Algorithm 1.1

Initial Diagnosis/Assessment of Adult mTBI*

Initial GCS 13-15 on arrival following blunt head trauma Stabilise ABCDEs and assess clinical risk factors.

Commence minimum of hourly clinical observations of vital signs, GCS, pupils, PTA and clinical symptoms

High risk mild head injury (# explanation on next page) Low risk mild head injury No indication for CT scan if all of... Strong indication for CT scan if... GCS 15 at 2 hours post-injury. GCS <15 at 2 hours post-injury. No focal neurological deficit. Deterioration in GCS. No clinical suspicion of skull fracture. Focal neurological deficit. Clinical suspicion of skull fracture. #2 No vomiting No known coagulopathy or bleeding disorder Vomiting (especially if recurrent). #3 Age <65 years Known coagulopathy or bleeding disorder. #4 No seizure Age >65 years. #5 Brief loss of consciousness (<5 mins). Seizure. # Brief post-traumatic amnesia (<30 mins) Prolonged loss of consciousness (>5 mins). No severe headache Persistent post-traumatic amnesia (A-WPTAS <18/18 at 4hrs post-No large scalp haematoma or laceration Isolated head injury Persistent abnormal alertness/behaviour/cognition. #8 No dangerous mechanism Persistent severe headache. No known neurosurgery/neurological impairment. Relative indication for CT scan if... No delayed presentation or representation Large scalp haematoma or laceration. #9 Multi-system trauma. #10 Dangerous mechanism. #11 Note: Mild acute clinical symptoms such as lethargy, nausea, dizziness, mild headache, mild behavioural change, amnesia for Known neurosurgery/neurological impairment. #12 event and mild disorientation are common and are not associated Delayed presentation or representation. #13 with increased risk of intracranial injury. These clinical symptoms Note: The presence of multiple risk factors is more concerning than usually start to improve within 2 to 4 hours of time of injury. a single isolated risk factor. In most uncomplicated mild head injury patients clinical symptoms start to improve by 2 hours post-injury and are returning to normal by 4 hours post-injury. Clinical symptoms that are deteriorating or not improving by 4 hours post-injury on serial observation Continue minimum of hourly clinical observations until at least four such as abnormal alertness/behaviour/cognition, PTA, vomiting or severe hours post time of injury headache are very concerning. Clinically deteriorates or clinical symptoms not improving Indication for CT scan. Continue clinical observations during observation period Normal CT Scan Abnormal CT scan CT scan unavailable Clinical symptoms Clinical symptoms Clinical symptoms Consider transfer for CT scanning particularly if: IMPROVING at 4-6 improving during time NOT IMPROVING at ■ Persistent GCS <15.</p> of clinical observation hours post time of 4-6 hours post time Deterioration in GCS. injury. of injury. Focal neurological deficit. Clinical suspicion of skull fracture. Known coagulopathy (esp if INR>4). ■ Persistent abnormal alertness, behaviour, cognition, Clinically safe for discharge for home observation if: PTA, vomiting or severe headache at 4 hours post-injury GCS 15/15 No persistent post-traumatic amnesia (nb A-WPTAS 18/18) Alertness / behaviour / cognition returning to normal Clinically improving after observation. Normal CT scan or no indication for CT scan. Clinical judgment required regarding discharge and follow-up of Consult senior clinician and network neurosurgical service elderly patients or patients with known coagulopathy or bleeding regarding further management and disposition. Continue clinical disorder due to increased risk of delayed subdural haematoma. observations in hospital.

Continued*

^{*} Adapted from the NSW Ministry of Health. Closed Head Injury in Adults - Initial Management (PD2012_013)

Algorithm 1.1

Initial Diagnosis/Assessment of Adult mTBI* Continued

Continued*



Clinically safe for discharge for home observation if:

- Responsible person available to take home and observe.
- Able to return if deteriorates.
- Discharge advice is understood.



Discharge for home observation if above criteria met:

- Provide written patient advice sheet
- Provide discharge summary for GP
- All patients should be advised to see their GP for follow-up if they are not feeling back to normal within 2 days
- Any patients who have minor CT abnormalities, who suffered significant clinical symptoms or who had prolonged post-traumatic amnesia should be routinely referred to their GP for follow-up due to an increased risk of post concussion symptoms.

Explanatory notes for risk factors:

- 1. Using GCS<15 at 2 hours post-injury allows clinical judgement for patients who present soon after injury or who have drug or alcohol intoxication. Drug or alcohol intoxication has not been shown to be an independent risk factor for intracranial injury but persistent GCS<15 is a major risk factor and mandates CT.
- Clinical suspicion of skull fracture includes history of focal blunt assault or injury; palpable skull fracture; large scalp haematoma or laceration; signs of base of skull fracture – haemotympanum / CSF leak / raccoon eyes / Battles sign.
- Recurrent vomiting more concerning than isolated vomiting but both are indications.
- 4. Known coagulopathy is both a strong indication for early CT scan and to check the INR. Early reversal of anticoagulation if abnormal CT scan and consider reversal if initially normal CT scan with high INR (>4) depending on clinical situation.
- Elderly patients have increasing risk of intracranial injury with increasing age; routine CT scanning indicated unless totally asymptomatic patient with no other risk factors.
- 6. Brief generalised seizures immediately following head injury are not significant risk factors. Prolonged, focal or delayed seizures are risk factors for intracranial injury.
- 7. Post-traumatic amnesia may manifest as repetitive questioning or short term memory deficits and can be objectively tested using the A-WPTAS. PTA > 30 mins is a minor risk factor and PTA > 4 hours a major risk factor for intracranial injury.
- 8. Abnormal alertness/behaviour/cognition detects subtle brain injury better than GCS and should be part of the bedside assessment. Family may help establish what is normal.
- 9. Multi-system trauma beware patient with unstable vital signs or distracting injuries or who receive analgesia or anaesthesia, as significant head injury is easily missed.
- 10. Clinical judgement required as to what is a large scalp haematoma or laceration.
- 11. Dangerous MVA ejection / rollover; pedestrians / cyclists hit by vehicle; falls >own height or five stairs; falls from horses / cycles etc; focal blunt trauma, eg bat / ball / club.
- 12. Known neurosurgery/neurological impairment conditions such as hydrocephalus with shunt or AVM or tumour or cognitive impairment such as dementia make clinical assessment less reliable and may increase risk of intracranial injury.
- 13. Delayed presentation should be considered as failure to clinically improve during observation. For representation consider both intracranial injury and post concussion symptoms and have a low threshold for CT scanning if not

For a narrative description and recommendations related to this algorithm, please refer to Section 1.

^{*} Adapted from the NSW Ministry of Health. Closed Head Injury in Adults - Initial Management (PD2012_013)