

Traumatic Brain Injury

Acute Care And Hospital Assessment

» A distillation of best practice reflecting ACC's current position

» JUNE 2006

- 20,000 to 30,000 New Zealanders sustain traumatic brain injury (TBI) each year; 2,000 to 3,000 will experience lasting effects from this injury.
- Management of TBI is aimed at preventing secondary injury due to:
 - hypoxia or hypotension
 - complications, especially intracranial haemorrhage
 - other injuries, especially of the cervical spine
 - the severity of injury and subsequent needs for future care.
- Irritability and uncooperative behaviour should never be assumed to be due to alcohol or drugs.
- CT scanning is the most useful specific investigation.

Background

ACC commissioned the Traumatic Brain Injury Guidelines (TBI Guidelines) entitled, 'The Diagnosis, Acute Management and Rehabilitation of People after Traumatic Brain Injury' from the New Zealand Guidelines Group (NZGG).¹ These Guidelines will be published soon. The Guidelines define TBI as 'An acute brain injury resulting from mechanical energy to the head from external forces.' This definition differentiates between people who have suffered a head injury (without TBI), and those with TBI, who may have neurological symptoms or signs.

The document also identifies a classification of severity of TBI:

Severity of Injury	Glasgow Coma Score (GCS)	Duration of Post Traumatic Amnesia
Mild	13–15	<24 hours
Moderate	9–12	1–6 days
Severe	3–8	7 days or more

The NZGG estimates that between 20,000 and 30,000 people suffer TBI annually in New Zealand, 80% of whom will seek medical attention. Between 8% and 10% of these will be categorised moderate or severe, representing approximately 2,000 to 3,000 per annum. The largest single group of patients are from motor vehicle crashes. Less than 1% of these injuries are fatal.

Prognosis

Most people with mild TBI will recover fully over 3 to 12 months; a minority will suffer longer lasting effects. However, there is a growing awareness of longer term psychosocial impairments in adults. In moderate and severe TBI, most will have some level of physical, cognitive, behavioural, or communicative disability and the effects of this will impact on the family/whanau as well as the patient.

Management in the Emergency Department ²

Management is aimed at identifying and treating:

- actual or potential hypoxia and hypotension
- acute complications of TBI, especially intracranial haemorrhage
- other injuries requiring urgent management, especially of the cervical spine
- different severities of TBI and the implications for ongoing management and follow up.

Assessment ²

Assessment should identify:

- the mechanism of injury
- the presence of vomiting since injury
- the presence of headaches and seizures
- the presence and duration of anterograde and post-traumatic amnesia
- the Glasgow Coma Score (GCS)
- whether there is evidence of an open, depressed, or basal skull fracture
- evidence of trauma above the clavicles
- evidence of drug or alcohol intoxication.

Warning: Abnormalities of GCS or neurological status should never be assumed to be due to intoxication with alcohol or drugs. Irritability and poor co-operation should be assumed to be due to cerebral irritation.

Initial Management

Initial management requires attention to the 'ABC's' of acute care. Patients with a GCS of 8 or less will usually require endotracheal intubation.

Cervical Spine

All patients should be assumed to have cervical spine injuries, and be appropriately immobilised, unless they have a GCS of 15 and cervical spine injury can be excluded clinically.

Investigation – CT Scanning²

The definitive investigation for TBI is CT scanning, which should be performed as soon as the patient has been stabilised. Indications for CT scanning include:

- *a deteriorating GCS
- *a GCS <13 on initial assessment
- a GCS of 13 or 14 two hours post injury
- *a suspected open, depressed, or basal skull fracture
- post-traumatic seizure(s)

- *any focal neurological deficit
- more than one episode of vomiting
- anterograde amnesia in excess of 30 minutes.

CT scanning is also indicated for patients who have suffered a loss of consciousness or amnesia, and:

- who are aged 65 or over
- have a coagulopathy (including warfarin therapy)
- experience a high risk mechanism of injury.

Note: Items marked * are absolute indications for CT scanning. Only in their absence, and if a CT scanner/operator is not readily available, can close observation be substituted for immediate scanning. Any deterioration towards an absolute indication will require an urgent CT scan.

In children the indications for CT scanning are similar, but special consideration should additionally be given if:

- a fall of 1 metre or down five stairs is sustained
- the cause is non-accidental
- lethargy or irritability is noted on examination
- the child is of a younger age (especially under 24 months).

In infants aged 24 months or less, CT scan criteria include those already mentioned and the additional risk factors of:

- the presence of a large scalp swelling or haematoma
- an occipital or parieto-temporal injury
- head injury in a child under 1 year.

Neurosurgical Consultation

Consult with the regional neurosurgical unit if:

- GCS is deteriorating - a drop of 2 or more, there is evidence of pupillary dilatation, or evidence of a new neurological deficit
- GCS is 8 or less
- there is significant neurological deficit
- the CT scan is abnormal
- there is clinical evidence of a cerebrospinal fluid (CSF) leak
- the patient has sustained penetrating injuries
- the patient has a seizure without full recovery.

Indications for Admission

- GCS less than 15
- Abnormal CT, or CT indicated but not available
- Focal or abnormal neurological signs
- Early post-traumatic seizure
- Skull fracture
- Major force of injury
- Clinician concern
- Inadequate facilities for supervision
- Mild symptoms requiring ongoing treatment.

Discharge from Emergency Department

Patients may be judged fit for discharge if:

- their GCS is 15 and,
 - CT scan is normal or not indicated
 - there are no other reasons for admission
 - appropriate support, written information, and supervision is available.

Referral for Rehabilitation

Patients with moderate or severe TBI will require rehabilitation usually through specialised units. People with mild TBI should usually be followed up by their General Practitioner to ensure resolution of all symptoms. If symptoms do not resolve, promptly refer the patient for further neurological assessment and rehabilitation.

References:

- 1 New Zealand Guidelines Group. The Diagnosis, Acute Management and Rehabilitation of People after Traumatic Brain Injury. Wellington, ACC, due for publication shortly.
- 2 National Collaborating Centre for Acute Care. Head injury: triage, assessment, investigation and early management of head injury in infants, children and adults. London: National Institute for Clinical Excellence (NICE); 2003.
- 3 Stiell I, et al. The Canadian CT Head Rule for patients with minor head injury. Lancet 2001;357 (9266): 1391.