



LONDON'S
AIR AMBULANCE
roadside intensive care



Pre-hospital Care Standard Operating Procedure

Head Injury

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APPROVAL/ ADOPTED:	PHC Policy Board	
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RELATED DOCUMENTS:	SOP Rapid Sequence Induction SOP Analgesia and Sedation SOP Haemorrhage control, vascular access and fluids SOP Packaging	
THIS DOCUMENT REFERS TO:	<input checked="" type="checkbox"/> PHC Clinical Practice PHC Non-clinical Practice PHC Operational Procedure	Ref: CP-14

Aims:

- Describe the rationale of clinical care for head injuries
- Describe the appropriate triage of head injuries
- Describe the appropriate use of analgesia in head injury
- Describe the indications for and precautions during rapid sequence induction in head injury
- Describe the indications for use of hypertonic saline in head injury
- Describe patient packaging for head injury

Background:

The principles of head injury management are the provision of adequate oxygenation and cerebral perfusion, treatment of other significant injuries and rapid transfer to a neurological centre. Many patients with head injury do not require surgery but, if they do require time critical intervention, taking them directly to a neurosurgical centre cuts the time dramatically. Even when surgical intervention is not required patients with head injury do better when managed in neurosurgical centres.

Indications for RSI in patients with head injury are straightforward – unconsciousness, airway compromise and ventilatory compromise make up the majority. We also anaesthetise a number of patients with head injury and a relatively high GCS (9 – 14). Most of these patients have cerebral agitation and we know that patients whom meet our dispatch criteria and have cerebral agitation have a high incidence of intracranial pathology. Often HEMS are specifically called to agitated head injuries by LAS because they are unmanageable.

Policy:

1. Use of Analgesia/ Sedation

Ketamine: This is rarely used in patients with head injury because of the possibility that ketamine raises ICP [it may also cause a temporary rise in BP and intraocular pressure].

Midazolam: If the patient is agitated or combative, sedate with aliquots of midazolam until control is achieved and then proceed to rapid sequence induction. This also enables effective preoxygenation.

2. Rapid Sequence Induction [RSI]

The RSI technique in head injury should minimise CO₂ increases and pharyngeal and laryngeal stimulation in an attempt to minimise ICP rises. Meticulous attention to oxygenation is also important as is prevention of hyper and hypoventilation (which has been associated with poor outcomes).

This may be achieved by:

- Adequate induction agent:
- Use the maximum possible dose of Etomidate [0.3mg/kg] that the patient's cardiovascular status allows.
- Adequate paralysis:
- Use the normal dose of Suxamethonium [1.5mg/kg].
- Gentle and minimal laryngoscopy: Avoid touching the posterior pharyngeal wall during intubation.
- Minimal tube movement. Hold the tube when the patient is moved.

3. Ventilation

- Ventilate to low normocapnia [end-tidal CO₂ of 30 mmHg, 4.0KPa]. This equates to a PaCO₂ of approximately 4.5KPa in normal individuals. This minimises the risk of cerebral vasodilation (high PaCO₂) and cerebral vasoconstriction (low PaCO₂).
- High levels of PEEP can increase ICP. We rarely use any more than 5 cmH₂O of PEEP so this should not be an issue.

4. Use of IV Fluids

After significant head trauma, the brain may lose the ability to autoregulate cerebral blood flow. A fall in MAP may therefore result in a reduction in cerebral oxygen delivery even if the ICP is normal. When splintage of limbs / pelvis has been maximised, then fluids should be administered to achieve a systolic blood pressure of 100mmHg [as per SOP Haemorrhage control, vascular access and fluids]. This can be increased to 120mmHg in isolated head injury.

5. Packaging

- Compression of the jugular veins will reduce venous return from the head and neck. This can increase ICP. The cervical collar should therefore be left slightly loose. Cervical spine immobilisation will be maintained with head blocks and tape on the orthopaedic scoop stretcher. The neck veins can also be constricted by a tight tracheal tube tie – this should be checked and loosened before transport.

- The patient should be transported in a 20 degrees head up position to maximise venous drainage.

6. Control of ICP / impending herniation

Mannitol

Mannitol is susceptible to cold and crystallizes in cold conditions. It is no longer used by this service.

Hypertonic Saline (HTS)

HTS has been shown to lower ICP in severe head injuries and may have other beneficial effects such as increasing circulating volume, minimal alteration to coagulation and anti-inflammatory properties. It is used extensively in ICU to lower refractory ICPs.

This service uses sodium chloride 5%. There is no evidence that one formulation of hypertonic saline offers advantages over another. It is available as a 250ml or 500ml infusion bag and should be stored at room temperature and not frozen. It has a shelf life of 36 months and can tolerate temperatures of 30 C without degradation.

Policy:

6 ml / kg (to a maximum of 350ml) of 5% Hypertonic saline should be delivered by well secured large bore peripheral (> 18 gauge) cannula over 10 minutes in patients with signs of actual or impending herniation resultant from severe head injury:-

- unilateral or bilateral pupil dilation / GCS < 8 (and usually 3)
- progressive hypertension (SBP over 160mmHg) and bradycardia (pulse below 60) / GCS < 8 (and usually 3)

The dose is given once and given regardless of blood pressure.

In patients with blunt trauma, hypotension and head injury a bolus of HTS as above will help restore circulating volume and may protect against cerebral hypoperfusion and reduce oedema.