Seizure v3.1: Emergency Department

**Inclusion Criteria**
- ≥ 1 month corrected age with epileptic seizure

**Exclusion Criteria**
- Non-epileptic events (pseudoseizures)

- Determine how long patient has been seizing
- Determine which medicines have been given for this episode of status epilepticus (i.e., ambulance, outside hospital, particularly benzodiazepines and fosphenytoin) and skip to appropriate step below
- Determine medication history: look for Seizure Care Plan, medication list or note in CIS
- Consider preregistering the patient to order 2nd line drugs

**1st Line: Benzo**

**Minute 3**

**Dose 1:** Give 3 min after seizure onset

**Minute 8**

**Dose 2:** Give 5 min after dose 1 if seizure continues

**Seizure continues for 5 minutes after 1st benzo: give 2nd dose of 1st line benzodiazepine**

**1st Line Benzodiazepine**

- **Dose 1:** Lorazepam 0.1 mg/kg max 4mg/dose administered IV 2mg/min
- **No IV access:** Midazolam 0.2mg/kg max 10mg/dose, ½ dose in each nostril
- **Request both 2nd Line drug doses**

**2nd Line: Options**

**Minute 13**

**Dose 1:** Give 5 min after 2nd benzo if seizure continues

**Minute 28**

**Dose 2:** Give 5 min after 1st dose infuses if seizure continues

**2nd Line Drug Treatment**

- For unexplained status epilepticus or new focal seizure, consider neuroimaging
- Consider EEG

**3rd Line**

**Minute 48**

Start midazolam drip 10 min after 2nd dose of 2nd line AED

**Infusion Rate**

- Phenobarbital: 1 mg/kg/min
- Fosphenytoin, lacosamide, levetiracetam, valproic acid: over 10 min

**Admit Criteria**

- Unstable cardiorespiratory or neurologic status (not returning to baseline, very somnolent)
- Underlying infection requiring inpatient stay
- Disabling parental anxiety
- Lack of safe home or safe transport to home

**For questions concerning this pathway, contact: SeizurePathway@seattlechildrens.org**

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Last Updated: August 2017
Next Expected Review: May 2022
Seizure v3.1: Acute Care

**Exclusion Criteria**
- Non-epileptic events (pseudoseizures)

**Inclusion Criteria**
- ≥ 1 month corrected age OR < 1 month after cardiac surgery or ECMO
- Patient admitted with history of epileptic seizures and risk of recurrence

**Definitions**
- Status Epilepticus: Motor seizure or typical seizure longer than 5 minutes, or two or more seizures within 5 minutes without return of consciousness between seizures
- Established status epilepticus (ESE): Seizure continues after benzodiazepine administration
- Refractory status epilepticus (RSE): Seizures continue after 1st and 2nd line therapy

**General Measures**
- Cardiorespiratory monitoring, blood pressure q 5 minutes
- Consider IV access
- Make NPO/hold feeds while seizing
- Document seizure start time
- Notify Contact Provider

**Drug Treatment**
- Prepare both doses of 1st Line drug, a benzodiazepine
- Call for 2nd person for assistance

**Investigations**
- Confirm that event is an epileptic seizure
- Assess risk of infection (if fever, see also Febrile Seizure Pathway)
- Review seizure medications given in the past 24 hours

**Hypothermia**
- For questions concerning this pathway, contact: SeizurePathway@seattlechildrens.org

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Last Updated: August 2017
Next Expected Review: May 2022
Seizure v3.1: Critical Care

Approval & Citation

Summary of Version Changes

Explanation of Evidence Ratings

On Admit
From PICU/CICU Seizure Plan, order 1st Line and 2nd Line medications based on guidance in this pathway, then confirm with Neurology. If patient has established epilepsy, see Seizure Care Plan in CIS.

