# Head Injury Guidelines Handbook for the Western Cape

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These guidelines are intended to guide the management of patients with Head Injuries in the Western Cape. The aim is to help to ensure equitable access to the right level of care for all head injured patients.

This guideline is based on the NICE clinical guideline www.nice.org.uk. The NICE head injury guidelines were compiled by focusing full systematic reviewing methods primarily on imaging of the head and cervical spine after injury. Brief literature reviews and formal consensus methods were used to deal with other topics.

This guideline was adapted from the NICE guideline by the following people using the Agree Instrument (Appraisal of guidelines for research and evaluation):

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The guideline was formatted by Dr Rene English and Dr Nadia Mehl.

It is accepted that the guidelines call for a CT scan in a large number of head injured patients, and that scanning slots may not be accessible for all patients given current realities. It is intended, however, that the implementation of these guidelines will be progressively realised as more resources become available.

For more information about the content and implementation of this guideline, please contact the Department of Neurosurgery at either GSH (021 4066213) or TBH (021 9385669).

If you have specific comments about the content of these guidelines, please contact: Prof Allan Taylor (021 4066213).

Date: September 2008

Review date: September 2010
Initial assessment of the patient with a head injury
All patients presenting with a head injury should be assessed by a trained member of staff within a maximum of 15 minutes of initial contact.

GOAL: To determine if high or low risk for brain and cervical spine injury

1. **Assess and stabilise:**
   - Airway
   - Breathing
   - Circulation

2. **Calculate the GCS**
   If < 4 years old, use the Children's GCS.

3. **Ask about and record:**
   - Type of head injury (e.g. MVA, stab)
   - How it happened
   - Alcohol, drugs
   - Amnesia for events
   - Vomiting
   - Previous brain surgery
   - Medications (especially warfarin)

4. **Measure and record the vital signs**
   BP, pulse, respiratory rate

5. **Examine patient**
   Look for signs of significant head injury (refer to page 5)

**Initial management post-examination and stabilisation:**

- Immobilise the c-spine (if not already done) if: GCS <15, Neck pain or tenderness, Focal signs, Paraesthesia or if not able to test for range of motion
- Monitor every 15 minutes: GCS, pupil size and reactivity, limb movement, HR, RR, BP, O₂ sats
- Skull and c-spine x-rays as appropriate
Initial assessment

HEAD

Look:
• Skull fracture
• Foreign object lodged in skull
• Bullet wound

Feel:
• Depressed skull fracture

EYES

Look:
• Penetrating orbital injury
• Periorbital bruising (raccoon eyes)
• Dilated pupil

NOSE

Look:
• Bleeding
• Obvious fracture

Feel:
• Fracture

MOUTH

Look:
• Bleeding into mouth

FACE

Look:
• Bruising
• Swelling

Feel:
• Fractures

BODY

Exclude:
• Focal neurological deficit
• Paraesthesia

Cautious assessment of range of movement if:
• simple rear-end collision
• sitting position in unit
• delayed onset neck pain
• no mid-line tenderness.

For further management:
• Pre-hospital (refer to page 6)
• District level facilities (refer to page 9)
• Secondary/tertiary level facilities (refer to page 12)
Management of the head injury patient in the pre-hospital environment

Assess and manage according to ATLS / APLS principles. Stabilise airway, breathing and circulation (ABC) before attending to other injuries.

Are any of the following present?

- GCS < 15 at any time since the injury.
- Any loss of consciousness.
- Any focal neurological deficit (e.g. weakness or loss of feeling in part of the body).
- Any suspicion of a penetrating head injury or skull fracture (e.g. clear fluid from the ears or nose, bruising of eyes and behind ear).
- Amnesia of events.
- Persisting headache.
- Vomiting since the injury.
- Seizure since the injury.
- Previous brain injury.
- History of bleeding or clotting disorder.
- Current anticoagulation therapy, such as warfarin.

