EMS Training

Epilepsy and Seizure Management

PARTICIPANT’S GUIDE
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The Epilepsy Foundation, a national non-profit with nearly 50 affiliated organizations throughout the United States, has led the fight against seizures since 1968.

The Foundation is an unwavering ally for individuals and families impacted by epilepsy and seizures. The mission of the Epilepsy Foundation is to stop seizures and SUDEP, find a cure, and overcome the challenges created by epilepsy through efforts including education, advocacy, and research to accelerate ideas into therapies. The Foundation works to ensure that people with seizures have the opportunity to live their lives to their fullest potential.

For additional information, please visit www.epilepsy.com

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Introduction

As EMS personnel, naturally, you are often the first responders when someone is having a seizure. The Epilepsy Foundation recognizes how important that EMS response can be to the health and safety of an estimated three million Americans subject to seizures caused by epilepsy. Beyond that number, there are likely millions more who may experience one or more seizure episodes as a result of trauma or other acute or chronic illness.

Given the prevalence and critical nature of these events, the Epilepsy Foundation has prepared this manual to provide information and training crucial to an effective EMS response to seizures. The recommendations from the Epilepsy Foundation outlined in this training are built on solid experience. However, the Foundation also recognizes that the availability of EMS responders, their training, authority for their practice, and their utilization of medications and treatments varies from location to location. Therefore, this information should be regarded as guidelines.

With this in mind, suggested response and treatments guidelines are divided into two categories:

- All Responders/BLS Response (Basic Life Support)
- ALS Response (Advanced Life Support)

EMS responders should follow local regulations, practice and/or medical control. Where differences arise, it is hoped that EMS responders will raise the issues with their leadership to see if modifications in local practice would enhance patient care and outcomes.

Seizure – a sudden, brief disruption of the normal neuron functioning in the brain.

Normal nerve cells, or neurons, in the brain fire billions of electrical signals to each other by means of tiny bursts of energy. They start and then stop, over and over again. Think of these bursts as flashes of energy.

A seizure is a sudden, brief disruption of the normal functioning of neurons in the brain. The disruption in the neurological environment causes some nerve cells to fire without stopping and spread to involve other nerve cells. When this happens, a kind of electrical pulse sweeps through the brain and typically causes the affected person to experience a variety of behaviors such as staring, falling, repetitive motions, disorientation, or to experience the massive muscular contractions generally known as convulsions.
# About this Training

When an individual has a convulsive seizure – that is, an alteration of brain function producing loss of consciousness and muscle contractions affecting the whole body – often the first impulse on the part of the public is to call 911 for an emergency medical services (EMS) response. This training describes a variety of seizures associated with epilepsy, seizures with other potential causes, appropriate EMS response on scene, and issues to be considered when determining whether or not further medical care is warranted.

In general, the goals are to:

- Strengthen the knowledge of Emergency Medical Services (EMS) responders in the recognition, causes, appropriate response and management of generalized and partial seizures and status epilepticus.
- Enhance the ability of EMS responders’ ability to respond effectively to individuals experiencing a seizure, with an emphasis on epileptic seizures.
- Help the EMS responders’ make informed decisions regarding the proper response to seizures with respect to the need for additional care and ambulance transport.

By the end of this training, you will be able to:

- Define what a seizure is and list various causes
- Describe the basics of epilepsy, a variety of seizures associated with epilepsy and other potential causes
- Differentiate between the types of seizures
- Outline appropriate EMS responses and treatment options for those experiencing a seizure

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# What is a Seizure?

**Seizure – a sudden, brief disruption of the normal neuron functioning in the brain.**

Normal nerve cells, or neurons, in the brain fire billions of electrical signals to each other by means of tiny bursts of energy. They start and then stop, over and over again. Think of these bursts as flashes of energy. A seizure is a sudden, brief disruption of the normal functioning of neurons in the brain.

As mentioned earlier, the disruption in the neurological environment causes some nerve cells to fire without stopping and spread to involve other nerve cells. When this happens, a kind of electrical pulse sweeps through the brain and typically causes the affected person to experience a variety of behaviors such as staring, falling, repetitive motions, disorientation, or to experience the massive muscular contractions generally known as convulsions.

A seizure that involves the entire brain is called a **generalized seizure**. This type of seizure generally results in convulsions and other clearly observable behaviors. But not all seizures are dramatic.

More limited disruptions of brain function produce less dramatic changes in movement or behavior, depending on what part or how much of the brain is affected. These are better known as **partial seizures** because only part of the brain is affected. We’ll talk more about these two types of seizures shortly.
A seizure usually lasts a few seconds to a few minutes. Return to full awareness may be rapid or slow. While seizures may take several forms, EMS is most likely to be called when someone has a generalized convulsion (tonic-clonic seizure) or a complex partial seizure which produces altered awareness and confused behavior inappropriate to the surroundings. EMS may also be requested by law enforcement officers to medically evaluate a person exhibiting confusion, disorientation, and other possible signs of seizure activity.

**Be careful not to confuse a seizure with intoxication.**

It may sometimes be tricky to differentiate between someone who is experiencing a seizure from someone who is intoxicated or reacting to legal or illegal substances. A seizure begins suddenly, whereas intoxication is a slowly building process. Information from bystanders, friends or family members as to the way the episode began will help identify which condition is present. During a seizure, the muscles of the body alternately contract and relax while the patient is unconscious. This massive relaxation of muscles may include those involved with bladder and bowel control. A seizure usually lasts a few seconds to a few minutes, and return to full awareness may be rapid or slow.

After a seizure, recovery may occur over a matter of minutes to an hour. An intoxicated person takes considerably longer to become alert, oriented and able to speak clearly. Do not rely on the smell of alcohol as a telltale sign that it is intoxication rather than a seizure. The person may have simply had a glass of wine prior to the seizure episode.