Initial seizure

0 min
Seizure

- Prepare 1st Line medication
- Secure IV access
- Support airway, breathing (O2), circulation

Seizure continues

3 to 5 min
1st Line

- Dose 1: Lorazepam IV
  - If no IV access: midazolam IM or IN
  - If GRID/epilepsy monitoring: midazolam IV
  - Request both 2nd Line drug doses
- Dose 2: Repeat benzodiazepine in 5 min if seizure continues
- Diagnostic tests
- Consult neurology

Seizure continues

No History Epilepsy

Age < 2 months old
- Dose 1: Phenobarbital IV
- Dose 2: Phenobarbital IV (total 30mg/kg maximum)

Age ≥ 2 months old
- Dose 1: Fosphenytoin IV
- Dose 2: Phenobarbital IV

Age < 2 months old
- Dose 1: Phenobarbital IV
- Dose 2: Phenobarbital IV (total 30mg/kg maximum)

Age ≥ 2 years and no metabolic disease
- Dose 1: Valproic acid IV
- Dose 2: Fosphenytoin IV

Established Epilepsy Options
On baseline antiepileptic drug
- IV bolus with antiepileptic drug the patient is already on, or...

Age < 2 years or unknown metabolic disease
- Dose 1: Fosphenytoin IV
- Dose 2: Phenobarbital IV

Age ≥ 2 years and no metabolic disease
- Dose 1: Valproic acid IV
- Dose 2: Fosphenytoin IV

- At Dose 2: Order 3rd line medication and stat EEG from PICU/CICU Seizure Plan

Seizure continues

3rd Line

- Midazolam bolus and continuous infusion x 24 hours, see titration guide
- Continuous EEG monitoring
- Titrate baseline epilepsy medication
- Repeat AED levels (orders in PICU/CICU Seizure Plan)
- If persistent focal or clinical seizure on exam, consider diagnostic tests

Seizure continues

Consider ketogenic diet
- If new onset epilepsy, first workup for inborn error of metabolism
- Keep patient NPO
- RN follow GOC: Immobilized or Limited Mobility (for SCH only)

Seizure continues

4th Line

- Consider transition to pentobarbital, ketamine, or propofol from PICU/CICU Seizure Plan
- Optimize adjunctive antiepileptic medications
- Consider additional oral or IV medication (IVIG, steroids) or treatment (therapeutic hypothermia)

Go to Acute Care

Go to Emergency Department

Inclusion Criteria
- ≥1 month corrected age OR
- <1 month after cardiac surgery or ECMO
- Patient admitted with history of epileptic seizures and risk of recurrence

Exclusion Criteria
- Non-epileptic events (pseudoseizures)

Definitions
Status Epilepticus: Motor seizure or typical seizure longer than 5 minutes, or two or more seizures without return of consciousness between seizures
Established status epilepticus (ESE): Seizures continue after benzodiazepine administration
Refractory status epilepticus (RSE): Seizures continue after 1st and 2nd line therapy

Hypotension/Myocardial Dysfunction
- Dose 1: Levetiracetam IV
- Dose 2: Levetiracetam IV

Infusion Rate
Phenobarbital: 1 mg/kg/min Fosphenytoin, lacosamide, levetiracetam, valproic acid: over 10 min

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Last Updated: August 2017
Next Expected Review: May 2022
What are the most current definitions of status epilepticus and refractory status epilepticus?

- Generalized seizure activity >5 minutes is defined as status epilepticus and requires pharmacotherapy.
  - Sustained electrographic seizure activity > 5 minutes meets the definition of status epilepticus.
- In certain clinical situations (i.e. focal seizures or absence seizures), consider >10 minutes of focal clinical seizure activity to meet definitions of status epilepticus requiring pharmacotherapy.
- Ongoing clinical seizure activity after treatment with first and second line anticonvulsant agents constitutes refractory status epilepticus and requires escalation in care.

What are the most current definitions of status epilepticus and refractory status epilepticus?

