UNM Pediatric Status Epilepticus Pathway

Indication: children > 1 month - 18 years with:
- seizure > 5 minutes in duration OR
- recurrence of seizure without return to baseline

**Stabilization Phase**

POC Glucose

Order if applicable:
- iStat (VBG and electrolytes)
- Chem10
- CBC
- Calcium (total and ionized)
- Magnesium
- AED Levels
- Head CT or MRI
- Utox
- LP (especially if <2 years, immune suppressed, or recent antibiotics)
- Blood cx, UA, Urine cx

**First Line Therapy**

Did patient already receive appropriate 1st dose of benzodiazepine?

<table>
<thead>
<tr>
<th>Route</th>
<th>Drug</th>
<th>Dose</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>IntraMUSCULAR</td>
<td>midazolam</td>
<td>5 mg if 13-40 kg</td>
<td>10 mg</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10 mg if &gt; 40 kg</td>
<td></td>
</tr>
<tr>
<td>IntraNASAL</td>
<td>midazolam</td>
<td>0.2 mg/kg</td>
<td>10 mg</td>
</tr>
<tr>
<td>IntraVENOUS</td>
<td>lorazepam</td>
<td>0.1 mg/kg</td>
<td>4 mg</td>
</tr>
<tr>
<td></td>
<td>diazepam</td>
<td>0.2 mg/kg</td>
<td>10 mg</td>
</tr>
</tbody>
</table>

If clinical seizure continues

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<td></td>
<td>diazepam</td>
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</table>

**Second Line Therapy**

If clinical seizure continues

NOTIFY NURSE TO DRAW MED FROM PIXIS

<table>
<thead>
<tr>
<th>Route</th>
<th>Drug</th>
<th>Dose</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>IntraVENOUS</td>
<td>Fosphenytoin</td>
<td>20 mg/kg</td>
<td>1500 mg</td>
</tr>
<tr>
<td></td>
<td>Levetiracetam</td>
<td>60 mg/kg</td>
<td>4500 mg</td>
</tr>
</tbody>
</table>

Check Fosphenytoin level 2 hours after load

**REFERENCES:**
**UNM Pediatric Status Epilepticus Pathway**

**Refractory Status Epilepticus**

**MIDAZOLAM INFUSION**

- **Bolus:** 0.2 mg/kg₁ [Max 10 mg]
- **Start infusion at:** 0.1 mg/kg/hour²

**Notes:**
- If a rate of 1 mg/kg/hr fails to control seizures for >30 minutes, advance to next agent
- No max rate reported; note that rates above 2 mg/kg/hr (max 50 mg/hr) have been used in adults

**ADDITIONAL ANTICONVULSANTS**

- **IV phenobarbital:** 20 mg/kg, max 1000 mg¹
- **IV valproic acid:** 20 mg/kg, max 1000 mg²

  ¹Check phenobarbital serum level 2 hours after load
  ²Valproic acid contraindicated if suspected or known metabolic disease, caution in children <2 years

**WEAN:**

- Decrease rate by 0.5 mg/kg/hr q 6 hours

**Continue infusion until 24-48 hours seizure-free**

**IF SEIZURE CONTINUES**

- Bolus: 0.15 mg/kg AND Increase infusion rate by 0.05-0.1 mg/kg/hr [Repeat bolus and rate-increase q 15 minutes until seizure cessation]

**Notes:**
- If IBI becomes prolonged, hold infusion until IBI < 20 seconds, then resume infusion at dose 0.5 mg/kg/hr less than previous dose

**PENTOBARBITAL INFUSION**

- **Bolus:** 5 mg/kg over 30 minutes.
- **Repeat as needed to burst suppression IBI 10 seconds, up to 30 mg/kg (6 boluses total)⁴**

**ONCE BURST SUPPRESSION IS ACHIEVED:**

- **Start infusion at:** 1.0 mg/kg/hr⁴
- **Stop midazolam infusion**

**Notes:**
- Monitor serum levels
- Max rate: 5 mg/kg/hr
- If IBI becomes prolonged, hold infusion until IBI < 20 seconds, then resume infusion at dose 0.5 mg/kg/hr less than previous dose

