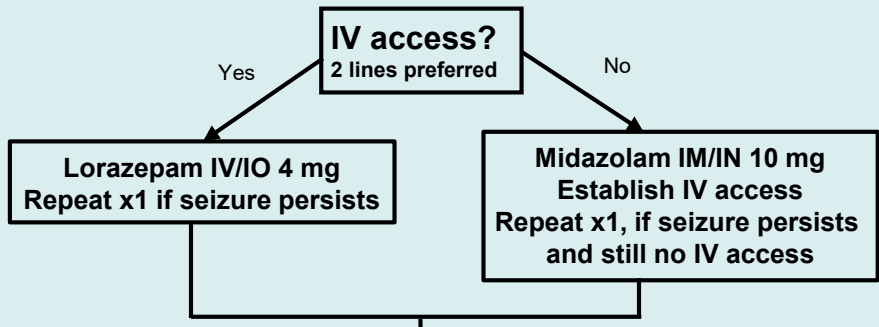


# Adult Status Epilepticus Guideline, Emergency Department

Intended to guide treatment of seizure NOT due to toxicologic etiology. Contact poison center at 800-222-1222 if concern for tox-related seizures as management may differ.

≥5 minutes of continuous seizure activity or episodes without return to baseline

**Impending SE**  
0 - 5 MIN



**Established SE**  
5 - 20 MIN

**If seizure continues after benzodiazepine bolus therapy**

**Single bolus of 1 of the following:**

<p><b>Fosphenytoin** IV</b> 20 mg/kg, max 1500 mg <b>Monitor for hypotension and arrhythmia</b></p>	<p><b>Levetiracetam IV</b> 60 mg/kg, max 4500 mg</p>	<p><b>Valproic Acid IV</b> 40 mg/kg, max 3000 mg <b>Avoid for hepatic or metabolic diseases</b></p>
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**If patient still seizing after 2nd line infusion completed**

**Intubate**

**Refractory SE**  
20 - 40 MIN

**Choose 1 of the following:**

<p><b>Midazolam IV</b> <b>Bolus:</b> 0.2 mg/kg <b>Infusion:</b> 1-10mg/hr titrate by 1mg/hr by RN &gt;10 mg/hr by physician No bolus restriction</p>	<p><b>Propofol# IV</b> <b>Bolus:</b> 1 - 2mg/kg max 80mcg/kg/min <b>Infusion:</b> 5 - 80 mcg/kg/min Titrate by 5-10 mcg/kg/min every 5-10 min by RN Bolus restricted to physician</p>
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**If patient continues to seize, see Adult SE Guideline, Critical Care Unit**

- Monitor:**
- Airway, Breathing, Circulation
  - **Initiate airway protection:**
    - Oxygen, lateral decubitus positioning and frequent suctioning
  - **Avoid intubation if possible**
- Workup:**
- Fingerstick glucose
  - STAT sodium
  - CBC, CMP, magnesium, phosphorus, ABG
  - Blood alcohol level, if indicated
  - Anti-epileptic levels (or hold yellow tube if meds unknown)
  - Urine tox screen, urine pregnancy test
  - ECG, telemetry

- Monitor:**
- Airway, Breathing, Circulation
  - **Continue airway protection measures**
  - Avoid intubation if possible

- Workup:**
- Serum AED levels
  - Head CT for 1st time seizure, when no longer seizing
  - If febrile, consider LP (CSF cell count, protein, glucose, HSV PCR, VDRL, cryptococcal Ag, Enterovirus PCR)
  - Blood cultures

- Intervention:**
- Treat possible underlying etiology/correct metabolic disturbances
  - **Consult neurology**

- Monitor:**
- Airway:
    - **Intubate prior to initiating sedating anti-seizure medications**
  - Breathing
  - Circulation