If YES
Transfer patient directly to a facility with a CT scanner

If NO
Transfer patient to closest most appropriate health facility
Initial management post-examination and stabilisation:

Immobilise the c-spine if:
- GCS <15
- Neck pain or tenderness
- Focal signs
- Paraesthesia
- Not able to test for range of motion

If cervical spine is to be immobilised place patient on 50mm thick mattress on top of the spinal board.

Monitor every 15 minutes
- GCS
- Pupil size and reactivity
- Heart rate
- Respiratory rate
- BP
- $O_2$ sats
District level facilities
Management of the head injury patient in district level facilities

Assess and manage according to ATLS / APLS principles. Stabilise airway, breathing and circulation (ABC) before attending to other injuries.

If the patient has sustained a significant head injury and any of the following are present:

- GCS < 15 at any time since the injury.
- Any loss of consciousness.
- Any focal neurological deficit (eg., problems understanding, speaking, reading or writing, loss of feeling in part of the body, problems balancing, weakness or any changes in vision).
- Any suspicion of a penetrating head injury or skull fracture (eg., clear fluid from the ears or nose, bruising of eyes and behind ear, new deafness in one or both ears.)
- Amnesia of events before or after the injury.
- Persisting headache.
- Vomiting since the injury.
- Seizure since the injury.
- Previous brain injury.
- History of bleeding or clotting disorder.
- Current anticoagulation therapy, such as warfarin.
- Age > 65 years.
- Suspicion of non-accidental injury.
- Any other symptom or sign that concerns you.

**YES**
Refer the patient to a hospital with a CT scanner for further investigations and management.

**NO**
- Observe
- Provide appropriate management (e.g. wound care, pain relief)
- Prepare for discharge (refer to page 19)
Preparing the patient for transfer to a secondary or tertiary level facility

- The referring professional should determine if an ambulance is required based on the patient’s condition.
- Telephonically notify the receiving Emergency Centre physician.
- A letter summarising all the symptoms and signs should be sent with the patient.
- Transportation should be undertaken within 4 hours.
- Monitor at regular intervals before and after transport: GCS, pupil size and reactivity, RR, HR, BP, O₂ sats

In all circumstances complete initial resuscitation and stabilisation of patients, and monitor at regular intervals to avoid complications during transport

Further management of patients who are not referred

Discharge patient if:
- Normal examination
- Normal observations
- No indication for transfer

Discharge into care of competent adult
Provide written and verbal instructions: refer to page 19.

If patient returns to the Emergency Centre within 48 hours of discharge with persistent complaints relating to the initial head injury such as:
- Drowsiness
- Confusion, agitation, abnormal behaviour
- Severe headache
- Vomiting
- Seizures
- Neurological signs or symptoms such as limb weakness or paraesthesia

involve a senior clinician and refer for CT scan.
Secondary/tertiary level facilities
Initial assessment of head injury patients as they arrive in the Emergency Centre

Assess and stabilise ABC’s before attending to other injuries. What is the GCS?

**GCS ≤ 8**
- Assess immediately.
- Involve suitably trained physician to provide appropriate airway management.
- Intubate and ventilate patient.
- Administer appropriate sedation and analgesia.
- Aim for a PaO2 > 13kPa, PaCO2 4.5-5kPa.

**GCS 9-14**
- Assess immediately
- Assess risk of brain injury / cervical spine injury
- **HIGH RISK**
  - Full clinical examination. Establish need for imaging of head and/or spine.
- **LOW RISK**
  - Re-examine within an hour. Establish need for imaging.

