



**Priority Two
Maintain Haemodynamic stability**

- Out-rule ongoing haemorrhage as per ATLS
- Maintain **minimum** systolic BP ≥ [70mmHg + (age in years x2)] if 0-10yr & ≥90mmHg if >10yr old
- If Hypotensive/hypovolaemic – 10-20ml/kg 0.9% NaCl as IV push – reassess post bolus. Repeat x3
- If fluid resistant – consider inotropes – see full guideline. Noradrenaline is typically first line via good PIV if CVC unavailable
- IVF @ 100% maintenance for age– NaCl 0.9%. Add dextrose 5% if <1yr AND hypoglycaemic. Keep bld glucose >4mmol/L
- Maintain Hb >100g/L. FFP, platelets and tranexamic acid can be considered if blood loss significant or ongoing
- Catheterise to monitor U/O and avoid bladder distension.

**Priority Three
Neuroprotection**

- Adequate sedation – 1st line – morphine load 100mcg/kg then infusion @ dose 20mcg/kg/hr (range 20-60mcg/kg/hr) AND midazolam load 50mcg/kg then infusion @ 2mcg/kg/min (range 1-5mcg/kg/min)
- Treat seizures - as per APLS – lorazepam 0.1mg/kg x2 then Levetiracetam load 40mg/kg IV over 20minutes (max 2.5gram)
- Maintain normothermia (36 – 36.5°C). Monitor **core** temp (rectal/oesophageal). Cool aggressively if hyperthermic >37°C
- If shivering occurs – consider neuromuscular blockade (NMB).
- NMB will mask seizures but may be necessary to facilitate safe transfer. Ensure adequate sedation before paralyzing
- Nurse with head in midline and head at 30° elevation if no C-spine precautions in place
- Perform non contrast CT brain and C spine when safe. Do **not** delay transfer for scan if head injury is obvious and timely CT unavailable – discuss with neurosurgical team/PICU team if unsure

**Priority Four
Treatment of suspected raised ICP**

- Suspect raised ICP if: Lateralising signs, pupillary dilatation, falling GCS, acute HR/BP changes, abnormal CT
- If clinical concern – reassess priorities 1-3. Assess need to suction – sedate for same. Use NBM if coughing
- Osmotic therapy –3% NaCl 5ml/kg **OR** mannitol 0.5gm/kg IV over 15- 20minutes – can be repeated
- If ongoing concern: Third line therapies → 3-5min targeted fall in paCO₂ of 1-2kpa – **prolonged use is harmful**

Time Critical Pre-Departure Checklist

Child with Elevated ICP

To be completed by referring team prior to departure
Contact with the accepting PICU intensivist via 1800 222 378
For advice during transfer

Airway / Ventilation Considerations

Appropriate Sized ETT well secured with spare intubation set available <input type="checkbox"/>	Blood gas (cap/ven/art) checked once on transport ventilator. Blood glucose reviewed. <input type="checkbox"/>
NGT inserted and attached to bile bag for drainage <input type="checkbox"/>	ETCO ₂ in ventilation circuit and visible on transport monitor – targeting 4.5-5Kpa <input type="checkbox"/>
CXR performed and ETT & NGT position modified if required <input type="checkbox"/>	Oxygen titrated to achieve O ₂ sats between 94-98% - <u>avoid hypoxia AND hyperoxia</u> <input type="checkbox"/>
Vent set to achieve 6-8ml/kg/min Tv + RR to keep ETCO ₂ in target. PEEP typically set to 5cmH ₂ O <input type="checkbox"/>	Appropriately sized ETT suction catheters available (uncuffed ETT size x2 = Catheter French) i.e. 3.5 cuffed ETT has same internal diameter as a 4.0 uncuffed ETT ∴ (4 x 2) = 8 F suction catheter <input type="checkbox"/>
Patient in midline and elevated to 30° – 45° for transfer <input type="checkbox"/>	Maintain normothermia – monitor core body temp <input type="checkbox"/>

Circulation Considerations

It is always recommended that cardiac arrest medications are brought in addition to, and kept separate from, those suggested below

Working Vascular Access x2 (IV/IO) <input type="checkbox"/>	If patient already on Noradrenaline – discuss with PICU re additional inotrope to bring on transfer – likely Adrenaline/Vasopressin <input type="checkbox"/>
Continuous ECG monitoring on transport monitor <input type="checkbox"/>	Push dose pressors: (to correct hypotension) <input type="checkbox"/> Choice & dose at discretion of medically responsible consultant.
NIBP set to auto q3-5min if art line unavailable <input type="checkbox"/>	1. Adrenaline 1:100,000 Add 1ml Adrenaline 1:1,000 to 99ml NS = 10mcg/ml solution (<u>label clearly</u>) Dose - 0.1ml/kg = 1mcg/kg per dose
Maintain minimum systolic BP ≥ 0-10yr = [70mmHg + (age in years x2)] >10yr old = ≥90mmHg <input type="checkbox"/>	2. Phenylephrine 100mcg/ml Dose - >1mo - 12yrs = 5-20mcg/kg Dose - >12yrs = 100-500mcg/kg
Rescue fluid available – 0.9% Saline <input type="checkbox"/>	3. Ephedrine diluted to conc. of 3mg/ml Dose – 1-12yr = 500mcg/kg Dose - >12yr = 3-7.5mg
Noradrenaline infusion prepared and connected to patient (if in use dose range is 0.02mcg/kg/min to 0.2mcg/kg/min) <input type="checkbox"/>	

Sedation / Neurosurgical Considerations

Deep sedation required:	Suggested bolus CNS medications for transfer Use & dose at discretion of medically responsible consultant. Dose titration recommended if haemodynamically unstable
• <2yr or haemodynamically unstable Morphine 20-40mcg/kg/hr AND Midazolam 3-5mcg/kg/min <input type="checkbox"/>	1. Ketamine 0.5-2 mg/kg
• >2yr and haemodynamically stable Propofol 3-5mg/kg/hr +/- Remifentanyl 0.1 – 0.2mcg/kg/min <input type="checkbox"/>	2. Rocuronium - 0.6-1.2 mg/kg
• Intermittent/continuous NMB blockade <input type="checkbox"/>	3. Propofol 1-2 mg/kg
	4. Lorazepam Dose 0.1mg/kg max 4mg for seizures
	5. Fentanyl 1-2mcg/kg

Document Details	
Document Type:	Clinical Guideline
Document Name:	Management of Patients with Severe Traumatic Brain Injury
Document Location:	IPATS Clinical Guideline Database
Version:	2.1
Effective From:	August 2022
Review Date:	August 2025
Author:	Dr Cathy Gibbons
Approved by:	Dr Dermot Doherty Consultant Intensivist CHI Dr Heike Bruell consultant intensivist CHI/NASCCRS
Related Documents:	
<p>The Irish Paediatric Acute Transport Service (IPATS) in conjunction has produced this clinical guideline with the Paediatric Intensive Care Unit and Neurosurgical Department, in Children’s University Hospital, Temple Street. It has been designed for nurses, doctors and ambulance staff to refer to in the emergency care of critically ill children.</p> <p>This guideline represents the views of IPATS and was produced after careful consideration of available evidence in conjunction with clinical expertise and experience. The guidance does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient.</p>	