

Fact sheet

Assessment following brain injury

As each individual's presentation following brain injury is different a comprehensive assessment is required to enable the team to plan an appropriate rehabilitation program tailored to the individual's needs.

> Assessment

- [General neurological assessment](#)
- [Pre hospital assessment](#)
- Rehabilitative phase assessment
 - [Physical assessment](#)
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Assessment

General neurological assessment

Database

- > History of present condition
- > Past medical history
- > Medication history
- > Results of specific investigations (x-rays, CT scans, blood tests)

Subjective assessment

- > Social situation
 - family support
 - accommodation
 - employment
 - leisure activities
 - social service support
- > Normal daily routine
- > Indoor and outdoor mobility
- > Continence
- > Vision
- > Hearing
- > Swallowing
- > Fatigue
- > Pain
- > Other ongoing treatment



- > Perceptions of own problems/main concern
- > Expectations of treatment

Objective Assessment

Function	Assessment
Posture and balance	<ul style="list-style-type: none"> > Alignment > Neglect > Sitting balance > Standing balance <ul style="list-style-type: none"> ○ Romberg Test
Voluntary movement	<ul style="list-style-type: none"> > Range of movement > Strength > Coordination <ul style="list-style-type: none"> ○ finger to nose test ○ heel to shin test ○ rapidly alternating movement > Endurance
Involuntary movement	<ul style="list-style-type: none"> > Tremor > Clonus > Chorea > Associated reactions
Tone	<ul style="list-style-type: none"> > Decreased/flaccid > Increased <ul style="list-style-type: none"> ○ spasticity (clasp-knife) ○ rigidity (cogwheel or lead pipe)
Reflexes	<ul style="list-style-type: none"> > Deep tendon reflexes <ul style="list-style-type: none"> ○ biceps (C5/6) ○ triceps (C7/8) ○ knee (L3/4) ○ ankle (S1/2) > Plantar response (Babinski's sign)
Muscle and joint range of movement	Passive range of movement
Sensory	<ul style="list-style-type: none"> > Light touch > Pinprick > Two point discrimination > Vibration sense > Joint position sense > Temperature > Vision and hearing

Functional activities	<ul style="list-style-type: none"> > Bed mobility > Sitting balance > Transfers > Upper limb function > Mobility > Stairs
Gait	<ul style="list-style-type: none"> > Pattern > Distance > Velocity > Use of walking aids > Orthoses > Assistance > <i>Cognitive Status</i> > Attention > Orientation > Memory

Pre hospital assessment

The aim of this assessment is to establish whether a brain injury has occurred. The following tools and factors are recommended to use in this assessment. These tools and factors are used to assess whether a person with a suspected brain injury requires assessment at an Emergency Department or other medical assessment and with what urgency:

- > Glasgow Coma Scale (GCS)
- > Level of Consciousness
- > Post Traumatic Amnesia
- > Neurological Signs
- > Bleeding Disorders and use of anticoagulants
- > Seizure
- > Drug and/or alcohol intoxication
- > Headache and Vomiting
- > History of Cranial Neurosurgical interventions

Glasgow Coma Scale (GCS)

The Glasgow Coma Scale (GCS) is used in immediate, pre hospital and hospital assessment and is used to assess and monitor people in the acute phase, with a suspected brain injury.

The GCS provides an indication of level of consciousness at a given point in time and allows for serial measurement. It provides a useful tool for communicating information to ambulance or emergency department staff.

The GCS is scored between three and 15, three being the worst and 15 the best. It is composed of three parameters: best eye response, best verbal response and best motor response. The definition of these parameters¹ is given below:

Best eye response	Best verbal response	Best motor response
1. No eye opening	1. No verbal response	1. No motor response
2. Eye opening to pain	2. Incomprehensible sounds	2. Extension to pain
3. Eye opening to verbal command	3. Inappropriate words	3. Flexion to pain
4. Eyes open spontaneously	4. Confused	4. Withdrawal from pain
	5. Oriented	5. Localising pain
		6. Obeys commands

The risk of intracranial complications and the consequent need for surgery increases as the GCS score declines. Any fall in a GCS score, after an initial recording, is of concern and may represent the development of intracranial bleeding, such as an extradural haematoma. A fall of two or more points, no matter what the original score, should mandate immediate further investigation and referral.

Level of Consciousness

A history of loss of, or altered, consciousness resulting from a brain injury is associated with an increased risk of developing an intracranial complication. In most cases, a longer duration of loss of, or altered, consciousness is associated with greater severity of injury. Loss of, or change in, consciousness may have other causes, and blood glucose levels should be checked routinely in all people with loss of or altered consciousness².

