

# PAEDIATRIC HEAD INJURY GUIDELINE

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**Target Audience:** Doctors, nurses and support staff working in Paediatrics

**Impact Assessment Carried Out By:**

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# HEAD INJURY ASSESSMENT AND EARLY MANAGEMENT



**Airway + C-spine management**  
**Indications for immediate intubation:**

- GCS ≤8
- Absent laryngeal reflexes
- Shock
- Ventilatory insufficiency: PaO<sub>2</sub><13kPa on O<sub>2</sub> or PaCO<sub>2</sub>>6kPa
- Spontaneous hyperventilation causing PaCO<sub>2</sub><4kPa
- Irregular respirations
- Signs of impending brain stem herniation

**Intubate for transfer if:**

- Unstable facial fracture or bleeding into mouth
- Seizures
- Deteriorating GCS (≥1 point on motor) even if not coma

Refer to STRS neurosurgical emergency guideline for ongoing management and neuroprotection:  
<https://www.evelinalondon.nhs.uk/our-services/hospital/south-thames-retrieval-service/clinical-guidelines.aspx>

**Indications for Neurosurgical referral (regardless of imaging results):**

- GCS ≤8 after initial resuscitation
- GCS falling (esp. motor)/fluctuating after admission
- Persisting unexplained confusion > 4 hours
- Progressive focal neurological deficit
- Seizures – recurrent/prolonged/lack of full recovery
- Definite/suspected penetrating injury
- CSF leak
- Basal skull fracture

Please **contact Neurosurgical SpR directly** to refer, not retrieval service (though retrieval service can help with advice on management and finding a bed).  
**Local anaesthetic team must transfer patient as a time critical transfer**

**Indications for Local (St Peter's) Hospital Admission:**

- Abnormality on CT not warranting transfer to neurosurgical unit
- GCS <15 after CT
- CT delayed – only transfer to paediatric ward if clinically safe to do so
- Persisting symptoms after CT eg vomiting, severe headache
- CSF leak
- NAI or intoxication suspected
- Any deterioration during observation in ED

**Neurological Observations\***  
\*based on advice from local neurosurgical referral centre, St George's Hospital, London, UK

- Every 15 mins for first 2 hours
- Every 30 mins for next 4 hours, then stop if well
- Return to every 15 mins if deteriorates & urgent doctor review

**Box 1: Do Head CT scan within 1 hour if any 1 of:**

- Suspicion of NAI
- Post-traumatic seizure and no history of epilepsy
- In ED initial GCS <14, or if under 1yr GCS <15
- 2 hours after injury, GCS <15
- Suspicion of open or depressed skull fracture or tense fontanelle
- Suspicion of basal skull fracture
- Focal neurological deficit
- If under 1yr: bruise, swelling or laceration >5cm on head
- On an anticoagulant or known clotting disorder – perform CT within 8 hours of injury

*Provisional CT report should be available within 1 hour of CT*

**Box 2: Do Head CT scan within 1 hour if more than 1 of:**

- LOC > 5 mins (witnessed)
- Abnormal drowsiness
- ≥3 discrete episodes of vomiting
- Dangerous mechanism of injury: high speed RTA (pedestrian, cyclist, vehicle occupant), fall from height >3m, high-speed injury from a projectile or other object
- Amnesia (antegrade or retrograde) > 5mins

*Provisional CT report should be available within 1 hour of CT*

**If only 1 risk factor from box 2:**  
Observe in ED for minimum of 4 hours after the injury. Thereafter review suitability for discharge with advice if well.  
**For Head CT within 1 hour if during observation there is:**

- GCS <15
- Further vomiting
- Further abnormal drowsiness

**If no indications for CT or CT normal:**  
**Discharge home with Head-Injury advice leaflet providing GCS 15 and does not meet criteria in Hospital Admission Box**

Patients who return to ED within 48hrs of discharge with any persistent complaint relating to the initial head injury should be seen by or discussed with a senior and considered for a CT scan.

**Paediatric GCS (for children ≤2yrs old):**

Eyes:	Verbal:	Motor:
4 Open spontaneously	5 Coos, babbles	6 Moves spontaneously, purposefully
3 Open to verbal stimuli	4 Irritable cry	5 Withdraws to touch
2 Open to pain only	3 Cries in response to pain	4 Withdraws to pain
1 No response	2 Moans in response to pain	3 Flexor posturing to pain
	1 No response	2 Extensor posturing to pain
		1 No response

### When to perform a CT of cervical spine in children

The threshold for CT C-spine is higher in children compared to adults because of the increased risk to the thyroid gland from ionising radiation and the generally lower risk of significant spinal injury.

Perform a CT cervical spine within 1 hour if any one of the following apply:

- GCS <13 on initial assessment
- Intubated and ventilated
- Focal peripheral neurological signs
- Paraesthesia in the upper or lower limbs
- Definitive diagnosis of C-spine injury is needed urgently (eg. before surgery)
- Patient is having other body areas scanned for head injury or multi-region trauma
- Strong suspicion of injury despite normal X-rays
- Plain X-rays are technically difficult or inadequate
- Plain X-rays identify a significant bony injury

Provisional radiology report should be ready within 1 hour of the scan being performed.

If clinical concerns of C-spine injury (eg. persisting peripheral neurology) despite normal X-rays and CT C-spine, MRI should be considered to look for soft tissue injury ie. SCIWORA – spinal cord injury without radiological abnormality.

### When to perform cervical spine X-rays in children

For children who have had a head injury and have neck pain or tenderness but no indications for a CT C-spine, perform 3-view cervical spine X-rays before assessing range of movement in the neck if either of these risk factors are identified:

- Safe assessment of range of movement in the neck is not possible (see box below)
- Dangerous mechanism of injury including:
  - fall from a height greater than 1 metre or 5 stairs
  - axial load to the head eg. diving
  - high-speed motor vehicle collision
  - rollover motor accident
  - ejection from a motor vehicle
  - accident involving motorised recreational vehicles
  - bicycle collision

If, on safe assessment range of neck movement, the child cannot actively rotate their neck 45° to the left and right, perform 3-view cervical spine X-rays.

The X-rays should be carried out within 1 hour of the risk factor being identified and reviewed by a clinician trained in their interpretation within 1 hour of being performed.

### When to assess range of neck movement in children

Range of movement in the neck can be assessed safely before imaging only if there are no high-risk factors for cervical spine CT or X-rays (see above) and at least one of the following low-risk features apply:

- was involved in a simple rear-end motor vehicle collision
- is comfortable in a sitting position in the emergency department
- has been ambulatory at any time since injury
- has no midline cervical spine tenderness
- presents with delayed onset of neck pain.

On assessment, if the child cannot actively rotate their neck 45° to the left and right, perform 3-view cervical spine X-rays.

References:

- **Head injury: assessment and early management. NICE guidelines [CG176]. Published January 2014, Updated 2019.**
- Expert opinion of local neurosurgical referral centre, St George's Hospital, London, UK
- APLS UK 6<sup>th</sup> Edition