**GCS 15**
- Assess within 15 minutes

**CT SCANNING INDICATIONS**

**CT-scan within 1 hour for exclusion of head injury if:**
- GCS < 13 at any point since injury
- GCS 13 or 14, 2 hours after injury
- Suspected open/depressed skull fracture
- Any sign of basal skull fracture
- Post-traumatic seizure
- Focal neurologic deficit
- ≥1 episode of vomiting since injury
- Penetrating orbital injury
- Tangential GSW head (even if no bullet penetration)
- Any penetrating head injury
- Loss of consciousness/amnesia and one of the following:
  - age ≥ 65 years
  - coagulopathy
  - dangerous mechanism of injury

**CT-scan within 8 hours if:**
- Amnesia for events occurring ≥30 min before the injury.
- Dangerous mechanism of injury:
  - High-speed MVA
  - Fall from a height (>1m)

**C-SPINE XRAYS FOR EXCLUSION OF C-SPINE INJURY**

**Age >10 years:** 3-view plain x-rays
**Age <10 years:** AP and lateral only.

**C-spine x-rays to be done if:**
- GCS < 15 at time of assessment.
- Paraesthesia in extremities.
- Focal neurological deficit.
- Testing of range of movement of the neck not possible.
- Cannot rotate neck to 45°.
- Neck pain and tenderness AND ≥ 60 years old or high-speed MVA or fall from height > 1 meter.

**CT C-spine if:**
- Not possible to achieve desired cervical views with x-ray.
- X-rays inadequate, suspicious or abnormal.
- Clinical suspicion remains despite normal x-rays.
Further management of the head injury patient

DISCUSS WITH THE NEUROSURGEON IF:

- Surgically significant abnormality on imaging (e.g. contusion, tract haematoma, depressed skull fracture, extra-axial haematoma, intracerebral haematoma or brain swelling).
- Regardless of imaging:
  - Persisting coma after initial resuscitation.
  - Unexplained confusion which persists for more than 4 hours
  - Deterioration in GCS after admission
  - Progressive focal neurological signs
  - A seizure without full recovery
  - Suspected penetrating skull injury
  - A cerebrospinal fluid leak

ADMIT IF:

- Surgically significant abnormalities on imaging
- If patient fulfills the criteria for CT, but scanner not available/patient not fit for scanning/not cooperative.
- Worrying signs (persistent vomiting/severe headaches).
- Intoxication.
- Other or multiple injuries.
- Suspected non-accidental injuries.
- CSF leak.

MULTIPLE INJURIES

Admit under the care of a specialist trained in this area.

IF A NEUROSURGICAL PROCEDURE REQUIRED:

Admit under the care of a specialist trained in the area.

IF THE PATIENT RECEIVED SEDATION:

Observe in the recovery setting.
Transfer of the patient
Transfer of the patient

ADULT/CHILD

Resuscitation and stabilisation of the patient should be completed before transfer to avoid complications during the journey.

- Carers and relatives should have as much access to the patient as is practical during transfer.
- All patients with a GCS ≤8 should be intubated and ventilated.
- Patients should be intubated and ventilated immediately if:
  - Coma
  - Loss of protective laryngeal reflexes
  - Ventilatory insufficiency (hypoxaemia or hypercapnia)
  - Respiratory arrhythmia

Intubate and ventilate before transfer if:

- Significant decrease in loss of consciousness, even if not coma
- Major facial fractures compromising airway
- Copious bleeding into mouth
- Seizures

An intubated patient should be ventilated with appropriate sedation and analgesia. Aim for a PaO2 >13 kPa and a PaCO2 4.5-5 kPa. Patient should be accompanied by a trained paramedic.
Admitted or observed patients
Admitted or observed patients

The aim of observation and monitoring is to detect neurological deterioration prompting urgent reappraisal.

• Observe the patient every 15 minutes within the first 2 hours. Then 2-hourly thereafter.
• If deterioration, arrange for CT-scanning and monitor every 15 minutes.

• Monitor and record the following:
  – GCS.
  – Pupil size and reactivity.
  – Limb movement.
  – Respiratory rate.
  – Blood pressure.
  – Temperature.
  – Blood oxygen saturation.

