IN THE NAME OF GOD

Seizure

SADRZADEH MD.

ASSISTANT PROF. OF EM MEDICINE

- The majority of seizures will cease spontaneously **within 5 minutes**

- **Status Epilepticus**

- Prompt identification and, whenever possible, reversal of seizure **triggers** are priorities. In particular, assessing for and correcting hypoglycemia should occur as early as possible.

Initial care

- Assess airway, breathing, and circulation
- Pulse oximetry
- Electrocardiogram
- Finger stick (give IV dextrose if glucose <60 mg/dL)
- Aspiration precautions (lateral decubitus)

PULSE check / Bedside Protection

lateral decubitus positioning and suctioning of oral cavity are important to prevent aspiration

the use of intraoral devices may lead to trauma without additional benefit

First-line therapy:

- Diazepam 5 mg up to a max of 20 mg
- Lorazepam 2–4mg up to max of 10 mg
- Midazolam 5–10 mg IV/IM/intranasal

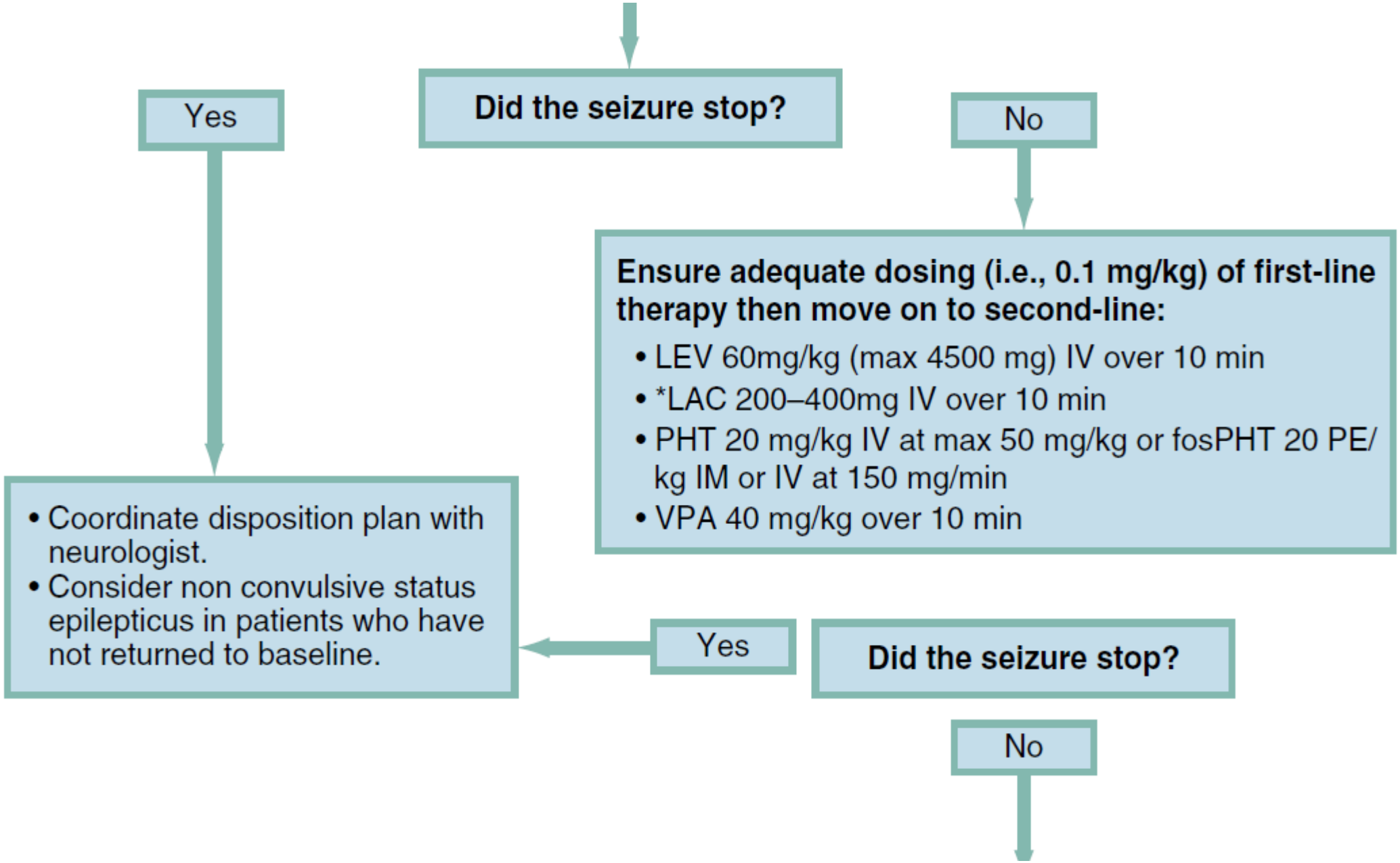
Did the seizure stop?

