South West Paediatric Major Trauma Network
Severe Head Injury in Children:
Guideline for Initial Management and Transfer

Severn Major Trauma Operational Delivery Network
Peninsula Trauma Network
Bristol Royal Hospital For Children

Authors:	P. Davis, S. Martin, G. Haythornthwaite, G. Fellows, A. Upex
Approved by:	South West Paediatric Major Trauma Network
Date Approved:	Version 4:
Date for Review:	

RECOGNITION:
Any child < 16y with evidence or suspicion of significant head trauma
And decreased level of consciousness and/or abnormal neurological signs

A
Maintain airway with C-spine control (Manual In-Line Stabilisation)
(Jaw thrust, Guedel if required)
Absolute indications for intubation:
- GCS ≤8
- Abnormal response to painful stimulus
- Signs of raised intracranial pressure (ICP)
- Unprotected airway due to trauma in conjunction with decreased level of consciousness
- Rapidly deteriorating consciousness
- Uncontrollable seizure
- Abnormal respiratory pattern

B
High flow oxygen 15L/min via face mask

Ventilated: Use lowest PIP possible, lowest PEEP ≥ 4cm H_2O, and lowest FiO_2 to achieve: **Sats ≥95%, ETCO2 4.0 - 4.5 kPa**

C
Treat hypotension and hypovolaemia:
- At least two IV/IO access sites; consider arterial line
- Ensure Tranexamic Acid (15mg/kg) bolus + infusion over 8 hours
- Consider blood loss due to trauma in sites other than head
- Consider possibility of spinal shock
- Treat with 10ml/kg 0.9% saline / plasmalyte or packed red cells
- 2/3 maintenance fluids of 0.9% saline / plasmalyte / Hartmann's

AGE (years)	MAP (mmHg)
<1	>50
1-4	>60
5-11	>70
≥12	>80

Metaraminol Bolus: 10mcg/kg; Inf: Start at 2.5mcg/kg/min (2.5ml/h)
Noradrenaline (central line): Start at 0.1 mcg/kg/min (1ml/h)
(http://www.watch.nhs.uk/drug-sheet/)

DO NOT DELAY TRANSFER AWAITING OPTIMAL CONDITIONS
TREAT IN TRANSIT TO REDUCE TIME TO DEFINITIVE SURGERY

D
Assess & document (prior to RSI):
Focal neurology, including Pupil size & reactivity; GCS
Posturing or seizure

E
Maintain normothermia (36-37°C)
Check glucose (aim ≥ 3mmol/l); <3 mmol/l give 2ml/kg 10% glucose

OBJECTIVES:
- **Early diagnosis: CT head & neck ASAP (within 60 mins of arrival as per TU standard)**
- **Minimise Secondary Brain Injury**
- **Time Critical Transfer: Aim to arrive at PMTC within 4 hours of presentation**

COMMUNICATION On recognition contact:
Paediatric Trauma Team Leader (Consultant ED PMTC)
Call: 0300 0300 789, choose Option 2
PTTL can conference-call:
- On-call neurosurgical registrar/consultant
- WATCh Transport Team (if cardiovascular instability &/or NAHI)

Ensure that images transferred urgently to PMTC at Bristol Royal Hospital for Children (UH Bristol)
IN EXTREMIS, at Derriford Hospital, Plymouth, in discussion with PMTC, consider local surgical intervention

RAPID SEQUENCE INDUCTION
Use local RSI checklist
Suggested Induction: Ketamine 1-2 mg/kg +/-
Fentanyl 1-3 micrograms/kg
Muscle relaxant: Rocuronium 1-2 mg/kg
Maintenance: Morphine, midazolam and rocuronium infusions (may consider Propofol infusion)
Monitor for and treat hypotension promptly (see C)

MANAGE ICP
- Analgesia and sedation (as above)
- Muscle relaxants (as above)
- Ventilate to End-Tidal CO2 of 4.0 - 4.5 kPa (see B)
- Head midline (protect C-spine but no collar)
- Head up to 30 degrees
- **Critical ICP: ↓HR, ↑BP, dilated pupil**

Bolus Hypertonic saline 3ml/kg of 5% or 5ml/kg of 2.7%
Subsequent doses 1-3ml/kg
Monitor; aim not to exceed $[Na^+]$ > 150mmol/l

TRANSFER
Senior clinician and assistant (nurse/ODP/paramedic) appropriately trained to safely transfer children
Use transfer checklist / trolley / bags
Call early for transport either by road or air
(BRI helipad open 9am - 7pm)
Contact PTTL (0300 0300 789) when 15 minutes away

Blood investigations:
FBC, Coagulation, U&E, Blood glucose, ABG
Cross match on arrival at PMTC (2 separate samples)