





## Objectives

- Review the frequency with which seizures occur in the U.S.
- Discuss the common types of seizures and their phases.
- Recognize common antiepileptic drugs.
- Review current treatment standards for patients suffering from seizure activity.

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss objectives.



## Introduction

- Seizures are abnormal muscular activity due to chaotic electrical transmissions in the brain.
- Although we “see” muscular activity from seizures, a seizure is actually a medical emergency to the brain.
- Seizures can occur for a variety of reasons, of which epilepsy is common.

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

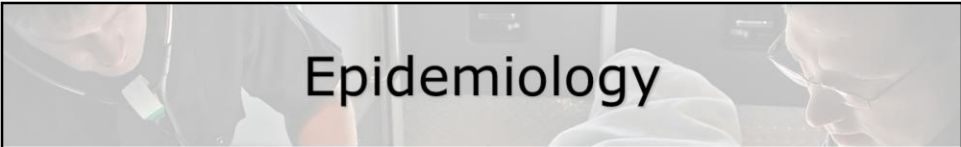
**PEARSON**

Seizures can be:

- Sudden in onset
- Severe in presentation
- Often scary for both the person experiencing them and the people around them

EMTs need to remember that seizures are in fact life-threatening at times, however with proper recognition, assessment, and management—the detrimental outcomes from seizures can often be averted.

Finally, people commonly associate convulsions with seizures, and although convulsions frequently accompany a seizure, there are those types of seizures that do not have any muscular manifestations.



## Epidemiology

- 6% of population will have at least one seizure in a lifetime.
- 50 million people worldwide have epilepsy.
- In 30% of patients with epilepsy, their seizures are uncontrolled, even with medications
- Status epilepticus carries with it a 20% mortality rate.

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

PEARSON

Discuss the epidemiological findings relating to seizures.

# Pathophysiology

- Two general categories of seizures
  - Primary (idiopathic)
    - Appear suddenly, unknown cause
  - Secondary (symptomatic)
    - Stem from an acquired insult (trauma, stroke)

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss the two general categories of seizures:

- Primary—unknown causes
- Secondary—can be tied to an insult or medical condition

Either way, the EMT must be able to recognize and symptomatically treat seizures when they occur.

**Table 18-1** Common Causes of Seizures.

<b>Brain injuries/diseases</b>	Degenerative tissue disease, cerebrovascular disturbances, stroke, space-occupying lesions, tumors, intracranial hemorrhage
<b>Metabolic causes</b>	Fever, critical variations in blood glucose, electrolytes, or oxygenation levels in the blood, heat stroke
<b>Toxins</b>	Drug abuse, alcohol abuse, poisonous or toxic substance abuse, alcohol withdrawal
<b>Infections</b>	Encephalitis, meningitis, central nervous system infections, infectious brain injury
<b>Posttraumatic head injury</b>	Intracranial hemorrhage, skull fractures, craniotomy, other brain surgeries
<b>Pregnancy</b>	Eclampsia



# Pathophysiology

- Febrile seizures
  - Caused by an elevated temperature
    - Simple febrile seizures – generalized, < 15 min duration, do not recur in 24 hrs
    - Complex febrile seizures – focal, > 15 min, and can recur in a 24-hr period
  - Prophylactic fever reduction can help prevent them

**BRADY**

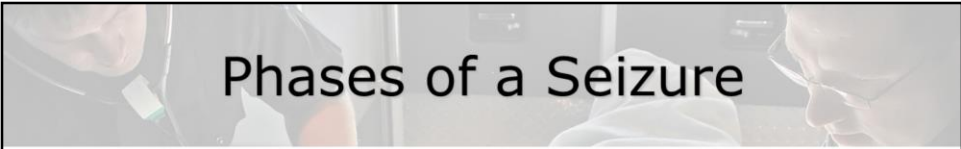
ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Most common to children six months to five years of age, males more than females.

