

## 20 Questions about Seizures

1. What are the two most common correctable causes for a seizure?
2. Name a few other causes of seizures...
3. While attending a syncope victim at the Justin Bieber concert you are told that the victim had a "seizure" for a few seconds when she was on the floor. She now is alert, oriented, and feels fine. What probably happened?
4. Can you get a fever from having a seizure?
5. Whose duty is it to report a seizure to the Department of Public Safety (e.g. for driver's license purposes)? How long is driving restricted following a first unprovoked seizure?
6. Name a few drugs that classically cause seizures.
7. What are the two types of partial seizures and how do they present?
8. What is "non-convulsive status epilepticus" and what is the prognosis?
9. A one year old who is having a generalized seizure when you arrive, duration now 10 minutes. An IV attempt fails. What is the correct dose of IM midazolam, given an average-sized one year old?
10. Is a "Jacksonian march" a new dance step? If not, what is it and why is it important?
11. Why is status epilepticus dangerous?
12. We usually think of generalized seizures as being the tonic-clonic variety. What are some other, less common forms?
13. Can fever alone cause a seizure?
14. Which important drug should all seizing patients receive?
15. If a seizure doesn't stop with initial doses of benzos, what is usually done next?
16. What is Todd's paralysis?
17. "Burn out" (in seizure, not paramedic terms) means what?
18. What are some clues to help distinguish subtle seizures from a normal post-ictal phase?
19. Midazolam, like all benzos, has a problematic side effect; to win showcase number three, name it...
20. A child hits an ice cream truck while riding his bike, and is witnessed to strike his unhelmeted head. A seizure follows immediately. On your arrival, he is awake and talking, with a normal neuro exam. What is his prognosis?

## 20 Answers about Seizures

1. Hypoxemia and hypoglycemia. Luckily, our skilled paramedics are well-equipped to detect and manage BOTH of these situations. Also, as usual, infants and small children are at greatly increased risk for hypoglycemia because their small stores of glycogen are quickly exhausted by the demands of a generalized tonic-clonic seizure.
2. Basically, seizures occur because of a structural defect of the brain, changes in the electrical environment of the brain, or poor oxygen and sugar delivery to the brain. A humble list: hypoxia, hypoglycemia (of course), stroke, head injury, tumors, low calcium, magnesium, or sodium, high sodium, uremia, meningitis and encephalitis, drugs, drug withdrawal, congenital syndromes including structural malformations and metabolic disturbances, acquired neurologic diseases especially AIDS and lupus, epilepsy (diagnosis of exclusion).
3. The swooner probably had some myoclonic twitches during her syncopal episode. These accompany about 20% of all fainting spells, are usually brief, not generalized, and

are **not** associated with a post-ictal phase, loss of bladder control, etc. This can be tricky to sort out, however, so err on the side of believing a seizure occurred if there's any doubt. These also occur during cardiac arrest – hence a common 'he had a seizure and his heart stopped' history from witnesses.

4. Yes. The body's hyperactivity during a tonic-clonic seizure will often lead to a rise in temperature, which may persist for up to an hour or so.
5. The patient bears the responsibility. Driving after a first seizure is, surprise, not usually restricted unless a cause is found that will probably lead to a recurrence. After the second, or with any chemically (e.g. cocaine) induced seizure, you lose your license for a variable period. Healthcare providers may report non-compliant patients or other concerns to the MN Dept. of Public Safety.
6. OK, here we go: Cocaine, theophylline, INH, clozapine, phenothiazines (like compazine and thorazine), chemotherapy agents, contrast dye, antibiotics (some), lidocaine, tricyclics, tramadol, acyclovir, decongestants, beta blockers, also bupropion (Wellbutrin). Drug withdrawal, including ETOH and sedatives. Also, taking too much of your anti-epileptic medication can cause you to have seizures.
7. Simple partial seizures involve NO change in consciousness, they may have an isolated area of sensory or motor changes including limb twitching, smell disturbances, hallucinations, etc. Complex partial seizures involve a change in consciousness often with staring, may have lip smacking etc. May mumble or be unable to respond, clumsy, undirected movements, often repetitive. Note there is **no** post-ictal period with simple seizures.
8. Simply that the patient is having continuous seizures, but is not exhibiting tonic-clonic limb movements. The patient may seem surprisingly normal aside from some confusion or may have obvious ongoing abnormalities. The prognosis is much better than for generalized tonic-clonic status in that the body is able to maintain protective reflexes, and acidosis and other metabolic changes are rare. Damage to brain cells can still occur, however!
9. 1mg IM. (Average 1yr wgt 10kg, dose 0.1mg/kg = 1mg)
10. Jacksonian march is the spread (or march) of seizure activity from an initial focus to the whole brain. The patient's seizure may be seen to start with a single limb, then progress to involve the whole body. If the seizure was witnessed, ask if the whole body was involved from the start; if not, what did happen? This history will be invaluable in knowing where to start looking for a lesion, and almost rules out several causes of seizures by its presence.
11. Generalized tonic-clonic seizures place the body under a huge amount of stress. Oxygen and glucose demand skyrockets. Energy stores are depleted, and by-products of the muscle activity create lactic acid, which accumulates. Within 30minutes, the body is at a critical point where brain cells begin to be damaged from the continuous hyperactivity. Most of the time, status is defined as the failure to normalize from a neuro standpoint between seizures (i.e. seizure-postictal-seizure etc. without waking up), or a continuous seizure lasting a prolonged time (usually 30minutes, though damage may occur with even five minutes of continuous seizing).
12. Absence seizure – staring, change in consciousness without obvious motor changes. May occur many times an hour (also called petit mal).

