### Clinical Guideline
**MANAGING CHILDREN WITH SEVERE HEAD INJURIES**

**SETTING**
Paediatric Intensive Care Unit (PICU)

**FOR STAFF**
All medical staff

**PATIENTS**
Children with a traumatic brain injury

### GUIDANCE

**ICP principles:**
CPP = MAP – ICP
- If CPP low, ICP low -> think fluid/inotropes
- If CPP low, ICP high -> think management cerebral oedema (i.e. blue flow algorithm)

**Maintain CPP**
- 40-50mmHg if 0-5 years
- 50mmHg if over 5 years
- 60mmHg if over 15 years

**Maintain ICP**
- < 15mmHg if < 1 year
- < 20mmHg if > 1 year

**Management of ICP > above limits for more than 5 mins**
- Ensure adequate sedation, paralysis, unobstructed venous drainage and appropriate ventilation
- Consider CT head to exclude surgically treatable lesion
- If Na less than 160mmol/L, use 5ml/kg 3% saline boluses to achieve Na up to 160mmol/L
- If Na over 160mmol/L, consider Mannitol (0.5G/kg) unless serum osmolarity under 320mOsm/L
- Consider Frusemide (0.5mg/kg) if HTS/mannitol not indicated/patient fluid overload
- Consider ventricular drainage to allow CSF drainage to lower ICP
- Load with thiopentone (3-5mg/kg bolus) followed by an infusion of 3-5mg/kg/hr. Aim for burst suppression on EEG

**Adjust MAP using fluids (10ml/kg crystalloid) and vasopressors (e.g. noradrenaline)**
- MAP targets:
  - >55mmHg if <1 year
  - >65mmHg if 1-5 years
  - >70mmHg if 5-15 years
  - >80mmHg if >15 years

**General Measures:**
- PaO₂ > 10kPa
- PaCO₂ 4.5-5kPa (consider volume limited approach)
- Blood sugar 4-10mmol/L
- Serum osmolality < 360mOsm/L
- Normothermia
- Head up tilt 30°
- Phenytoin for first 7 days
- Successful enteral nutrition
- Adequate sedation

**Additional Management Options:**
- Consider decompressive craniectomy
- Consider increasing MAP to increase CPP
- Consider an EEG if spontaneous surges in ICP could be due to seizures

**In Emergency (ICP > 30mmHg)**
- Give a bolus of sedation to ensure adequately sedated
- Give paralysis bolus
- Give paralysis bolus
- Give 5ml/kg 3% Saline and/or Mannitol 0.5 G/kg
- Increase minute ventilation until ICP control is regained; hand ventilate as last resort
- When ICP is controlled, stop intermittent paralysis and gradually return PaCO₂ to 4.5-5kPa

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**Notes:**

- CPP: Cerebral perfusion pressure
- ICP: Intracranial pressure
- MAP: Mean arterial pressure
- PaO₂: Arterial oxygen tension
- PaCO₂: Arterial carbon dioxide tension
- Na: Sodium
- MAP: Mean arterial pressure
- HTS: Hypertonic saline
- Mannitol: A hyperosmotic agent used to draw fluid out of the brain tissue and reduce ICP
- Thiopentone: A sedative and anaesthetic drug
- EEG: Electroencephalogram

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**Version:** v2.3

**Date:** From April 20 - To: Apr 23
RELATED DOCUMENTS
Paediatric Traumatic Brain Injury Foundation guidelines

AUTHORISING BODY
PICU Governance

SAFETY
Nil

QUERIES
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