Approach to treatment of convulsive status epilepticus in children and adolescents

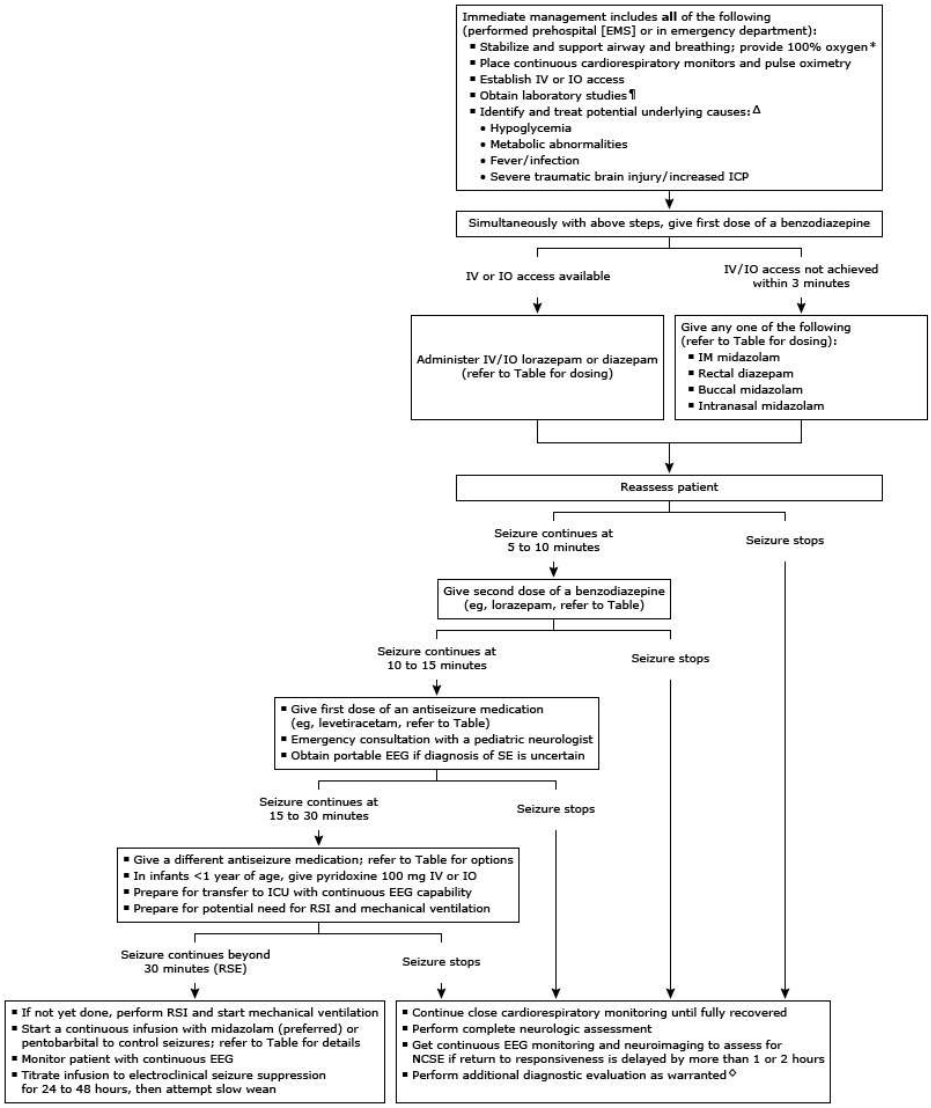

Table: Medications for CSE in pediatric patients

Benzodiazepines
- IV or IO access available:
  - Lorazepam 0.1 mg/kg IV or IO, max 4 mg
  - Diazepam 0.2 mg/kg IV or IO, max 10 mg
- If IV/IO access not achieved within 3 minutes:
  - IM midazolam 0.2 mg/kg, max 10 mg
  - Rectal diazepam 0.5 mg/kg, max 20 mg
  - Buccal midazolam 0.3 to 0.5 mg/kg, max 10 mg
  - Intranasal midazolam§

