

# Pediatric Severe Traumatic Brain Injury Guideline

## Recommendations by Topic Area and Level of Evidence

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### Monitoring Recommendations

#### *Intracranial pressure (ICP) monitoring*

- **III1:** Use of ICP monitoring is suggested.

#### *Advanced neuromonitoring*

- **III1:** If brain tissue oxygenation monitoring is used, maintaining a level greater than 10 mm Hg is suggested.

#### *Neuroimaging*

- **III1:** Excluding the possibility of elevated ICP on the basis of a normal initial (0 to 6 hours after injury) CT examination of the brain is not suggested in comatose pediatric patients. *This is a new recommendation.*
- **III2:** Routinely obtaining a repeat CT scan more than 24 hours after admission and initial follow-up is not suggested for decisions about neurosurgical intervention, unless there is evidence of either neurologic deterioration or increasing ICP.

### Threshold Recommendations

#### *Thresholds for treatment of intracranial hypertension*

- **III1:** Treatment of ICP that targets a threshold of less than 20 mm Hg is suggested.

#### *Thresholds for cerebral perfusion pressure (CPP)*

- **III1:** Treatment to maintain CPP at a minimum of 40 mm Hg is suggested.
- **III2:** A CPP target between 40 mm Hg and 50 mm Hg is suggested to ensure that the minimum value of 40 mm Hg is not breached. There may be age-specific thresholds, with infants at the lower end and adolescents at or above the upper end of this range.

### Treatment Recommendations

#### *Hyperosmolar therapy*

- **III1:** Bolus hypertonic saline (HTS) 3 percent is recommended in patients with intracranial hypertension. Recommended effective doses for acute use range between 2 mL/kg and 5 mL/kg over 10 to 20 minutes. *This is a new recommendation.*
- **III1:** Continuous infusion HTS is suggested in patients with intracranial hypertension. Suggested effective doses as a continuous infusion of 3 percent saline range between 0.1 mL/kg and 1.0 mL/kg of body weight per hour, administered on a sliding scale. The minimum dose needed to maintain ICP less than 20 mm Hg is suggested.
- **III2:** Bolus of 23.4 percent HTS is suggested for refractory ICP. The suggested dose is 0.5 mL/kg, up to a maximum of 30 mL. *This is a new recommendation.*

### ***Analgesics, sedatives and neuromuscular blockade***

- **III1:** With use of multiple ICP-related therapies, as well as appropriate use of analgesia and sedation in routine ICU care, avoiding bolus administration of midazolam and/or fentanyl during ICP crises is suggested because of the associated risks of cerebral hypoperfusion. *This is a new recommendation.*

### ***Cerebrospinal fluid (CSF) drainage***

- **III1:** CSF drainage through an external ventricular drain is suggested to manage increased ICP.

### ***Seizure prophylaxis***

- **III1:** Prophylactic treatment is suggested to reduce the occurrence of early (within 7 days) posttraumatic seizures. *This is a revised recommendation.*

### ***Ventilation therapies***

- **III1:** Prophylactic severe hyperventilation to a partial pressure of carbon dioxide level less than 30 mm Hg in the first 48 hours after injury is not suggested.
- **III2:** If hyperventilation is used in the management of refractory intracranial hypertension, advanced neuromonitoring for evaluation of cerebral ischemia is suggested.

### ***Temperature control/hypothermia***

- **III1:** Prophylactic moderate (32°-33°C) hypothermia is not recommended over normothermia to improve overall outcomes. *This is a revised recommendation.*
- **III1:** Moderate (32°-33°C) hypothermia is suggested for ICP control. *This is a revised recommendation.*

### ***Barbiturates***

- **III1:** High-dose barbiturate therapy is suggested in hemodynamically stable patients with refractory intracranial hypertension despite maximal medical and surgical management.

### ***Decompressive craniectomy***

- **III1:** Decompressive craniectomy is suggested to treat neurologic deterioration, herniation or intracranial hypertension refractory to medical management.

### ***Nutrition***

- **III1:** Use of an immune-modulating diet is not recommended.
- **III1:** Initiation of early enteral nutritional support (within 72 hours from injury) is suggested to decrease mortality and improve outcomes. *This is a new recommendation.*

### ***Corticosteroids***

- **III1:** The use of corticosteroids is not suggested to improve outcomes or reduce ICP. *This is a revised recommendation.*

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Recommendations are designated as level I, level II or level III. The level of recommendation is determined by assessment of the quality of the body of evidence, rather than the class of the included studies. Thus, the levels were primarily based on the quality of the body of evidence as follows:

- Level I recommendations were based on a high-quality body of evidence.
- Level II recommendations were based on a moderate-quality body of evidence.
- Level III recommendations were based on a low-quality body of evidence

(Source: *The Brain Trauma Foundation*)