**Typical Causes for Seizures**

A seizure may be idiopathic - that is, it occurs spontaneously and is of unknown cause. Or a seizure may be secondary to an injury, infection or other disorder affecting the brain. Typical causes (of the disruption in the neurological environment making way for a seizure) include:

- Head trauma
- Poisoning
- Chemical imbalances
- Certain drugs
- Severe infections of the brain
- High fever
- Flashing lights

By age 80, nearly 10% of us will have experienced at least one seizure. One of the most common causes of seizures is epilepsy - it is a neurological disorder that has recurring seizures as its primary symptom.
What is Epilepsy?

Epilepsy is one of the most common causes of seizures, affecting an estimated 3 million Americans. It is also called a seizure disorder.

Specifically, epilepsy is a neurological disorder characterized by recurring seizures not otherwise provoked by acute injury or other health emergency. It is one of the potential causes that should always be considered by EMS personnel when called to respond to a seizure event or a person displaying signs of altered mental functioning (mentation).

Because of lingering stigma associated with the condition, some people will strongly deny having epilepsy despite the presence of seizures and a typical history, but will acknowledge having “a seizure disorder.” EMS responders providing assistance to someone with seizures should use both terms when taking a patient history.

Except for stroke, epilepsy is the most common neurological disorder in the United States, affecting some three million Americans of all ages, or approximately one in every 100 people.

Causes of Epilepsy

In 70% of cases, no cause can be found for epilepsy although it is estimated that genetic factors play a role. Known causes include:

- Head injuries
- Stroke
- Brain tumors
- Poisoning
- Problems in brain development before birth
- Serious infections such as encephalitis or meningitis

Among elderly people, epilepsy is most often caused by stroke, cardiovascular disease, brain tumors or Alzheimer’s disease. Epilepsy is also more prevalent in children with mental retardation, Down syndrome, autism, cerebral palsy, and other developmental disorders. Many returning veterans with head injuries develop epilepsy.

As epilepsy is not a specific disease, it is not contagious. It is also not a mental illness, although a seizure may briefly affect mental functioning. However, people who have epilepsy may, like any other person, also have mental health problems, including depression and anxiety. Most are able to prevent seizures by daily use of antiepileptic medications, also called anticonvulsants. However, despite medical therapy, seizures persist in approximately 20% of patients with primary generalized epilepsy (involving the whole brain at once) and 35% of those with partial epilepsy (involving only part of the brain).
The likelihood is high that you will one day be called to treat someone having a seizure.

If seizures happen in a public place, they are likely to generate a 911 call for emergency assistance. If seizures happen at home, and there is an established diagnosis of epilepsy, EMS is usually not called, as the family has experience in the progression and recovery phase of a typical seizure for that patient.

Danger of Prolonged Seizure

EMS may be called, however, if someone with epilepsy whose seizures usually last only a couple of minutes experiences a series of seizures or a single seizure that shows no sign of stopping. Prolonged seizures, those lasting longer than 5 minutes, may progress to a condition known as status epilepticus. Status epilepticus is life threatening and requires immediate medical intervention. Rapid transport to a hospital or emergency care medical center may be required.

Epilepsy and Seizure Triggers

In many cases, there is no obvious trigger for a seizure in someone who has been diagnosed with epilepsy. The possibility of seizures exists despite use of seizure-preventing medication. Nevertheless, there are some key triggers that may produce seizures in people with epilepsy. Triggers include:

- Failure to take medication or running out of medication
- Effects of a planned change in medication or interaction with other medication, either purchased over the counter or prescribed
- Sleep deprivation
- Key points of the menstrual cycle in women
- Effects of hunger or excessive stress
- Heavy use of alcohol, other drugs, or withdrawal from use
- High fever from infection
- Severe dehydration
- Exposure to flashing lights

Witnesses/family comments regarding the presence of one or more of these triggering factors may help the EMS responder identify an epilepsy-related seizure.
Epilepsy and Seizures: Types

As already noted, epilepsy is one of the most common causes of seizures, and seizures caused by epilepsy take a variety of forms. Seizures in a person with epilepsy may be generalized or partial, based on how much of the brain is affected by the neurological dysfunction.

Generalized Seizures

Generalized tonic clonic seizures - (formerly known as grand mal) are the most common and best known type of generalized seizure. This seizure affects the whole brain at once. They begin with stiffening of the limbs (the tonic phase), followed by jerking of the limbs and face (the clonic phase). A generalized seizure is the type most likely to be encountered by EMS responders. A generalized tonic clonic seizure can also be caused by head trauma, poisoning, brain tumors, metabolic disorders or other acute conditions affecting the brain.

Absence seizures – (formerly known as petit mal) are lapses of awareness, sometimes with staring, that begin and end abruptly, lasting only a few seconds. There is no warning and no after-effect. Awareness and the ability to communicate usually quickly return after an absence seizure. More common in children than in adults, absence seizures are frequently so brief that they escape detection, even if the child is experiencing 50 to 100 attacks daily. They may occur for several months before a child is sent for a medical evaluation.

Myoclonic seizures – marked by rapid, brief contractions of muscles, which usually occur at the same time on both sides of the body. Occasionally, they involve one arm or a foot. People usually think of them as sudden jerks or clumsiness. A variant of the experience, common to many people who do not have epilepsy, is the sudden jerk of a foot during sleep.
Atonic seizures — produce an abrupt loss of muscle tone. Other names for this type of seizure include drop attacks, astatic or akinetic seizures. They produce head drops, loss of posture, or sudden collapse. Because they are so abrupt, without any warning, and because the people who experience them fall with force, atonic seizures can result in injuries to the head and face. Protective headgear is sometimes used by children and adults. The seizures tend to be resistant to drug therapy. Awareness and the ability to communicate usually quickly return after an atonic seizure.

Infantile spasms — clusters of quick, sudden movements that start between 3 months and two years. If a child is sitting up, the head will fall forward, and the arms will flex forward. If lying down, the knees will be drawn up, with arms and head flexed forward as if the baby is reaching for support.