Yes

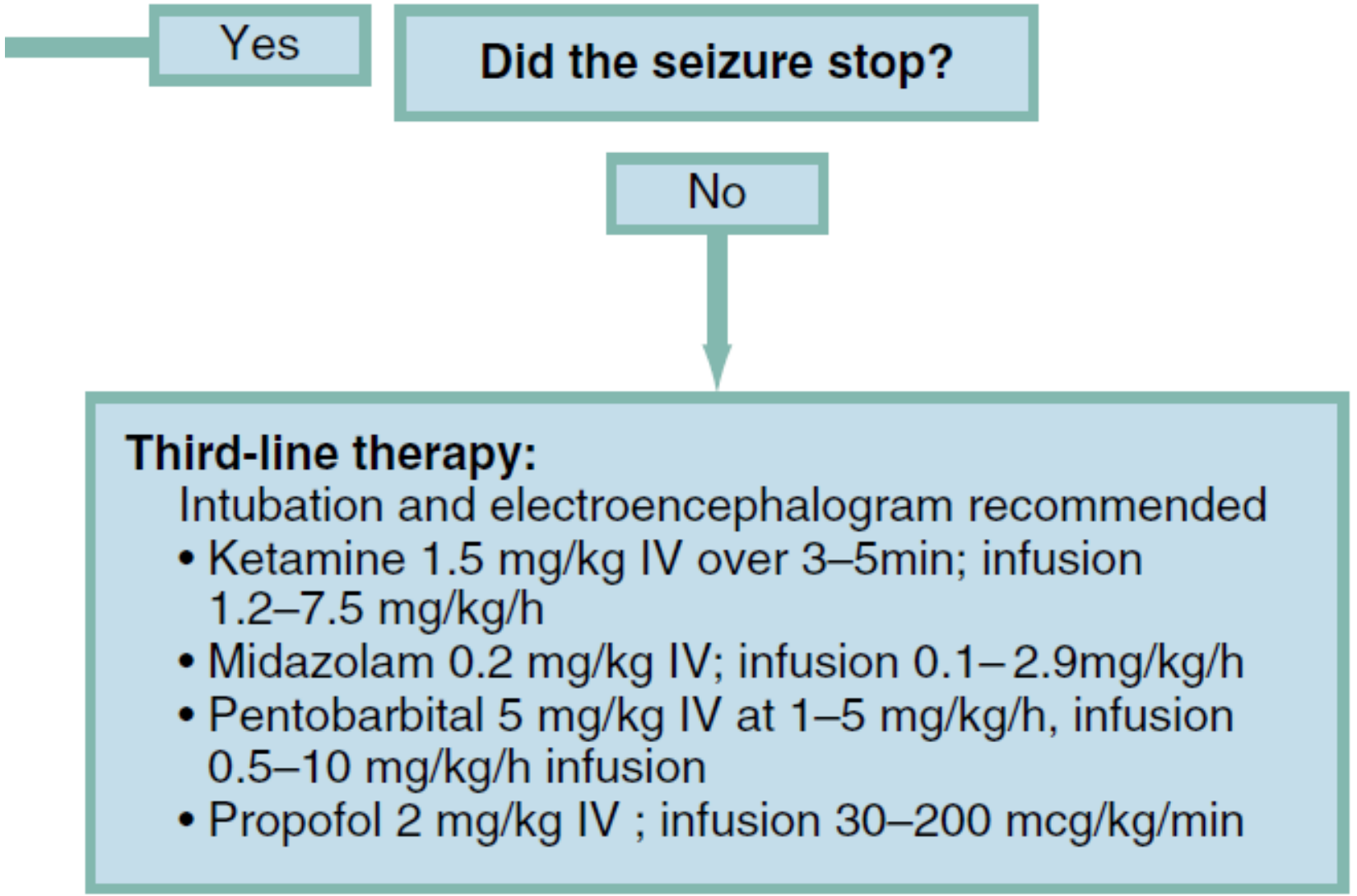
No

TABLE 14.2 Commonly Used Parenteral Antiseizure Agents, Dosing, and Pharmacologic Considerations for Status Epilepticus

Medication	Adult Dose	Comments
First Line		
Diazepam	0.15–0.2 mg/kg IV over 1–2 min max 10 mg per dose, 10– 20 mg PR	Repeat doses every 5 min to a maximum of 30 mg; monitor respiratory status. Rapid redistribution. IV formulation contains propylene glycol. Preferred benzodiazepine for rectal route when IM midazolam and IV lorazepam are not available
Lorazepam	0.1 mg/kg IV over 1–2 min (maximum 4 mg per dose)	Repeat doses every 5 min to a maximum of 12 mg (adults); monitor respiratory status. Rapid redistribution. IV formulation contains propylene glycol. Preferred IV benzodiazepine; do NOT administer IM.
Midazolam	0.2 mg/kg IV over 1–2 min, IM, IN (max of 10 mg per dose)	Repeat doses may be administered every 5 min; monitor respiratory status. Half-life ~7 h. Rapid redistribution. Active metabolites. Preferred IM benzodiazepine.


Did the seizure stop?
Yes
No
Ensure adequate dosing (i.e., 0.1 mg/kg) of first-line therapy then move on to second-line:
• LEV 60mg/kg (max 4500 mg) IV over 10 min
• *LAC 200–400mg IV over 10 min
• PHT 20 mg/kg IV at max 50 mg/kg or fosPHT 20 PE/kg IM or IV at 150 mg/min
• VPA 40 mg/kg over 10 min
Did the seizure stop?
Yes
• Coordinate disposition plan with neurologist.
