Guidance document for processing PM-JAY packages

Medical Management for Raised intracranial pressure

Procedures covered: 1 **Specialty:** Pediatric Medical Management

Package Name	Procedure Name	HBP 1.0 code	HBP 2.0 code	Package price (INR)	Remarks
Medical Management for Raised intracranial pressure	After Decompressive craniotomy / After Shunt procedure / After other emergency neuro surgical procedures / For ICP monitoring	New Package	MP008A	General Ward- 1800/- HDU – 2700/- ICU without ventilator– 3600/- ICU with Ventilator– 4500/-	Add-on procedure

ALOS: 10-14 days

Minimum qualification of the treating doctor:
Essential: MD/DNB/DCH/Equivalent (Pediatric), MD/DNB/Equivalent (Neurology), DNB/Equivalent (Critical care), MCh/DNB/Equivalent (Neurosurgery)

Special empanelment criteria/linkage to empanelment module: Care at a Tertiary Hospital (Pediatric/Neurosurgical intensive care unit)

Disclaimer:
For monitoring and administering the claim management process for **Medical Management for Raised intracranial pressure,** shall be following these guidelines. This document has been prepared for guidance of PROCESSING TEAM and TRANSACTION MANAGEMENT SYSTEM of AB PM-JAY for the claims of procedures mentioned above. The hospitals can also refer to this document so that they have the insight on how the claims will be processed. However, this document doesn't provide any guidance on clinical and therapeutic management of patient. In that respect the hospitals and physicians may refer to any other relevant material as per the extant professional norms.

PART I: GUIDELINES FOR CLINICAL AND HEALTHCARE PROVIDERS

1.1 Objective:

The purpose of this section is to act as a guidance & a clinical decision support tool for the clinicians in deciding the line of treatment, plan clinical management of patient and decide referral of cases to the appropriate level of care (as required) for treatment of patients under PMJAY and selection of corresponding Health Benefit Package.

It will also serve as a tool for hospitals to determine and submit the mandatory documents required for claiming reimbursement of health benefit package under PMJAY.

1.2 Clinical key pointers:

Raised intracranial pressure (ICP, > 20 mm Hg) is often seen in children with acute brain injury of various neurological or non-neurological etiologies and often complicates the clinical picture and management; it may progress into herniation syndrome and death.

Pre-operative patients

The most common etiologies of raised ICP in the pediatric intensive care unit (PICU) of developing countries are due to infections (ie, meningitis, encephalitis), hydrocephalus, hypoxic/ ischemic brain injury, intraparenchymal bleed of vitamin K deficiency, metabolic encephalopathy, brain tumors, cerebral infarction, and traumatic brain injury (TBI).

Clinical presentation

Symptoms and signs of raised ICP are neither sufficiently sensitive nor specific; hence identifying patients at risk of developing raised ICP is a crucial for preventing secondary brain injury.

In conscious patients' irritability, headache, vomiting, confusion and decreased alertness, and neck retraction may be the presenting features. These are neither sufficiently sensitive nor specific for timely recognition of raised ICP. Tense fontanelle on palpation and papilledema, are reliable signs of raised ICP, but the latter is usually absent in acute conditions, even in patients with documented elevated ICP. The most common symptom is progressive decline in neurological status, eventually leading to a comatose state.

In unconscious/comatose patients, raised ICP should be suspected in all patients with head injury, meningitis, encephalitis, liver disease and diabetes mellitus. The clinical features highly specific of raised ICP are generally seen late, when brain herniation is imminent or has already set in. These are abnormal posturing (decerebration or decortication), abnormal pupillary dilatation, hypertension, bradycardia, irregular breathing, sixth nerve palsy and papilledema. Cushing reflex (hypertension, bradycardia, irregular breathing) becomes evident only later in the course of illness, and may not occur in young children. Abnormal pupillary dilatation and posturing (decerebration or decortication) can occur in the absence of raised ICP.

Indications for ICP Monitoring

GCS Score: 3–8 (after resuscitation)

1. Abnormal Admission Head CT Scan
    a. Hematoma
    b. Contusion
    c. Edema
    d. Herniation
    e. Compressed basal cisterns
2. Normal Admission Head CT Scan PLUS 2 or more of the following
    a. Age > 40 years
    b. Motor posturing
    c. Systolic blood pressure < 90 mm Hg

Management

All patients with an modified Glasgow Coma Score (m-GCS) ≤8 are likely candidates for raised ICP. Persistent elevation of ICP above 20 mm Hg for greater than 5 minutes in a patient who is not being stimulated should be treated immediately.

