

Seizure and Status Epilepticus Stabilization

Give a benzodiazepine (a calming medicine that hits the brakes on seizures) at 5 minutes. If still seizing, give a second seizure medicine at 20 minutes. If still seizing, use anesthetic (sleep medicine) at 40 minutes.

THE ONE-LINE TRUTH

A seizure that lasts longer than 5 minutes, or seizures that come back without the person waking up in between, is status epilepticus (a seizure that will not stop) — a brain emergency that needs medicine right away.

The chain — how it unfolds

1. The balance between GABA (the brain's stop-signal) and glutamate (the brain's go-signal) breaks, triggered by low antiepileptic drug levels, alcohol withdrawal, stroke, infection, bad electrolytes, drugs, tumor, or eclampsia. — why: Without enough GABA braking or with too much glutamate gas, neurons start firing in a runaway chain — one neuron triggers the next, and the electrical storm spreads across the whole brain like a wildfire jumping from tree to tree.
2. The whole brain fires at once, causing a generalized tonic-clonic seizure: the body goes stiff (tonic phase), then shakes violently (clonic phase), breathing stops or becomes irregular, and the person loses consciousness. — why: The motor cortex (the part of the brain controlling movement) fires uncontrollably, sending chaotic signals down the spinal cord to every muscle, making them contract all at once — that is the stiffness and shaking you see; meanwhile, the reticular activating system (the brain's wake-up center) shuts down, so the person cannot respond or remember.
3. The longer the seizure runs, the more GABA receptors disappear from the neuron surface, and the brain becomes resistant to its own calming signals and to benzodiazepines. — why: Neurons pull GABA receptors inside the cell to protect themselves from the flood of signals, but this makes the brake pedal stop working — so a seizure that has run for 30 minutes is much harder to stop than one treated at 5 minutes.

4. Glutamate floods the synapse, calcium pours into neurons faster than they can pump it out, and the calcium overload kills cells from the inside (excitotoxicity) — leading to permanent brain damage after 30–60 minutes. — why: Neurons use calcium as a signal, but too much calcium turns on enzymes that chew up the cell's proteins and DNA, causing the neuron to die — this is why long seizures can leave someone with memory loss, weakness, or thinking problems even after the seizure stops.
5. Muscles contract so hard for so long that muscle fibers rip apart and spill myoglobin into the blood (rhabdomyolysis), the kidneys try to filter it and get clogged, and acute kidney injury follows. — why: Myoglobin is toxic to kidney tubules and physically blocks the filters, especially when the patient is dehydrated or acidotic — so the kidneys can fail days after the seizure if rhabdomyolysis is severe.
6. The brain's temperature center loses control, core temperature climbs above 104°F (hyperthermia), and the heat damages proteins in every organ, raising the risk of multi-organ failure. — why: The hypothalamus (the brain's thermostat) is overwhelmed by the seizure's electrical chaos and cannot regulate temperature, while the muscles generate heat faster than the body can cool itself — high fever then cooks enzymes and cell membranes throughout the body.
7. Breathing becomes chaotic — long pauses (apnea) alternate with gasping — oxygen levels drop, carbon dioxide builds up, and the patient can aspirate saliva or vomit into the lungs, causing aspiration pneumonia or acute respiratory distress syndrome. — why: The brainstem's breathing centers are disrupted by the seizure, the tongue and jaw muscles are stiff and block the airway, and the gag reflex is gone — so secretions slide down into the lungs instead of being coughed out.
8. After the seizure stops, the brain is exhausted and flooded with inhibitory signals (postictal state), so the person is deeply confused, sleepy, or cannot speak for minutes to hours while neurons recover. — why: Neurons are hyperpolarized (extra-negative inside) and depleted of ATP and neurotransmitters after firing nonstop, so they cannot fire normally until they recharge — that is why confusion and sleepiness after a seizure are normal recovery, not a new emergency, as long as the person gradually wakes up.

Spot it — what you see, and why

- Repeating jerking movements of the arms, legs, or whole body that the person cannot stop: Electrical storms in the motor cortex (the strip of brain that controls movement) send wild, uncontrolled signals down the nerves to the muscles, making them fire over and over in a rhythm the person cannot control.

