

Pathway revised April 2010. Pathways will be reviewed regularly and updated as necessary.

**ADULT WITH A BLUNT HEAD INJURY**

The Canadian CT Head Rule is a clinical decision rule for adults with a minor head injury, although individual patient factors do need to be taken into account.

- Very High Risk Head Injury**
- Focal neurological deficit
  - Patients on oral anticoagulants or with a bleeding disorder
  - Penetrating skull injury
  - Obvious depressed skull fracture
  - GCS < 13 at any time since injury
  - Post-traumatic seizure
  - Unstable vital signs with major trauma

- Minor Head Injury**  
Patient with a history of loss of consciousness, amnesia, or disorientation and a GCS of 13 or greater when examined

- Trivial Head Injury**  
No loss of consciousness, no amnesia and no disorientation

- Canadian CT Head Rule**
- High risk (of abnormality requiring neurosurgical intervention)
- GCS score < 15 at 2h after injury
  - Suspected open or depressed skull fracture
  - Any sign of basal skull fracture (haemotympanum, 'raccoon' eyes, cerebrospinal fluid otorrhoea/rhinorrhoea, Battle's sign)
  - Vomiting two or more times
  - Aged 65 or older
- Medium risk (for demonstrating brain injury on CT not requiring neurosurgical intervention)
- Retrograde amnesia of more than 30 minutes
  - Dangerous mechanism (pedestrian struck by motor vehicle, occupant ejected from motor vehicle, fall from height of more than 3 feet or five stairs)

