger JE, Wright DW. Guidelines for the Management of Severe Traumatic Brain Injury. 2007.
- 4.2. Kochanek, P. M., Tasker, R. C., Bell, M. J., Adelson, P. D., Carney, N., Vavilala, M. S., ... & Reuter-Rice, K. E. (2019). Management of Pediatric Severe Traumatic Brain Injury: 2019 Consensus and Guidelines-Based Algorithm for First and Second Tier Therapies. *Pediatric Critical Care Medicine*, 20(3), 269-279.

5.0 APPROVALS

All revisions of this guideline are approved by the Trauma Service Department. This guideline is reviewed every three years or sooner if deemed necessary. Policy authority for this document resides with the Trauma Service Department. This guideline is approved by the Trauma Services Manager and the Director of Trauma Services.

HISTORY	
Original Date	
	07/2016
Revision Date	
	6/19, 11/19
Review Date	
	06/18