- Order:**
- 1 hour post-load levels for fosphenytoin or valproic acid

- Intervention:**
- Titrate drip for any ongoing clinical seizure activity
  - Admit to ICU – Neurocritical care preferred
  - **Initiate cEEG as soon as possible following intubation as paralytics may mask seizure activity**
  - Ensure adequate access (consider central venous line)

\*\* Phenytoin can be given if fosphenytoin is not available, but ensure max rate is limited to 50 mg/min. *If patient develops hypotension or arrhythmia, infusion should be slowed down.* # High dose, long duration propofol drips must be monitored for propofol-related infusion syndrome

# Adult Status Epilepticus Guideline, Critical Care Unit

Ongoing management of status epilepticus beyond the Emergency Department and into the Neurocritical care unit

Refractory SE  
20 - 40 MIN

## Add 3<sup>rd</sup> line Agent:

Chose a different agent than the one used as a 2nd line agent:

- Fosphenytoin\*\* IV 20 mg/kg, max 1500 mg
  - Levetiracetam IV 60 mg/kg, max 4500 mg
  - Valproic Acid IV 40 mg/kg, max 3000 mg
- OR**
- Phenobarbital IV Bolus: 20 mg/kg
  - Additional fosphenytoin\*\* IV 5-10 mg/kg for patients initially loaded with fosphenytoin

### Monitor:

- Vital signs
- Ongoing vent management
- Telemetry

### Workup:

- Continuous EEG
- Follow up on initial CSF results if LP done

### Intervention:

- Continue to correct all underlying causes/metabolic disturbances
- Avoid/discontinue medications which are proconvulsant
- Initiate acyclovir if concern for HSV encephalitis
- Initiate antibiotics if concern for bacterial meningitis

Refractory SE  
40-60 MIN

**Patient admitted to Neurocritical Care  
cEEG initiated and shows ongoing seizure activity**

## Initiate Burst Suppression

- Pentobarbital 5-15 mg/kg IV load followed by 0.5-5 mg/kg/hr infusion, titrated to a burst suppression pattern on EEG
- Once pentobarbital started, discontinue midazolam or propofol, but continue other antiseizure medications
- Maintain burst suppression for 24 hours, then wean over 12-24 hours; If clinical or electrographic seizures recur, then burst suppression should be resumed

### Monitor:

- Ongoing vent management
- Telemetry
- While on pentobarbital, monitor for myocardial suppression, loss of GI motility and absorption, and there is an increased risk of infections

### Work up:

- Follow up on AED levels
- Consider: Tick panel, treponemal IgG/IgM, HIV

### Intervention:

- Titrate pentobarbital to maintain **burst suppression**: The EEG should be low voltage suppressed (flat) with rare (3-10) electrical bursts of higher amplitude mixed frequency activity per minute

Super refractory SE  
> 60 MIN

## If patient still seizing consider the following options

**Additional anticonvulsants:** lacosamide, perampanel, topiramate, clobazam, etc.

**Ketogenic diet**

**Urgent vagal nerve stimulator** placement and activation

**Epilepsy resection surgery** (if a single seizure focus is identified)

**Ketamine** 2 mg/kg bolus followed by 0.5-10 mg/kg/hr infusion

**Electroconvulsive therapy (ECT)**

If concern for possible paraneoplastic/autoimmune etiology, consider initiation of immunomodulation therapies:

**Methylprednisolone**  
1 g/day for 5 days IV

**IVIg 0.4 mg/kg/d x5 days**  
**OR**  
**Plasmapheresis qod x 5-7 exchanges**

**Rituximab 375 mg/m<sup>2</sup> once weekly for 4 doses**

### Monitor:

- Ventilator, telemetry
- cEEG
- Monitor AED levels as needed
- Monitor for toxicity of AEDs

### Order:

- Consider additional CSF studies as clinically indicated: repeat HSV PCR, MS panel, Epilepsy Autoimmune Evaluation, meningitis/encephalitis pathogen panel, VZV IgG/IgM, VZV PCR
- Arboviral panel, Powassan
- **MRI brain** (must be after seizures controlled so that cEEG can be removed)

### Intervention:

- Discuss goals of care if seizures remain uncontrolled
- Consider Palliative Care consult

\*\* Phenytoin can be given if fosphenytoin is not available, but ensure max rate is limited to 50 mg/min. If patient develops hypotension or arrhythmia, infusion should be slowed down.