Partial seizures

In partial seizures the electrical disturbance in the brain is limited to a specific area of one cerebral hemisphere (side of the brain). Partial seizures are subdivided into simple partial seizures (in which consciousness is retained); and complex partial seizures (in which consciousness is impaired or lost). Partial seizures may spread to cause a generalized seizure, in which case the classification category is partial seizures secondarily generalized. Partial seizures are the most common type of seizure experienced by people with epilepsy. Virtually any movement, sensory, or emotional symptom can occur as part of a partial seizure, including complex visual or auditory hallucinations.

A Simple partial seizure may be no more than an odd feeling, a shaking limb, a change in how things look or smell, or a period of lost time that only the person having the seizure experiences. These episodes are unlikely to generate calls for emergency assistance unless they are continuous. However, they sometimes precede a generalized seizure. If family members or bystanders report that someone experiencing a convulsion or a period of changed awareness had one of these episodes first, it helps to establish the diagnosis.

A Complex partial seizure is easily mistaken for an episode of mental illness, intoxication, use of illicit drugs or directed anti-social behavior. Depending on the function of the affected part of the brain, and how extensive the disruption is, this type of seizure produces a kind of dream-state, in which the person appears to be awake but is completely or almost completely out of touch with his or her surroundings. He will be unable to respond to directions. He may mumble or repeat a phrase over and over again. He may wander into traffic or other danger quite oblivious to the risk of harm. In rare cases, people having this type of seizure may cry out, run, flail their arms, or experience extreme fear.
Special Cautions

Use of force

While the overwhelming majority of EMS responders do an outstanding job recognizing and handling citizens experiencing seizures, in limited cases they may respond with inappropriate force to behaviors associated with seizures, especially complex partial seizures. These particular seizures cloud awareness, block normal communication, and produce a variety of undirected, involuntary and unorganized movements that may be erroneously viewed as aggression. The results can be fatal, especially when dangerous restraint practices are used.

DO NOT FORCIBLY RESTRAIN A PERSON WHO IS HAVING A SEIZURE; THIS INCLUDES USE OF IMMOBILIZATION TECHNIQUES AND DEVICES.

The Importance of Stopping Convulsions

Although not an actual type of seizure, status epilepticus is said to exist after 30 minutes of continuous seizure activity. It is a true medical emergency requiring immediate treatment or rapid transport to a hospital. However, current recommendations call for treatment to stop a convulsive seizure if it has continued for more than 5 minutes, followed by hospital transport.

While prolonged generalized convulsions are regarded as being of highest risk, it is also possible to experience prolonged partial seizures. These present as episodes of continual confusion lasting much longer than the 2 to 3 minutes that a normal seizure of this type would last. Because they represent continuing disruption of brain activity, they too require emergency treatment and need to be stopped as soon as possible.

Most seizures due to epilepsy resolve safely and do not result in death or serious injury. However, there are exceptions.

- The generalized tonic clonic seizure places substantial strain on the cardiovascular system and, in rare cases, may be fatal.
- If a seizure is triggered by a non-epileptic, life-threatening event (such as acute poisoning, severe injury, or hypoxia from any cause) the seizure may result in death.
- Death may result if a seizure occurs in a potentially dangerous environment, such as at heights, in water, or while driving. Occasionally, a seizure while eating will lead to aspiration of food or vomit into the lungs, which is one reason why the airway should always be checked by EMS. Suffocation during a seizure sometimes occurs if the seizure happens during sleep.
After a Seizure:

The Postictal Phase

The period of time after the seizure (ictus) ends and the person’s alertness and orientation returns to their pre-seizure state is called the postictal period, also spelled post-ictal. Although the amount of time a person stays in this period varies between individuals, the type and location of the seizure, medications, etc., it can last from seconds to several hours. Usually after a generalized seizure or complex partial, the person will initially appear confused, disoriented and tired, and may feel fearful, depressed, frustrated and even embarrassed. Full recovery is accompanied by re-establishment of coherent speech. The patient is likely to have no memory of events that occurred prior to the seizure.

However, usually within 20 minutes, most have regained full alertness and orientation. If after 20 minutes the person remains confused, the person should be transported to an appropriate medical facility for evaluation.
Treating Seizures

At a very high level, there are several basic actions you will need to take to understand the situation when coming upon a seizure call.

Treatment Do’s

Establish safety and privacy - create a safe space. Make sure the physical area is safe by removing objects that could hurt the patient. Ensure the scene is safe for rescuers. Use appropriate body substance isolation (BSI) precautions.

- **Check for obvious triggers** – look around for obvious seizure triggers such as downed electrical wires or chemical spills.

- **Assess the patient** – check level of consciousness, responses, etc., even look for a medical ID bracelet or necklace.

- **Question witnesses** – attempt to find out what preceded the episode. Try to get specifics about the patient’s behavior to help you understand the type of seizure the person is experiencing.

- **Establish a timeline** – find out how long the person has been in seizure.

- **Conduct a head-toe examination** – look for trauma, protect the person’s head by placing something soft and flat under it but DO NOT restrain the person, and keep the airway clear.

- **Determine next steps** – decide if the person can be safely treated on the scene or requires further medical intervention. Pay attention to what happens in the postictal phase.

**WARNING**

If it has been more than 5 minutes, transport the patient to the hospital.
There are a number of important cautions that you must be aware of.

### Treatment Don’ts

- **Don’t give anything by mouth** - people with epilepsy should never be given epilepsy meds and/or fluids until the seizure is over and consciousness has returned.

- **Don’t restrain** - the EMS responder should never attempt to prevent further injury by restraining the jerking movements of someone having a seizure. Restraining involuntary muscle spasms that produce jerking may cause muscle tears or even fractures. It is better to let the movements take place freely, but to protect the head from continued impact on the ground by placing something flat and soft underneath. Make sure breathing is unimpeded.

- **Don’t make assumptions** - EMS responders should never assume that because an alcohol type odor is noted on a person’s breath, that the individual is intoxicated. The individual may have gone out to dinner and had a single drink prior to the seizure, but the two events are not necessarily connected. Withdrawal from alcohol or barbiturates is more likely to trigger a seizure.

