

HEAD INJURY (TRAUMATIC BRAIN INJURY)

ALL PROVIDERS / EMT

- ☐ Focused history and physical exam
- ☐ Cardiac monitor, ETCO₂, and Pulse Oximetry monitoring when available
- ☐ **Treatment Plan**
 - Maintain airway. Administer oxygen to maintain SaO₂ 90-94%.
 - Consider spinal motion restrictions per the *Spinal Motion Restriction Guideline*
 - Elevate head 30 degrees.
 - Monitor the level of consciousness during the transport
 - **Severe TBI** (GCS <8 or AVPU “P” or “U”):
 - Adult: Consider endotracheal intubation for airway protection (Paramedic only)
 - Pediatrics: Continue effective BVM. Utilize airway adjuncts, if needed to ensure adequate chest rise, ventilation, and oxygenation.
 - **Do not hyperventilate** unless patient shows signs of herniation: unilateral pupillary dilation or posturing. In this case, increase respiratory rate by ~10% above normal target respiratory rate (see Mild Hyperventilation Guide). Target ETCO₂: 30-35 mmHg.

Mild Hyperventilation Guide for Signs of Herniation

Age	Normal Ventilation Rate	Mild Hyperventilation Rate
Neonate	40	44
Infant	30	33
Child	20	22
Adult	10	12

- Open skull fractures should be covered with dry sterile dressings. Do not apply pressure unless needed to stop severe hemorrhage.
- ☐ **Key Considerations**
 - TBI may be painful. However, excessive pain medications can cloud serial neurological assessments. Pain medications should generally be avoided in a patient with altered mental status after TBI. If pain is severe, give small doses only until pain is manageable.
 - Patients with TBI may be confused or combative. Consider physical/chemical restraints if needed to protect patient or personnel.
 - Loss of memory, prolonged confusion or altered mental status associated with trauma may indicate a significant head injury.
 - Avoid hypoxia (SaO₂ should be 90-94%).
 - Avoid over tightening of cervical collar (if placed) as this can cause increased intracranial pressure
 - Do not allow the patient to be hypotensive. Try to keep adult SBP >110 using the *Shock and Fluid Therapy Guideline*.
 - Pediatric lowest acceptable systolic blood pressures are birth to 1 month = 60mmHg, 1 month to 1 year = 70mmHg, 1 year to 10 years is = 70mmHg + (age x 2) and over 10 years = 90mmHg.

ADULT

PEDIATRIC (<15 years)

NOTE: Pediatric weight based dosing should not exceed Adult dosing.

AEMT

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- ☐ Advanced airway, vascular access, and fluid therapy per *IV/IO Access* and *Shock and Fluid Therapy Guidelines*
- ☐ Check blood pressure every 5-10 minutes.
- ☐ Follow the Traumatic Brain Injury pressure management under the *Shock and Fluid Therapy Guideline*.

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PARAMEDIC

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- ☐ **Persistent hypotension unresponsive to fluids:**
- ☐ **Epinephrine 2–10 mcg/min** IV/IO infusion for hypoperfusion. Titrate to maintain a SBP >100 mmHg
- ☐ **Push Dose Epinephrine 10mcg** as needed to maintain a SBP >100 mmHg after fluid bolus
- ☐ **Norepinephrine** initial dose: **0.05 – 1 mcg/kg/min** IV/IO for hypoperfusion. Titrate to maintain a SBP > 100 mmHg. For patients in refractory shock: 8-30 mcg/minute

- ☐ **Persistent hypotension unresponsive to fluids:**
- ⌚ **Epinephrine 0.1–1 mcg/kg/min** IV/IO infusion for hypoperfusion. Titrate to maintain a SBP >70 + (age in years x 2) mmHg
- ⌚ **Push Dose Epinephrine 1 mcg/kg (dose in appendix)** as needed to maintain a SBP >70 + (age in years x 2) mmHg after fluid bolus
- ⌚ **Norepinephrine** initial dose: **0.05 - 0.1 mcg/kg/min**, titrate to max of 2 mcg/kg/min to maintain SBP >70 + (age in years x 2) mmHg