Post Traumatic Amnesia (PTA)

Post Traumatic Amnesia (PTA) occurs when there is impaired memory of events after brain trauma and is associated with an increased risk of intracranial complications³.

Neurological Signs

Refer to general neurological assessment.

Bleeding Disorders and use of anticoagulants

People with coagulopathy or who are on anticoagulant medication or supplements have an elevated risk of intracranial complications⁴.

Check medication use including alternative and complementary therapies.

Seizure

A seizure alone, with no other neurological signs and full recovery, is almost never a sign of an intracranial haematoma. The difficulty with seizures is that the person may become unconscious as a result of the seizure or from a drug to stop the seizure. Unless recovery is prompt and complete a CT scan is necessary to exclude such a complication⁵.

¹ NZ Evidence Based Practice Guideline 2006

² NZ Evidence Based Practice Guideline 2006

³ NZ Evidence Based Practice Guideline 2006

⁴ NZ Evidence Based Practice Guideline 2006

⁵ NZ Evidence Based Practice Guideline 2006

Drug and/or alcohol intoxication

Drug and/or alcohol intoxication can result in signs and symptoms that are also risk factors for intracranial complications (e.g. vomiting, headache, amnesia, impaired consciousness). Excessive consumption of alcohol can also cause hypoglycaemia, which, in turn, can cause impaired consciousness. This makes a differential diagnosis difficult and could lead to an incorrect diagnosis of a developing intracranial complication⁶.

Drug and/or alcohol use has also been identified as independent risk factors for poorer outcomes following brain injury and may impact on rehabilitation⁷.

Headache and Vomiting

Headache and vomiting may be associated with raised intracranial pressure and is a risk factor for intracranial complications⁸.

History of Cranial Neurosurgical interventions

Cranial neurosurgical intervention is likely to increase the risk of developing a subdural haematoma. Therefore, past medical history should be recorded, particularly if there has been cranial neurosurgery in the six weeks prior to injury, or if there is a shunt for hydrocephalus⁹.

Physical assessment

There is evidence that a specialist in physical rehabilitation medicine such as a physiotherapist should lead both the physical assessment and planning of physical therapy. Assessments of the physical functioning of people with a brain injury should include assessment of the following:

- > muscle weakness and paralysis
- > abnormal muscle tone (spasticity)
- > deficits in joint range of motion
- > ataxia/coordination
- > visual loss
- > hearing loss
- > posture
- > activities of daily living
- > gait¹⁰

⁶ NZ Evidence Based Practice Guideline 2006

⁷ NZ Evidence Based Practice Guideline 2006

⁸ NZ Evidence Based Practice Guideline 2006

⁹ NZ Evidence Based Practice Guideline 2006

¹⁰ NZ Evidence Based Practice Guideline 2006

Communicative assessment

It is recommended that communicative assessments be performed by a speech therapist and include assessment of the following:

- > dysphasia (expressive and receptive)
- > cognitive communication disorder
- > dysarthria
- > dysphagia
- > apraxia of speech
- > acquired dyslexia
- > acquired dysgraphia¹¹

Neuropsychological assessment

It is recommended that a neuropsychologist should lead a cognitive and behavioural assessment and should include assessment of the following:

- > cognitive
 - insight and awareness
 - attention
 - memory
 - speed of information processing
 - perception
 - complex problem solving
 - self-monitoring
 - social judgement
- > behavioural/emotional
 - emotional lability
 - poor initiation
 - mood change
 - adjustment problems
 - personality changes including aggressive outbursts, disinhibition, inappropriate sexual behaviour
 - poor motivation
 - drug and alcohol misuse
 - mental health disorders particularly depression, anxiety disorders and psychosis¹²

¹¹ NZ Evidence Based Practice Guideline 2006

¹² NZ Evidence Based Practice Guideline 2006

Recommended assessment tools

The [Centre for Outcome Measurement in Brain Injury](#) has a number of assessment tools specific to brain injury.

References

Association of Chartered Physiotherapists Interested in Neurology 1995, *Neurological Assessment: Standards of Physiotherapy Practice in Neurology*, London

Evidence Based Practice Guideline 2006, *Traumatic Brain Injury: Diagnosis, Acute Management and Rehabilitation*, New Zealand Guidelines Group, New Zealand

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Resources accurate as at 3 February 2009. If you have any questions or wish to update the information, please contact [Dr Maggie Killington](#)

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