

# STANDARD TREATMENT WORKFLOW (STW)

## HEAD INJURY

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Ministry of Health and Family Welfare, Government of India



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### Standard Treatment Workflow

## HEAD INJURY

ICD-S09.90XA

### CLINICAL PRESENTATION

SYMPTOMS		CLINICAL PRESENTATION		PREHOSPITAL CARE OF HEAD INJURY
Headache/vomiting	Brief or persistent loss of consciousness (LOC)	Seizures	Local signs of scalp hematoma/laceration	
Confusion/amnesia/inability to remember events related to trauma	Blood/blood stained/clear watery fluid leak from nose/ear			

**RED FLAG SIGNS:**

- Unconscious
- Irregular respiration
- Pupil size asymmetric

**IF RED FLAG SIGNS PRESENT:**

- Give 200ml (to adult patients or as per weight to children) 20% mannitol IV over 30 minutes (only if systolic BP > 90 mmHg) and refer to higher centre immediately after stabilisation of ABC.

### NEUROLOGICAL ASSESSMENT

GLASGOW COMA SCORE (GCS) TO QUANTIFY SEVERITY OF HEAD INJURY	NOTE PUPILS: SIZE / SHAPE / REACTION / SYMMETRY	ELICITING MOTOR RESPONSE TO PAINFUL STIMULI	IRREGULAR RESPIRATION
<b>ASSESSMENT DOMAIN</b>	<b>LOOK FOR SYMMETRY OF MOTOR RESPONSE</b>		
Eye opening (E)			
Spontaneous			
To speech			
To pain			
None			

Diagram illustrating pupil assessment: NORMAL (symmetrical pupils), ANISOCORIA (unequal pupils), and Abnormal pupil dilation.



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### CLINICAL PRESENTATION

<b>SYMPTOMS</b> 	Headache/vomiting	Seizures	<b>RED FLAG SIGNS:</b> • Unconscious • Irregular respiration • Pupil size asymmetric <b>IF RED FLAG SIGNS PRESENT:</b> • Give 200ml (to adult patients or as per weight to children) 20% mannitol IV over 30 minutes (only if systolic BP > 90 mmHg) and refer to higher centre immediately after stabilisation of ABC	<b>PREHOSPITAL CARE OF HEAD INJURY</b> • Golden hour of head injury management: ABC as in trauma guidelines • Look for associated injuries to pelvis/long bones/chest/abdomen • Any external bleeding controlled with local pressure • All suspected head injury cases: shift to higher centre (where CT SCAN and neurosurgeon are available) • Transfer only when ABC are stable
	Brief or persistent loss of consciousness (LOC)	Local signs of scalp hematoma/laceration		
	Confusion/Amnesia/inability to remember events related to trauma	Blood/ blood stained/ clear watery fluid leak from nose/ear		

### NEUROLOGICAL ASSESSMENT

<b>GLASGOW COMA SCORE (GCS) TO QUANTIFY SEVERITY OF HEAD INJURY</b> <table border="1"> <thead> <tr> <th>ASSESSMENT DOMAIN</th> <th>SCORE</th> </tr> </thead> <tbody> <tr> <td><b>Eye opening (E)</b></td> <td></td> </tr> <tr> <td>Spontaneous</td> <td>4</td> </tr> <tr> <td>To speech</td> <td>3</td> </tr> <tr> <td>To pain</td> <td>2</td> </tr> <tr> <td>None</td> <td>1</td> </tr> <tr> <td><b>Verbal response (V)</b></td> <td></td> </tr> <tr> <td>Oriented</td> <td>5</td> </tr> <tr> <td>Confused conversation</td> <td>4</td> </tr> <tr> <td>Inappropriate words</td> <td>3</td> </tr> <tr> <td>Incomprehensible sounds</td> <td>2</td> </tr> <tr> <td>None</td> <td>1</td> </tr> <tr> <td><b>Best motor response (M)</b></td> <td></td> </tr> <tr> <td>Obeys commands</td> <td>6</td> </tr> <tr> <td>Localizes pain</td> <td>5</td> </tr> <tr> <td>Flexion withdrawal to pain</td> <td>4</td> </tr> <tr> <td>Abnormal flexion (decorticate)</td> <td>3</td> </tr> <tr> <td>Extension (decerebrate)</td> <td>2</td> </tr> <tr> <td>None (flaccid)</td> <td>1</td> </tr> </tbody> </table>	ASSESSMENT DOMAIN	SCORE	<b>Eye opening (E)</b>		Spontaneous	4	To speech	3	To pain	2	None	1	<b>Verbal response (V)</b>		Oriented	5	Confused conversation	4	Inappropriate words	3	Incomprehensible sounds	2	None	1	<b>Best motor response (M)</b>		Obeys commands	6	Localizes pain	5	Flexion withdrawal to pain	4	Abnormal flexion (decorticate)	3	Extension (decerebrate)	2	None (flaccid)	1	<b>NOTE PUPILS: SIZE/ SHAPE/ REACTION/ SYMMETRY</b> <b>LOOK FOR SYMMETRY OF MOTOR RESPONSE</b> 	<b>ELICITING MOTOR RESPONSE TO PAINFUL STIMULI</b> <b>IRREGULAR RESPIRATION</b> • Labored breathing • Accessory muscles of respiration active
ASSESSMENT DOMAIN	SCORE																																							
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<b>SCORING &amp; INTERPRETATION OF SEVERITY</b> • GCS Score = [E(4)] + [V(5)] + [M(6)] • Score range: 3 to 15 • Mild = GCS 13-15, Moderate = GCS 9-12, Severe = GCS 3-8	<b>INVESTIGATIONS</b> <b>ESSENTIAL</b> • Chest X ray • Ultrasound abdomen and chest to rule out abdominal free fluid/hemothorax • NCCT Head with Cervical Spine as soon as possible in all head injury patients • Definite indication for CT SCAN if any of the following are present • GCS <15 • Transient loss of consciousness • Suspected skull fracture • Post traumatic seizure • Focal neurological deficit • Persistent vomiting • Amnesia	<b>DESIRABLE:</b> • X rays long bone and pelvis (if indicated)  <b>OPTIONAL:</b> • Blood alcohol levels • Plain MRI brain for prognostication (not in acute cases) • Biomarkers like serum S100b																																						