• Consider non convulsive status epilepticus in patients who have not returned to baseline.
No

Second Line		
Levetiracetam	1000–4500 mg over 10–15 mins (40-60 mg/kg for status epilepticus; maximum of 4500 mg)	Renally cleared.
Fosphenytoin	10–20 mg PE/kg IV (max 150 mg PE/min), IM	May give an additional 5 PE/kg 10 min after loading dose. May cause hypotension and dysrhythmia but less profound than phenytoin. May be administered IM if no IV access. Compatible in saline, dextrose and lactated Ringers.
Lacosamide	200–400 mg IV over 10 min	May give an additional 5 mg/kg over 5 min (max 250 mg IV). May cause arrhythmias (prolonged PR and QTc intervals, or tachyarrhythmias). Renally cleared.
Phenobarbital	15–20 mg/kg at 50–100 mg/min	May give additional 5–10 mg /kg. Monitor respiratory status. Strong cytochrome P450 (CYP) inducer. IV formulation contains propylene glycol.
Phenytoin	15–20 mg/kg IV infusion maximum at 50 mg/min (25 mg/min in patients with cardiac history)	May give an additional 5–10 mg/kg 10 min after the load, up to 30 mg/kg total. May cause hypotension and dysrhythmia. Potent CYP inducer. May cause rash, fever. IV formulation contain propylene glycol. Only compatible in saline. Severe tissue injury risk with extravasation.
Valproic acid	20–40 mg/kg IV over 5–10 min; max 3000 mg.	May give additional 20 mg/kg (max 2000 mg) over 5 min. Potent CYP inhibitor. May cause hyperammonemia, hepatotoxicity, and platelet dysfunction.