Antiseizure medications
- Levetiracetam 60 mg/kg IV or IO (maximum 4500 mg)
- Fosphenytoin 20 mg PE/kg IV or IO (maximum 1500 mg)*¥‡
- Valproate 20 to 40 mg/kg IV or IO (maximum 3000 mg)
- Phenobarbital 20 mg/kg IV or IO (maximum 1000 mg)*†

Medications for refractory SE
- Requires mechanical ventilation, cardiovascular monitoring, and continuous EEG monitoring:
  - Midazolam infusion: 0.2 mg/kg IV bolus followed by continuous infusion; start infusion at 0.05 to 0.1 mg/kg per hour; titrate to achieve cessation of clinical and electrographic seizures using continuous EEG; max dose 2 mg/kg per hour
  - Pentobarbital infusion: 5 to 15 mg/kg IV bolus followed by continuous infusion; start infusion at 0.5 mg/kg per hour; titrate to achieve cessation of clinical and electrographic seizures using continuous EEG; max dose 5 mg/kg per hour

This algorithm summarizes our suggested approach to antiseizure treatment for convulsive status epilepticus (CSE) in children and adolescents. CSE is defined as a single unremitting seizure lasting >5 minutes or frequent clinical seizures without an interictal return to the baseline clinical state. Along with immediate antiseizure therapy, children with CSE require simultaneous, rapid initiation of monitoring, including frequent core temperature measurement; supportive care of airway, breathing, and circulation; and rapid recognition and treatment of hypoglycemia and other potential underlying causes, such as complex febrile seizures, electrolyte disturbance, poisoning, central nervous system infection, sepsis, and traumatic brain injury. Refer to UpToDate topics on pediatric CSE for additional details.

EMS: emergency medical services; IV: intravenous; IO: intraosseous; ICP: intracranial pressure; IM: intramuscular; EEG: electroencephalogram; SE: status epilepticus; ICU: intensive care unit; RSI: rapid sequence endotracheal intubation; NCSE: nonconvulsive status epilepticus; RSE: refractory status epilepticus; PE: phenytoin equivalents.

* Rapid sequence intubation should be performed if airway, ventilation, or oxygenation cannot be maintained, or if the seizure becomes prolonged.

¶ For ancillary studies to obtain in children with status epilepticus, refer to UpToDate topics on status epilepticus in children.

Δ Common causes of pediatric CSE are listed here. If isoniazid poisoning is suspected, pyridoxine should be administered (70 mg/kg IV or IO; maximum 5 g). For further discussion of causes of CSE in children, refer to UpToDate's topic on pediatric CSE.

◇ Additional evaluation may include neuroimaging if CSE is the first presentation of epilepsy or if there are new focal neurologic findings, signs of head trauma, concern for increased ICP, or prolonged duration of depressed consciousness (ie, for >1 to 2 hours after the episode). For additional details regarding the diagnostic evaluation in children with CSE, refer to UpToDate topics on pediatric CSE.

§ Refer to text for dosing intranasal midazolam.

¥ Phenytoin and fosphenytoin may be less effective for the treatment of seizures due to toxins or drugs and may intensify seizures caused by cocaine, other local anesthetics, theophylline, or lindane. In such cases, levetiracetam, valproate, or phenobarbital should be used.

‡ With fosphenytoin administration, the rate of infusion should not exceed 2 mg PE/kg per minute (maximum rate: 150 mg PE per minute). If fosphenytoin is not available, IV phenytoin may be used (20 mg/kg IV; do not exceed 1 mg/kg per minute; maximum rate: 50 mg per minute). Both fosphenytoin and phenytoin require cardiac monitoring.

† When administering phenobarbital, the maximum infusion rate is 2 mg/kg per minute with a ceiling of 50 mg/min. Anticipate respiratory depression.
