

Seizures

(Adapted from an evidence-based guideline created using the National Prehospital Evidence-Based Guideline Model Process)

Aliases

Status epilepticus, febrile seizure, convulsions, eclampsia

Patient Care Goals

1. Prompt cessation of seizures in the prehospital setting
2. Minimizing adverse events in the treatment of seizures in the prehospital setting
3. Minimizing seizure recurrence during transport

Patient Presentation

Seizures due to trauma, pregnancy, hyperthermia, or toxic exposure should be managed according to those condition-specific guidelines.

Inclusion Criteria

Seizure activity upon arrival of prehospital personnel or new or recurrent seizure activity lasting greater than 5 minutes

Exclusion Criteria

None

Patient Management

Assessment

1. History
 - a. Duration of current seizure
 - b. Prior history of seizures, diabetes, or hypoglycemia
 - c. Typical appearance of seizures
 - d. Baseline seizure frequency and duration
 - e. Focality of onset, direction of eye deviation
 - f. Concurrent symptoms of apnea, cyanosis, vomiting, bowel/bladder incontinence, or fever
 - g. Bystander administration of medications to stop the seizure
 - h. Current medications, including anticonvulsants
 - i. Recent dose changes or non-compliance with anticonvulsants
 - j. History of trauma, pregnancy, heat exposure, or illicit drug use, alcohol use history, toxin exposure
2. Exam
 - a. Air entry and airway patency
 - b. Breath sounds, respiratory rate and effectiveness of ventilation
 - c. Signs of perfusion (pulses, capillary refill, color)
 - d. Neurologic status (GCS, nystagmus, pupil size, focal neurologic deficit or signs of stroke)
 - a. Focus on extremity tremors, myoclonic jerks, rigidity, repetitive movements
 - b. Careful eye exam evaluating for ongoing nystagmus or deviation

Treatment and Interventions

1. If signs of airway obstruction are present and a chin-lift, jaw thrust, positioning, and/or suctioning does not alleviate it, place oropharyngeal airway (if gag reflex is absent) or nasopharyngeal airway.
2. Place pulse oximeter and/or waveform capnography to monitor oxygenation/ventilation.
3. Administer **oxygen** as appropriate for dyspnea or distress with a target of achieving greater than

- 93% saturation for most acutely ill patients.
4. Assess perfusion.
 5. Assess neurologic status.
 6. Routes for treatment:
 - a. If IV/IO access is not established, use of IN/IM routes are preferred over rectal (PR),
 - i. If **Diazepam PR** is prescribed to the patient and available EMS may consider administration of diazepam PR at prescribed dose (Alternative: 0.2 mg/kg, maximum dose 10 mg) as an acceptable treatment option. *[PARA]*
 7. Anticonvulsant Treatment:
 - a. **Benzodiazepines: Midazolam *[PARA]***
 - i. **Adult: 5-10mg IV/IO/IM/IN repeat every 5-10min**
 - ii. **Pediatric : 0.1mg/kg IV/IO/IN or 0.25mg/kg IM repeat every 5-10min**
 - b. **Levetiracetam (Keppra):**
 - i. Dosing
 - i. Adult:
 - i. Status Epilepticus or recurrent seizures: **40-60mg/kg (Max 4,500mg) IV/IO**
 - i. Doses of 1000-2000mg acceptable given logistics considerations
 - ii. Patients on oral Levetiracetam (Keppra): May consider IV administration of oral dose for breakthrough seizures or missed dose situations
 - ii. Pediatrics: Consult Medical Control
 - ii. May be given concurrently with or after benzodiazepines dependent on clinical factors such as number and duration for current seizures, previous seizure history and medication history. Contact **Medical Control** for guidance as needed.
 - c. Continuation of anti-epileptic medications as initiated by sending facility **[PARA/Inter-Facility]**
8. Glucometry
 - a. If still actively seizing, check blood glucose level
 - b. If less than 60 mg/dL, treat per the Hypoglycemia guideline.
9. Consider **Magnesium Sulfate *[PARA]* 4g IV over 20 minutes** in the presence of seizure in the third trimester of pregnancy or post-partum [see the [Eclampsia/Pre-eclampsia guideline](#)].
10. For febrile seizures, consider the following interventions after stopping the seizure, since the following interventions provide symptomatic relief for fevers but do not stop the seizure:
 - a. **Acetaminophen** (PO if able to swallow) *[AEMT]* Refer to [Medication Protocol](#)
AND/OR
 - b. **Ketorolac IV/IO/IM OR Ibuprofen PO** (if able to swallow) *[AEMT]* Refer to [Medication Protocol](#)
AND/OR
 - c. Removing excessive layers of clothing
AND/OR
 - d. Applying cool compresses to the body
11. Consider 12-lead ECG following cessation of seizure in patients without a history of seizure to determine possible cardiac cause.

Patient Safety Considerations

- More than two maximal doses of benzodiazepines are associated with high risk of airway compromise.
 - Use caution, weigh risks and benefits of deferring treatment until hospital, and/or consider consultation with medical oversight if patient has received two ,maximal doses of benzodiazepines by bystanders and/or prehospital providers and there are concerns about the ability to manage potential airway compromise.
- Hypoglycemic patients who are treated in the field for seizure should be transported to hospital, regardless of whether or not they return to baseline mental status after treatment.

Notes and Educational Pearls

Key Considerations

- Many airway/breathing issues in seizing patients can be managed without intubation or placement of an advanced airway. Reserve these measures for patients that fail less invasive maneuvers as noted above.
- For new onset seizures or seizures that are refractory to treatment, consider other potential causes including, but not limited to, trauma, stroke, electrolyte abnormality, toxic ingestion, pregnancy with eclampsia, hyperthermia.
- A variety of safe and efficacious doses for benzodiazepines have been noted in the literature for seizures.

Pertinent Assessment Findings

The presence of fever with seizure in children less than 6 months old and greater than 6 years old is **not** consistent with a simple febrile seizure and should prompt consideration for meningitis, encephalitis or other cause.

Quality Improvement

Associated NEMESIS Protocol(s) (eProtocol.01)

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Key Documentation Elements

- Actively seizing during transport and time of seizure onset or cessation
- Focality of onset, direction of eye deviation
- Concurrent symptoms of apnea, cyanosis, vomiting, bowel/bladder incontinence, or fever
- Medication amounts and routes given by bystanders or prehospital providers
- Neurologic status (GCS, nystagmus, pupil size, focal neurologic deficit or signs of stroke)
- Blood glucose level

Performance Measures

- Frequency of performing glucometry
- Time to administration of anticonvulsant medication
- Rate of respiratory failure
- Rate of seizure recurrence

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