Immediate goal of management is to prevent/reverse herniation and to maintain good cerebral perfusion pressure (CPP). The therapeutic measures include stabilization of airway, breathing and circulation, along with neutral neck position, head end elevation by 30°, adequate sedation and analgesia, minimal stimulation, and hyperosmolar therapy (mannitol or 3% saline).

Short-term hyperventilation, to achieve PCO2≈30 mm Hg, using bag ventilation can be resorted to if impending herniation is suspected. CPP targeted therapy (targeting CPP ≥ 60 mm Hg) is associated with better clinical outcome.

Decompressive craniotomy may improve the outcome in raised ICP unresponsive to medical treatment.

Management of Patients With Sign of Raised ICP: No ICP Monitoring in Place

I. Perform ABC's while preparing patient for emergent neuroimaging (head CT/MRI)
A–Airway: Secure airway, do rapid sequence intubation, maintain/induce sedation-analgesia with Midazolam and/or Morphine or Fentanyl
B–Breathing: Perform hyperventilation using ambu-bag while waiting for intubation, maintain $PaCO_2$ ≈ 30 - 32 mm Hg
C–Circulation: Assess for euvolumia, give NS bolus if evidence of hypoperfusion / hypotension present particularly prior to instituting osmotic therapy (20% mannitol)
II. Once airway is secured, euvolumia is established, patient is sedated, initiate the general measure like Head End Of Bed (HOB) elevated to 30 degrees. Plan to do neuroimaging.
III. Plan for blood biochemistry (Serum Na, K, BUN, Glucose, Osmolality stat, and Q4–6 h thereafter)
IV. Mannitol 0.5 g/kg IV bolus stat then 0.25 g/kg if required Q4–6 h.
- Hold mannitol dose for if Osmolar Gap > 10 or Change in Osmolar Gap > 10.

V. 3% NaCl 10 mL/kg IV bolus over 15–30 min followed by 0.1 to 1 ml/kg/hr infusion if no significant ICP reduction within 1 hr of Mannitol administration, or if unable to give Mannitol due to high baseline serum Osmolality or osmolar Gap.
VI. Once neuroimaging results are available, call neurosurgery stat as indicated, while continuing above maneuvers.
- Focal mass lesion with midline shift–considered for early emergent decompressive craniectomy.
- Diffuse brain edema/swelling–refer for intraparenchymal catheter placement where facility is available.
- Hydrocephalus–refer for emergent EVD insertion and CSF drainage where facility is available, insertion for Intraventricular catheter monitoring and CSF drainage.

Management of Patients With Sign of Raised ICP: ICP Monitoring in Place

General measures and First tier therapy
- Head in neutral position, 30° elevation.
- Ensure oxygenation- Normoxia (PaO_2>60 mmHg, SpO_2>92%)
- Ensure adequate circulating volume- Normovolemia
- Maintain normal BP
- Ventilation to achieve $PaCO_2$ ≈35 mmHg
- Osmotic diuretic- Mannitol 0.25–0.50 /kg i.v. over 20 min, repeat S.O.S or Hypertonic (3%) saline infusion: 10 ml/kg bolus, followed by 0.1 ml−1.0 ml/kg h infusion
- Dexamethasone - 1–2 mg/kg i.v. Q 6 h—cytotoxic cerebral edema (brain abscess, granuloma, tumor)
- CSF drainage- Obstructive hydrocephalus
- Prevent all events that increase ICP
  Fever / hypothermia, pain- adequate sedation–analgesia, seizures- anticonvulsant, loud noise, invasive stimuli.

Second tier therapy
- Hyperventilation ($PaCO_2$ 30–35 mmHg)
- Barbiturates coma- Thiopental or pentobarbital
- Moderate hypothermia(32–34°C)

Third tier therapy
- Decompressive craniectomy or temporal lobectomy
- Profound hyperventilation to $PaCO_2$>25 < 30 mm Hg (use transiently)

Postoperative Neurosurgical Patients

Neurosurgical patients are a special subset of patients requiring postoperative care. Challenging neurosurgical disease processes, advanced surgical techniques, and unique individual patient requirements advocate the need for meticulous postoperative care to ensure safe transition toward recovery. Timely detection of systemic and neurological changes allows early diagnostic and therapeutic interventions. The mainstay of postoperative care revolves around airway, maintenance of hemodynamics, sedation, analgesia, nutrition, fluid management, and management of disease-specific complications.

