

# Status Epilepticus

\* in children over 1 month of age

**Status Epilepticus is a time-sensitive emergency, since untreated seizures lead to more seizures and delayed treatment contributes to morbidity and mortality.<sup>1</sup> Providing sufficient evidence-based treatment early is essential to improve patient outcomes. If your patient is actively seizing, refer to [TREKK and EIIIC's Status Epilepticus Algorithm](#).**

## MAKING THE DIAGNOSIS

- Seizures lasting longer than 5 minutes or multiple seizures without full recovery of consciousness between seizures warrant treatment as status epilepticus.
- To determine the underlying cause and manage concurrently, consider the following investigations, depending on the clinical situation:
  - Electrolytes, glucose, urea, creatinine, CBC, blood/urine cultures, blood gas, LFTs and/or drug screen.
  - Anti-convulsant levels if patient on treatment (e.g., phenytoin, carbamazepine, phenobarbital, valproic acid).
  - Head CT if history of trauma, signs of increased intracranial pressure, and/or focal neurological signs.
  - Lumbar puncture (LP) if suspicion for meningitis AND no focal neurologic findings on exam or contraindications to LP on imaging. Initiation of antimicrobials should NOT be delayed if LP is not possible.

## POSSIBLE ETIOLOGIES

- Fever, severe infection (meningitis, encephalitis), anoxic injury, hypo/hyperglycemia, hypo/hyponatremia, hypo/hypercalcemia, traumatic brain injury, anti-epileptic drug non-adherence/withdrawal/overdose, toxic exposure, structural brain abnormality, hypoxic-ischemic encephalopathy, progressive neurodegenerative disorder, stroke, underlying genetic condition.

## MANAGEMENT

### Phase 0 (Goal 0-5 minutes)

- Maintain airway (suction secretions, position, jaw thrust), breathing (100% oxygen via non-rebreather mask +/- assisted ventilation), and circulation (monitor, IV access, isotonic fluid bolus if inadequate perfusion).

### Phase 1 (Goal 5-15 minutes)

#### PREHOSPITAL<sup>2</sup>

- **DO NOT** wait to check blood glucose before initiating treatment or placing an IV/IO.
- Give Midazolam 0.2 mg/kg/dose IM/intranasal (MAX 10 mg/dose)
  - Consider standardized Midazolam dose: 5 mg/dose for 13-40 kg; 10 mg/dose for >40 kg via IM/intranasal route.
- Check blood glucose:
  - If blood glucose <3.3 mmol/L (<60 mg/dL): Treat with D25W 2 mL/kg/dose IV (MAX 100 mL/dose) OR D10W 5 mL/kg/dose IV (MAX 250 mL/dose).
  - If ≥3.3 mmol/L (≥60 mg/dL): Give second dose of Midazolam 0.2 mg/kg/dose IM/intranasal (MAX cumulative dose of 10 mg in prehospital setting; if max dose given, consult Medical Director/Base Hospital for next step).

#### EMERGENCY DEPARTMENT<sup>3</sup>

- Give a benzodiazepine (if two doses not already given prior to ED arrival):
  - IV/IO Access:
    - Lorazepam 0.1 mg/kg/dose IV/IO (MAX 4 mg/dose) OR
    - Midazolam 0.1 mg/kg/dose IV/IO (MAX 10 mg/dose)
  - No IV/IO Access:
    - Midazolam 0.2 mg/kg/dose IM/intranasal (MAX 10 mg/dose)
 Consider standardized Midazolam dose: 5 mg/dose for 13-40 kg; 10 mg/dose for >40 kg via IM/intranasal route.
- Check blood glucose and respond as per Prehospital section above (if not already done prior to ED arrival).
- Give a second benzodiazepine dose for ongoing seizures 5 minutes after the first dose.
- If IV/IO access becomes available, switch to IV/IO route.
- Do not give more than two doses of benzodiazepine due to increased risk of apnea.

### Phase 2 (Goal 15-50 minutes)

- Levetiracetam, Phenytoin/Fosphenytoin and Valproic acid are equally efficacious for status epilepticus.<sup>4</sup> If available, Levetiracetam is preferred given rapid administration, favourable side effect profile, and fewer drug interactions.

