

Management of First Unprovoked Seizure in Children

Guideline developed by Aimee F. Luat, MD, Diplomate in the specialty of Neurology with Special Qualification in Child Neurology and Epilepsy, Diplomate in the specialty of Advanced Clinical Neurophysiology with Added Competency in Epilepsy Monitoring in collaboration with the Arkansas Children's Hospital Pediatric Neurology Faculty. Developed in collaboration with the ANGELS team, June 10, 2014. Last revised by Aimee F. Luat, MD August 31, 2016.

Background

First unprovoked seizures occur in 23 to 61 per 100,000 person-years. The incidence is higher in children <1 year (130.2 per 100,000 person-years). The reported overall seizure recurrence risk following a first unprovoked seizure in children and adults varies from 27% to 52%. This guideline covers the definition, assessment, differential diagnosis, management, and treatment of first unprovoked seizures in children. Specifically, it aims to assist physicians in determining which patients need prompt diagnostic evaluation and which patients have higher risk of seizure recurrence and may need to start anti-epileptic drug (AED) treatment. Children with first seizure lasting ≥ 30 minutes (status epilepticus), febrile seizures, and neonatal seizures are excluded.

Definition, Assessment, and Diagnosis

Definition

- Unprovoked seizure: seizure or seizure clusters occurring within 24 hours in a child >1 month of age, occurring in the absence of precipitating factor
- Acute symptomatic seizures (reactive seizures, provoked seizures, and situation-related seizures): seizures or seizure clusters associated with acute brain insult which may be due to

- infectious, toxic, metabolic, or traumatic cause
- Epileptic seizure refers to the transient alteration of behavior due to abnormally excessive neuronal discharges in the brain.
- Epilepsy is a neurologic disorder characterized by enduring risk of having epileptic seizures with its associated neurobiological, cognitive, psychological, and social consequences.
- International League against Epilepsy (ILAE) task force new operational definition of epilepsy is a disease of the brain defined by any of the following conditions:
 - At least 2 unprovoked (or reflex) seizures occurring on 2 separate occasions
 - Presence of 1 unprovoked (or reflex) seizure and recurrence risk of $\geq 60\%$ which is the same recurrence risk following 2 unprovoked seizures
 - Diagnosis of an epilepsy syndrome.
- Seizure semiology refers to the signs and symptoms of seizure.
- Focal (partial) seizures originate from an epileptic network limited in one hemisphere which may either be discretely localized or more widespread.
- Generalized epileptic seizures originate within a bilaterally distributed and rapidly engaging epileptic network.
- Epilepsy syndrome consists of combination of signs and symptoms that characterize an epileptic disorder and the diagnosis is based on clinical features including age of onset, seizure types and EEG findings.
- Etiology of epilepsy: the cause of epilepsy
 - Structural/metabolic etiology (symptomatic etiology): due to a structural or metabolic condition of the brain that has been associated with predisposition of developing epilepsy
 - Genetic etiology (idiopathic, epilepsy): due to an underlying genetic defect(s)
 - Unknown etiology (cryptogenic etiology): due to causes not yet known

Assessment

- Immediate stabilization of the child
 - Airway
 - Breathing
 - Circulation
 - Stopping of the active seizure (see Section III, Treatment, below)
- Patient history and assessment of riskfactors
 - Age
 - Was it a seizure? Actual detailed description and sequence of the event should be noted.
 - Seizure semiology
 - Sleep state
 - Duration of seizure and presence of multiple seizures in 24 hours
 - Family history of epilepsy
 - Presence of precipitating factors like fever, trauma, and electrolyte imbalance; if present, seizure is probably provoked
 - Birth and perinatal history (e.g., history of prematurity, perinatal insult)
 - Developmental history (presence of developmental delay and/or regression)
 - Past medical history (e.g., history of meningitis, encephalitis, and remote symptomatic brain injury such as head trauma)
 - Current medications and history of toxic ingestion
- Physical and neurological examination
 - Presence of dysmorphic features and neurocutaneous stigmata
 - Inability to return to baseline and presence of prolonged focal neurologic deficit (Todd's paralysis) may warrant neuroimaging and stat electroencephalography (EEG).