### MANAGEMENT AT HIGHER CENTRE WITH CT SCAN & NEUROSURGEON

MILD HEAD INJURY (GCS: 13 - 15)	MODERATE HEAD INJURY (GCS: 9 - 12)	SEVERE HEAD INJURY (GCS: 3 - 8)
<ul style="list-style-type: none"> <li>History</li> <li>General examination</li> <li>Neurological examination</li> <li>Skull X-Ray</li> <li>Cervical spine X-Ray</li> <li>Blood alcohol levels</li> </ul> <p>CT HEAD- Ideally in all except completely asymptomatic pts</p> <p>ADMIT → Amnesia, +/- LOC, Deteriorating consciousness, Moderate-severe headache, Alcohol/drug intoxication, Skull fracture, Associated injury, Abnormal CT SCAN</p> <p>DISCHARGE → Does not meet criterion for admission, Discuss need to return if problem persists</p>	<ul style="list-style-type: none"> <li>Initial Assessment</li> <li>CT SCAN IN ALL CASES</li> </ul> <p>Admit even if CT is normal</p> <p>Frequent neurological examinations Follow up CT SCAN if deteriorates/before discharge</p> <p>If patient Improves → Discharge when stable</p> <p>If patient deteriorates → Repeat CT SCAN, Manage as per severe HI</p>	<p>Intubate, Sedate, Resuscitate</p> <p>CT SCAN → Not available → Refer to higher centre if &lt; 2 hrs</p> <p>Diffuse lesion → ICU → Monitor ICP, Elevate Head end, Sedate, Maintain PaO<sub>2</sub> 100 mmHg, Maintain PaCO<sub>2</sub> 30-32 mmHg, ICP still high → Treat ICP</p> <p>Surgical Lesion (decompressive craniectomy)</p>

### MEDICAL MANAGEMENT

- Treatment of high intracranial pressure**
  - Sedation, analgesia and mild to moderate hyperventilation (PaCO<sub>2</sub> 30-35 mmHg)
  - Osmotic therapy: mannitol: 0.25 - 1.00 g/kg IV bolus or 3ml/kg 3% hypertonic saline 8 hourly
- Antiepileptic drugs**
  - Phenytoin (20mg/kg over 30 min IV, followed by 5mg/kg in 2-3 divided doses)
  - Levetiracetam (500 mg BD, continue for 1-3 months)
  - Prophylaxis - if seizure free for 6 months
  - Therapeutic - if seizure free for 2 years after receiving drug therapy, consider tapering/ discontinue antiepileptic
  - Consult neurosurgeon/neurologist before stopping
- Steroids NOT useful in Head Injury**

### SURGICAL MANAGEMENT IN HEAD INJURY IF

- Extradural hematoma > 30cc in volume
- Subdural hematoma > 10mm thick with midline shift > 5 mm and evidence of deterioration in clinical neurology/change in pupillary size
- Most common operation done is decompressive craniotomy with hematoma evacuation and/ or removal of large bone flap (15x12cm). To be done by neurosurgeon only

**REMOVAL OF LARGE BONE FLAP (15CM X 12 CM) BY A NEUROSURGEON (DECOMPRESSIVE CRANIECTOMY) IS THE MOST COMMON SURGICAL PROCEDURE DONE**



### COMPLICATIONS TO WATCH FOR

- Deterioration of GCS score
- New onset or worsening focal neurological deficit
- Persistent headache, vomiting, or restlessness
- Bradycardia, hypertension
- Abnormal initial CT SCAN (repeat at 24 hours or earlier if indicated)

### ABBREVIATIONS

- CT : Computed Tomography  
ICP : Intracranial Pressure  
ICU : Intensive Care Unit  
MRI : Magnetic Resonance Imaging  
NCCT : Non-contrast Computerized Tomography

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### KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES

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