Clinical Pathway/Protocol Approval Form

**Status Epilepticus**

**Title**

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I approve the attached version of this Clinical Pathway or Protocol.

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Status Epilepticus: An Evidence-Based Management Guideline

Definitions

**Status epilepticus** – seizures lasting 30 minutes or more. Two or more sequential seizures without full recovery of consciousness to baseline between seizures (3,8)

**Convulsive Status Epilepticus** - generalized tonic or tonic-clonic seizures lasting ≥ 30 minutes. (3)

**Minimally convulsive Status Epilepticus** – persistent convulsive status epilepticus characterized only by minimal clinical signs such as rhythmic eye fluttering or asymmetrical tone. This condition is also referred to as “subtle status epilepticus” (5)

**Non-convulsive Status Epilepticus** – persistent electrographic status epilepticus without any clinical manifestations. This definition encompasses both generalized processes, such as absence non-convulsive status epilepticus, as well as lateralized or focal non-convulsive status epilepticus (2,5).

**Refractory status epilepticus** - Status epilepticus which has persisted despite administration of a first line agent (Lorazepam 0.1 mg/kg) and a second line agent (Fosphenytoin 30 mgPE/kg or Phenobarbital 20 mg/kg). (1,10)

Epidemiology

Generalized convulsive status epilepticus is the most common neurological emergency seen in childhood (7). It is also among the top five reasons for admission to the PICU at Texas Children’s Hospital and is the second most common reason for transport calls. Status epilepticus is a medical emergency and is associated with an overall mortality rate of 8% in children and 30% in adults (3,7). Among children, the overall incidence of status epilepticus is approximately 1 to 6 per 10,000 per year (3,7,8). The incidence appears to be higher in children under one year of age with over 50% of cases occurring in children under 3 years. Status epilepticus represents the first seizure of subsequent epilepsy in approximately one-third of patients (3). In another third it is seen in patients with known epilepsy, often associated with low anticonvulsant levels (4) (although sub-therapeutic drug levels may not have been the cause of status epilepticus in these children). The most common etiologic classification of status epilepticus in children is remote symptomatic (prior history of a CNS insult with an acute provoking event), representing 33% of the total cases (8). Acute symptomatic (acute provoking event without remote injury) constitutes 26% of cases with febrile status epilepticus (a special case of acute symptomatic) making up 22% of cases. Less common etiologies are cryptogenic (15% of total; no acute or chronic factors detectable), progressive encephalopathy (3%), and remote symptomatic with an acute precipitant (1%).

In a study of new-onset seizures in children, 76% lasted a mean duration of 3.6 minutes while the remaining 24% had a mean duration of 31 minutes (9). Clearly the longer that a seizure continues, the lower the probability becomes that it will stop without intervention. In clinical practice, once a seizure has lasted longer than 5 minutes, an intervention is warranted – either rectal diazepam given at home or intravenous Lorazepam as described below. As a practical matter, all seizures should be treated as
status epilepticus until they stop. The duration-based definitions given above are more useful for research purposes than for clinical decision-making.

**Inclusion criteria**
- Patients with convulsive status epilepticus
  - First seizures and known seizure disorders
- Ages 1 month – 18 years

**Exclusion criteria**
- Refractory status epilepticus
- Strong clinical suspicion of meningitis/encephalitis or other serious infection (rashes)
- Suspicion of head trauma
- History of head trauma within the past 24 hours or a strong clinical suspicion of such trauma.
- Non-convulsive status epilepticus
- Seizure recurrence within 12 hours of the cessation of status epilepticus.

**References:**

**Initial Management of Status Epilepticus**

- **Lorazepam 0.1 mg/kg IV**
  - (Max dose = 2 mg/dose)
  - Seizures continue for 5 minutes
  - Seizures stop!

- **Assess Airway Competency**

- **Fosphenytoin 20 mgPE/kg IV**
  - (Max dose = 1 gram total)
  - (Max rate = 150 mgPE/minute)
  - Seizures continue for 5 minutes after full dose given.

- **Assess Airway Competency**

- **Obtain Phenytoin peak level 30 minutes after last infusion**

- **Lorazepam 0.1 mg/kg IV**
  - Fosphenytoin 20 mgPE/kg IV
  - Seizures continue for 5 minutes after full dose given

- **Obtain Phenytoin peak level 4 hours after infusion**

- **Fosphenytoin 10 mgPE/kg IV**
  - Seizures continue for 5 minutes after full dose given

- **Consider Airway Securement**

- **Phenobarbital 20 mg/kg IV**
  - (Max dose 600 mg)
  - (Max rate = 50 mg/minute)
  - Seizures continue for 10 minutes

- **Prepare for intubation**

- **Call Neurology for additional recommendations**

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**A** Fosphenytoin should be dosed in Phenytoin Equivalents (PE) which converts Fosphenytoin dosage into an equivalent number of milligrams of Phenytoin. (50 mg Fosphenytoin = 50 mg Phenytoin Equivalents) The maximal rate of administration of Fosphenytoin is 150 mgPE/minute. If at all possible, intravenous Phenytoin should not be used - given the high likelihood of morbidity (extravasation and hemodynamic complications) It is common for patients to experience flushing and pruritis with Fosphenytoin administration. This is due to the phosphate group being cleaved off and is not an allergic reaction to the medicine. In patients with a documented allergy to Phenytoin, Phenobarbital 20 mg/kg should be used after Lorazepam. If a patient with a documented allergy to Phenytoin stops seizing after one dose of Lorazepam, contact neurology for recommendations for additional medications.

**B** For patients already on prescription Phenytoin (Dilantin), a stat Phenytoin (Dilantin) level should be ordered and Phenobarbital should be given after Lorazepam (instead of Fosphenytoin).

**C** The peak efficacy of Phenobarbital is approximately 30-60 minutes after administration. It should be administered at a rate equal to or less than 50 mg per minute.
Decision Tree for Work-up of Status Epilepticus Patients

Known seizure disorder

- Febrile
  - All Patients
    - Check AED levels
    - Neurology consult
    - Electrolytes
    - Glucose d-stix
    - Tracheal aspirate
  - Consider
    - CBC, diff
    - Cultures (blood, viral)
    - Brain CT
    - Lumbar puncture
    - EEG
    - Chem 10
  - Not recommended
    - MRI

- Afebrile
  - All Patients
    - Check AED levels
    - Neurology consult
    - Electrolytes
    - Glucose d-stix
  - Consider
    - Tox screen
    - EEG
    - Brain CT in infants < 1 year
  - Not recommended
    - Head imaging

First seizure

- Febrile
  - All Patients
    - Brain CT
    - Lumbar puncture
    - Extra CSF
    - CBC, Diff
    - Glucose d-stix
    - Chem 10
    - CXR
    - Tracheal aspirate
    - U/A, culture
    - Blood culture
    - Viral cultures
    - Neurology consult
  - Consider
    - CBC, Diff
    - EKG
    - EEG
    - Inborn error of metabolism work-up
  - Not recommended
    - MRI

- Afebrile
  - All Patients
    - Brain CT
    - Chem 10
    - Glucose d-stix
    - Tracheal aspirate
    - Neurology consult
  - Not recommended
    - MRI

* Only if patient is intubated.

1. All patients who receive Phenobarbital in the Status Epilepticus Management Algorithm should have a stat EEG to rule out sub-clinical
status epilepticus. All patients who remain obtunded and/or do not
demonstrate signs of awakening appropriately after medications should
receive a stat EEG to rule out sub-clinical status epilepticus.

2. Neurology consult may wait until normal office hours unless the patient
has signs of a new focal neurological deficit. Neurology should be called
immediately for patients with new focal neurological deficits.

3. A brain CT is recommended before performing a lumbar puncture.

4. An extra tube of CSF should be saved in the lab for additional neurologic
and viral studies.

5. If lumbar puncture results are concerning for infection, the patient should
be excluded from this guideline. Additional recommended studies may
include:
   - CSF viral culture
   - CSF PCR for HSV, Enterovirus, Adenovirus
   - Nasal wash/throat swab for viral culture and rapid Adenovirus screen
   - Nasal wash for Influenza A & B during appropriate season
   - Stool/rectal swab for viral culture and rapid Adenovirus screen
   - Arbovirus studies during summer

6. In infants < 1 year, consider inflicted neurotrauma and obtain a head CT
as appropriate.