### Outcomes/Goals

1. Rapid identification and treatment of pediatric patients with seizure activity lasting longer than 5 minutes or repetitive seizures without resumption of neurological baseline.
2. Create a team-oriented approach to efficient and timely treatment of status epilepticus.
3. **Cessation of seizure activity**

### NURSE documentation

- Onset of seizure
- Fever history
- Recent injury or illnesses
- History of seizure activity

### INTERVENTIONS

**Initiate on arrival**

- ESI Triage level II
- Ensure ventilation / provide supplemental oxygen
- Establish IV / IO access
- POC glucose
- Cardiac / SaO2 monitoring

### DIAGNOSTICS

- Bedside CBG

### PHYSICIAN (LIP)

**Fluids (if indicated)**

- Normal Saline bolus 20 ml/kg

**Medication**

**Initial Treatment (first 5 minutes)**

- D10W 5ml/kg for CBG <50 (<3 months)
- D25 2ml/kg IV push for children

**Lorazepam** 0.05-0.1 mg/kg slow IV push, repeat q 10 minutes for continued seizure activity

See page 2 for full management in Early Status and alternatives if no IV/IO access

<table>
<thead>
<tr>
<th>2nd Line Treatment (7 minutes)</th>
<th>≥2 years of age</th>
<th>≤2 years of age</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fosphenytoin</strong> 20 mg/kg IV infuse over 10 minutes</td>
<td>Complex febrile seizures or allergy to fosphenytoin consider:</td>
<td><strong>Phenobarbital</strong> 20 mg/kg IV (max 800 mg) &gt;20 minutes</td>
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<tr>
<td><strong>Continued Benzodiazepines</strong> - monitor respiratory status carefully</td>
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<tr>
<th>3rd Line Treatment</th>
<th><strong>Phenobarbital</strong> 20 mg/kg IV - if fosphenytoin as 2nd line treatment (max single dose 800 mg)</th>
<th><strong>Fosphenytoin</strong> 20 mg/kg IV - if given phenobarbital as 2nd line treatment</th>
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<tbody>
<tr>
<td><strong>Levetiracetam</strong> (keppra) 20 mg/kg IV</td>
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<tr>
<td><strong>Valproic acid</strong> 20 mg/kg IV</td>
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<tr>
<td><strong>Continue Benzodiazepines</strong></td>
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<tr>
<th>4th Line Treatment Refractory Status</th>
<th><strong>General Anesthesia / Intubation</strong></th>
<th><strong>Midazolam infusion</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1 mg/kg bolus followed by 0.1 mg/kg/hr gtt up to 0.4 mg/kg/hr</td>
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<tr>
<td><strong>Pentobarbital</strong></td>
<td>10 mg/kg load over 30 minutes followed by 1 mg/kg/hr infusion (max 3 mg/kg/hr)</td>
<td></td>
</tr>
</tbody>
</table>

### ADMISSION

- Call PICU attending / consult neurology
- Call primary care physician
- Prepare family/infant for admission to PICU or Intermediate Unit

**Status refers to a single, prolonged convulsive seizure lasting >5 minutes or repetitive seizures without resumption of neurological baseline.**

**Clinical Pathway**

**Pediatric Prolonged Seizure**

January 2012

**≥2 years of age**

- Fosphenytoin 20 mg/kg IV infuse over 10 minutes

**≤ 2 years of age**

- Complex febrile seizures or allergy to fosphenytoin consider:
  - Phenobarbital 20 mg/kg IV (max 800 mg) >20 minutes
**Clinical Pathway Decision Making Process**

**Pediatric Prolonged Seizure**

**January 2012**

**Establish IV/IO**
- Provide adequate ventilation/provide supplemental oxygen
- SaO2/cardiac monitoring

**Concurrent Treatment/Diagnosis**
- Consider the following:
  - Head CT, lumbar puncture, chest xray
  - Isotonic saline infusion 20mg/kg
  - Dextrose (D10 or D25)
  - Consult Neurology and/or PICU

**INITIAL TREATMENT**

**5 MINUTES**

**Initial Benzodiazepine (IV/IO access)**
- **Lorazepam** 0.05-0.1 mg/kg slow IV push
- Repeat dose in 3-5 minutes x 3 if continued seizure activity