Cause of Postoperative Intracranial hypertension

- Mass lesion (hematoma) / Edema
- Increased cerebral blood volume (vasodilation)
- Disturbances of CSF dynamics

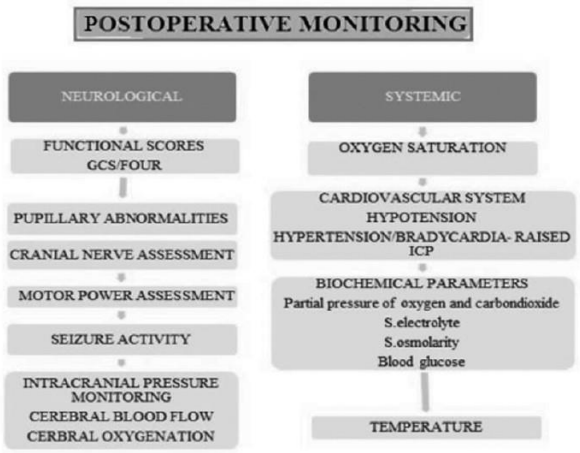

Fig. 1 Postoperative monitoring in neurosurgical patients. FOUR, full outline of unresponsiveness; GCS, Glasgow Coma Score; ICP, intracranial pressure.

In many intracranial events, raised ICP and low cerebral perfusion pressure (CPP) cause cerebral ischemia. ICP monitoring is an important component of multimodal neuromonitoring and helps in maintaining CPP. There are both invasive and noninvasive monitoring techniques.

Clinical signs of IC-HTNa

1. pupillary dilatation (unilateral or bilateral)
2. asymmetric pupillary reaction to light
3. decerebrate or decorticate posturing (usually contralateral to blown pupil)
4. progressive deterioration of the neurologic exam not attributable to extracranial factors

Brain Trauma Foundation guideline states ICP above 22 mm Hg as threshold for treatment. The treatment of raised ICP follows stepwise pattern starting with head elevation (30°), normoventilation (or short period of hyperventilation), adequate sedation, analgesia, and muscle paralysis (to prevent coughing and bucking on ventilator and decreasing work of breathing). If ICP continues to be high (>25 mm Hg), hyperosmolar therapy (mannitol/hypertonic saline) and ventriculostomy can be added to the previous treatment. Other options to decrease raised ICP include therapeutic hypothermia, decompressive craniectomy, and inducing barbiturate coma.

1.3 Mandatory documents- For healthcare providers

Following documents should be uploaded by the concerned hospital staff at the time of pre-authorization and claims submission:

Mandatory document	Medical Management for Raised intracranial pressure
i. At the time of Pre-authorization	
Clinical notes including history, evaluation findings including BP monitoring, vitals monitoring, Intracranial pressure monitoring, and planned line of management	Yes
Pediatric Glasgow coma scale documentation	Yes
CT/MRI scan	Yes
Lumbar puncture	Yes
Fundoscopy report	Yes
Optional Ocular ultrasound Electroencephalogram Near infrared spectrometry (NRS) Transcranial doppler	Yes
Intra-operative and post-op monitoring documents for recent/last surgery done (if applicable)	Yes
ii. At the time of claim submission	
Detailed Indoor Case Papers (ICPs) mentioning the treatment details	Yes
Investigation reports (if required)	Yes
Detailed Discharge Summary	Yes

PART II: GUIDELINES FOR PROCESSING TEAM

PART III: GUIDELINES FOR TRANSACTION MANAGEMENT SYSTEM (TMS)

3.1 **Objective:** To enable setting up of cross check mechanisms/rule engines within the IT platform (TMS) to ensure compliance with STGs and to prevent fraud / abuse of the Health Benefit Package.

3.2 **Below mentioned are the scenarios where a provision would be built in TMS for pop-ups**:

I. Did the patient present with clinical signs and symptoms of raised Intra Cranial Pressure (ICP) such as headache, vomiting, seizure, blurring of vision, pupillary dilatation? Yes
II. Did imaging/investigations support the diagnosis of raised Intra Cranial Pressure (ICPs)? Yes

Till the time the functionality is being developed, the processing doctors shall check the above manually.

References

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2. Panda, Nidhi & Mahajan, Shalvi & Chauhan, Rajeev. (2019). Management of Postoperative Neurosurgical Patients. Journal of Neuroanaesthesiology and Critical Care. 06. 80-86. 10.1055/s-0039-1689055.
3. Rangel-Castilla L, Gopinath S, Robertson CS. Management of intracranial hypertension [published correction appears in Neurol Clin. 2008 Aug;26(3):xvii. Rangel-Castillo, Leonardo [corrected to Rangel-Castilla, Leonardo]]. *Neurol Clin*. 2008;26(2):521-x. doi:10.1016/j.ncl.2008.02.003
4. Mark S. Greenberg. Handbook of Neurosurgery. Ninth Edition. 2020. Thieme.