- Based on the 2016 International League Against Epilepsy (ILAE) scheme, seizures are classified as focal, generalized, or unknown onset. Seizures are then subclassified as motor and nonmotor, and then further subclassified as having awareness, impaired awareness, or unknown awareness [LOE: guideline (Fisher 2016)].
- Status epilepticus (SE) is defined as convulsive, focal, or absence. Convulsive SE includes >5 minutes of ongoing generalized clinical seizure activity, recurrent seizure without recovery to clinical baseline, or electrographic seizure activity (Falco-Walter 2016; Brophy 2012; Trinka 2015).
- Focal SE with impaired consciousness is >10 minutes, and absence SE is >10-15 minutes (Falco-Walter 2016; Trinka 2015).
- Established SE is persistence beyond treatment with a benzodiazepine (Falco-Walter 2016). Refractory SE is defined as ongoing seizures after treatment with appropriate doses of first (benzodiazepine) and second line AEDs (Falco-Walter 2016; Brophy 2012.)
Acute Status Epilepticus: Diagnostic Tests

**Labs**
- STAT glucose
- Full electrolytes (with Ca, Mg, Phos)
- Liver and kidney function (LFTs, BUN, Cre)
- Antiepileptic drug (AED) levels

**History**
- Check CIS Care Plan/Care Coordination for individualized Seizure Plan
- Check med rec for AEDs to inform 2nd agent choice

**Imaging**
- Consider CT (HASTE MRI in some cases) if emergent imaging indicated (e.g.: new focal seizure, asymmetric EEG)

**Infectious workup**
- Consider an LP in patients with seizure and fever at high risk of CNS infection
- Do not delay antimicrobials for infectious workup

Toxicology Testing

- Consider toxicology testing in children with prolonged seizure/SE, when no apparent etiology is immediately identified, as the frequency of ingestion as a diagnosis was at least 3.6%. To detect a specific ingestion, suspected because of the clinical history, it should be noted that a specific serum toxicology level is required, rather than simply urine toxicology screening. [☆☆☆☆☆ Very low quality] (Rivielo, 2006)

Assess Risk of Meningitis or Intracranial Infection

- Perform a lumbar puncture in any child with seizure and a fever who is felt to be at SIGNIFICANT RISK for meningitis/intracranial infection. Specific aspects of the history or exam that might suggest meningitis or intracranial infection are outlined in the table below:

<table>
<thead>
<tr>
<th>History</th>
<th>Physical Signs</th>
<th>Complex Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt;3 days duration of illness</td>
<td>Photophobia</td>
<td>Focal seizures</td>
</tr>
<tr>
<td>Seen by primary MD in previous 24 hours</td>
<td>Questionable neck rigidity</td>
<td>Seizure duration &gt;15 minutes</td>
</tr>
<tr>
<td>Drowsiness or vomiting at home</td>
<td>Drowsiness</td>
<td>Multiple seizures in 24 hours</td>
</tr>
<tr>
<td>Infant 6-12 months old; deficit in Hb or pneumococcal vaccine or immunization status cannot be determined</td>
<td>Convulsions on examination</td>
<td>Meningitis Less Likely</td>
</tr>
<tr>
<td>Preferred with antibiotics</td>
<td>Weakness or neurological deficit on examination</td>
<td>Prior febrile seizure</td>
</tr>
</tbody>
</table>


More detail on this subject can be found in the Febrile Seizure Pathway.
Benzodiazepines (1st line: 2 doses)

Default benzodiazepine:

- Lorazepam 0.1 mg/kg (max 4mg/dose) IV if seizure lasts >3 minutes (> 5 minutes for partial seizure), repeat dose in 5 minutes if seizure continues

No IV Access

- Midazolam 0.2 mg/kg (max 10mg/dose) nasally, ½ dose in each nostril if seizure lasts >3 minutes (> 5 minutes for partial seizure), repeat dose in 5 minutes if seizure continues
- If no nares available: Midazolam 0.5 mg/kg (max 10mg/dose) buccally if seizure lasts >3 minutes (> 5 minutes for partial seizure), repeat dose in 10 minutes* if seizure continues

For patients in the Epilepsy Monitoring Unit or in hospital for GRID/Strip Monitoring

- Midazolam 0.1 mg/kg (max 5mg/dose) IV if seizure lasts >3 minutes, repeat dose in 5 minutes if seizure continues

*Rationale for every 10 minutes is that medication is not aerosolized so absorption may be slower (expert opinion)

Benzodiazepines (1st line: 2 doses)

- Administer a maximum of two doses of first-line treatment (including pre-hospital treatment). More than two doses is associated with respiratory depression and subsequent doses are unlikely to be effective [Guideline (Friedman 2011)]
- Administer intranasal OR buccal midazolam if unable to secure immediate IV access.