- **Don’t allow extended seizure** - although not an actual type of seizure, status epilepticus is said to exist after 30 minutes of continuous seizure activity. It is a true medical emergency requiring immediate treatment or rapid transport to hospital. However, current recommendations call for treatment to stop a convulsive seizure if it has continued for more than 5 minutes, followed by hospital transport.

While prolonged generalized convulsions are regarded as being of highest risk, it is also possible to experience prolonged partial seizures. These present as episodes of continual confusion lasting much longer than the 2 to 3 minutes that a normal seizure of this type would last. Because they represent continuing disruption of brain activity, they too require emergency treatment and need to be stopped as soon as possible.
Prehospital Treatment:
Convulsive Seizure in Progress

All Providers/BLS Response:

- Assure scene safety, utilize BSI precautions, and advocate for patient respect, rights and privacy.
- Do not restrain movements.
- Assess level of consciousness (LOC).
- Ask witnesses how long the seizure has been under way, precipitating factors, witnessed injury, and if they gave any medication or tried any treatments to stop the seizure prior to your arrival. Determine if they witnessed any blank stare, cry, fall, loss of consciousness, shaking or shaking on one side of the body that progressed to full blown seizure, staring, chewing movements of the mouth, followed by confusion and loss of awareness of environment.
- Time the seizure from the beginning point supplied by bystanders. If the time extends beyond five minutes, transport actively convulsing patient to hospital, with or without ALS, and notify receiving hospital.
- If trauma is not suspected, turn patient on one side into the recovery position to allow fluids in the mouth to drain and keep airway clear.
- Place something soft and flat under the head to protect against injury.
- Protect patient’s privacy by removing nonessential bystanders.

- Clear surrounding area of items that could injure patient.
- Institute active seizure management with the goal of protecting life and safety until the seizure ends, as follows:
  - Make sure the mouth and airway are clear of any items that well meaning but misguided bystanders may have inserted. Do not attempt to secure the tongue.
  - Loosen restraining garments around the neck and airway.
  - Determine need for airway support (breathing may be arrested at the start of the seizure as muscles contract, resulting in a bluish tinge to tissues, and may be shallow during the postictal phase). If airway is compromised by secretions, blood or vomit, suction to remove.
  - Maintain an open airway and administer oxygen using appropriate delivery device, such as a non-rebreather mask with 100% supplemental oxygen at 12-15LPM. (If ventilations require assist, consider inserting a nasopharyngeal airway (NPA) and maintain until patient can control his or her own airway.)
  - Assess presence of pulse and closely monitor pulse rate. This is of critical importance in an actively seizing patient because of the risk of cardiac arrest due to low oxygen levels (hypoxia).
Initiate and monitor ventilatory and cardiac status. If available, utilize BP, EKG, pulse-oximetry, eTCO2 and/or other approved methods of monitoring the effectiveness of the cardio-pulmonary systems.

Look for medical ID bracelet or necklace on patient or in patient’s wallet if authorized (“epilepsy”, “seizures”, “seizure disorder”, “diabetic”, etc.). Lack of medical history ID does not rule out epilepsy.

Check patient’s blood glucose level and treat as authorized.

Check patient’s temperature. Ensure hyperthermic patient (infant, child and adult) experiencing seizure is not excessively dressed or bundled. Cool using approved methods. Do not allow patient to shiver thus increasing metabolic rate and body temperature.

Obtain a focused history from witnesses, family or accompanying individuals about any diagnosis of epilepsy and/or other precipitating event, history of pregnancy, diabetes, alcohol/drug use, history of abnormal ingestion, or known head injury. Use SAMPLE as an aid (page 29).

Were any of the following noted by witnesses prior to the seizure?

- Blank stare, cry, fall, loss of consciousness, shaking OR
- Shaking on one side of the body that progresses to full blown seizure OR
- Staring, chewing movements of the mouth, followed by
- Confusion and loss of awareness of environment

Conduct a physical head-to-toe exam, including:

- Lung sounds, pupil response, trauma to head and tongue, etc.
- Pay particular attention to possible need for spinal immobilization.
- Presence of antiepileptic medication on individual (see list on page 23).

Monitor vital signs and LOC until patient is fully awake, alert and oriented.
Activate ALS and/or rapidly transport patient to an appropriate receiving facility if the patient:

- Continues to seize after 5 minutes OR
- Experiences a second seizure shortly after the first OR
- Remains unconscious OR
- After 20 minutes, remains confused OR
- Is pregnant OR
- Has a co-morbid condition such as diabetes OR
- Experienced the seizure while in water OR
- Has been injured during or prior to the seizure or other event OR
- Is experiencing severe headache or other symptoms different from those usually associated with his or her seizures

ALS Response to convulsive seizure in progress:

- Follow All Providers/BLS Response guidelines as described above.
- Follow local protocols if convulsive seizure lasts beyond 5 minutes.
- Prepare for medication delivery to stop seizure activity.
- Obtain circulatory access.
- Continue to monitor patient's cardiac and respiratory status, level of consciousness and observe for any changes in neurological status

ALS Response to convulsive seizure continuing beyond 5 minutes:

Most seizures caused by epilepsy end after a couple of minutes. Extended seizures from any cause, lasting more than 5 minutes and continuing, stresses neurological, respiratory, and cardiovascular systems. If seizures are prolonged, there is a marked increase in metabolic rate which may lead to such serious conditions as hypoxia, hypercapnia, hypoglycemia, metabolic acidosis and electrolyte disturbances. It is therefore important to institute active treatment to bring the seizure to an end as soon as possible. Benzodiazepine drugs have been the cornerstone of emergency treatment of seizures for years. Diazepam (Valium) is the most widely used drug of this type. Other benzodiazapines are available and may be authorized.

PEDIATRICS: For pediatric patients with seizures, follow pertinent protocols above. In addition: If the patient is less than 12 months old, or appears ill, strongly urge parents to have the child transported to hospital and/or to be promptly evaluated by a physician.
- **Diazepam (Valium)** is delivered primarily by IV, but is poorly absorbed and may be unreliable if given intramuscularly.

- **Midazolam (Versed)** has a much shorter half-life and may be administered by IV, IM and Buccal.

