CLINICAL GUIDELINE

SEIZURE AND STATUS EPILEPTICUS

(1 month–25 years of age)

Children's MINNESOTA

Aim: Shorten duration of all seizures and reduce incidence of status epilepticus. Standardize treatment and evaluation of acute seizures.

Phase	Timing	Decision-making and medication	Interventions
Stabilization	0 min.	**Inclusion Criteria:** Patient ≥ 1 month of age with seizure activity ↓ Seizures can be subtle to appreciate. Team to assess presence of seizures prior to each medication administration ↓	**Stabilization** • Note time of seizure onset • Call for assistance • Support ABCs, provide for patient safety and seizure precautions • Apply oxygen, O2 sat monitor, and cycle blood pressure Q 3 min • Check POC glucose • Insert PIV Stat • **See Note 2** for additional labs/imaging
1st Line Meds	5 min.	**IV Access**: Lorazepam 0.1 mg/kg IV (max 4 mg) *See Note 1 if lorazepam is unavailable* **No IV Access**: Midazolam 0.2 mg/kg IM, IN, or Buccal (max 10 mg)	**1st line medications** • Prepare 1st line medication(s) for seizures lasting 3 minutes or longer (see **table 1** for alternate medications) • No more than two doses of first line medications, including pre-hospital
	10 min.	**IV Access**: 2nd dose Lorazepam 0.1 mg/kg IV (max 4 mg) **No IV Access**: 2nd dose Midazolam 0.2 mg/kg IM, IN, or Buccal (max 10 mg)	
2nd Line Meds	20 min.	**Choose any single medication** **All ages**: Levetiracetam 60 mg/kg IV over 5 min (Max 4500 mg) *See Note 1 for dosing if patient is already on levetiracetam maintenance* **> 2 months**: Fosphenytoin PE 20 mg/kg IV over 10 min (Max 1500 mg) *Avoid in Dravet Syndrome* **< 2 months**: Phenobarbital IV 20 mg/kg IV over 10 min *May repeat 10 mg/kg once*	**2nd line medications** • Place IO if no IV access • Consult Neurology and PICU to plan the following: - Additional 2nd line medication (vs direct to 3rd line) - Preferred 3rd line medication - EEG type and timing - Imaging type and timing • **Consultations:** If external, contact Children's Minnesota Physician Access at 612-343-2121 or 866-755-2121
3rd Line Meds and IV Drips	40 min.	**Choose any single medication in consultation with Neurology and PICU** Midazolam 0.2 mg/kg bolus, followed by 0.1 mg/kg/hr infusion Propofol 2 mg/kg IV bolus, followed by 50 mcg/kg/min infusion	**IV Drips** • Intubate airway and place on ventilator • Consider PICU/Anesthesia support

Terminology

Status Epilepticus: Seizure > 5 minutes and/or 2+ seizures without return to baseline mental status between episodes

Non-epileptic event: Formerly referred to as psychogenic or pseudo-seizure

Non-convulsive status: Continuous seizure activity on EEG without motor activity

IV – Intravenous
IM – Intramuscular
IO – Intraosseous
IN – Intranasal (divide dose between nares)
ABCs – Airway, Breathing, Circulation
POC – Point of Care
PE – Phenytoin Equivalents
NAT – Non-accidental trauma
UDS- Urine Drug Screen

EXCLUSION GUIDELINES

Patients **excluded** from this guideline:
- Age < 1 month
- NICU patients
- Non-epileptic event
- Non-convulsive status epilepticus
- Febrile seizures
- Patients with existing seizure plan

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NOTE 1: ANTIEPILEPTIC MEDICATIONS

1st line therapies:[1]

- Lorazepam 0.1 mg/kg IV, IO (max 4 mg)
    - Midazolam 0.1 mg/kg IV (max 10 mg) if lorazepam is unavailable or on shortage
- Midazolam 0.2 mg/kg IM, IN, Buccal (max 10 mg) – preferred in absence of IV access (higher dosing than when given IV)

Alternate 1st line therapy

- Diazepam Buccal or Rectal
    - < 6 yr: 0.5 mg/kg (max 20 mg)
    - 6 – 11 yrs old: 0.3 mg/kg (max 20 mg)
    - 12 yrs and older: 0.2 mg/kg (max 20 mg)

2nd line therapies[2,3,4]

- Levetiracetam loading dose:
    - Not on levetiracetam at home: 60 mg/kg IV (max 4500 mg)
    - On levetiracetam at home: 20 mg/kg IV (max 4500 mg)
- Fosphenytoin 20 mg/kg PE IV (max 1500 mg)
    - Avoid in patients with Dravet syndrome
- Phenobarbital IV 20 mg/kg IV (max 1000 mg)

Alternate 2nd line therapies

- Valproic Acid 30–40 mg/kg IV (max 3000 mg)
- Lacosamide 10 mg/kg IV (max 400 mg)

3rd line therapies[5]

- Midazolam 0.2 mg/kg bolus, followed by 0.1 mg/kg/hr continuous infusion
- Propofol 2 mg/kg IV bolus + infusion at 50 mcg/kg/min

Alternate 3rd line therapies

- Ketamine 2-3 mg/kg bolus followed by 10 micrograms/kg/min
- Pentobarbital 5-10 mg/kg bolus dose (rate < 50 mg/min) followed by 0.5-5 mg/kg/hr continuous infusion

NOTE 2 : LABORATORY AND IMAGING STUDIES

Labs:

- **All patients:** Point of care glucose
- **Most patients requiring hospitalization:** CBC, BMP, calcium, phos, magnesium
- **Expanded infectious labs if high suspicion for meningitis (Note 4):** Blood culture, CSF cell count +gram stain and cultures, Meningitis/Encephalitis CSF panel, HSV CSF, CSF to save
- **Toxicology studies:** Consider urine drugs of abuse screen and comprehensive urine drug screen (MedTox) if mental health concern, trauma (especially NAT), no seizure history. Consider consulting toxicologist/poison control
- **Drug levels:** If on anti-epileptic meds, draw applicable provisional tube of blood for drug levels to save and discuss with neurologist.

Imaging: Not typically indicated in the acute setting for patients with return to baseline neurologic exam.

- Head trauma – non-contrast CT, consider UDS on all patients getting head CT
- Patients not returning to baseline as expected within a few hours of seizure, suspected infection, mass, inflammatory process consider MRI with contrast (limited non contrast MRI in time/resource restricted settings)

NOTE 3: EEG GUIDANCE

- For patients requiring admission, EEG is often helpful in the evaluation. The type and timing of EEG should be determined in consultation with the neurologist on call.
- Patients admitted to the ICU for status epilepticus will require continuous EEG monitoring
- Patients not otherwise requiring admission generally should not be admitted for EEG alone

NOTE 4: SPECIAL CONSIDERATIONS

- Hypoglycemia – administer IV or IO: D50 at 1 ml/kg, D25 at 2 ml/kg, D12.5 at 4 ml/kg, D10 at 5 ml/kg (max 25 grams)
    - For severe hypoglycemia, especially in the very young, consider adrenal insufficiency
- Hyponatremia – administer IV or IO: 3% NS at 1 ml/kg push. Repeat up to 5 times until seizure stops.
- Difficult airway – consider Ketamine as third line therapy, consult PICU and/or anesthesia
- Suspect meningitis/encephalitis in patients with fever, who do not return to baseline, are currently on antibiotics. Please see meningitis guideline for antibiotic guidance
- Toxicology - consider in all Trauma/NAT or if seizure does not fit with clinical history

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