Alcohol-intoxicated patients:
- Alcohol-intoxicated patients have a prevalence of intracerebral injury on CT scans of 2.4-8.4%.

Patients with coagulopathies:
- Patients taking warfarin should be worked up aggressively perhaps with overnight observation and repeat scanning (abnormal clotting predicts delayed brain injury on CT).

Patients with shunt-treated hydrocephalus:
- Aggressive diagnostic work-up is indicated.

Infants & children:
- Infants have been reported to develop intracranial haematomas despite normal initial examinations and CT scans; symptoms such as vomiting and seizures have poor specificity and sensitivity.
- A number of studies show that 0.4-1.5% of children with minor head injuries require neurosurgical intervention.
- No single set of clinical criteria to detect all pediatric patients with radiographic lesions has been identified and liberal use of CT scanning may be advisable despite associated risks.
- Risk for asymptomatic brain injury is higher in children under 6 months.
- Age less than 2 years is an independent risk factor for significant head injury.

Age greater than 60 years is also an independent risk factor for intracranial injury.

**Assessment of head injury**

Patients with head injuries can be divided into those with high-risk indicators and those with minor head injuries. Clinical rules exist to help determine which patients with minor head injuries require CT scans.

**Definite indications for imaging**

High risk factors that clearly necessitate imaging include:
1. Loss of consciousness for more than 5 minutes.
2. Depressed or decreasing level of consciousness.
3. Focal neurological findings.
4. Seizure.
5. Failure of mental status to improve over time in an alcohol-intoxicated patient.
6. Penetrating skull injuries.
7. Signs of a basal or depressed skull fracture.

- There is no precise definition of what constitutes a minor head injury.
- Normal neurological examination has been used by some experts to define a minor head injury even with brief LOC and post-traumatic amnesia.
- GCS of 15 at time of assessment used by others.
- GCS of 13 or higher has also been used as definition (although 40% with a GCS of 13 have an abnormal CT).

**Clinical criteria for imaging in patients with minor head injuries**

**New Orleans Criteria for CT brain after minor head injury:**
1. Headache.
2. Vomiting.
3. Age over 60 years.
4. Drug or alcohol intoxication.
5. Deficits in short-term memory.
6. Evidence of trauma above the clavicles.

**Canadian CT head rules:**
- Defines minor head injury as 'defined witnessed LOC, definite amnesia or witnessed disorientation in patients with a GCS of 13-15'.
- The rules are:
  1. GCS of less than 15 2 hours after the injury.
  2. Suspected open or depressed skull fracture.
  3. More than two episodes of vomiting.
  4. Physical evidence of basal skull fracture.
  5. Age >65 years.
- In addition, there were two 'medium-risk' factors for predicting brain injury on CT:
  1. Amnesia for events that happened more than 30 minutes prior to injury.
  2. Dangerous mechanism:
     (i) Pedestrian struck by motor vehicle.
     (ii) Occupant ejected from motor vehicle.
     (iii) Fall from higher than 3 feet or 5 stairs.
- The five 'high risk' criteria were 100% sensitive in a study of over 3000 patients.