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A seizure can suddenly strike any of your patients—are you ready? Learn how to recognize the signs of seizure so you can better care for patients with this disorder and help them live a healthy life.

Seizure! What next?

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The author has disclosed that he has no significant relationship with or financial interest in any commercial companies that pertain to this educational activity.

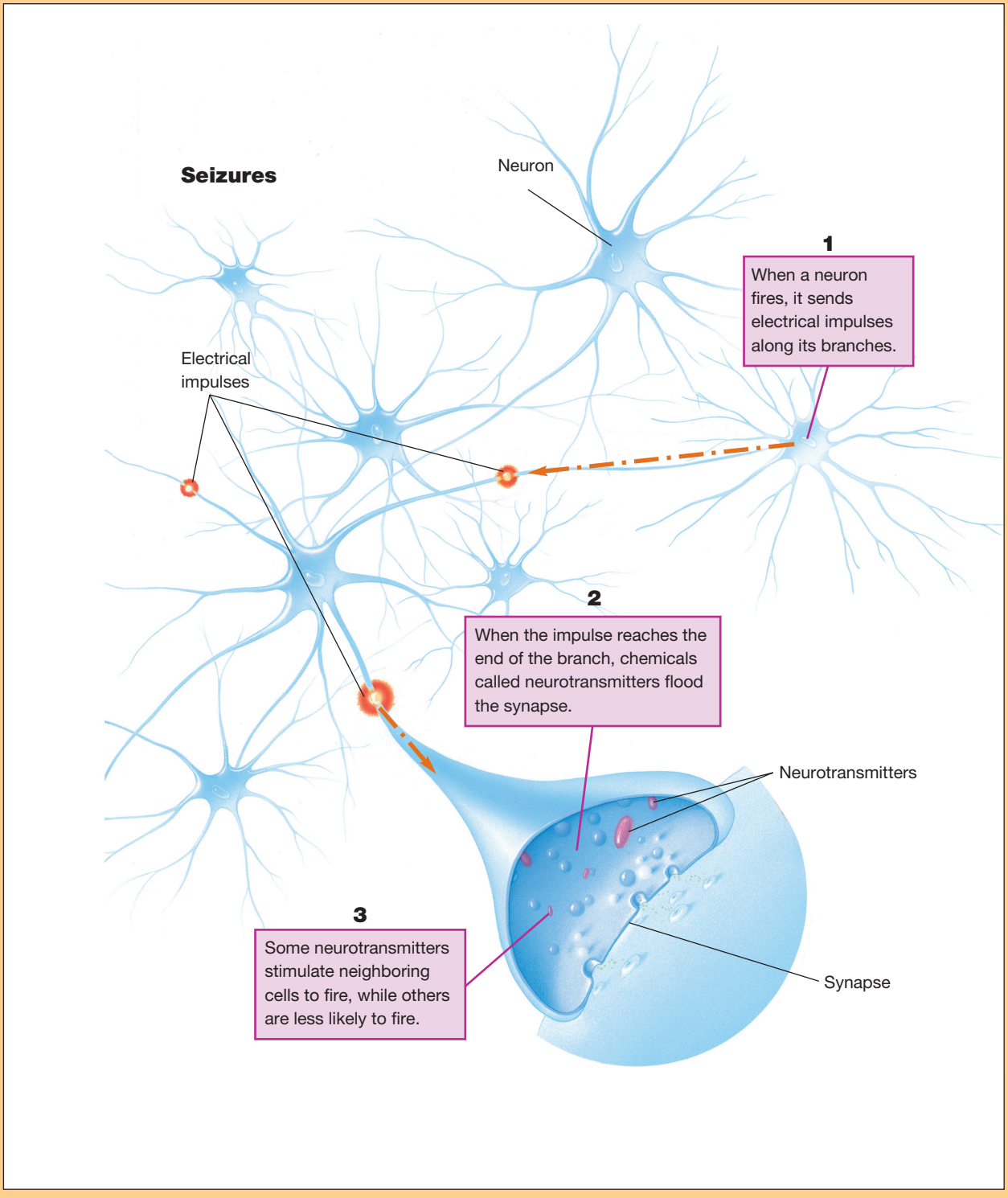
SEIZURES CAN AFFECT anyone, anywhere—about 2.5 million adults and children in the United States suffer from seizure disorders. But do you know what causes them and how they're treated? In this article, we'll take a look at the different types of seizures, the signs and symptoms, how seizures are diagnosed, and how to care for a patient who's having one. Let's get started.