Any of the following require prompt re-evaluation:
• Development of agitation or abnormal behaviour
• A sustained (more than 30 min) drop of one point in GCS level
• Any drop of greater than 2 points in GCS level regardless of duration.
• Development of severe or increasing headache or persisting vomiting.
• New or evolving neurological symptoms or signs such as pupil inequality or asymmetry of limb or facial movement.

If any abnormalities are detected, ask a second member of staff to confirm the findings. If confirmed, involve supervising doctor and refer patient to the neurosurgeon.
Discharge of patients
Discharge of patients

Discharge plan

- All patients should be discharged into care of responsible caregiver
- All patients should receive verbal advice and a written head injury advice card before discharge
- Do not discharge any patient who presents with a head injury until GCS = 15 or until they can be cared for by their family
- All patients who have been admitted or undergone imaging should be referred to a community health centre or general practitioner for routine follow-up within one week.

Important considerations prior to discharge

If:

- **No carer at home**: discharge only if suitable supervision arrangements have been organised, or when the risk of late complications is deemed negligible.

- **Low risk, CT not done, GCS = 15**: if CT is not indicated on the basis of history and examination, no other factors warrant admission and there are appropriate support structures for safe transfer and subsequent care, the patient may be discharged.

- **Normal imaging of the head**: if the patient has returned to GCS 15, no other factors warrant admission and there are appropriate support structures for safe transfer and subsequent care, the patient may be discharged.

- **Normal imaging of the cervical spine**: if the patient has returned to GCS 15, no other factors warrant admission and there are appropriate support structures for safe transfer and subsequent care, the patient may be discharged.

- **Admitted for observation**: discharge after resolution of all significant symptoms and signs, providing suitable home supervision arrangements exist.

- **At risk of non-accidental injury**: do not discharge an infant or child with a head injury that required imaging of the head or cervical spine until assessed by a clinician experienced in the detection of non-accidental injury.
Signs that a person who has been discharged within 48 hours from hospital following a head injury should go or be taken to their nearest Emergency Centre:

- Unconsciousness, or lack of full consciousness (for example, problems keeping their eyes open).
- Any confusion (not knowing where they are, getting things muddled up).
- Any drowsiness (feeling sleepy) that goes on for >1 hour when they would normally be wide awake.
- Any problems understanding or speaking.
- Any loss of balance or problems walking.
- Any weakness in one or both arms or legs.
- Any problems with eyesight.
- Very painful headache that won’t go away.
- Any vomiting – being sick.
- Any fits (collapsing or passing out suddenly).
- Clear fluid coming out of the ear or nose.
- New bleeding from one or both ears.
- New deafness in one or both ears.
Using the GCS
Using the GCS

Normal consciousness: GCS = 15/15

<table>
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<tr>
<th>ADULTS:</th>
<th>CHILDREN: &lt;4 years</th>
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<tbody>
<tr>
<td><strong>E: EYE OPENING</strong></td>
<td><strong>E: EYE OPENING</strong></td>
</tr>
<tr>
<td>4. Spontaneous</td>
<td>4. Spontaneous</td>
</tr>
<tr>
<td>3. To speech</td>
<td>3. To speech</td>
</tr>
<tr>
<td>2. To pain</td>
<td>2. To pain</td>
</tr>
<tr>
<td>1. None</td>
<td>1. None</td>
</tr>
<tr>
<td><strong>V: VERBAL RESPONSE</strong></td>
<td><strong>V: VERBAL RESPONSE</strong></td>
</tr>
<tr>
<td>5. Oriented</td>
<td>5. Alert, babbles, coos, words or sentences to usual ability</td>
</tr>
<tr>
<td>4. Confused</td>
<td>4. Less than usual ability and/or spontaneous irritable cry</td>
</tr>
<tr>
<td>3. Inappropriate words</td>
<td>3. Cries inappropriately</td>
</tr>
<tr>
<td>2. Incomprehensible sounds</td>
<td>2. Occasionally whimpers or moans</td>
</tr>
<tr>
<td>1. None</td>
<td>1. None</td>
</tr>
<tr>
<td>(If ventilated or intubated, record T)</td>
<td>(If ventilated or intubated, record T)</td>
</tr>
<tr>
<td><strong>M: MOTOR RESPONSE</strong></td>
<td><strong>M: MOTOR RESPONSE</strong></td>
</tr>
<tr>
<td>6. Obey commands</td>
<td>6. Obey commands or performs normal spontaneous movements</td>
</tr>
<tr>
<td>5. Localises pain</td>
<td>5. Localises pain or withdraws to touch</td>
</tr>
<tr>
<td>4. Normal flexion (withdraws)</td>
<td>4. Withdraws from pain</td>
</tr>
<tr>
<td>3. Abnormal flexion (decorticate)</td>
<td>3. Flexion to pain (decorticate)</td>
</tr>
<tr>
<td>2. Extension (decerebrate)</td>
<td>2. Extension to pain (decerebrate)</td>
</tr>
<tr>
<td>1. None</td>
<td>1. None</td>
</tr>
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**Calculating the GCS:**
GCS score = (E+M+V)
Best possible score = 15; worst possible score = 3
- Describe the 3 individual components (eye-opening, verbal response and motor response) in all communications and record scores for each modality
- Base total score on a sum of 15 (for example 13/15)
- Include a grimace alternative to the verbal score in the paediatric version to allow scoring for pre-verbal children