No IV/IO access
- **Midazolam** 0.4 mg/kg IM or Intranasal
- **Diastat** PR (max single dose 20 mg)
  - 2-5 years: 0.5 mg/kg
  - 6-11 years: 0.3 mg/kg
  - ≥12 years: 0.2 mg/kg

**2nd LINE TREATMENT**

**7 MINUTES**

Successful IV/IO placement **≥2 years of age**
- **Fosphenytoin** 20 mg/kg IV over 10 minutes (do not exceed 150 mg/min)
  - Continued seizure activity give additional 5 mg/kg fosphenytoin >5 minutes

Successful IV/IO placement **< 2 years of age**
- Complex febrile seizures or allergy to fosphenytoin consider:
  - **Phenobarbital** 20 mg/kg IV (max dose 800 mg) >20 minutes

**3rd LINE TREATMENT**

**After infusion of 2nd line of treatment**

**Phenobarbital** 20 mg/kg IV - if fosphenytoin as 2nd line treatment
  - (max single dose 800 mg)

**Fosphenytoin** 20 mg/kg IV - if given phenobarbital as 2nd line treatment

**Levetiracetam** (keppra) 20 mg/kg IV

**Valproic acid** 20 mg/kg IV

**Continue Benzodiazepines**

**Infuse all IV medications over 20 minutes**

**4th LINE TREATMENT**

**Refractory Status**

**Midazolam infusion**
- 0.1 mg/kg bolus followed by 0.1 mg/kg/min gtt up to 0.4 mg/kg/hr

**Pentobarbital**
- 10 mg/kg load over 30 minutes followed by 1 mg/kg/hr infusion (max 3 mg/kg/hr)

**Intubation**

**Continuous infusions/general anesthesia**
Prolonged Pediatric Seizure

Goals of Clinical Pathway

1. Rapid identification and treatment of pediatric patients with seizure activity lasting longer than 5 minutes or repetitive seizures without resumption of neurological baseline
2. Create a team-oriented approach to efficient and timely treatment of status epilepticus.
3. Cessation of seizure activity

Etiologic classifications of status epilepticus

Most studies of SE epidemiology and outcome have used the following classification of episodes:

- **Acute symptomatic** (26%) - Episodes caused by an acute infection, head trauma, hypoxemia, electrolyte disturbance, hypoglycemia, intoxication or drug withdrawal
- **Progressive encephalopathy** (3%) – SE occurring with an underlying progressive CNS disorder, such as mitochondrial disorder, Rasmussen encephalitis, CNS lipid storage diseases, aminoacidopathies, or organic acidopathies
- **Remote symptomatic** SE (33%) - Episodes secondary to static conditions (eg, remote cerebral insult in the perinatal period)
- **Remote symptomatic with an acute precipitant** (1%) – SE in a patient with a chronic encephalopathy but precipitated by an acute event such as those in acute symptomatic SE
- **Febrile** (22%) – SE for which the only provocation is a febrile illness, after excluding a direct CNS infection
- **Cryptogenic** (15%) – SE without identifiable cause

Refractory Status and Levetiracetam

Refractory Seizures has a mortality rate that ranges from 32-77% and is compounded by other co morbid conditions and multiple organ dysfunctions. RSE may cause irreversible brain injury.

Levetiracetam, owing to minimal drug interactions, can be used to control refractory status epilepticus effectively.

Although there are no randomized controlled studies available, clinicians used this drug as soon as it was available on the market on an off-label basis [Trinka, 2007b; Shorvon et al. 2007b].

156 patients who were treated with IV LEV for various forms of SE have been reported with an overall success rate of 65.4%. Trinka and Dobesberger 2007.


Why Propofol isn’t used in Status Epilepticus

The development of propofol infusion syndrome, an irreversible chain of events associated with significant morbidity and mortality, is a concern. Propofol infusion syndrome was first described in 1992 by Parke et al. Since then, numerous case reports and reviews have been published.

Reports of severe acidosis and movement disorder after propofol use in infants have caused a significant decrease in its use within that age group.

Metabolic acidosis may be a complication related to prolonged use of propofol, explaining the rarity of this complication in short surgical anesthesia. In contrast, metabolic acidosis in children with prolonged propofol use for sedation and treatment of SE has been reported. Also worrisome is the association of propofol-related metabolic acidosis in patients receiving the ketogenic diet (Ramachandranmair and Corden).

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