What's a seizure?

Impulses traveling to and from the brain and spinal cord through neuronal cells, or neurons, regulate the body's functions. Typically, neurons fire in a rhythmic pattern to carry out normal daily functions. For example, movement impulses originate in the brain and travel to an arm or leg to be moved. These impulses are a combination of electrical and chemical activity that occurs almost instantly and constantly throughout the entire body (see *How seizures happen*).

A seizure is uncontrolled electrical firing in the brain caused by hypersensitive neurons that are easily excited. A person of any age can develop a seizure at any time. A seizure can be

How seizures happen



a sign of an underlying disorder, such as:

- metabolic disturbance (blood glucose or calcium level)
- brain tumor
- fever caused by infection in the brain or spinal fluid (meningitis or encephalitis)
- traumatic head injury
- stroke
- ingestion of toxins
- alcohol withdrawal.

Seizure vs. epilepsy

Keep in mind that epilepsy isn't the same as a seizure. Epilepsy is defined as the occurrence of at least two unprovoked seizures 24 hours apart. Different types of epilepsy are classified by how the seizure activity manifests; the most common are those with generalized seizures and those with partial-onset seizures. Epilepsy can be primary (when the cause is unknown) or secondary (when the cause is known and the epilepsy is a sign of an underlying condition, such as a brain tumor). Epilepsy affects an estimated 3% of people during their lifetime, with most forms occurring in childhood.

Although studies suggest that susceptibility to epilepsy may be inherited, the cause of epilepsy in many people is unknown. Epilepsy can follow birth trauma, asphyxia neonatorum (oxygen deprivation in a newborn), head injuries, some infectious diseases (bacterial, viral, parasitic), toxicity (carbon monoxide and lead poisoning), circulatory problems, fever, metabolic and nutritional disorders, or drug or alcohol intoxication. It's also associated with brain tumors, abscesses, and congenital malformations.

Epilepsy isn't associated with intellectual level. People who have epilepsy without other brain or nervous system disabilities fall within the same intelligence ranges as the overall population. Epilepsy isn't synonymous with mental retardation or illness. However, many people who have developmental disabilities because of serious neurologic damage also have epilepsy.

Classifying seizures

Generalized seizures

Absence (petit mal): Not preceded by an aura. The patient has a brief change in level of consciousness (about 10 seconds) and may stare into space or appear to be in a daze. An absence seizure may develop into complex partial or tonic-clonic seizure.

Atonic: The patient experiences a loss of postural tone and a loss of consciousness and may fall to the floor. These are rare in adults and are usually seen in children with Lennox-Gastaut syndrome.

Myoclonic: The patient experiences brief, involuntary single or repetitive muscle jerks (myoclonus) and doesn't lose consciousness. These seizures are primarily seen in young children and infants.

Tonic-clonic (grand mal): Preceded by an aura. In the *tonic* phase, the patient experiences muscle stiffening and loss of consciousness. In the *clonic* stage, he loses control of his extremities in a rhythmic, uncontrolled pattern for about 1 minute. During the tonic-clonic seizure, the patient may also lose control of his bladder and bowels. Consciousness returns slowly; after the seizure the patient enters a stage of rest known as the postictal phase, which lasts about an hour. During this phase, the patient will be confused or disoriented and will be difficult if not impossible to arouse.

Partial seizures

Simple: The patient experiences strange or unusual sensations, such as odors or visual abnormalities, and may experience sudden or restless movement, hearing distortion, stomach discomfort, or a sudden sense of fear.

Complex: Usually after experiencing an aura, the patient may stare blankly into the distance and appear confused. He may be unable to change position and may lose consciousness.

Secondary generalized: The patient has a partial seizure that progresses toward a generalized seizure, with loss of consciousness.

Types of seizures

A seizure can be partial or generalized, and subgroups within these classifications further define specific seizure conditions. Let's review what these terms mean.

Generalized seizures involve both hemispheres of the brain. They result from abnormal neuronal activity throughout the brain. There are several types of generalized seizures, including absence, atonic, myoclonic, and tonic-clonic. See *Classifying seizures* for specifics on all seizure types. Seizures that are generalized at the onset are often the result of metabolic disturbances.