- **Lorazepam (Ativan)** has a longer duration of action (up to 90 minutes) and may be considered as another IV or IM alternative agent to stop seizures.

- **Diazepam rectal gel (Diastat)** may also be available for EMT.

  Epilepsy medications administered intranasally are also available; use per local protocol.

Effective duration of action varies depending on drug, dose and route of administration. Recurrence of seizures should be watched for. Administer and re-administer approved benzodiazapine per local protocol.

Watch for respiratory depression associated with benzodiazapine use and ventilate as needed to maintain normal SaO2 and eTCO2 levels.

Overdoses of benzodiazapines may be treated by flumazenil (Romazicon), a specific benzodiazepine receptor antagonist with a very short half-life. The onset of reversal is usually evident within 1 to 2 minutes after IV injection is completed. Caution should be exercised with initial and/or repeated dosing to patients with liver disease. Caution should also be used with flumazenil (Romazicon) due to the possibility of eliciting symptoms of benzodiazepine withdrawal, including seizures.

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**Prehospital Treatment:**

**Patient No Longer Convulsing**

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**All Providers/BLS Response:**

Monitor vital signs and level of consciousness (a slow return to full awareness may be expected, but confusion may persist). Breathing is likely to be labored and shallow at first, therefore:

- All seizure patients should be placed on a non-rebreather mask with 100% supplemental oxygen at 12-15 LPM.

- Continue to monitor patient’s pulse, blood pressure and respiratory status.
Monitor breathing closely and be ready to assist with positive-pressure ventilation if needed. Consider a nasopharyngeal airway as needed.

Look for medical ID bracelet or necklace on patient or in patient’s wallet if authorized (“epilepsy”, “seizures”, “seizure disorder”, “diabetic”, etc.). Lack of medical history ID does not rule out epilepsy.

Check patient’s blood glucose level and treat as authorized.

Obtain a focused history from witnesses, family or accompanying individuals about any diagnosis of epilepsy and/or other precipitating event, missed medications, sleep deprivation, excessive hunger or stress, history of pregnancy, diabetes, alcohol/drug use, history of abnormal ingestion, or known head injury. Use SAMPLE (page 29).

Conduct a physical head-to-toe exam, including:

- Lung sounds, pupil response, trauma to head and tongue, etc.
- A rapid, head to toe physical exam to check for any injuries the patient may have sustained during the seizure is advised. Sudden falls with complete loss of consciousness may fracture bones or cause head injuries. Manage any injuries found and continue to monitor the patient’s airway, breathing, circulation and vital signs. Pay particular attention to possible need for spinal immobilization.

Monitor vital signs and LOC until patient is fully awake, alert and oriented.

Activate ALS and/or rapidly transport patient to an appropriate receiving facility if:

- A second seizure occurs shortly after the first OR
- The patient remains unconscious OR
- After 20 minutes, patient remains confused OR
- Patient is pregnant OR
- Has a co-morbid condition such as diabetes OR Experienced the seizure while in water OR
- Has been injured during or prior to the seizure or other event OR
- Is experiencing severe headache or other symptoms different from those usually associated with his or her seizures

**PEDIATRICS:** For pediatric patients experiencing a seizure, follow pertinent protocols above. In addition: If the patient is less than 12 months old, or appears ill, strongly urge parents to have the child transported to hospital and/or to be promptly evaluated by a physician.

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ALS Response to patient no longer convulsing:
Follow protocols as described above, with addition of the following:

- While placement of a nasopharyngeal airway is usually sufficient to maintain the airway, in rare cases an advanced airway may be required, i.e., ET, Combitube, LMA, King Airway, etc.

- If an advanced airway is utilized, eTCO2 monitoring is encouraged.

Prehospital Treatment: Complex Partial Seizure Marked by Automatic Behavior, Confusion, Inability to Communicate

If witness descriptions include an abrupt start, with stare, mumbling, picking at clothes, and subsequent wandering, running, or disturbed behavior, the event is most likely to be a complex partial seizure.

All Responders/BLS Response:

- Ask witnesses when and how the episode began.

- Calmly reassure patient that all is well and he or she is safe.

- Establish level of consciousness with questions such as name, location, date.

- Block patient’s access to doors, open windows or other hazards such as busy streets by standing in front of patient. However, do not grab hold unless immediate danger threatens. Patients in the throes of a complex partial seizure may unknowingly flail against restraint.

- Seek information from accompanying individuals regarding any existing epilepsy or seizure disorder diagnosis.

- Monitor recovery and arrange for safe passage home for patient once he or she is fully aware of surroundings.

- If safe to do so, check patient’s blood glucose level but be aware that a person in the throes of a complex partial seizure may unknowingly flail against restraint. Treat as authorized.

ALS Response:
Treat per ALS Response Seizure in Progress on pages 15 and 16.

Obtain a focused history from witnesses, family or accompanying individuals.
Epilepsy and Seizures: Patient Experiencing a Convulsive or Complex Partial Seizure Who has a Vagus Nerve Stimulation (VNS) Implant

All Responders/BLS Response:

Some patients with epilepsy are being treated with an implanted device called a Vagus Nerve Stimulator (VNS) designed to prevent seizures through electrical stimulation of the vagus nerve in the neck.

The stimulated nerve carries a small electrical charge into the brain on a regular, programmed basis. The charge originates in a small disc battery implanted on the left side of the chest wall. Additional charges may be generated by means of a magnet, worn on the patient’s wrist, being passed over the battery. Some patients find they can abort an impending seizure or shorten a seizure in progress by generating an additional electrical pulse in this way.

- Treatment of someone who has a VNS and is having a seizure includes moving the patient’s wrist magnet in a single pass over the implanted battery on a slow count of 1-3. The implant area may be visible as a small elevated oval area of the upper left chest wall.

- Assist the patient by passing the magnet over the VNS battery once every 3-5 minutes, up to three times.

NOTE: If the VNS does not stop and/or control the seizure activity, treat per guidelines as listed under PREHOSPITAL TREATMENT: CONVULSIVE SEIZURE IN PROGRESS.