All predispose to febrile seizures:

- Upper respiratory infections
- Ear infections
- Viral syndromes



## Phases of a Seizure

- Characteristic three phases of a seizure
  - Preictal (aura)
  - Ictus (ictal)
  - Postictal

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

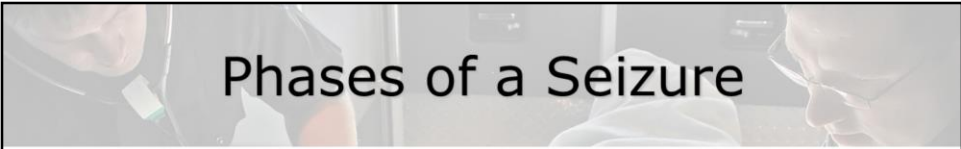
**PEARSON**

Discuss the phases of the seizure and characteristics of each.

Cover how to recognize each phase and provide management as needed:

- Preictal—have patient lay down
- Ictus—protect head, manage airway/breathing
- Postictal—maintain airway, oxygenate





# Phases of a Seizure

- Types of seizures
  - Partial seizures
    - Simple partial seizure
    - Complex partial seizure

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Partial seizures involve only one hemisphere, they may still be conscious and oriented.

Generalized seizures are more involved, and can manifest with convulsion activity as well as alterations in mental status.

Provide more specific descriptions for each type.

Focus is not recognizing the type of seizure so that the treatment can be expected and more readily administered.

# Phases of a Seizure

- Types of seizures
  - Generalized seizures
    - Absence seizure
    - Tonic seizure
    - Clonic seizure
    - Myoclonic seizure
    - Atonic seizure
    - Generalized tonic-clonic seizure

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Partial seizures involve only one hemisphere, they may still be conscious and oriented.

Generalized seizures are more involved, and can manifest with convulsion activity as well as alterations in mental status.

Provide more specific descriptions for each type.

Focus is not recognizing the type of seizure so that the treatment can be expected and more readily administered.

**Figure 18-1** A generalized tonic-clonic, or grand mal, seizure is a sign of abnormal release of electrical impulses in the brain: (a) Aura. (b) Loss of consciousness followed by tonic phase. (c) Clonic phase. (d) Postictal phase.



**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**



## Phases of a Seizure

- Status epilepticus
  - Means “continuous state of seizures”
  - Occurs in 25% of patients with epilepsy
  - Mortality is 20%

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Literally meaning “continuous state of seizure,” status epilepticus initiates a catecholamine surge causing significant physiologic changes in the body.

These changes include, but are not limited to, hypertension and tachydysrhythmia (rapid heart rate), as well as increases in temperature, blood glucose levels, and cerebral metabolic demand.

It is recommended that status epilepticus be treated after five minutes of continuous seizure activity.

Typically the patient will present with persistent, rhythmic tonic-clonic convulsions with impairment of consciousness. Associated injuries include:

- Head and facial trauma
- Tongue lacerations
- Even shoulder dislocations

**Table 18-2** Antiepileptic Drug Therapy.

Broad-Spectrum Antiepileptic Drugs	Narrow-Spectrum Antiepileptic Drugs
Valproic acid (Depakote, Depakene)	Phenytoin (Dilantin)
Lamotrigine (Lamictal)	Phenobarbital
Levetiracetam (Keppra)	Carbamazepine (Tegretol)
Clonazepam (Clonopin)	Oxcarbazepine (Trileptal)
Topiramate (Topamax)	Gabapentin (Neurontin)
Zonisamide (Zonegran)	Pregabalin (Lyrica)
Diazepam rectal gel (Diastat)	Vigabatrin (Sabril)





## Assessment Findings


- Always ask specific questions regarding the seizure patient
  - Are the patient's meds available?
  - Is the patient taking the prescribed meds?
  - Is the proper amount of medication left in bottle?

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

All of these questions will provide important answers the EMT can use to help differentiate between the types of seizures as well as contribute to proper management.



