STANDARD TREATMENT WORKFLOW (STW)

HEAD INJURY

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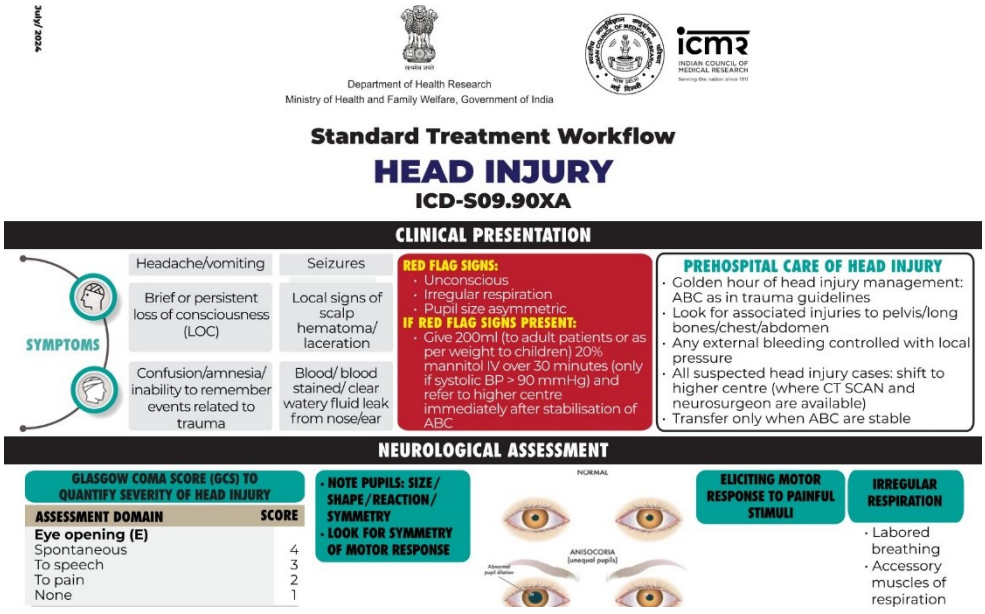

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Standard Treatment Workflow

HEAD INJURY

ICD-S09.90XA

CLINICAL PRESENTATION

SYMPTOMS

Headache/vomiting	Seizures
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

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

PREHOSPITAL CARE OF HEAD INJURY
- 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

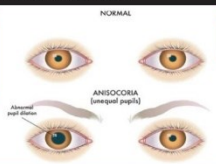
NEUROLOGICAL ASSESSMENT

GLASGOW COMA SCORE (GCS) TO QUANTIFY SEVERITY OF HEAD INJURY

ASSESSMENT DOMAIN	SCORE
Eye opening (E)	
Spontaneous	4
To speech	3
To pain	2
None	1
Verbal response (V)	
Oriented	5
Confused conversation	4
Inappropriate words	3
Incomprehensible sounds	2
None	1
Best motor response (M)	
Obeys commands	6
Localizes pain	5
Flexion withdrawal to pain	4
Abnormal flexion (decorticate)	3
Extension (decerebrate)	2
None (flaccid)	1

SCORING & INTERPRETATION OF SEVERITY
- 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

NOTE PUPILS: SIZE / SHAPE / REACTION / SYMMETRY
LOOK FOR SYMMETRY OF MOTOR RESPONSE



ELICITING MOTOR RESPONSE TO PAINFUL STIMULI

IRREGULAR RESPIRATION
- Labored breathing
- Accessory muscles of respiration active

INVESTIGATIONS

ESSENTIAL
- 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

DESIRABLE:
- X rays long bone and pelvis (if indicated)

OPTIONAL:
- 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)

- History
- General examination
- Neurological examination
- Skull X-Ray
- Cervical spine X-Ray
- Blood alcohol levels

CT HEAD- Ideally in all except completely asymptomatic pts

ADMIT
- Amnesia
- H/o LOC
- Deteriorating consciousness
- Moderate-severe headache
- Alcohol/drug intoxication
- Skull fracture
- Associated injury
- Abnormal CT SCAN

DISCHARGE
- Does not meet criterion for admission
- Discuss need to return if problem persists

MODERATE HEAD INJURY (GCS: 9 - 12)

- Initial Assessment
- CT SCAN IN ALL CASES

Admit even if CT is normal

Frequent neurological examinations
Follow up
CT SCAN if deteriorates/before discharge

If patient Improves
Discharge when stable

If patient deteriorates
Repeat CT SCAN
Manage as per severe HI

SEVERE HEAD INJURY (GCS: 3 - 8)

Intubate, Sedate, Resuscitate

CT SCAN → Not available → Refer to higher centre if < 2 hrs

Diffuse lesion → ICU

Surgical Lesion (decompressive craniectomy)

- Monitor ICP
- Elevate Head end
- Sedate
- Maintain PaO_2 100 mmHg
- Maintain $PaCO_2$ 30-32 mmHg

ICP still high → Treat ICP

MEDICAL MANAGEMENT

- **Treatment of high intracranial pressure**
  - Sedation, analgesia and mild to moderate hyperventilation ($PaCO_2$ 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 X12 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