Epilepsy and Seizures: Is Ambulance and Hospital Transport Needed?

All Responders/BLS Response:

A seizure in an individual who does not have epilepsy is likely to be the result of an acute, serious, even life-threatening condition. Rapid transport to a hospital or appropriate facility is advisable in such cases. However, a seizure in someone who has epilepsy, while potentially serious, is much more likely to resolve without further problems. In such cases, transport to hospital may be unnecessary unless there are complications. Some localities mandate hospital evaluation for all emergency calls. Others allow the patient to decline ambulance transport. Wherever possible, post-ictal (post-seizure) patients with epilepsy should have the option to decline.

If local protocols permit, transport of someone with a history of epilepsy may NOT be necessary if:

- Breathing is unimpaired AND
- Patient appears fully awake and oriented AND
- Is under medical supervision for seizures AND
- Is taking medications as prescribed AND
- Patient or legal guardian understands and assumes risk for declining transport
If transport is declined:

- Secure appropriate signature on release form or waiver per local protocol.
- If possible, contact and secure an agreement from family member, friend or taxi service to assure that patient returns home safely.
- A person who just experienced a generalized tonic clonic or complex partial seizure should not be allowed to drive. A family member, friend, or taxi should be called to take the seizure patient home. Not only may there be some residual confusion or slowed response on the part of the patient, but driving privileges in many states require a person to be seizure free for a set period of time, usually a matter of months or even years.

Transport to an appropriate medical facility IS appropriate if:

- The patient remains unconscious OR
- Experiences a second seizure shortly after the first OR
- After 20 minutes, patient remains confused OR
- Patient is pregnant OR
- Has a co-morbid condition such as diabetes OR
- Experienced the seizure while in water OR
- Has been injured during or prior to the seizure or other event OR
- Is experiencing severe headache or other symptoms different from those usually associated with his or her seizures.

However, if in doubt as to the patient’s post-seizure level of recovery or post-seizure condition, err on the side of caution, and transport.
Epilepsy and Seizures: Antiepileptic (Anticonvulsant) Drugs

A number of drugs are used in the treatment of epilepsy. Their primary role is to prevent seizures and their effectiveness depends largely on whether they are taken regularly in the appropriate dose. However, a seizure is still possible even when all regimens are followed. Presence of one or more of these medications on an individual who is having a seizure increases the likelihood that the seizure is due to epilepsy, although some of the drugs have other indications as well. The following medications can be prescribed for epilepsy:

- Carbamazepine (Tegretol, Tegretol XR, Carbatrol)
- Clonazepam (Klonopin)
- Ethosuximide (Zarontin)
- Felbamate (Felbatol)
- Gabapentin (Neurontin)
- Lacosamide (Vimpat)
- Lamotrigine (Lamictal)
- Levetiracetam (Keppra)
- Oxcarbazepine (Trileptal)
- Phenobarbital Phenytoin (Dilantin, Phenytek)
- Pregabalin (Lyrica)
- Primidone (Mysoline)
- Rufinamide (Banzel)
- Tiagabine (Gabitril)
- Topiramate (Topamax)
- Valproate (Depakote, Depakene)
- Lorazepam (Ativan), diazepam (Valium) and midazolam (Versed) may also be prescribed for emergency treatment to halt an extended seizure.
- Rectal diazepam gel (Diastat) may be prescribed for emergency use by non-medical personnel to bring prolonged or cluster seizures to a close.
- Fosphenytoin (Cerebyx) is used in hospital settings to stop episodes of status epilepticus.

- Vigabatrin (Sabril)
- Zonisamide (Zonegran)
Prehospital Treatment: Convulsive Seizure in Progress

Seizure of Unknown Cause

All Providers/BLS Response:

If there is no evidence of a previous diagnosis of epilepsy or seizure disorder, EMS personnel responding to an individual undergoing a convulsive seizure must consider other potential underlying causes. Since prompt treatment of that underlying cause may in some cases help bring the seizure to an end while preserving the health of the patient, identification of the underlying cause is important. Seizures may result from a CNS injury/disorder, metabolic changes, severe infection, Alzheimer’s disease/dementia or other conditions causing disruption in brain activity.

Whatever the cause, the immediate physical management of the seizure is the same as the management of a generalized convulsive seizure in someone with epilepsy (see pages 15-17).

While initial EMS management may be the same, identification of the underlying cause is important, since prompt treatment of the underlying cause may in some cases help bring the seizure to an end while preserving the health of the patient.

Prehospital Treatment: Convulsive Seizure Due to CNS Injury/Disorder

These include:

- Trauma to the brain: structural damage, free blood, scar tissue formation and hypoxia due to medical causes and/or blow to the head
- Brain tumor
- Scar on the brain from a previous injury
- Stroke
- Alzheimer’s disease/dementia
- Changes in cardiac rate or rhythm abnormalities that may affect cerebral blood flow and/or flow of oxygen to the brain

Identifying factors:

- No diagnosis or history of epilepsy
- History of recent head injury, stroke or TIA
- Diagnosed brain tumor or other disorder
- Signs of acute injury to the head
- Signs of neurological dysfunction: change in mental status, respiratory pattern, pupil size/reactivity/orientation/or posturing
- Droop of facial tissues, slurred speech, paralysis or weakness on one side of the body
- Advanced age
- Alzheimer’s diagnosis
All Providers/BLS Response:
Treat following guidelines on pages 15-17.

If head injury is possible and signs of increasing intracranial pressure are observed (increased BP, decreased pulse rate, rapid and/or deep irregular respirations, unilateral dilated pupil, posturing, focal neurological findings, etc.) slightly hyperventilate patient (age variable) with bag-valve mask and 100% O2 and/or utilize eTCO2 monitor to maintain CO2 between 30-35.

ALS Response:
If seizure has lasted longer than 5 minutes, follow ALS Response on pages 15-17.

- Administer medications per local protocols.
- Limit fluid administration except as indicated by signs of hypovolemia.
- Provide rapid transport to nearest appropriate facility.