- Staring blankly and not responding when you call their name or touch them: Abnormal electrical activity spreads across both halves of the brain at once, shutting down the networks that keep you awake and aware—like a power surge that blacks out the whole building instead of lighting it up.
- Confusion or sleepiness that does not clear up after a few minutes: After a seizure the brain's neurons (nerve cells) are exhausted from firing too much and need time to recharge; in status epilepticus (a seizure that will not stop) the seizures keep restarting before the brain can recover, so confusion lingers or deepens.
- Eyes rolled back, eyelids fluttering, or unusual eye movements: The seizure discharge spreads to the brainstem and the cranial nerve nuclei (tiny control centers for eye muscles deep in the brain), causing the eyes to move in ways the person is not choosing.
- Lips turning blue or skin looking dusky gray: During a tonic-clonic seizure the chest muscles lock up and breathing pauses; oxygen in the blood drops, so hemoglobin (the red protein that carries oxygen) turns dark purple-blue and shows through the skin.
- Foaming or drooling at the mouth: The person cannot swallow normally during the seizure, so saliva pools in the mouth; fast breathing or jaw clenching churns it into foam.

Red flags — act now

- Seizure lasting longer than 5 minutes, or a second seizure starting before the person wakes up fully
- Lips or face turning blue, gasping, or not breathing normally
- Pregnant woman having a seizure
- Seizure after a head injury
- Confusion or weakness that does not improve 15–20 minutes after shaking stops

Treat it — in this order

1. Lorazepam 4 mg IV (or midazolam 10 mg IM/IN) within the first 5 minutes → Benzodiazepines flood the brain's GABA receptors (the main stop-signal switches) and tell the overactive neurons to quiet down. This stops the seizure in its tracks within 1–2 minutes in most cases.
2. Check blood glucose and give dextrose 50% (25–50 mL IV) if low; check electrolytes (sodium, magnesium, calcium); start IV line and draw blood → Brain cells need the right fuel (glucose) and the right electrical balance (electrolytes) to fire correctly. Fixing these restores the balance between go-signals and stop-signals the brain is fighting to keep.

3. Give fosphenytoin 20 PE/kg IV, or levetiracetam 60 mg/kg IV, or valproate 40 mg/kg IV (within 5–40 minutes) → These long-acting drugs block the go-signals (sodium or calcium channels) in the brain so neurons fire less easily. Unlike benzos, they stay in the body for hours and prevent the seizure from restarting after the fast-acting benzo wears off.
4. Ask history: prior seizures or epilepsy? AED levels or missed doses? Alcohol use or sudden stopping? Pregnancy? Recent drugs, infections, or head injury? → Each answer points backward to what broke the brain's balance: a low AED level means the patient skipped pills, alcohol stopping causes brain rebound, infection causes inflammation, eclampsia (in pregnancy) breaks electrolyte balance. You find the upstream cause so you can fix it, not just treat the shaking.
5. If still seizing after 40 minutes: intubate the airway, start propofol or midazolam drip or pentobarbital, watch continuous EEG for burst suppression → Anesthetic drips put the entire brain into a controlled sleep-state (burst suppression on EEG) so no neurons can fire a seizure. The breathing tube (endotracheal tube) protects the airway because seizure muscles can close it off and anesthetics slow breathing.

Your top priorities at the bedside

1. Protect the airway by turning the patient on their side, removing objects from the mouth, and suctioning if needed; give oxygen by nasal cannula or non-rebreather mask to keep oxygen saturation above 94%. — why: Seizures stop normal breathing and the tongue can block the airway (the breathing tube); low oxygen damages the brain within 4 to 6 minutes, so keeping oxygen flowing to the brain prevents permanent injury.
2. Check blood glucose with a finger-stick immediately; if glucose is below 60 mg/dL, give 1 ampule (25 grams) of dextrose 50% IV push after securing IV access. — why: The brain needs glucose (sugar) for energy and cannot store it; low blood sugar stops brain cells from working and causes seizures that will not respond to seizure medicine until the sugar is corrected.
3. Give lorazepam (Ativan, a benzodiazepine that calms brain electrical activity) 4 mg IV push over 2 minutes, or midazolam 10 mg into the muscle or nose if no IV access, within the first 5 minutes of seizure. — why: Benzodiazepines stop seizures by increasing GABA (a brain chemical that slows electrical signals); early treatment within 5 minutes stops status epilepticus (a seizure that will not stop) before brain cells start dying from overactivity and lack of energy.