Partial seizures involve a single area of the brain in which the neurons fire rapidly in an uncontrolled pattern. They're common in patients who have a structural brain lesion. Partial seizures can be simple (the patient doesn't lose consciousness) or complex (the patient becomes unconscious).

Is your patient at risk?

How can you tell if your patient may be at risk for a seizure? First, check his medical history. Does he have any potential risk factors for seizure? If so, has any medication been prescribed? And if he's taking medication, has he been taking it as prescribed?

Review his electrolyte levels (sodium, calcium) for abnormalities, as well as his blood glucose level. Low calcium or blood glucose levels can trigger seizures.

Diagnostic evaluations such as magnetic resonance imaging and computed tomography scans can help identify lesions on the brain. Electroencephalogram (EEG) results can diagnose a seizure or identify the type of seizure a patient has had. An EEG involves placing tiny electrodes on various parts of the scalp to study brain waves for seizure activity. However, seizure activity on an EEG is evident only when the patient is actually having a seizure.

Advise your patient to keep a seizure log to document when he has a seizure, how long the seizure lasted, and how he felt afterward.

Care during a seizure

Once you realize that a patient's having a seizure, your first step is to protect him from injury and, if he's having a tonic-clonic seizure, provide privacy. During a seizure, the patient's tongue may occlude his airway. One treatment for this is simply to turn him on his side, which lets the tongue fall from the back of the mouth to the side of the mouth. In severe cases of airway occlusion, an oral airway placed in the patient's mouth may be necessary to keep his airway open.

Ease the patient to the floor, if possible, and place a pad or pillow underneath his head to prevent injury. Loosen any restrictive clothing and push aside any furniture that may injure the patient. If the patient is in bed, remove pillows, raise side rails, and use pads on the bed rails. Don't attempt to pry open his jaw or insert anything—broken teeth and injury to the patient's lips and tongue may occur. Don't attempt to restrain the patient. Remain with him throughout the seizure; in a hospital setting, you may want to call for assistance.

If your patient's seizure lasts for more than 10 minutes or he doesn't regain consciousness between seizures, he's considered to be in ***status epilepticus***, which is a life-threatening emergency. Because seizure increases metabolic needs, status epilepticus may trigger severe cardiac, pulmonary, or metabolic derangements. Status epilepticus is often caused by an abrupt withdrawal from seizure medications, but it can also result from drug toxicity or electrolyte disturbances. Status epilepticus requires immediate medical intervention. The primary medications used are I.V. lorazepam (Ativan) or diazepam (Valium).

Once the patient's seizure has subsided, keep him on his side to prevent aspiration (see *Positioning the patient after a seizure*). Make sure his airway is patent. The patient will usually be confused after his seizure, so help reorient him to his environment.

Treatment of seizures

In addition to medications administered to manage status epilepticus, several medications are currently used for ongoing treatment of generalized or partial seizures (see *Medications to treat seizures*).

Sometimes surgery is necessary for patients who don't respond to drug therapy for their generalized or partial seizures. If the patient's EEG shows brain trauma, a brain tumor, or an abscess, the healthcare team may consider surgical resection of the area of the brain affected.