A grimace alternative to verbal responses should be used in preschool or intubated children.

**G: GRIMACE**
5. Spontaneous normal facial/oro-motor activity
4. Less than usual spontaneous ability or response to touch stimuli only
3. Vigorous grimace to pain
2. Mild grimace to pain
1. No response

**M: MOTOR**
6. Obey commands or performs normal spontaneous movements
5. Localises pain or withdraws to touch
4. Withdraws from pain
3. Flexion to pain (decorticate)
2. Extension to pain (decerebrate)
1. None
Head Injury Guidelines for the Western Cape

**Initial Assessment**

1. **Assess and stabilise:**
   - Airway
   - Breathing
   - Circulation

2. **Calculate the GCS**
   If < 4 years old, use the Children's GCS.

3. **Ask about and record:**
   - Type of head injury (e.g. MVA, stab)
   - How it happened
   - Alcohol, drugs
   - Amnesia for events
   - Vomiting
   - Previous brain surgery
   - Medications (especially warfarin)

4. **Measure and record the vital signs**
   BP, pulse, respiratory rate

5. **Examine patient**
   Look for signs of significant head injury

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**Initial management post-examination and stabilisation:**

- Immobilise the c-spine (if not already done) if:
  - GCS <15,
  - Neck pain or tenderness,
  - Focal signs
  - Paraesthesia
  - If not able to test for range of motion
- Monitor every 15 minutes: GCS, pupil size and reactivity, limb movement, HR, RR, BP, O₂ sats
- Skull and c-spine x-rays as appropriate

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**Head**

- **LOOK:**
  - Penetrating orbital injury
  - Periorbital bruising (raccoon eyes)
  - Dilated pupil
- **FEEL:**
  - Fracture

**FACE**

- **LOOK:**
  - Bruising
  - Swelling
- **FEEL:**
  - Fractures

**BODY**

- **LOOK:**
  - Focal neurological deficit
  - Paraesthesia
- **EXCLUDE:**
  - Focal neurological deficit
  - Paraesthesia

**EAR**

- **LOOK:**
  - Blood (haemotympanum)
  - CSF leakage
  - Bruising (suspected base of skull fracture)
- **FEEL:**
  - Fracture

**NOSE**

- **LOOK:**
  - Bleeding
  - Obvious fracture
- **FEEL:**
  - Fracture

**MOUTH**

- **LOOK:**
  - Skull fracture
  - Foreign object lodged in skull
  - Bullet wound
- **FEEL:**
  - Depressed skull fracture

---

1. **Assess and stabilise:**
   - Airway
   - Breathing
   - Circulation

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