Time from arrival at a facility to seizure cessation may be shorter for non-IV compared to IV benzodiazepines by 2-3 minutes [☆☆☆☆☆ Very low to ★★★☆☆ Moderate quality (Brigo 2015c, Ayra 2015)]

Buccal midazolam appears to be more effective at stopping the seizure at 10-20 minutes than rectal diazepam [☆☆☆☆☆ Moderate quality (Brigo 2015a, Brigo 2015c); no other differences in efficacy at 10-20 minutes by route of administration were found [☆☆☆☆☆ Low to ★★★☆☆ Moderate quality (Brigo 2015b, Brigo 2015c, Haut 2016)]

Meta-analyses conflict on whether there are differences in efficacy by choice of benzodiazepine. [☆☆☆☆☆ Very low to ★★★☆☆ Low quality (Brigo 2015b, Brigo 2015c, Haut 2016, Zhao 2016)]
Consider 2nd Line IV bolus with drug patient is already on

**Option 1**
- Levetiracetam
  - Dose 1: levetiracetam 40 mg/kg (max 3,000 mg)
  - Dose 2: fosphenytoin 20 PE/kg IV 20 mg/kg

**Option 2**
- Valproic acid
  - Dose 1: valproic acid 20 mg/kg
  - Dose 2: fosphenytoin 20 mg/kg

**Option 3**
- Lamotrigine
  - Dose 1: lamotrigine 10 mg/kg
  - Dose 2: fosphenytoin 20 mg/kg

**Option 4**
- Fosphenytoin
  - Dose 1: fosphenytoin 20 mg/kg
  - Dose 2: PHENOBARBITAL 10 mg/kg

**Option 5**
- PHENOBARBITAL
  - Dose 1: PHENOBARBITAL 10 mg/kg
  - Dose 2: PHENOBARBITAL 10 mg/kg

---

### 2nd line medications

- Fosphenytoin (PHT), phenobarbital (PB), valproate (VPA), and levetiracetam (LEV) can all be considered 2nd line treatment of status epilepticus (SE).

  None has demonstrated superiority as a second line anticonvulsant. Fosphenytoin has been favored not because of proven superiority, but because of familiarity and long half life (Falco-Walter 2016). Guidelines differ in their recommendations: some continue to recommend IV PB or IV PHT [Guideline (NICE 2016)] but others are ambivalent about choice of second line agent and include IV VPA or LEV as potential treatment options [Guideline (Brophy 2016, Brigo 2016, Capovilla 2013, Glauze 2016, Melnick 2014, Huff 2014)].

  Efficacy of PHT 15-20 mg/kg (50.5%) may be even less than that of PB (vs 73.6%), VPA 20-40 mg/kg (75.7%), and LEV 20 mg/kg max 4 g (44-72%) in various studies (Sasir 2014, Falco-Walter 2016, Zelano 2012).

  Retrospective cohort studies including children as young as 2 years of age found VPA to be effective compared to alternative 2nd line agents across all seizure subtypes, with a low rate of respiratory and cardiovascular side effects [Very low (Trinka 2015)].

---

### 2nd line medications

- For children already on an antiepileptic drug, consider a bolus dose of the antiepileptic drug the patient is already on prior to initiating an additional agent [Guideline (Brophy 2012)]

- Use valproic acid (VPA) or levetiracetam (LEV) 2nd line for patients in whom the side effects of phenytoin (PHT) or phenobarbital (PB) are unacceptable

  VPA, PHT, or LEV were no different in clinical seizure cessation when used as a second line treatment [Moderate quality (Brigo 2016)]

  VPA caused a significantly lower rate of adverse effects compared to PHT [Low quality (Brigo 2012, Brigo 2013)]

  In patients who could not receive PHT or PB as a 2nd line agent, a systematic review of 9 retrospective single-arm found levetiracetam to be 44-90% effective with no respiratory or hemodynamic side effects (Zelano 2012)

- Do not use valproic acid in patients with POLG-1 mutations who may present with refractory status epilepticus because it may cause fatal hepatitis; avoid valproic acid in patients under age 2 due to the risk of hepatitis.
## Refractory status epilepticus: CEEG and titration of midazolam infusion

### Initiation
- Bolus 0.15 mg/kg midazolam IV
- Initiate midazolam infusion at 0.1 mg/kg/hr
- Q 15 minutes: Bolus 0.15 mg/kg midazolam IV AND increase infusion by 0.1 mg/kg/hr for ongoing seizure (in communication with NEU) until burst suppression is achieved.
- Airway, hemodynamic support as clinically indicated.
- NPO

  ➢ If difficulty achieving burst suppression
    - Consider ketogenic diet preparation (send labs; NS-based IVF) with Neurology
    - By 24 hours: discuss alternatives

### Stable burst suppression
- Minimum 24h
  - Wean for over-suppression
  - Titrate other AEDs

### Weaning
- Wean by 0.1 mg/kg/hr q 4 hours (in communication with NEU)
- Continue EEG until off of IV anesthetic x 24 hours
- Hold wean & notify neurology for any clinical seizure
- If electrographic seizures: consider increase in maintenance AEDs while continuing midazolam wean

## Refractory seizures: 3rd and 4th line medications

- Begin 3rd line treatment after seizure duration of 40 minutes [Guideline (Glauser 2016)] to 45 minutes [Guideline (NICE 2012; Friedman 2011)]
- Use midazolam 3rd line because it may have a slightly better risk/benefit profile [Guideline (Friedman 2011)]
  - Options include repeating 2nd line therapy, or anesthetic doses of thiopental, midazolam, pentobarbital, or propofol [Guideline (Glauser 2016, Brophy 2012, NICE 2012, Capovilla 2013)]
  - Adults using midazolam infusion achieved a high rate of seizure control with the lowest rate of side effects and a low rate of withdrawal seizures compared to thiopental/phenobarbital or propofol (Ferlisi 2012)
- Give midazolam in normal saline solution to allow for possible addition of ketogenic diet
- Titrate anesthetic doses to burst suppression EEG pattern [Guideline (Brophy 2012)]
- If midazolam is ineffective, consider the following options: pentobarbital, ketamine, ketogenic diet, pyridoxine, plasmapheresis or steroids (for refractory status epilepticus caused by an autoimmune process), and therapeutic hypothermia
Criteria for Inpatient Admission

**Admit Criteria**
- Unstable cardiorespiratory or neurologic status (not returning to baseline, very somnolent)
- Underlying infection requiring inpatient stay
- Disabling parental anxiety
- Lack of safe home or safe transportation to home

**ED Patients**

- Children who are clinically unstable neurologically (e.g., not returning to baseline, very somnolent following doses of anti-seizure medications) should be admitted for observation and support. [Expert Opinion (E)] (Fetveit, 2008; Baumer, 2004)
- Children who present with an underlying infection requiring inpatient stay (e.g., severe pneumonia, infection requiring intravenous antibiotics) should be admitted. [Expert Opinion (E)] (BC, 2010)
- Children whose parents have "disabling" anxiety following the seizure episode may require admission for observation and further parental education and reassurance. [Expert Opinion (E)] (BC, 2010; Fetveit, 2008)
- Children that lack a safe home or safe transportation home require admission and may require social work consultation. [Expert Opinion (E)] (Fetveit, 2008)
Ketogenic Diet Preparation

