Acute Management and Transfer of Adults with Traumatic Brain Injury (TBI)

- **Airway & C-spine protection**
- **Breathing & ventilatory control**
- **Circulation & haemorrhage control**
- **Disability (neurological status)**
- **Exposure**
- **Secondary survey**

**GCS ≤8 or falling**
- **Urgent referral to neurosurgeon**
  - **Intubate** Manual in-line immobilisation
  - **Ventilate**
    - **PaO₂ ≥13kPa**
    - **PaCO₂ 4.5 – 5.0kPa**
  - **Lines**
    - 2 large bore IV cannulae
    - Arterial line
    - Urinary catheter
  - **Sedate**
    - Propofol, fentanyl infusions & short acting muscle relaxant
  - **Search for causes of hypotension**
  - **Other Parameters**
    - Core temperature 35 – 37 °C
    - Blood sugar 6 – 10 mmol/l
    - ONLY use glucose if BM <4mmol/l
    - Insert urinary catheter
  - **Neurological Observations**
  - **CT scan head & C-spine down to T1**
    - Report within 1h of request
  - If pupils dilate or clinical condition deteriorates then re-contact neurosurgical SpR immediately

**GCS ≥9**
- **Consider referral to neurosurgeon**
  - **Neurosurgical Referral**
    - Refer to regional centre for traumatic brain injury - may have local transfer protocol
    - Receiving unit prior to transfer
  - **Ambulance Control State:** "Neurosurgical critical transfer"
  - **Prior to leaving:**
    - Ensure patient stable
    - Recheck arterial blood gas
    - Bring a copy of all notes, investigations and scans
    - Ensure monitoring and observations during transfer are documented
    - Do not delay transfer unnecessarily

**GCS, pupil & limb assessment**
- ½ hourly until GCS 15 then
  - ½ hourly for 2 hours
  - 1 hourly for 4 hours
  - then 2 hourly

**Prompts for urgent review, CT & referral to neurosurgeon**
- Confusion or agitation persisting >4 hours
- Sustained decrease in GCS by 1 point for more than 30min
- Any decrease in GCS by 2 points or more regardless of duration
- Severe or increasing headache
- Persistent vomiting
- New neurological signs
- Unequal pupils, asymmetry of limb or facial movements
- **Seizure**
  - **Treat single seizure as per local policy**
  - **Anticonvulsants usually after**
  - **½ hourly until GCS 15 then**
  - **lower threshold:**
    - > 65 years
    - High risk mechanism of injury
    - Anticoagulated

**Indications for urgent referral to a neurosurgeon**
- CT scan shows a recent intracranial haemorrhage/haematoma
- Patient fits criteria for CT scan but scan cannot be performed locally
- Patient has concerning clinical features (see below) irrespective of CT findings

**Clinical features which must be discussed with a neurosurgeon**
- Persisting coma (GCS score ≤ 8/15) after resuscitation
- Confusion that persists for more than 4 hours
- Deterioration in level of consciousness after admission
- Progressive focal neurological signs
- A seizure without full recovery
- Compound or depressed skull fracture
- Definite or suspected penetrating injury
- A CSF leak or other sign of a basal skull fracture

**Glasgow Coma Scale and Score**
- **Eye opening**
  - Spontaneous
  - To sound
  - To pressure
  - None
- **Verbal response**
  - Orientated
  - Confused
  - Words
  - Sounds
  - None
- **Motor Response**
  - Obey commands
  - Localising
  - Normal flexion
  - Abnormal flexion
  - Extension
  - None

**References**
   and Care Excellence. 2011.
6. www.sign.ac.uk

Neurocritical Care Multidisciplinary Team, The National Hospital for Neurology and Neurosurgery. 2015