Any High Risk Factors

Either of the Medium Risk Factors

No High or Medium Risk Factors

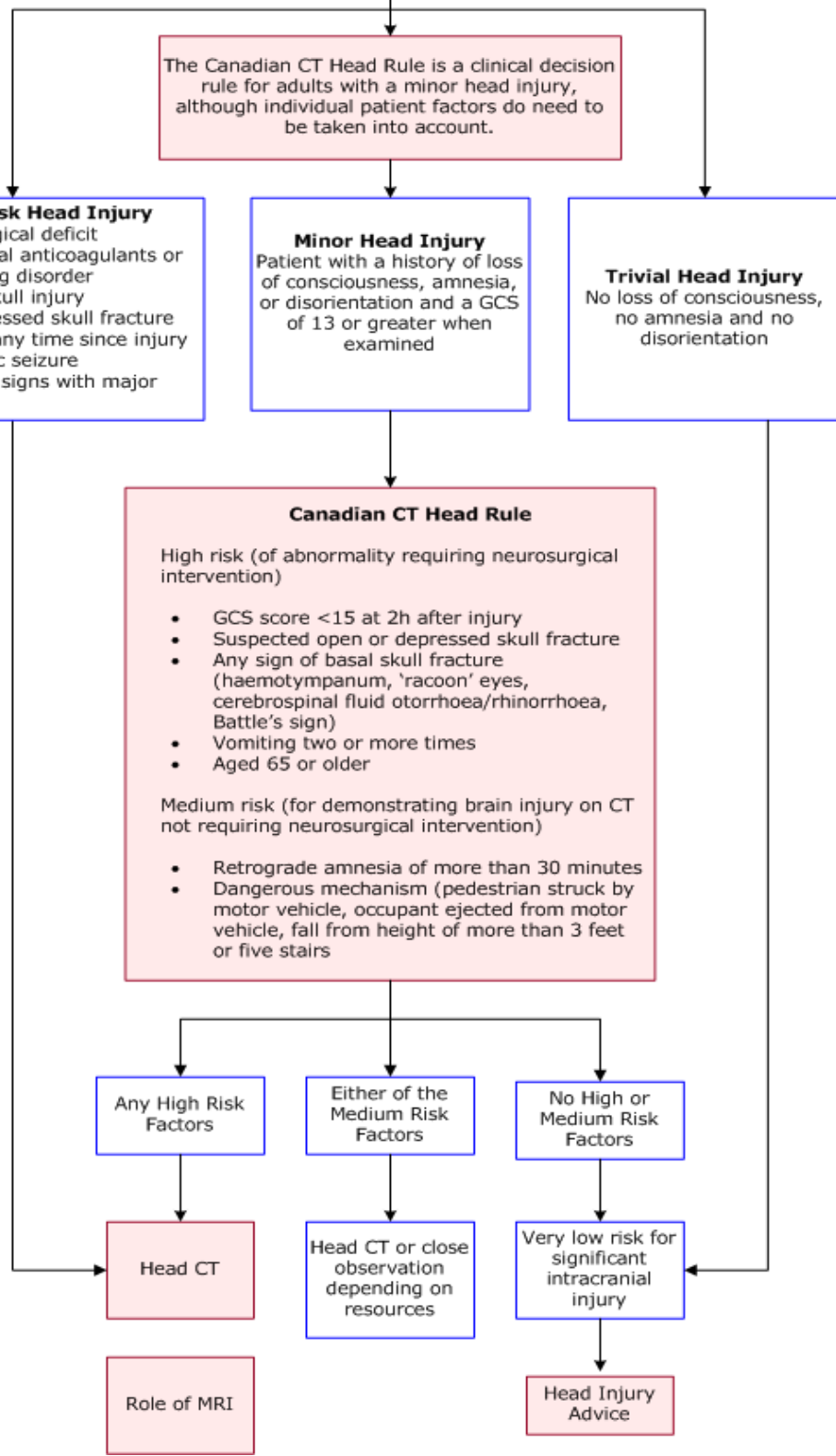
Head CT

Head CT or close observation depending on resources

Very low risk for significant intracranial injury

Role of MRI

Head Injury Advice





## CANADIAN COMPUTED TOMOGRAPHY (CT) HEAD RULE

- The Canadian CT Head Rule was prospectively derived on 3121 patients who had a minor head injury, defined as a GCS of 13 or greater with witnessed loss of consciousness, disorientation or definite amnesia. [3,8,9](#)
- The authors found that patients with minor head injury could be classified into two levels of risk. Those with one of the five high risk factors are at substantial risk for neurosurgical intervention and CT is considered mandatory in these cases. [3,8,9](#)
- Patients with either of the two medium risk characteristics could have a clinically important brain injury that would be seen on CT but are not at risk for needing neurosurgical intervention. The authors concluded that these patients could be managed with CT or close observation depending on local resources. [3,8,9](#)
- Prospective validation was carried out in Canada and reported a sensitivity of 100% and a specificity of 52.1% for clinically important brain injury. [14](#)
- External validation of the Canadian CT Head Rule has been disappointing. A Dutch study of 3181 consecutive patients reported a sensitivity for predicting neurosurgical intervention of 100%, but a sensitivity of only 84.5% for clinically important brain injury. Similarly, a retrospective study of 240 patients in Australia found that two of ten clinically important brain injuries would have been missed if the Canadian CT Head Rule had been applied. [15,16](#)
- The NICE Head Injury Guidelines (National Collaborating Centre for Acute Care - National Institute of Clinical Excellence) also recommends CT imaging for patients with post-traumatic seizure or a GCS of less than 13 at any time since injury. [13](#)

## COMPUTED TOMOGRAPHY

- Generally considered the most appropriate first line investigation for patients with head injury.
- Is able to detect scalp, bone, extra-axial haematomas and parenchymal injuries. [12](#)
- There have been a number of guidelines developed for the use of CT in head injury with various recommendations. The Canadian CT Head Rule is generally considered the best of these guidelines. [3](#)
- Although skull x-rays have been historically advocated as a first line investigation they are now rarely used because of the lack of correlation between a skull fracture and a significant intracranial haematoma. [1-2](#)
- As CT is widely available and relatively inexpensive many hospitals are now using CT as a means of rapidly determining those patients with minor head injuries who can be safely discharged versus those who need admission or neurosurgical opinion. [4-7](#)
- There have been some reported cases of patients who have had a normal head CT and subsequently developed an intracranial haematoma. [10,11](#)





## HEAD INJURY ADVICE

- The following advice has been adapted from the NICE Guidelines and the Royal Perth Hospital Emergency Department Head Injury Advice Form. [13](#)
- Patients are advised to seek immediate medical attention if the following symptoms develop within a week post head injury:
  - Disorientation, confusion, drowsiness for more than an hour, lack of awareness, gradually increasing dullness, or reduced conscious level.
  - Any difficulties in understanding or speaking
  - Unequal pupils of the eye, blurred vision, loss of vision in one or both eyes.
  - Onset of fits or seizures
  - Severe and continued headache
  - Any vomiting
  - Weakness in one or more arms or legs
  - Difficulties with walking or maintaining balance
  - Clear fluid coming out from your ear or nose
  - Bleeding from one or both ears
  - Onset of hearing difficulties
  - Any other marked changes

## MAGNETIC RESONANCE IMAGING

- May be used in the subacute setting to evaluate patients with unexplained neurological deficits.
- MRI is superior to CT in identifying diffuse axonal or shear injury and small intraparenchymal contusions. [17,18](#)
- Magnetic resonance angiography may be used in some patients to assess for arterial injury or venous sinus occlusion.
- Disadvantages:
  - Insensitive to acute subarachnoid or parenchymal haemorrhage, and fracture compared with CT. [17,19](#)
  - Limited role in the acute setting due to long acquisition times and difficulty in performing a scan of the critically ill patient who may require life support systems.
  - Certain absolute indications, eg. pacemaker.





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