# Status Epilepticus

Drug	Dose	Age	Comments/Cautions
Levetiracetam	60 mg/kg/dose IV/IO (MAX 3000 mg/dose) Infuse over 5 minutes	Any age <sup>4</sup>	↓side effects/drug interactions, low risk of psychosis
Fosphenytoin	20 mg phenytoin equivalent (PE)/kg/dose IV/IO/IM (MAX 1000 mg PE/dose) Infuse over 10 minutes	Any age	↓BP, ↓HR, arrhythmia; avoid in toxicologic seizures; choose alternate drug if on phenytoin at home or consider partial loading dose of 10 mg PE/kg/dose
Valproic Acid	40 mg/kg/dose IV/IO (MAX 3000 mg/dose) Infuse over 10 minutes	≥2 years <sup>4</sup>	In Canada, only available via Health Canada Special Access Program; caution in patients with liver dysfunction, mitochondrial disease, urea disorder, thrombocytopenia or unexplained developmental delay
Phenytoin	20 mg/kg/dose IV/IO (MAX 1000 mg/dose) <b>Infuse over 20 minutes</b>	Any age	↓BP, ↓HR, arrhythmia; avoid in toxicologic seizures; choose alternate drug if on phenytoin at home or consider partial loading dose of 10 mg kg/dose; use only if Fosphenytoin not available
Phenobarbital	20 mg/kg/dose IV/IO (MAX 1000 mg/dose) <b>Infuse over 20 minutes</b>	<6 mos <sup>1</sup>	Respiratory depression, especially in combination with benzodiazepines

**If patient is still seizing 5 minutes after end of medication infusion, choose a different second-line agent from this list to give next. Contact Pediatric Referral Site.**

- DO NOT combine Phenytoin and Fosphenytoin.

### Phase 3 (Goal 50 minutes onwards)

- If two second-line therapies fail, discuss further management with Pediatric Referral Site.
- Anticipate the need/prepare for definitive airway support due to the risk of apnea.
- Third-line therapy consists of continuous IV infusion of Midazolam, Pentobarbital, Propofol OR Ketamine.<sup>5</sup>

### MONITORING

- Monitor heart rhythm, pulse oximetry, and blood pressure.
- Anticipate apnea and/or hypotension with the use of multiple medications.
- Neurology consult, continuous electroencephalogram (EEG) monitoring +/- video should be initiated (at Pediatric Referral Site) as soon as feasible for patients on continuous infusion or those with persistent altered mental status, need for pharmacological paralysis, and/or paroxysmal events suspected to be seizures.<sup>6</sup>

### CRITERIA FOR ADMISSION/TRANSFER TO PEDIATRIC REFERRAL SITE

- Patients with refractory seizures or who are not awake and responsive within 4-6 hours of ED arrival should be admitted/transferred for further evaluation and/or monitoring.

### CONSIDERATIONS FOR DISCHARGE HOME

- Discharge home may be considered in patients who have returned to baseline post seizure management in discussion with Pediatric Referral Site, taking into account parental comfort.
- Counsel parents/guardians on what to do if a seizure recurs at home using this resource ([Eng/Esp](#)) or this resource ([Eng/Fr](#)).

**The purpose of this document is to provide healthcare professionals with key facts and recommendations for the screening and management of status epilepticus in children in the emergency department.** This summary was co-produced by the status epilepticus content advisors for TREKK, Dr. Katherine Muir and Dr. Sarah Buttle of the Children's Hospital of Eastern Ontario (CHEO), and content advisor for EIIC, Dr. Manish Shah of the Texas Children's Hospital, and uses the best available knowledge at the time of publication. However, healthcare professionals should continue to use their own judgment and take into consideration context, resources and other relevant factors. The TREKK Network and EIIC are not liable for any damages, claims, liabilities, costs or obligations arising from the use of this document including loss or damages arising from any claims made by a third party. The TREKK Network and EIIC also assumes no responsibility or liability for changes made to this document without its consent. This summary is based on:

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