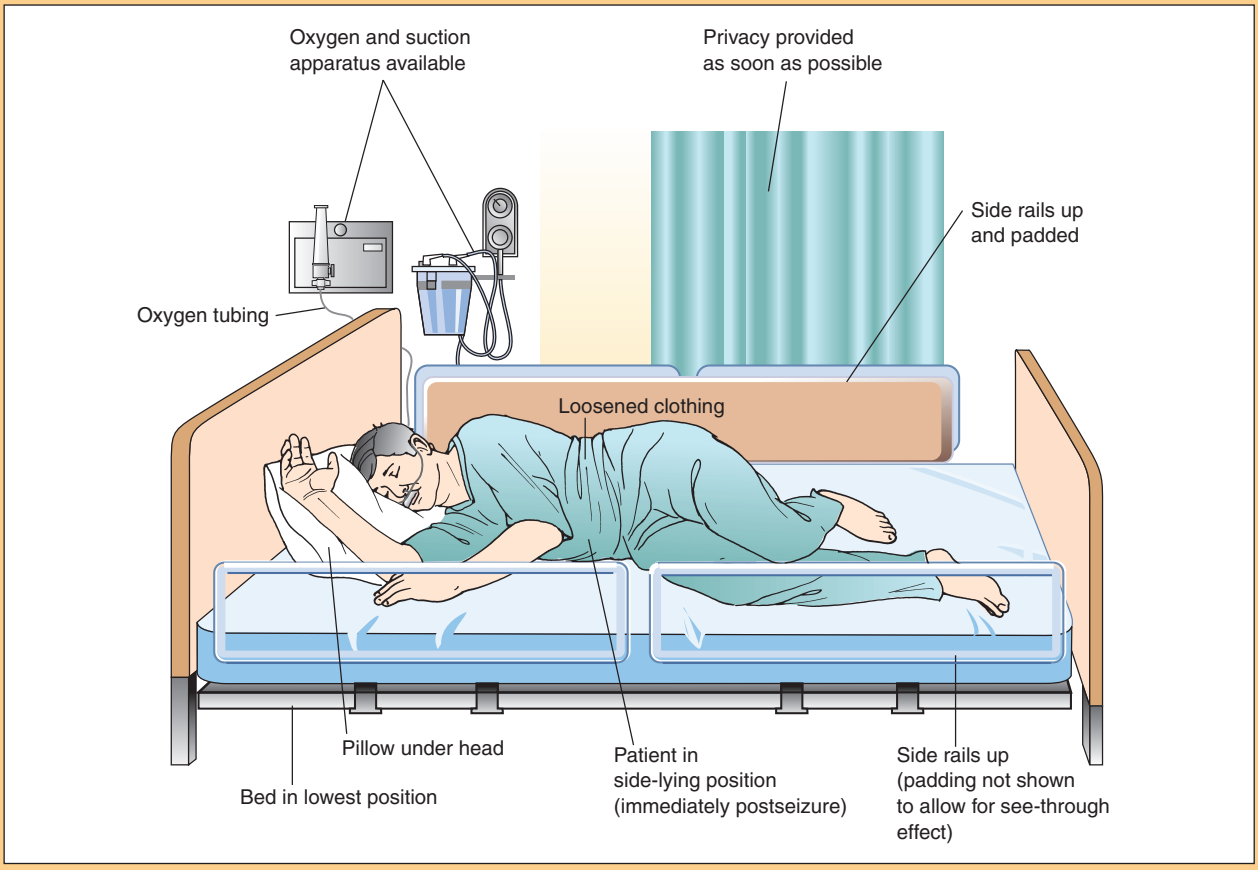
A newer, less invasive surgical approach is the use of a vagal nerve stimulator (VNS). A pacemaker-like device is placed in the patient's left chest area and a lead connects it to the left vagus nerve. The generator is programmed to stimulate the vagus nerve at regular intervals to reduce seizure activity; the healthcare provider determines the intervals. An advantage of VNS therapy is that if a patient detects a seizure coming on, he can stop it by holding a special magnet over the generator.

Educating patients

Patient education is of the utmost importance for a patient who's living with recurring seizures. You'll need to help him gain a clear understanding of his condition, how it will be treated, and how he should follow up with his healthcare providers.

Teach your patient about the medications he needs to take and stress that he needs to take them exactly as prescribed by his healthcare provider, even if he hasn't recently had a seizure. It's also important for your patient and his family to understand the possible adverse reactions of his medication: They must know that they need to alert his healthcare provider immediately if they notice any signs of toxicity. *Medications to treat seizures* reviews possible toxic effects.

Positioning the patient after a seizure



Medications to treat seizures

Medication	Indication	Dose-related adverse reactions	Toxic effects
Carbamazepine (Tegretol)	Primary therapy for generalized and complex partial seizures	Dizziness, drowsiness, unsteadiness, nausea and vomiting, diplopia, mild leukopenia	Severe skin rash, blood dyscrasias, hepatitis
Clonazepam (Klonopin)	Primary therapy for atypical absence seizures and atonic and myoclonic seizures	Drowsiness, behavior changes, headache, hirsutism, alopecia, palpitations	Hepatotoxicity, thrombocytopenia, bone marrow failure, ataxia
Ethosuximide (Zarontin)	Primary therapy for absence epilepsy	Nausea and vomiting, headache, gastric distress	Skin rash, blood dyscrasias, hepatitis, systemic lupus erythematosus
Felbamate (Felbatol)	Monotherapy or adjunct therapy in adults with severe seizures or in children with Lennox-Gastaut syndrome and uncontrolled seizures. Benefits of using the drug must outweigh its serious risks.	Anorexia, vomiting, insomnia, somnolence, aplastic anemia, hepatotoxicity, cognitive impairments, headache, fatigue	Aplastic anemia, hepatotoxicity