## Assessment Findings

- Always ask specific questions regarding the seizure patient
  - Was the patient standing prior to seizure?
  - Was the patient's entire body involved?
  - How long did the seizure last?
  - How was the patient right after seizure?

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

All of these questions will provide important answers the EMT can use to help differentiate between the types of seizures as well as contribute to proper management.

**Table 18-3** Seizure Assessment Findings Based on Seizure Type.

Type of Seizure	Aura	Consciousness	Amnesia	Postictal
Simple partial	Yes	Not affected	No	No
Complex partial	Yes	Impaired	Yes	Yes
Absence/petit mal	No	Impaired	No	No
Tonic	No	Not affected	No	No
Clonic	No	Varies	No	No
Myoclonic	No	Not affected	No	No
Atonic	No	Not affected	No	No
Tonic-clonic	Yes	Impaired	Yes	Yes

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**





## Emergency Medical Care

- Move objects near patient to avoid injury
- Protect the patient's head
- Do not restrain the patient

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Although the seizure patient will require specific management, if the patient is seizing when you arrive on scene or your with the patient, move all objects away from the patient that may cause injury.

Always protect the head from striking the floor, but don't physically restrain the entire patient (this may cause musculoskeletal trauma).

**Figure 18-2** Protect the patient from injury by moving furniture and other objects away from the patient.



**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**



## Emergency Medical Care


- Establish a patent airway
  - Use manual techniques, suction as necessary
- Ensure breathing adequacy
  - Provide PPV if breathing inadequate
  - Use high-flow oxygen

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss initial management.



## Emergency Medical Care

- Assess central and peripheral perfusion
- Monitor for cardiac arrest
  - Some people seize prior to arrest

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss initial management.

**Figure 18-3** Clear the patient's airways of secretions, blood, and vomitus.



**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**



## Case Study

You are called for an “unknown unresponsive” male patient at the local college campus. When you arrive at the dorm, you are met by campus security and the patient's roommate. The room mate states he came into the room and found him seizing on the floor. As you walk in, the patient is still seizing.

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

PEARSON

Discuss presentation.



## Case Study

- Scene Size-Up
  - Standard precautions taken
  - Scene is safe
  - Adult male patient, 20-21 years of age
  - Some lamps and a chair are overturned
  - NOI – seizure activity (patient still seizing)
  - Patient will be taken down steps

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss presentation.



## Case Study

- What are some concerns you have at this time?
- What additional equipment might you need?
- What are three questions you should quickly ask the roommate?

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Concerns include the still seizing patient and determining what caused the seizure so that future ones may be prevented.

If not with you, you will need the suction unit, and additional help carrying the patient down stairs. The patient may not be that large, but if you have a critical patient it is best to have additional help available during the movement of the patient.

When was the last time you saw the patient?

How long ago did you arrive back at the dorm?

Do you know if the patient takes any meds?

Do you know where the roommate keeps his meds, if any?

Has the roommate been complaining of anything?





## Case Study

- Primary Assessment Findings
  - Patient unresponsive
  - Vomit in the airway
  - Breathing is objectively labored
  - Peripheral pulse is hard to find, but carotid is present
  - Skin is warm and diaphoretic, fingers and around the lips are ashen
  - No indication of significant trauma or bleeding

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss as needed.



## Case Study

- Is this patient a high or low priority? Why?
- Based on the primary survey, what emergency care would be warranted at this time?
- Should the EMT perform a rapid physical exam or the SAMPLE history first?

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

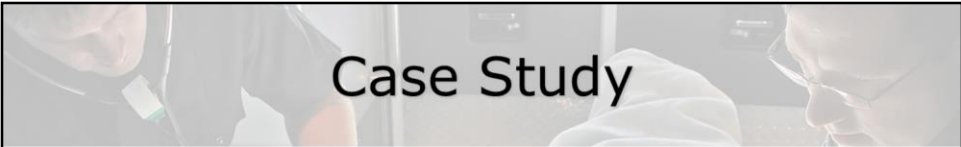
This patient is a high priority due to the active seizure—plus it is currently unknown how long the seizure has been going on prior to arrival of the room mate.