**WEAN:**

- Decrease rate by 0.5 mg/kg/hr q 6 hours

**Continue infusion until 48 hours seizure-free**

**Seizure cessation**

**REFERENCES:**
4. Phelps S, Pediatric Injectable Drugs, 2013

**TRANSFER TO PICU**

There is no clear evidence to guide therapy in this phase. Select either of the following options.
**UNM Pediatric Status Epilepticus Pathway**  
*Super refractory status epilepticus treatment options*

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### KETAMINE INFUSION  
(Continue midazolam infusion, see below)

- **Bolus:** 2.5 mg/kg x 2 q 5 minutes
- **Start infusion at:** 8 mcg/kg/min (0.5 mg/kg/hr)
- **Decrease midazolam infusion to:** 0.05 mg/kg/hr

- **Increase rate by:** 8 mcg/kg/min (0.5 mg/kg/hr) every 15 minutes as needed to achieve resolution of clinical and/or electrographic seizures
- **Continue Ketamine infusion until:** 48 hours seizure-free
- **Wean by:** 8 mcg/kg/min (0.5 mg/kg/hr) q 6 hours

**Notes**
- **Max rate:** 55 mcg/kg/min (3.5 mg/kg/hr)
- **Doses as high as:** 160 mcg/kg/min (10 mg/kg/hr) have been used in adults

**Reference:**

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### PROPOFOL INFUSION

- **Bolus:** 3 mg/kg
- **Start infusion at:** 50 mcg/kg/min (3 mg/kg/hr)
- **Stop midazolam infusion**

- **Increase rate by:** 8 mcg/kg/min (0.5 mg/kg/hr) every 15 minutes as needed to achieve burst suppression (goal IBI 10 seconds)
- **Once burst suppression is achieved:** → continue infusion for 24 hours → wean to 50% max rate for 6-12 hours → wean to 25% max rate for 6-12 hours → stop

- **Monitor ABG, LFTs, CK q 6 x 24 hours, then q12**

**Notes**
- **Max duration:** 48 hours
- **Max dose:** 300 mcg/kg/min (18 mg/kg/hr)
- **Contraindications:** ketogenic diet, metabolic disorder, egg allergy

**Reference:**
- Phelps S, *Pediatric Injectable Drugs*, 2013

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### LACOSAMIDE BOLUS

<table>
<thead>
<tr>
<th>Weight</th>
<th>Bolus and Maintenance</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;40 kg</td>
<td>10 mg/kg, 10 mg/kg/day div BID (start 12 hours later)</td>
</tr>
<tr>
<td>&gt;40 kg</td>
<td>200—400 mg, 200 mg bid</td>
</tr>
</tbody>
</table>

**Notes**
- **Max maintenance dose:** 14 mg/kg/day$^4$
- **Max infusion rate:** 60 mg/min$^4$

**Reference:**
- Phelps S, *Pediatric Injectable Drugs*, 2013
- Hoffer I, Intravenous lacosamide in status epilepticus and seizure clusters, *Epilepsia* (2011)

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### VALPROIC ACID INFUSION

- **Bolus:** 20-40 mg/kg, then start infusion
  - **Obtain level 1 hour after bolus**
- **Start infusion**
  - **Rate:** 1 mg/kg/hr
  - **With PHENobarbital or phenytoin, rate:** 2 mg/kg/hr
  - **With PENTOBarbital, rate:** 4 mg/kg/hr
- **Increase rate by 1 mg/kg/hr as needed to achieve serum concentration (80-100 mg/L)**
  - **Obtain level 2 hours after rate increase**

**Notes**
- **Max rate:** 6 mg/kg/hr
- **Wean:** 1 mg/kg/hr q 2 hours
- **Contraindicated if suspected or known metabolic disease, caution in children <2 years**

- **Monitor CBC, CMP daily**

**Reference:**
- Phelps S, *Pediatric Injectable Drugs*, 2013

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### PROPOFOL INFUSION

- **Bolus:** 3 mg/kg
- **Start infusion at:** 50 mcg/kg/min (3 mg/kg/hr)
- **Stop midazolam infusion**

- **Increase rate by:** 8 mcg/kg/min (0.5 mg/kg/hr) every 15 minutes as needed to achieve burst suppression (goal IBI 10 seconds)
- **Once burst suppression is achieved:** → continue infusion for 24 hours → wean to 50% max rate for 6-12 hours → wean to 25% max rate for 6-12 hours → stop