Medications to treat seizures (continued)

Medication	Indication	Dose-related adverse reactions	Toxic effects
Gabapentin (Neurontin)	Adjunct therapy for partial seizures, including secondary generalized seizures	Ataxia, drowsiness, somnolence, fatigue, weight gain, dizziness, gastrointestinal (GI) upset, dyspnea	Leukopenia, hepatotoxicity
Lamotrigine (Lamictal)	Adjunct therapy for partial seizures, including secondary generalized seizures	Rash (including Stevens-Johnson syndrome), dizziness, ataxia, blurred vision, nausea, drowsiness, tremor, headache, weight gain	Severe rash (Stevens-Johnson syndrome)
Levetiracetam (Keppra)	Adjunct therapy for partial seizures in epilepsy	Somnolence, dizziness, fatigue	Unknown
Oxcarbazepine (Trileptal)	Adjunct therapy for partial seizures in epilepsy	Dizziness, somnolence, double vision, fatigue, nausea, vomiting, loss of coordination, abnormal vision, abdominal pain, tremor, abnormal gait	Hepatotoxicity
Phenobarbital (Luminal)	Primary therapy for all forms of epilepsy except absence seizures	Sedation, irritability, diplopia, ataxia	Skin rash, anemia
Phenytoin (Dilantin)	Status epilepticus; parenteral treatment and prevention of seizures	Pruritus, nystagmus, dizziness, somnolence, ataxia, nausea, tinnitus, hypotension, groin discomfort with infusion, visual problems, hirsutism, gingival hyperplasia, dysrhythmias, dysarthria	Severe skin reaction, peripheral neuropathy, ataxia, drowsiness, blood dyscrasias
Primidone (Mysoline)	Primary therapy for generalized tonic-clonic, partial, and complex-partial seizures	Lethargy, irritability, diplopia, ataxia, impotence	Skin rash
Tiagabine (Gabitril)	Adjunct therapy for partial seizures	Dizziness, fatigue, nervousness, tremor, difficulty concentrating, dysarthria, weak or buckling knees, abdominal pain	Unknown
Topiramate (Topamax)	Adjunct therapy for partial seizures	Dizziness, somnolence, ataxia, confusion, fatigue, paresthesia, speech difficulties, diplopia, impaired concentration, nausea, anorexia, depression, weight loss	Kidney stones
Valproate (Depakote, Depakene)	Primary therapy for myoclonic, tonic-clonic, and adult-onset absence seizures	GI upset, weight gain, hair loss, tremor, hepatic dysfunction, thrombocytopenia, menstrual irregularities	Hepatotoxicity, skin rash, blood dyscrasias, nephritis
Zonisamide (Zonegran, Excegran)	Adjunct therapy for partial seizures in epilepsy	Somnolence, dizziness, anorexia, headache, nausea, agitation, rash	Leukopenia, hepatotoxicity

Educate the patient's family about the type of seizure that affects the patient—he may lose all control during a seizure and will need to rely on his family to get him the help he needs.

Advise your patient to keep a seizure log to help him document when he has a seizure, whether he experienced an aura, how long the seizure lasted, and how he felt afterward. Tell him to share this with his healthcare provider at his next appointment.

Explain to your patient that someone who's diagnosed with a seizure disorder must temporarily stop driving for 6 months to a year, depending on his state's passenger vehicle laws.

Tell your patient that there are some simple steps he can take to help prevent seizures, such as eating regular balanced meals, refraining from alcohol consumption, getting adequate rest, and controlling his stress level. Advise him to wear a medical-alert bracelet and explain how the accompanying medical alert card will identify his condition and provide his healthcare provider's name and contact information.

Keep it positive

With proper education and encouragement, your patient and his family can become well informed about seizures without becoming overwhelmed. Having instructions on how to care for their loved one when he's having a seizure will allow his family to respond quickly and give him the appropriate immediate care he'll need. If your patient follows his treatment regimens and makes some lifestyle changes, he should be able to live with and control his seizures. **LPN**

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