Differential Diagnosis

- Breath-holding spells
- Syncope
- Gastro-esophageal reflux
- Transient ischemic attacks
- Sleep disorders
- Panic attacks
- Complicated migraines
- Movement disorders
- Psychogenic seizures

Management: Diagnostic Tests

- Brain magnetic resonance imaging (MRI) is the imaging of choice in the following cases:
 - Infants and children without features characteristic of idiopathic focal or generalized epilepsy
 - Presence of focal seizures, focal neurologic deficits, neurocutaneous stigmata, clinically significant developmental delay, or regression
 - For any child <2 years old with seizures
 - If stroke is a concern
- Head computed tomography (CT): the preferred method in urgent cases, if seizure could be related to hydrocephalus, trauma, or intracranial bleeding and if MRI is unavailable.
- Emergent neuroimaging should be performed in a child of any age with prolonged postictal neurologic deficits, or who has not returned to baseline mental state several hours after a seizure; non-urgent neuroimaging study could be deferred to the next several days or later.
- Electroencephalography (EEG) with sleep deprivation is recommended to increase the sensitivity; urgent EEG should be done if the patient has not returned to his baseline or if subclinical seizure is suspected.
- Serum electrolytes and glucose should be considered on individual basis.
- Toxicology screen should be considered if there is any question of drug exposure or substance abuse.
- EKG should be considered.
- Lumbar puncture should be considered
 - In infants <6 months of age
 - For any child with persistent (or unknown) alteration of mental status
 - Failure to return to baseline
 - In any child with meningeal signs
 - NOTE: If there are any signs of increased intracranial pressure, neuroimaging should be done before lumbar puncture.

Treatment

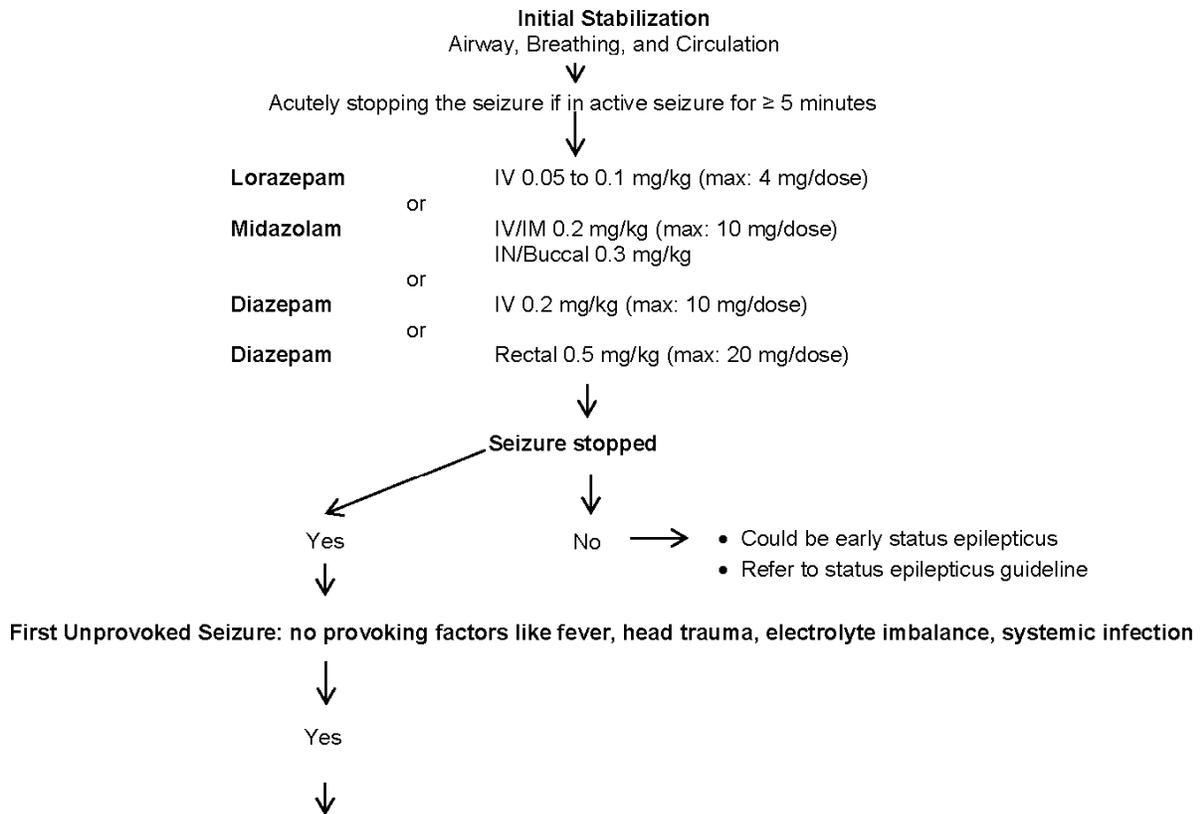
- Benzodiazepines
 - First line agent to stop acutely ongoing seizure
- Lorazepam
 - IV 0.05 to 0.1 mg/kg (max: 4 mg/dose)
- Midazolam
 - IV/IM 0.2 mg/kg (max: 10 mg/dose)
 - IN/Buccal 0.3 mg/kg
- Diazepam