Yes
Did the seizure stop?
No
Third-line therapy:
Intubation and electroencephalogram recommended
• Ketamine 1.5 mg/kg IV over 3–5min; infusion 1.2–7.5 mg/kg/h
• Midazolam 0.2 mg/kg IV; infusion 0.1–2.9mg/kg/h
• Pentobarbital 5 mg/kg IV at 1–5 mg/kg/h, infusion 0.5–10 mg/kg/h infusion
• Propofol 2 mg/kg IV ; infusion 30–200 mcg/kg/min

Third Line—Require Intubation, Mechanical Ventilation, and Hemodynamic Support		
Ketamine	Loading: 1.5 mg/kg IV over 3–5 min May repeat 0.5 mg/kg every 3–5 mins as needed Maintenance: starting dose 0.1-4 mg/kg/hr, max 15 mg/kg/hr	NMDA antagonist, which provides an alternative treatment to GABAergic mediated anesthetics. May cause hypotension when shock index ≥0.9. Higher infusion rates associated with large volumes due to dilution.
Midazolam	Loading: 0.2 mg/kg IV, followed by 0.2 mg/kg every 3–5 min (max 2 mg/kg) May repeat 0.2–0.4 mg/kg (max 40 mg bolus) max 2 mg/kg Maintenance: 0.05–2 mg/kg/h	May cause hypotension with higher doses.
Pentobarbital	Loading: 5–15 mg/kg at 50 mg/min, may administer an additional 5–10 mg/kg if needed, max 25 mg/kg Maintenance: 0.5–5 mg/kg/h	Half-life 22 h (up to 50 h as it is dose dependent). May cause hypotension, ileus, myocardial suppression, immunosuppression, and thrombocytopenia. Contains propylene glycol.
Propofol infusion	Loading: 1–2 mg/kg, may repeat 0.5–2 mg/kg every 3–5 mins up to max of 10 mg/kg total Maintenance: normal range 20–80 mcg/kg/min, max 200 mcg/kg/min	Half-life 0.6 h (extended with prolonged infusions). May cause hypotension, respiratory depression, hypertriglyceridemia, pancreatitis, propofol infusion syndrome

Lab Tests

- **BS glucometry** / Serum **BS**
- **Sodium, Calcium, and Magnesium** levels
- **CPK** : (seizure>2 minutes)
- **A Pregnancy test**
- **Toxicology screen**
- **ABG** : Anion gap metabolic acidosis is commonly secondary to **lactic acidosis** in convulsive seizures; acidosis is typically **transient** with lactic acid levels declining within the first hour after convulsions cease

Lab Tests

- Patients with or without history of epilepsy who are on **Antiseizure Medications** for any indication (i.e., seizure prophylaxis, mood stabilization, anxiety, and/or adjunctive psychiatric treatment) should have **levels obtained**, as available

- **Reactive leukocytosis** of varying magnitude is very common after convulsive seizures
- **Lumbar puncture**

BOX 14.1 Characteristics Prompting Consideration of Neuroimaging in a Patient With Seizures

Age >40 years
Coma
Immunocompromised state
Clot disorder (hypercoagulability or hypocoagulability)
History of intracranial hemorrhage
History of malignancy
Severe, thunderclap headache
Status epilepticus, convulsive and nonconvulsive, of unclear etiology
Stigmata of neurocutaneous syndromes
Suspected trauma

THANK YOU