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Acute Management of Moderate-Severe Traumatic Brain Injury

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KEY POINTS

-Neurocritical care management of traumatic brain injury (TBI) patients focuses on preven-

tion and prompt treatment of secondary insults.

-The acutely injured brain is highly vulnerable to brief deviations from normal physiologic

values that would normally be well-tolerated.

-Treatments administered prophylactically against intracranial hypertension or other harm-

ful sequelae have not been shown to be beneficial in clinical trials and have sometimes

produced undesirable effects.

-Future advances in the management of TBI require treatments tailored to specific sub-

types of patients, such as those with diffuse injury or with surgically evacuated traumatic

hematomas

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**Associations between intracranial pressure thresholds and multimodal monitoring in acute traumatic neural injury: a scoping review**

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**Abstract**

**Background:** Current moderate/severe traumatic brain injury (TBI) guidelines suggest the use of an intracranial pressure (ICP) treatment threshold of 20 mmHg or 22 mmHg. Over the past decade, the use of various cerebral physiology monitoring devices has been incorporated into neurocritical care practice and termed "multimodal monitoring." Such modalities include those that monitor systemic hemodynamics, systemic and brain oxygenation, cerebral blood flow (CBF), cerebral autoregulation, electrophysiology, and cerebral metabolism. Given that the relationship between ICP and outcomes is not yet entirely understood, a comprehensive review of the literature on the associations between ICP thresholds and multimodal monitoring is still needed.

**Methods:** We conducted a scoping review of the literature for studies that present an objective statistical association between ICP above/below threshold and any multimodal monitoring variable. MEDLINE, BIOSIS, Cochrane library, EMBASE, Global Health, and SCOPUS were searched from inception to July 2022 for relevant articles. Full-length, peer-reviewed, original works with a sample size of ≥50 moderate-severe TBI patients were included in this study.

**Results:** A total of 13 articles were deemed eligible for final inclusion. The included articles were significantly heterogenous in terms of their designs, demographics, and results, making it difficult to draw any definitive conclusions. No literature describing the association between guideline-based ICP thresholds and measures of brain electrophysiology, cerebral metabolism, or direct metrics of CBF was found.

**Conclusion:** There is currently little literature that presents objective statistical associations between ICP thresholds and multimodal monitoring physiology. However, overall, the literature indicates that having ICP above guideline based thresholds is associated with increased blood pressure, increased cardiac decoupling, reduced parenchymal brain oxygen tension, and impaired cerebral autoregulation, with no association with CBF velocity within the therapeutic range of ICP. There was insufficient literature to comment on other multimodal monitoring measures.

**Keywords:** Acute traumatic neural injury; ICP thresholds; Multimodal monitoring; TBI.