- IV 0.2 mg/kg (max: 10 mg/dose)
- Rectal 0.5 mg/kg (max: 20 mg/dose)
- Treatment after first seizure reduces the risk of subsequent seizures in the short term but the prognosis for the development of epilepsy is not altered.
 - In general, treatment is not recommended, as half of patients will not have seizure recurrence.
 - Treatment may be considered in situations where the benefits of decreasing seizure recurrence outweigh antiepileptic drugs side effects.

Algorithm in the Management of First Unprovoked Seizure in Children

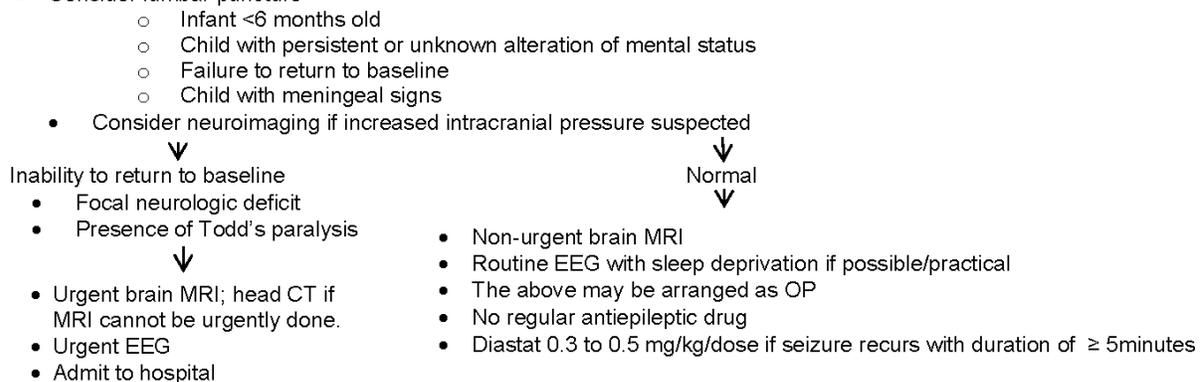
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Risk Assessment and Patient History

- Age; semiology; focal features: automatisms (purposeless repetitive movements such as picking at clothing and lip smacking); eye or head turning; unilateral jerking
- Seizure during sleep or awake; duration, presence of multiple seizures in 24 hours
- Presence of perinatal insult, developmental delay, and (+) family history
- Past medical history and current medications
- Physical and neurological exams
- Routine blood lab tests and EKG based on individual basis
- Toxic screen if question of drug exposure or substance abuse
- Consider lumbar puncture
 - Infant <6 months old
 - Child with persistent or unknown alteration of mental status
 - Failure to return to baseline
 - Child with meningeal signs



This guideline was developed to improve health care access in Arkansas and to aid health care providers in making decisions about appropriate patient care. The needs of the individual patient, resources available, and limitations unique to the institution or type of practice may warrant variations.

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