The patient presently has:

- Airway concerns
- Breathing concerns
- An altered mental status

The patient needs their head protected during the seizure. If possible the EMTs may try to suction the vomit out of the airway via nasopharyngeal suctioning if the mouth is clenched. EMTs can also attempt PPV during the seizure to help with ventilation and oxygenation.

At this time, the patient needs managed first. If at all possible the EMTs should attempt some information from the room mate while moving the patient to the ambulance.



## Case Study

- Medical History
  - Unknown specifically, but roommate states he's seen the seizures before
- Medications
  - Unknown per roommate, none can be found with scan inside room
- Allergies
  - Unknown

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

If the room mate states that the patient has seen seizures before, then the patient likely has a history of them.

Without any medications found on scene or family immediately available, then an absolute determination cannot be made.



## Case Study

- Pertinent Secondary Assessment Findings
  - Patient is still seizing, EMS on scene in 8 minutes
  - Abrasion and bleeding noted to right temporal lobe
  - Occasional vomiting into airway occurs
  - Breathing is still ineffective with ongoing seizure

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss case progression.



## Case Study

- Pertinent Secondary Assessment Findings
  - Carotid pulse present, tachycardic
  - Abdomen soft
  - Blood sugar level is 102 mg/dL
  - Patient has been incontinent of urine
  - Heart rate 102, respirations controlled, B/P unknown

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss case progression.



## Case Study

- What is your field impression thus far?
- What type of seizure do you think this patient is having?
- Why is taking a BGL important in a seizure patient?

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Field impression thus far is status epilepticus—probably secondary to an epileptic patient not being compliant with their medications.

The type of seizure the patient is having is “tonic-clonic”.

Taking the BGL is important because sometimes low blood sugar can precipitate seizures.



## Case Study

- Care provided:
  - Controlling of the head during seizure
  - Airway maintenance with suctioning
  - Breathing assisted with PPV and oxygen
  - Circulation maintained
  - ALS notified for backup or intercept

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss as needed.

## Case Study

- In a patient with status epilepticus, explain what could happen with the following:
  - Airway
  - Core temperature
  - Cardiovascular status
  - Musculoskeletal system

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

The airway will continue to be an issue, especially if the mouth is clenched. Suctioning may only be possible through the nasal cavity with a flexible catheter.

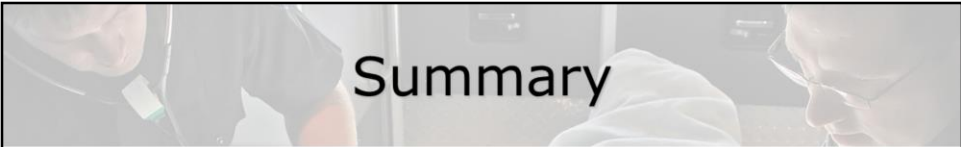
The core temperature will continue to rise due to the muscular contraction.

The heart will have to work harder as will the rest of the cardiovascular system, with probably less oxygenation and waste removal during the seizure.

If/when the cardiovascular status starts to fail due to hypoxia and acidosis, cardiac arrest will follow shortly.

With prolonged seizures, the contraction of opposing extensor and flexor muscles have been violent enough to cause long bone fractures, vertebral fractures, and other musculoskeletal trauma.





## Summary

- A seizure occurs due to an abnormal electrical discharge in the brain.
- Most seizures are self-limiting, but prolonged seizures require immediate attention.
- Status epilepticus is a dire medical emergency that can easily result in death.

**BRADY**

ALWAYS LEARNING *Transition Series: Topics for the EMT*  
Joseph J. Mistovich • Daniel Limmer

**PEARSON**

Discuss as needed.