Myoclonic – often in the AM. Sudden, shock-like jerking of the upper extremities.

Atonic – sudden loss of tone with a fall to the floor. Often have injuries from the fall. VERY hard to distinguish from syncope except may have a post-ictal phase.

Tonic – truncal and facial spasm with flexion of the upper extremities. Almost always occurs

in childhood.

Clonic – again, more common in children, repetitive jerking; unless observed onset, cannot usually tell from tonic-clonic

Tonic-clonic – begins with tonic phase (the sudden contraction of the muscles and vocal cords may result in the cry that often is a tip off to the EMS/ED crew), then proceeds to clonic. By far the most common of the generalized motor seizures. (grand mal).

13. A simple febrile seizure occurs in about 3-5% of the population from ages 6 months – 5 years. In order to be simple it has to be a generalized seizure (no focal findings) lasting < 15 minutes and no other clear cause in the setting of a fever. There's a strong family history. About 30% of children that have one will have another (on average, though younger age at onset tends to associate with higher risk for recurrence. There's nothing the parents can do to prevent them as the seizures usually occur as the fever climbs – often at the onset of the illness. We do work the kids up for the source of fever, but unless there's reason to believe there's something else going on the seizure doesn't need additional workup.
14. Oxygen – also very important in the early post-ictal phase, when the body is playing catch-up. A word here about pulse ox. Remember that numbers like 97%-99% still means that a significant number of RBCs are not carrying the max oxygen that they could to the starving brain, so give O2 despite a "normal" pulse ox.
15. A rapid IV load of keppra or fos-phenytoin is next, with or without additional benzos. Depending on duration we likely will move rapidly to intubation (usually using propofol, which can stop seizures) and then higher dose benzos and adding additional agents like Depakote IV (Depakene) or phenobarb.
16. Todd's paralysis is a weakness persisting longer than a normal post-ictal period. Usually involving a side or extremity, it may last up to days. This is a diagnosis of exclusion after CT and other studies are normal and there has clearly been a seizure.
17. Burn out occurs when the body's energy supplies become depleted. The seizure activity continues, but as time passes the muscle contractions get weaker and weaker. This is a sign that the brain and body are weakening, and damage is probably occurring.
18. Any rhythmic or repetitive movements including twitching or lip-smacking. Look carefully for increased muscle tone (post-ictal should be relaxed), head or eye deviation, eyelid fluttering, nystagmus, etc.
19. Respiratory depression. Especially when you combine a post-ictal phase with, for example, the 10mg midazolam if you can't gain IV access the potential is high for decreased ability to protect the airway, and maybe even apnea. Whenever you manage a seizure patient, give plenty of O2 and have the airway bag handy. Make sure the patient is side-lying when possible and have the suction available. These are very effective drugs, but a word to the wise that you're not necessarily out of trouble when the seizure stops. Maybe you want to drive this time? (PS: Don't even *think* of giving flumazenil to reverse the benzos, they'll start seizing again, and no amount of benzos will get them out of it since you've blocked the receptors!)
20. An immediate seizure in the setting of trauma is usually benign, and results from the mechanical impact of the head with the truck causing a massive depolarization of brain neurons, leading to a seizure. The child will still need a full eval, of course, but you may be able to offer some comfort to the parents (provided the child is recovering quickly and isn't

missing limbs, etc). Any seizure that's delayed beyond a few seconds after impact should make you suspect a head injury, and manage accordingly.