October/2019

Department of Health Research
Ministry of Health and Family Welfare, Government of India

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Standard Treatment Workflow (STW) for the Management of
ACUTE ENCEPHALITIS SYNDROME (AES) IN CHILDREN
ICD-10-G04

Acute onset of fever (</= 5-7 days) with altered sensorium and/or new onset of seizures (excluding simple febrile seizures)

SYMPTOMS

- Fever, headache, vomiting, lethargy, unconsciousness
- Seizures
- Abnormal posturing
- Paucity of limb movements

ADDITIONAL INFORMATION (HISTORY OF)

- Rash, vesicles, past history of chicken pox
- Residence of child: rural/urban, endemic for cerebral malaria, any epidemic of AES in neighborhood
- Animal contact, insect bite, dog bite
- Drug or toxin exposure- enquire for presence of any drugs at home
- Recent travel
- Trauma
- Seizures
- Recent immunizations
- Recurrent episodes of encephalopathy
- Past or concurrent systemic illness
- Pre-morbid developmental/ neurological status of the child

EXAMINATION

VITAL SIGNS
- Temperature
- Pulse rate
- Respiratory rate
- Blood pressure

GENERAL EXAMINATION
- Pallor
- Petechieae
- Rash
- Icterus

NEUROLOGICAL EXAMINATION
- Level of consciousness by Glasgow Coma Scale (GCS)
- Abnormal posturing- decerebrate, decorticate
- Active seizures
- Cranial nerves: pupil size and reaction, doll's eye movements, squint, facial deviation
- Focal neurological deficits
- Meningeal signs

INVESTIGATIONS

ESSENTIAL
CBC, LFT, KFT, blood sugar, CECT Brain, CSF examination* (cytology, biochemistry, culture, AFB staining, Gene Xpert), peripheral smear for malarial parasite, Rapid Malarial Antigen Test

DESIRABLE
MRI Brain, CSF PCR for Herpes simplex encephalitis, JE serology, EEG, Dengue serology and NS1 testing, HIV testing

OPTIONAL
CSF Neurovirology panel, anti-NMDA receptor antibody testing, PCR viral testing of other samples (throat swab, nasopharyngeal aspirates, stool etc), Blood Tandem Mass Spectrometry and urine gas chromatography, antinuclear antibodies

***Lumbar puncture is contra-indicated or neuroimaging must be obtained before lumbar puncture**
1.Fundus: papilledema 2. Platelet count < 50,000 3. Focal neurological deficits 4. Asymmetric/unreactive pupils 5.Decerebrate/decorticate posturing

MANAGEMENT

All patients need to be admitted.
If any of the following signs are present, the child should be referred to tertiary care facility with PICU and facilities for mechanical ventilation:
• Glasgow Coma Scale < 8 • Abnormal breathing pattern • Shock not responding to fluid bolus • Decerebrate or decorticate posturing
• Seizures persisting despite benzodiazepine and phenytoin

Step I: Rapid assessment and stabilization
- Establish and maintain airway: Intubate if GCS<8, impaired airway reflexes, abnormal respiratory pattern, signs of raised intracranial pressure, SpO2 <92% despite high flow oxygen and fluid refractory shock
- Ventilation, oxygenation
- Circulation: Establish IV access, take samples for relevant investigations, Fluid bolus if in circulatory failure (20 mL/kg NS), inotropes if required
- Identify signs of cerebral herniation or raised ICP
- Temperature: treat fever and hypothermia
- Treat ongoing seizures- Benzodiazepine, followed by phenytoin loading

Step II: History, Examination and Investigations as given above

Step III: Empirical Treatment (must be started if CSF cannot be done/report will take time and patient sick)
- **Ceftriaxone:** 100 mg/kg/day in 2 divided doses X 10-14 days
- **Acyclovir** (use in all suspected sporadic viral encephalitis) :
  3 mo to 12 y: 500mg/m2 8 hourly (min 21 days)
  >12 y: 10mg/Kg 8 hourly (14-21 days in confirmed cases)**
- **Artesunate combination therapy** (stop if peripheral smear and RDT are negative) : 3mg/kg in child <20 kg, and 2.4mg/kg in child > 20kg IV/IM at 0,12 and 24 hours, followed by once daily parental/oral X 3-7 days

**If therapy was started empirically stop acyclovir, in case an alternative diagnosis is confirmed, or HSV PCR of CSF is negative on two occasions (24-48 h apart) and MRI imaging not suggestive of Herpes Simplex Encephalitis

Step IV: Supportive care and treatment
- Maintain euglycemia, hydration and control fever
- Treat raised intracranial pressure#, mild head-end elevation–15-30˚
- Treat seizures##; Give anticonvulsant if: history of seizures / GCS <8 / child has features of raised ICP
- Steroids: Pulse steroids (methylprednisolone) to be given in children with suspected acute disseminated encephalomyelitis or autoimmune encephalitis

Step V: Prevention/treatment of complications and rehabilitation
- Physiotherapy, posture change, prevent bed sores and exposure keratitis
- Complications: aspiration pneumonia, nosocomial infections, coagulation disturbances
- Nutrition: early feeding
- Psychological support to patient and family

#Management of raised intracranial pressure
- Intubate if: GCS <8 / evidence of herniation / irregular respirations and inability to maintain airway
- Signs of impending herniation: patient to be hyperventilated to a target PaCO2 of 30-35 mmHg
- Initial bolus of Mannitol(0.25 g/kg), then 0.25 g/kg q 6 h as per requirement, up to 48 hours.
- In the presence of hypotension, hypovolemia, and renal failure: hypertonic (3%) saline (preferable to mannitol) 0.1–1 mL/kg/hr by infusion; serum sodium to be targeted to 145-155 meq/L
- Adequate sedation and analgesia
- Avoid noxious stimuli
- Administer nebulized lignocaine prior to endotracheal tube suctioning

##Treatment of seizures
1st Line: IV Lorazepam 0.1mg/kg or Midazolam 0.2 mg/kg orDiazepam 0.3 mg/kg).
If no IV access: IM Midazolam 0.2 mg/kg
2nd Line: Inj. Phenytoin 20 mg/kg (in Normal saline 1mg/kg/min)
If seizures still persist:
Refractory status: Transfer to PICU -> midazolam infusion (1-18 microgram/kg/min)
If ICU facilities not available: sodium valproate (20 mg/kg)
or
levetiracetam (20-40 mg/kg) or phenobarbitone (20mg/kg)

DISCHARGE CRITERIA

Hemodynamically stable	Improvement in consciousness	Afebrile	Has started eating and drinking orally	Seizures have subsided	Parents have been explained the supportive care and physiotherapy to be continued at home

KEEP A HIGH THRESHOLD FOR INVASIVE PROCEDURES

REFERENCES

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