- **Monitor ABG, LFTs, CK q 6 x 24 hours, then q12**

**Notes**
- **Max duration:** 48 hours
- **Max dose:** 300 mcg/kg/min (18 mg/kg/hr)
- **Contraindications:** ketogenic diet, metabolic disorder, egg allergy

**Reference:**
- Phelps S, *Pediatric Injectable Drugs*, 2013

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### TOPIRAMATE BOLUS

- **Bolus:** 5 mg/kg
- **Maintenance:** 5 mg/kg/day div BID (start 12 hours later)

**Notes**
- **Seizure-free after 24 hours:** Continue 5 mg/kg/day div BID
- **Seizures continue after 24 hours:** Increase dose by 5 mg/kg/day q day
- **Max dose reported in children:** 25 mg/kg/day
- **Max dose reported in adults:** 1600 mg/day

- **Monitor BMP daily**

**Reference:**
## IMMUNOTHERAPY

**METHYLPREDNISONE**
- 30 mg/kg/day IV x 3 days

**IMMUNOGLOBULINS**
- 1 gm/kg x 2 days

**PLASMA EXCHANGE**
- 5 exchanges
- Frequency: every other day

Notes:
- Max: 1 gram/day
- Consider antiviral/antibiotic agents if infectious studies pending
- Ensure all autoantibody/infectious titers are drawn prior to administration

If an autoimmune or paraneoplastic etiology is confirmed and patient is not responding to above treatments, consider rituximab or cyclophosphamide.

Reference:
Abend N, et al. Status epilepticus and refractory status epilepticus management, Semin Ped Neurol (2014)

## KETOGENIC DIET

<table>
<thead>
<tr>
<th>Step 1: Draw Screening Labs</th>
<th>Step 2: Develop a Feeding Plan</th>
<th>Step 3: Diet Initiation</th>
<th>Step 4: Diet Monitoring</th>
<th>Step 5: Discharge Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>-CBC</td>
<td>Estimate caloric needs: For intubated patients: Use the BMR (see below) For extubated patients: Use the BMR x 1.2-1.4</td>
<td>Remove all dextrose from fluids</td>
<td>BMP, Mg, Phos daily</td>
<td>If weaning diet, can decrease by 0.5:1 ratio every week until negative urine ketones then resume a regular diet</td>
</tr>
<tr>
<td>-CMR</td>
<td>Estimate fluid needs: 0-10 kg: 100 mL/kg/day 10-20 kg: 1000 mL + 50 mL/kg/day 20-40 kg: 1500 mL + 20 mL/kg/day &gt;40 kg: use adult fluid needs</td>
<td>Change all medications to low-carbohydrate forms</td>
<td>UA q8hrs until 4+ ketones then q12hrs</td>
<td>If continuing diet, family needs a gram scale, urine ketone strips, glucometer, extensive dietitian education, and close follow-up as an outpatient</td>
</tr>
<tr>
<td>-Mg and Phos</td>
<td>Determine starting ratio: &lt;18 months: Initiate at 3:1 ratio and adjust as needed &gt;18 months: Initiate at 4:1 ratio and adjust as needed</td>
<td>Slowly advance continuous feeds to goal and condense feeds further as tolerated</td>
<td>Blood glucose q4hrs until 4+ ketones then q8hrs</td>
<td></td>
</tr>
<tr>
<td>-Plasma acylcarnitine profile</td>
<td>Determine formula recipe: Ketocal 4:1 liquid is 1.5 kcal/mL Ketocal 4:1 or 3:1 powder is 7 kcal/g (Displacement: 1 mL/g)</td>
<td></td>
<td>CO2 level</td>
<td>Bilirubin dosing (split BID)</td>
</tr>
<tr>
<td>-Urinary organic acids</td>
<td></td>
<td></td>
<td>≤16</td>
<td>1 mg/kg</td>
</tr>
<tr>
<td>-Plasma amino acids</td>
<td></td>
<td></td>
<td>13-15</td>
<td>2 mg/kg</td>
</tr>
<tr>
<td>-Free and total carnitine</td>
<td></td>
<td></td>
<td>&lt;12</td>
<td>3 mg/kg</td>
</tr>
<tr>
<td>-25-hydroxy vitamin D3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-Zn and Se</td>
<td></td>
<td></td>
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</tbody>
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Reference: