

TBI ICP/CPP Management Algorithm

Local intracranial pressure and cerebral perfusion pressure management protocol. The specific treatment protocol has been described previously (Menon D,

Ercole A. Critical care management of traumatic brain injury. Handbook of clinical neurology. 2017; 140:239-74).

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Traumatic Brain Injury ICP/CPP Algorithm

Patients with traumatic brain injury (TBI) admitted to the NCCU are managed according to this protocol. Each step of the protocol must be preceded by thorough checking of the position and accuracy of all intracranial monitoring. Surgical referral for evacuation of significant space occupying lesion(s) (SOL) is mandatory before escalating medical treatment. Consider EVD insertion before escalating medical treatment.

All patients managed according to this protocol must have the following within 4 hours of admission to NCCU:

- 1) invasive arterial (transducer at the tragus) and central venous catheter
- 2) ICP monitoring
- 3) Cerebral microdialysis catheter and PbO₂ probe
- 4) ICM+

Initial target of CPP of 65mmHg (CPP >55mmHg may be acceptable). Autoregulation parameters and brain biochemistry are used to individualise targets.

Stage 1

Adequate resuscitation, ensure euolemia, add inotropes and vasopressors if needed. FICE echo.

Elevate head to 30° unless clinically contraindicated (otherwise 10-15°)

Targets:
SpO₂ >94%; PaCO₂ 4.5 – 5.0kPa
CPP 55 - 65 mmHg – transducer at level of tragus.
Hb >90 g/L
Blood glucose 4 - 10mmol/L; (brain glucose >0.5mmol/L)

Multimodal monitoring: PRx <0.2 (use CPPopt); PbO₂ >15; LPR ≤ 25
Targeted temperature management to 37°C (regular paracetamol + cool as needed);

Propofol 2-4mg/kg/hr; fentanyl 1-4 micrograms/kg/hr; consider atracurium 0.5mg/kg/hr.

AED if seizures suspected and perform EEG

1st line – levetiracetam – 1000mg-1500mg IV BD;

2nd line – phenytoin 20mg/kg IV loading then 100 mg IV TDS/QDS

If ICP >20 mmHg
escalate to STAGE 2,
consider rescan and
evacuation of SOL

Stage 2

Drain CSF via EVD at 5-10 cmH₂O

Using CVC, 5% NaCl 2ml/kg IV – repeat until plasma Na⁺ >160mmol/l
or plasma osmolality ≈320mOsm/kg)

Induce mild hypothermia - ≈35°C; daily lipids, ECG and CK if still on propofol

If ICP >20 mmHg
escalate to STAGE 3,
consider rescan and
evacuation of SOL

Stage 3

Trial of CPP >70mmHg

Advanced haemodynamic monitoring – further optimise cardiovascular function
AEDs if not already initiated and daily lipids, ECG and CK if still on propofol

On consultant approval only: PaCO₂ to 4.0kPa and monitor brain oxygenation

If ICP >25 mmHg
escalate to STAGE 4,
consider rescan and
evacuation of SOL

Stage 4 – NCCU Consultant approval only

Moderate hypothermia to 32-34°C.

Change propofol to midazolam 1-20mg/hr (± 2mg/kg/hr propofol)

- daily lipids, ECG and CK if still on propofol

If ICP >25 mmHg
escalate to STAGE 4,
consider rescan and
evacuation of SOL

Stage 5 – NCCU Consultant approval only

Add IV anaesthetic (e.g. propofol 1mg/kg IV stat) – maintain CPP.

If ICP and CPP improve, start thiopental: 250mg boluses up to 3-5g, then 3-8 mg/kg/hr

Burst suppression ratio >>50%

Consider
decompressive
craniectomy
(mandatory NCCU
consultant
discussion)