Seizure Diagnostic Evaluation
Evidence Based Outcome Center

	Afebrile Seizure (New Onset)	Simple Febrile Seizure	Complex Febrile Seizure
Lumbar Puncture	Not Indicated **Exclusion criteria**: Patients less than 6 months of age	A lumbar puncture should be performed: • Following a simple febrile seizure if the child is ill-appearing or if there are clinical signs or symptoms of concern • Persistent altered mental status or neuro deficit A lumbar puncture should be considered: • Child 6 to 12 months of age who is deficient in immunizations or for whom immunization status is unknown • Child of any age who has been pretreated with antibiotics	A lumbar puncture should be performed: • Following a complex febrile seizure if the child is ill-appearing or if there are clinical signs or symptoms of concern • Persistent altered mental status or neuro deficit A lumbar puncture should be considered: • Child 6 to 12 months of age who is deficient in immunizations or for whom immunization status is unknown • Child of any age who has been pretreated with antibiotics
Laboratory	Consider CMP for any of the following: • Dehydration • Vomiting • Diarrhea • Persistent altered mental status Consider toxicology screen for any of the following: • High risk population • Persistent altered mental status	Patient's history and clinical condition will guide laboratory screening.	Patient's history and clinical condition will guide laboratory screening.
EEG	**OUTPATIENT** Obtain in all cases of suspected, probable or definite seizure. Neurology follow-up within 1 week.	Persistent encephalopathy	Not indicated if only prolonged or recurrent within 24 hours. Consider for focal motor seizure, persistent encephalopathy or abnormal focal exam.
Neuroimaging	Consider urgent MRI (if available) or CT for any of the following: • Focal seizure • Persistent encephalopathy • Focal exam • < 6 months of age • Closed head injury • Recent shunt revision • Existing comorbidities that increase likelihood of seizure activity • High index for focal lesion Refer for consideration of outpatient brain MRI if none of the above factors apply.	Not Indicated	Consider for focal motor seizure onset, focal deficit or abnormal focal exam: MRI of the brain w/wo contrast Obtain CT **only if** emergent concerns **and** MRI is not available.
Admission	Admit for any of the following: • Recurrent seizures at onset • Persistent encephalopathy • Focal deficit • Parental anxiety • Concerns regarding follow-up • High index of seizure suspicion for patients less than 6 months • Anti-Epileptic Medications required for seizure cessation Contact Neurologist on call if STAT EEG read is required.	Only indicated in ill appearing child, extreme parental anxiety or social concerns, or anti-epileptic medications required for seizure cessation.	Admit for any of the following: • Persistent encephalopathy • Focal exam • Ill-appearing Contact Neurologist on call if STAT EEG read is required. Consider observation for any of the following: • Recurrence within 24 hours • Extreme parental anxiety or social concerns • Anti-Epileptic Medications required for seizure cessation Consider outpoint neurology referral: • Multiple recurrent febrile seizures (in different • illnesses) • Focal seizures without focal deficits • Parental anxiety

For seizure exacerbation in known seizure patient please consult neurology.

Status Epilepticus: Emergency Department/Inpatient Pathway

Inclusion Criteria

Age ≥ 3 months
Convulsive seizure lasting ≥ 3 minutes
Non-convulsive seizure lasting ≥ 3 minutes

Exclusion Criteria

Age < than 3 months

Step 1: First Dose Benzodiazepine

If patient has received 2 or more doses of benzodiazepines before arrival to the hospital, move to second dose of benzodiazepine medication in the protocol

IV Access:
Lorazepam- 0.1 mg/kg/dose IV (max: 4 mg/dose)
Dilute medication 1:1 with Normal Saline – IV push over 30 seconds
OR
No IV Access: Choose one of the following AND establish IV access
Midazolam – Use IV formulation
1. Intranasal: 0.3 mg/kg (max: 10 mg/dose)
   Use 5 mg/mL concentration, if ≥ 1 mL give half in each nare
2. Buccal: 0.3 mg/kg (max: 10 mg/dose)

Diazepam- 0.5 mg/kg/dose per rectum (max: 20 mg/dose)

Prepare next step medication

Seizure continues 3 minutes more

NO

YES

Step 2: Second Dose Benzodiazepine

Consult Neurologist
Call for STAT continuous EEG

IV Access: Administer or Repeat
Lorazepam- 0.1 mg/kg/dose IV (max: 4 mg/dose)
OR
No IV Access: Repeat one of the following AND establish IV access
Midazolam – Use IV formulation intranasal or buccal
Diazepam- 0.5 mg/kg/dose per rectum