# High dose, long duration propofol drips must be monitored for propofol-related infusion syndrome

**Evidentiary Table for Adult Status Epilepticus Clinical Guidelines  
Updated May 2022; Originally produced December 2018**

#	Author Publication Date	Study/Review	Design	LOE	Results/Recommendations	Comments
1	Glaser, Tracy et al <i>Epilepsy currents 2016</i>	Evidence Based Guideline: Treatment of convulsive status epileptics in children and adults: Report of the guideline committee of the American Epilepsy Society	Evidence based clinical practice guideline	NA	<p>First line: A benzodiazepine (specifically IM midazolam or IV lorazepam) is recommended as the initial therapy of choice, given their demonstrated efficacy, safety, and tolerability.</p> <p>Second line: No evidence based second therapy of choice. Choose one of the following as a single loading dose:</p> <ul style="list-style-type: none"> <li>- IV fosphenytoin (20mg/kg, max 1500mg)</li> <li>- IV valproic acid (40 mg/kg, max 3000mg)</li> <li>- IV levetiracetam (60mg/kg, max 4500mg)</li> </ul> <p>Third Line: No clear evidence to guide therapy. If second therapy fails to stop seizure, treatment considerations should include intubation, sedation (midazolam or pentobarbital or propofol), neurology consult and cEEG monitoring.</p>	<p>- Strong evidence for 1st line recommendations</p> <p>- Insufficient evidence for 2nd and 3rd line recommendations</p>

#	Author Publication Date	Study/Review	Design	LOE	Results/Recommendations	Comments
2	Chamberland et al <i>Lancet</i> 2020	Efficacy of levetiracetam, fosphenytoin and valproate for established status epilepticus by age group (ESETT): a double blind, responsive adaptive, randomized controlled trial.	RCT		No difference in primary outcome: absence of seizure with improved consciousness and without additional anti seizure medication at 1h from start of drug infusion.  Choose one of the following as next line therapy for benzodiazepine-refractory status epilepticus: <ul style="list-style-type: none"> <li>- IV levetiracetam (60mg/kg; max 4500mg) children (52%), adults (44%), older adults (37%)</li> <li>- IV Fosphenytoin (20mg/kg; max 1500mg): children (49%), adults (46%), older adults (47%)</li> <li>- IV Valproate (40mg/kg; max 3000mg): children (52%), adults (46%), older adults (47%)</li> </ul>	Large RCT, second line therapy is equally effective
3	Teiman, David et al <i>NEJM</i> 1998	A comparison of Four treatments for Generalized Convulsive Status Epilepticus	RCT	I	Control of SE at 20 min (p=0.02) IV lorazepam 0.1mg/kg (64.9%) IV phenytoin 18mg/kg (43.6%) IV phenobarbital 15 mg/kg (58.2%) IV diazepam 0.15 mg/kg (55.8%)	Large RCT, sufficient power
4	Silbergleit, R et al <i>NEJM</i> 2012	Intramuscular versus intravenous therapy for prehospital status epilepticus	Non-inferiority RCT	I	Absence of seizure activity on arrival to ED (p < 0.001 FOR non-inferiority) IM midazolam 10mg (73.4%) IV lorazepam 4mg (63.4%)	Large RCT, sufficient power
5	Gujjar, Arunodaya et al <i>Seizure: European Journal of Epilepsy</i> 2017	Intravenous levetiracetam versus phenytoin for status epilepticus and cluster seizures: A prospective, randomized study	Small RCT	II	Rate of seizure control in SE at 24h following second line agent (p=0.62) IV levetiracetam IV phenytoin	