Prehospital Treatment: Convulsive Seizure Due to Metabolic Disorder

A variety of metabolic irregularities can produce a chemical imbalance in the brain sufficient to produce a generalized convulsive seizure. Susceptible individuals include those with diabetes or other metabolic disorder, or women who are pregnant and subject to pre-eclampsia.

Potential causes also include:
- Low blood levels of oxygen or sodium.
- Decreased blood levels of calcium, magnesium, potassium, or glucose.
- Increased blood levels of sodium, glucose, or calcium.
- Pre-eclampsia/eclampsia of pregnancy.
- Liver or kidney failure.
- Sudden withdrawal from heavy alcohol, barbiturate, or benzodiazepine use.
- Side effects of legal or illegal drugs, including aminophylline, lidocaine, phenothiazines, physostigmine, tricyclic antidepressants, certain antihypertensive medications, cocaine, PCP and amphetamines.
- Electrolyte imbalance, sometimes associated with diuretic use.
- High temperature, humidity or over exertion (e.g. during or after running.)

Prehospital Treatment: Active Seizure has Ceased

All Providers/BLS Response:
Treat following guidelines on pages 18-19.

Activate ALS and/or rapidly transport patient to an appropriate receiving facility.

Treatments for certain types of stroke patients include fibrinolytic therapy and the use of neuroprotective medications administered in a timely manner, usually within 2-3 hours from time of onset, in a hospital setting. Check local protocols.
Identifying factors:
- No diagnosis or history of epilepsy
- Medical ID for diabetes
- Low blood sugar level per blood glucose test
- History of liver or kidney disease or diabetes
- Headache
- Visual disturbances
- Altered respiratory pattern
- Evidence of legal or illegal drug use
- Pregnancy
- Elevated body temperature decreased sweating

All Providers/BLS Response:
Treat following guidelines on pages 15-17.

ALS Response:
Treat following BLS Response above. If the seizure duration is longer than 5 minutes, follow ALS response on pages 18-19. ALS treatment to correct underlying cause, if not already performed, includes the following:

Medication delivery:
- **Hypoglycemic patient:** Administer glucose and possibly thiamine, depending on local protocol. Follow local protocol for glucose dose for children and infants.
- **Decreased LOC and respiratory rate:** Administer naloxone (Narcan) if decreased LOC and respiratory rate from possible opiate overdose. Follow local protocol for dose and route. Narcan may be administered by a variety of routes, including intravenous, intramuscular, subcutaneous, sublingual, intralingual, tracheal and intranasal using a mucosalatomizer device.
- **Pregnant Patient:** For seizures in a pregnant patient, treat as above, establish vascular access, and provide rapid transport to appropriate facility. Treat per local protocols, consider administration of magnesium sulfate.
- **Overdose:** For seizures caused by an overdose of tricyclic antidepressents or sodium channel blockers, follow local protocols for possible administration of sodium bicarbonate or other reversal agents.
Hyperthermia/Heat Stroke: For seizures caused by hyperthermia/heat stroke, initiate rapid cooling methods, administer IV fluids and electrolyte replacement and provide rapid transport.

Pre-Hospital Treatment: Active Seizure has Ceased

Obtain a focused history. It is important to find and bring any medications or other drugs that the patient may have taken to the emergency department for further evaluation.

Cause of Seizure: Seizure Due to Infectious Disease

Certain serious infections of the brain produce conditions that lead to seizures or create high fevers that trigger seizures. Potential causes include meningitis, encephalitis, and other childhood illnesses associated with high fever.

Identifying factors:
- No diagnosis or history of epilepsy
- Hyperthermia
- Headache, stiff neck
- Photophobia
- Dehydration
- Confusion or unconsciousness
- History of infection

Pre-Hospital Treatment: Seizure in Progress Due to Infection

All Providers/BLS Response:
Take appropriate body substance isolation (BSI) precautions to protect EMS providers and the patient.

Treat following All Responder/BLS Response on pages 15-17.

ALS Response:
Treat following BLS Response above. If seizure lasts longer than 5 minutes, follow ALS Response on pages 17-19.
Pre-Hospital Treatment Once Active Seizure has Ceased

All Responders/BLS Response:

- Take appropriate body substance isolation precautions to protect EMS providers and the patient.
- Administer high-flow, high concentration oxygen by non-rebreather mask.
- Initiate and maintain appropriate cardiac and respiratory monitoring.
- Check blood sugar levels and treat per local protocols.
- For pediatric patients, follow local protocols for possible administration of acetaminophen or ibuprofen.
- Transport to appropriate receiving facility and notify prior to arrival of possible infectious patient.

ALS Response:

Follow All Responders/BLS Guidelines above:

- Obtain vascular access for possible medication or fluid administration, if not already started.
- Treat shock and hyperthermia per local protocols.
Epilepsy and Seizures: All Responders Using SAMPLE to take a seizure history

Gather as much information as possible from the postictal patient (who may still be fatigued and somewhat confused), witnesses or family members. The commonly used mnemonic SAMPLE is an efficient way to gather data:

**Signs and Symptoms.** These may range from postictal confusion to a bleeding tongue bitten during the seizure, to bystander reports of how the seizure progressed, to types of injury if trauma is suspected as a cause. Remember that people often think that a seizure episode lasted longer than it actually did.

**Allergies** to any substance ingested prior to the seizure, including medications, foods, animals, dyes, or other sources. It is possible that an allergic reaction triggered the seizure.

**Medications** that the patient is taking. The presence of seizure-preventing medications (see list on page 23) or a VNS implant under the chest wall is a strong indication that the seizure is the result of an ongoing epileptic condition. Withdrawal from seizure medications, or an abrupt drop in therapeutic blood level due to missed doses, is a common cause of seizures in people with epilepsy. Changes in medications can also cause breakthrough seizures. Seizures may also be caused as a side effect of certain prescription drugs or use of illegal drugs such as cocaine or PCP.

**Pertinent medical history.** Determine if the patient has a history of epilepsy (seizure disorder), brain injury, hypoglycemia, diabetes, recent illness, other health conditions associated with seizures, or recent changes in their daily routine.