Prepare next step medication

Seizure continues 3 minutes more

NO

YES

Monitor blood pressure, electrocardiogram, and respiratory function
Manage off Pathway

Step 3: First Dose IV Anti-Epileptic Drug (AED)

CRT or Critical Care Consultation can be considered at this point

Primary:
Levetiracetam- 30-60 mg/kg/dose **IV** (max: 3 g/dose)
Infuse no faster than 5 mg/kg/min

Other Medications to consider:
Fosphenytonin- 20 mg/kg/dose **IV** with 1:1 Normal Saline or D5W
Infuse no faster than 3 mg/kg/minute (max: 150 mg PE/min)
Valproic Acid- 20-40 mg/kg/dose **IV** (max: 2 g/dose)
Infuse no faster than 10 mg/kg/min
(For Valproic Acid- Do not use in patients with hepatic disorders or possible mitochondrial disorders)

Prepare next step medication

Seizure continues 10 minutes after infusion complete

NO

YES

Step 4: Second Dose IV AED

CRT or Critical Care Consultation can be considered at this point

Primary:
Fosphenytonin
If not previously given: 20 mg/kg/dose **IV**
If repeat dose: 5-10 mg/kg/dose **IV**
Infuse no faster than 3 mg/kg/minute (max: 150 mg PE/min)

Other Medications to consider:
Lacosamide- 8-10 mg/kg **IV** infuse over 15 minutes
Valproic Acid- 20 mg/kg/dose **IV** (max: 2 g/dose)
Infuse no faster than 10 mg/kg/min
Phenobarbital- 20 mg/kg **IV** (max 1 g/dose)
Infuse no faster than 2 mg/kg/min (max: 60-100 mg/min)

Seizure continues 10 minutes after infusion complete

NO

YES

Critical Care Management see next page

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Status Epilepticus: Critical Care Pathway

Choose Midazolam or Pentobarbital for continuous infusion

Exclusion Criteria

Age < than 3 months

Midazolam (Preferred if not intubated)

1. **Midazolam** give 0.2 mg/kg **IV** bolus (max: 10 mg) followed by
2. **Midazolam** 0.2 mg/kg/hr **IV** continuous infusion
3. Establish a secure airway

If seizure persists >10 minutes after first Midazolam bolus:

1. Every 10 minutes, repeat Midazolam 0.2 mg/kg/dose **IV** bolus (max: 10 mg/dose) and
2. Increase Midazolam by 0.2 mg/kg/hr IV continuous infusion (max: 1.5 mg/kg/hr)

   [Evidence suggests that if patient doesn't respond to 0.5 mg/kg/hr they are unlikely to respond to higher does, consider moving to next agent]

Consult neurology for titration goal to achieve seizure cessation, or until burst-suppression on EEG based on neurology recommendations, or until cardio-respiratory depression.

If seizure persists on 1.5 mg/kg/hr for 10 min (total 70 min on Midazolam) max tolerated/allowed Midazolam infusion:

Pentobarbital

1. **Pentobarbital** 5-15 mg/kg **IV** bolus over 1-2 hours followed by
2. **Pentobarbital** IV infusion 1-3 mg/kg/hr **IV** (max: 5 mg/kg/hr) continuous infusion
3. Establish a secure airway

If not in burst suppression 1 hour after starting infusion:

1. Repeat bolus Pentobarbital 5 mg/kg IV over 1 hour and
2. Increase infusion by 1-2 mg/kg/hour

Maintain burst suppression with hourly boluses 5 mg/kg if needed over 1 hour

Consult neurology for titration goal to achieve seizure cessation, or until burst-suppression on EEG based on neurology recommendations, or until cardio-respiratory depression.

Ketamine

1. **Ketamine** 2-3 mg/kg **IV** bolus IV push over 60 seconds followed by
2. **Ketamine** 10 mcg/kg/min **IV** infusion

If seizure persists >10 min after first Ketamine bolus:

1. Every 10 minutes, repeat Ketamine bolus 1-2 mg/kg **IV** and
2. Increase Ketamine infusion by 5-10 mcg/kg/min to max dose 100 mcg/kg/min

Agents to consider for super refractory status epilepticus:

1. Ketogenic diet
2. Propofol [initial 1-2/mg/kg loading dose]
3. Anakinra [300mg subQ daily or See protocol for FIRES/autoimmune etiologies]
4. Verapamil [40mg/kg TID up to 120mg/kg TID]
5. High dose Topiramate via NG tube (start 5 mg/kg/day and increase by 5-10 mg/kg/day to max 25 mg/kg/day)

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Approved by the Febrile Seizure & New Onset Afebrile Seizure Evidence-Based Outcomes Center Team

Revision History

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