Labs

- Plasma amino acids
- Urine organic acids
- Acylcarnitine profile
- Lactate

Actions

- Consult nutrition (ketogenic dietician)
- Avoid dextrose infusions, medications in dextrose while decision-making

Return to Critical Care
### Titration

(Per CIS orderset)
- **Start**: 2 mg/kg IV bolus + infusion at 50 mcg/kg/min
- **Titrate** q10 minutes to achieve burst suppression: additional 2 mg/kg IV bolus + infusion increase 25 mcg/kg/min

### Contraindications
- Sulfite allergy
- Egg allergy
- Soybean allergy

### Laboratory Monitoring

Consider
- **Serial ABG, lactate, potassium**
- **Daily lipid level**

[Return to Critical Care]
Seizure with lack of return to baseline (30 min)
OR
Ongoing seizure activity 10 minutes > 2\textsuperscript{nd} line, 1\textsuperscript{st} dose AED (30 min)

**STAT EEG**
*Temporary (fast) lead placement
*Immediate bedside read

- Established clinical seizure phenotype?
  - Reliable exam (no paralysis)?
  - Low risk condition?   YES NO

**Clinical monitoring**

**Continuous EEG**
*Long-term (slower) lead placement
*EEG tech monitoring + read q2h/q4h
*Consider imaging/procedures before hookup*

### Indications for continuous EEG (refer to CCEEG P&P)

<table>
<thead>
<tr>
<th>Definite</th>
<th>Process notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ongoing status epilepticus requiring IV anesthetic agent (e.g. midazolam infusion)</td>
<td>- Assess need daily w/ NEU</td>
</tr>
<tr>
<td>Increased ICP requiring IV anesthetic agent titrated to burst suppression (e.g. pentobarbital)</td>
<td>- Reorder q24h</td>
</tr>
<tr>
<td>Any high risk patient (examples below) requiring frequent paralytic</td>
<td>- Ongoing monitoring by EEG tech</td>
</tr>
</tbody>
</table>
| **High risk; consider use** | - Formal review by EEG reader based on priority score:  
  1: q2h  
  2: q4h  
  3: q8h |
| Events of unclear significance (hemodynamic/motor symptoms) | - Concerns? Page NEU resident (will discuss with EEG reader PRN) |
| Encephalopathy, in the setting of CNS injury. Exemplary include: | |
|  - Recent seizure (30 min) | - |
|  - Stroke | - |
|  - Trauma | - |
|  - Sepsis | - |
|  - CNS infection | - |
|  - Structural brain lesion/tumor | - |
|  - Ischemic/hypoxemic injury/cardiac arrest | - |
|  - ECLS | - |
|  - Therapeutic hypothermia | - |
|  - Postoperative neurosurgery | - |
|  - Post cardiac bypass | - |
|  - Liver or renal failure | - |
|  - Toxin/ingestion | - |

**To Continuous EEG p 2**
In children with status epilepticus, how (in which patients and for how long) should continuous EEG (cEEG) monitoring be used?

- Initiate continuous EEG within 60 minutes of seizure onset if ongoing seizures are suspected or the patient has not returned to baseline after administration of seizure medication [يديعوت Low quality (Claasen 2013, Brophy 2012)]
- Initiate cEEG monitoring in patients with unexplained abnormal mental status, or with abnormal mental status in the setting of high-risk clinical setting (including following seizure, acute supratentorial brain injury, and pharmacologic paralysis)
- Continuous EEG is required for the management of status epilepticus [يديعوت Very low quality (Claasen 2013, Brophy 2012)]
- For patients with refractory status epilepticus, continue cEEG for 24-48 hours of electrographic control, and during weaning of 3rd line antiepileptic agents
Seizure Pathway Approval & Citation

Approved by the Clinical Standard Work (CSW) Seizure Pathway team for August 3, 2017

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Retrieval Website: http://www.seattlechildrens.org/pdf/seizure-pathway.pdf

Please cite as:
This pathway was developed through local consensus based on published evidence and expert opinion as part of Clinical Standard Work at Seattle Children’s. Pathway teams include representatives from Medical, Subspecialty, and/or Surgical Services, Nursing, Pharmacy, Clinical Effectiveness, and other services as appropriate.