**Last oral intake** to assess the likelihood of vomiting and aspiration as a complication of the seizure.

**Events leading up to the incident.** These are important. Have the patient describe, as best s/he can, what s/he was doing before the seizure began or, if s/he cannot remember (not unusual), see if friends or witnesses can provide that information. Exposure to flashing lights, for example, may be a seizure trigger for some people. In young children a sudden rise in fever may trigger what is called a febrile (fever) seizure.
Glossary of Terms

**Absence Seizure** – (formerly known as petit mal) lapses of awareness, sometimes with staring, that begin and end abruptly, lasting only a few seconds, with no warning and no after-effect. Awareness and the ability to communicate usually quickly return after an absence seizure.

**ALS** - Advanced Life Support

**Atonic seizures** – seizures producing an abrupt loss of muscle tone. Other names for this type of seizure include drop attacks, astatic or akinetic seizures. They produce head drops, loss of posture, or sudden collapse. Atonic seizures can result in injuries to the head and face.

**Benzodiazepines** - any of a group of aromatic lipophilic amines (as diazepam and chlordiazepoxide) used especially as tranquilizers.

**BLS** - Basic Life Support

**BSI** – body substance isolation which means precautions taken to prevent exposure to a patient’s possibly contaminated body fluids.

**Complex Partial Seizures** - partial seizures in which consciousness is impaired or lost.

**Convulsions** - massive muscular contractions

**Epilepsy** - a neurological disorder that has recurring seizures as its primary symptom. Epilepsy is one of the most common causes of seizures, affecting nearly 3 million Americans. It is also called a seizure disorder.

**Fibrinolytic Therapy** - The goal of fibrinolytic (thrombolytic) therapy is to dissolve occlusive clots in specific arteries.

**Generalized Seizure** - a seizure that involves the entire brain is called a generalized seizure. These seizures may cause loss of consciousness, falls, or massive muscle spasms.

**Generalized Tonic Clonic Seizure** - (formerly known as grand mal) the most common type of generalized seizure, affecting the whole brain at once, and beginning with stiffening of the limbs (the tonic phase), followed by jerking of the limbs and face (the clonic phase). A generalized tonic clonic seizure can be caused by head trauma, poisoning, brain tumors, metabolic disorders or other acute conditions affecting the brain.

**Grand Mal Seizure** – see Generalized Tonic Clonic Seizure

**Hyperthermic** – exceptionally high fever.

**Infantile spasms** – clusters of quick, sudden movements that start between 3 months and two years. If a child is sitting up, the head will fall forward, and the arms will flex forward. If lying down, the knees will be drawn up, with arms and head flexed forward as if the baby is reaching for support.
Mentation - altered mental functioning

Myoclonic seizures - seizures marked by rapid, brief contractions of bodily muscles, which usually occur at the same time on both sides of the body. Occasionally, the involve one arm or a foot.

Neuroprotective Medications - medications serving to protect neurons from injury or degeneration

Partial Seizure - a limited disruption of brain function producing less dramatic changes in movement or behavior than generalized seizures, depending on what part, or how much of the brain is affected.

Petit Mai Seizure - see Absence Seizure

Postictal (post-ictal) Period - the period of time after the seizure (ictus) ends and the person’s alertness and orientation returns to the pre-seizure state.

Pre-eclampsia - a serious condition developing in late pregnancy that is characterized by a sudden rise in blood pressure, excessive weight gain, generalized edema, proteinuria, severe headache, and a visual disturbances and that may result in eclampsia (convulsions or coma late in pregnancy) if untreated.

S.A.M.P.L.E. - mnemonic device used to gather data efficiently from the postictal patient (who may still be fatigued and somewhat confused), witnesses or family members. S = Signs and Symptoms; A = Allergies; M = Medications; P = Pertinent Medical History; L = Last Oral Intake; and E = Events Leading Up to the Incident.

Seizure - a sudden, brief disruption of the normal functioning of neurons in the brain. The disruption in the neurological environment causes some nerve cells to fire without stopping and spreading to involve other nerve cells.

Seizure Disorder - See Epilepsy

Simple Partial Seizures - partial seizures in which consciousness is retained.

Status Epilepticus Seizure - an epileptic seizure that lasts more than 30 minutes, or a constant or near constant state of having seizures. Status epilepticus is life threatening and requires immediate medical intervention.

SUDEP - Sudden Unexplained Death in Epilepsy; rare condition affecting mostly young adults with epilepsy.

VNS Implant - Vagus Nerve Stimulation Implant; apparatus designed to prevent seizures through electrical stimulation of the vagus nerve in the neck.
Frequently Asked Questions

Is it true that flashing lights can trigger a seizure?
Yes. Some people with epilepsy are photosensitive. This means that they may have a seizure if exposed to intense, strobe-type light or a group of lights flashing synchronously.

Is epilepsy contagious?
No, epilepsy is not contagious in any way. People used to be afraid that contact with the saliva that may collect around the mouth when someone has a seizure could pass the condition on. However, we know now that this is totally untrue. You cannot catch epilepsy or seizure disorders.

Then is epilepsy considered a disease?
Not in the sense that it can be caught from or passed on to another person. It is better described as a disorder or health condition.

Do people with epilepsy have a mental illness?
Epilepsy is not considered to be a mental illness; although a seizure may briefly affect mental functioning. However, like any other person, people who have epilepsy may also have mental health problems including depression and anxiety.

Is epilepsy the same as a seizure disorder?
Yes. Epilepsy may be referred to as a seizure disorder or vice versa. Because of the lingering stigma associated with the condition, some people may strongly deny that they have epilepsy. But they may acknowledge having a ‘seizure disorder’ instead. EMS responders should use both terms - epilepsy and seizure disorder - when taking a patient history.

Where can I find more resources on epilepsy and seizure disorders?
National Epilepsy Library www.epilepsy.com

Where can I find more information on VNS and other methods of seizure control?
Epilepsy Foundation website: www.epilepsy.com

Where can I find a more detailed list of epilepsy medications?
You can find “Medicines for Epilepsy” on the next page.