When possible, we used the GRADE method of rating evidence quality. Evidence is first assessed as to whether it is from randomized trial or cohort studies. The rating is then adjusted in the following manner (from: Guyatt G et al. J Clin Epidemiol. 2011;4:383-94.):

**Quality ratings are downgraded** if studies:
- Have serious limitations
- Have inconsistent results
- If evidence does not directly address clinical questions
- If estimates are imprecise OR
- If it is felt that there is substantial publication bias

**Quality ratings are upgraded** if it is felt that:
- The effect size is large
- If studies are designed in a way that confounding would likely underreport the magnitude of the effect OR
- If a dose-response gradient is evident

Guideline – Recommendation is from a published guideline that used methodology deemed acceptable by the team.

Expert Opinion – Our expert opinion is based on available evidence that does not meet GRADE criteria (for example, case-control studies).

**Quality of Evidence:**
- ⭐⭐⭐⭐ High quality
- ⭐⭐⭐⭐ Moderate quality
- ⭐⭐⭐ Low quality
- ⭐⭐ Very low quality

Guideline
Expert Opinion
Summary of Version Changes

- **Version 1 (6/19/2012):** Go live
- **Version 1.1 (6/24/2012):** Adaptation for android use
- **Version 1.2 (6/11/2013):** Exclusion criteria updated; patients in ICU may be on pathway at discretion of attending MD
- **Version 2.0 (5/11/2016):** Added value analysis with rationale supporting use of intranasal midazolam over rectal diazepam
- **Version 2.1 (12/5/2016):** Changed name of inpatient order from orderset to powerplan
- **Critical Care Pathway Version 1.0 (5/3/2017):** Go live
- **Version 3.0 (8/3/2017):** Combined with critical care with acute care and ED phases, added 2nd to 4th line treatment options
- **Version 3.1 (8/4/2017):** Fixed language in ED phase in arrow between benzodiazepine dose 1 and 2
Medical Disclaimer

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required.

The authors have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication.

However, in view of the possibility of human error or changes in medical sciences, neither the authors nor Seattle Children’s Healthcare System nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they are not responsible for any errors or omissions or for the results obtained from the use of such information.

Readers should confirm the information contained herein with other sources and are encouraged to consult with their health care provider before making any health care decision.
Studies were identified by searching electronic databases using search strategies developed and executed by a medical librarian, Susan Groshong. Searches were performed in November 2016 in the following databases—on the Ovid platform: Medline and Cochrane Database of Systematic Reviews; elsewhere: Embase, National Guideline Clearinghouse, TRIP and Cincinnati Children’s Evidence-Based Care Recommendations. In Medline and Embase, appropriate Medical Subject Headings (MeSH) and Emtree headings were used respectively, along with text words, and the search strategy was adapted for other databases as appropriate. The concept of status epilepticus was searched; retrieval was limited to humans, English language and 2011 to current. A second search was performed concurrently in the databases listed above plus Ovid Cochrane Central Register of Controlled Trials for the concepts electroencephalography monitoring and cardiac surgery or extracorporeal membrane oxygenation. The search results were limited to humans, English language and 2006 to current. Retrieval for both searches were further limited to certain evidence categories, such as relevant publication types, index terms for study types and other similar limits. Additional articles were identified by team members and added to results.

Susan Groshong, MLIS
April 21, 2017

**Identification**

- 318 records identified through database searching
- 12 additional records identified through other sources

**Screening**

- 295 records after duplicates removed
- 295 records screened
- 198 records excluded

**Eligibility**

- 97 records assessed for eligibility
- 40 full-text articles excluded, 12 did not answer clinical question, 28 did not meet quality threshold

**Included**

- 57 studies included in pathway

Flow diagram adapted from Moher D et al. BMJ 2009;339:bmj.b2535


