

Chapter 15

Neurologic Emergencies

Unit Summary

After students complete this chapter presentation and the related course work, they will understand the significance and characteristics of the following: anatomy and physiology of the nervous system, common disease processes (strokes, seizures, headaches, and altered mental status); assessment and basic care management involving patients with neurologic emergencies (including performing tests for speech, facial movement, and arm movement); and assistance of the ALS provider in managing these neurologic emergencies.

National EMS Education Standard Competencies

Medicine

Applies fundamental knowledge to provide basic emergency care and transportation based on assessment findings for an acutely ill patient.

Neurology

Anatomy, presentations, and management of:

ÉDecreased level of responsiveness (pp 5676568, 5766577, 586)

ÉSeizure (pp 5676568, 5736576, 586)

ÉStroke (pp 5676568, 5706573, 5856586)

Anatomy, physiology, pathophysiology, assessment, and management of:

ÉStroke/transient ischemic attack (pp 5676568, 5706573, 5786586)

ÉSeizure (pp 5676568, 5736576, 5786586)

ÉStatus epilepticus (pp 5676568, 5736576, 5786586)

ÉHeadache (pp 5676570, 5786585)

Knowledge Objectives

1. Discuss the anatomy and physiology of the brain and spinal cord. (pp 5676568)
2. Discuss the different types of headaches, the possible causes of each, and how to distinguish a harmless headache from a potentially life-threatening condition. (pp 5686570)
3. List the various ways blood flow to the brain may be interrupted and cause a cerebrovascular accident (CVA). (p 570)
4. Discuss the causes of ischemic strokes, hemorrhagic strokes, and transient ischemic attacks (TIA) and their similarities and differences. (pp 5706572)
5. List the general signs and symptoms of stroke, and identify those symptoms that manifest if the left hemisphere of the brain is affected, if the right hemisphere of the brain is affected, and if there is bleeding in the brain. (p 572)

6. Discuss three conditions with symptoms that mimic stroke and the assessment techniques the EMT may use to identify them. (pp 572-573)
7. Define a generalized seizure, partial seizure, and status epilepticus, including their effects on a patient and how they differ from each other. (pp 573-574)
8. Describe the different phases of a seizure. (p 574)
9. List the different types of seizures and their possible causes. (pp 573-575)
10. Explain why it is important for the EMT to recognize when a seizure is occurring or whether one has already occurred in a patient and to identify other problems that may be associated with the seizure. (p 575)
11. Describe the postictal state and the specific patient care interventions that may be necessary to assist the patient. (p 576)
12. Define altered mental status, its various possible causes, and the patient assessment considerations that apply to each. (pp 576-577)
13. Discuss the special considerations required for pediatric patients who exhibit altered mental status. (p 577)
14. Discuss scene safety considerations when responding to a patient with a neurologic emergency. (p 578)
15. Describe the steps involved in performing a primary assessment of a patient who is experiencing a neurologic emergency and the necessary interventions that may be required to address all life threats. (pp 578-579)
16. Describe the process of history taking for a patient who is experiencing a neurologic emergency, and explain how this process varies depending on the nature of the patient's illness. (pp 579-581)
17. Describe the secondary assessment of a patient who is experiencing a neurologic emergency. (pp 581-583)
18. Discuss how to use a stroke assessment tool to identify a stroke patient rapidly, giving examples of two commonly used tools. (pp 581-582)
19. List the key information an EMT must obtain and document for a stroke patient during assessment and reassessment. (pp 583-585)
20. Explain why a patient who is suspected of having a stroke is placed on stroke alert and requires treatment within the first 3 to 6 hours after the stroke begins. (pp 584-585)
21. Discuss special considerations for geriatric patients who are experiencing a neurologic emergency. (p 585)
22. Describe the patient management, treatment, and transport of patients who are experiencing headaches, stroke, seizure, and altered mental status. (pp 585-586)

Skills Objectives

1. Demonstrate how to use a stroke assessment tool such as the Cincinnati Prehospital Stroke Scale to test a patient for aphasia, facial weakness, and motor weakness. (pp 581-582)

Lecture

I. Introduction

A. Stroke is the third leading cause of death in the United States, after heart disease and cancer.

1. It is common in geriatric patients.
2. More men than women have strokes, but strokes are more likely to be fatal in women.
3. Other contributing factors include family history and race.
 - a. African Americans, Hispanics, and Asians have a higher risk of stroke.
4. Revolutionary treatments are available for stroke.
 - a. Many hospitals are certified stroke centers.
 - b. Rapid transport is vital.

B. Seizures and altered mental status may also occur when there is a disorder in the brain.

1. Seizures may occur as a result of:
 - a. A recent or an old head injury
 - b. A brain tumor
 - c. A metabolic problem
 - d. A genetic disposition
2. Altered mental status (AMS) is a common presentation in patients with a wide variety of medical problems.
 - a. Possible causes include:
 - i. Intoxication
 - ii. Head injury
 - iii. Hypoxia
 - iv. Stroke
 - v. Metabolic disturbances
 - b. Treatment varies widely.

II. Anatomy and Physiology

A. The brain is the body's computer.

1. It controls breathing, speech, and all other body functions.
2. There are three major parts: brain stem, cerebellum, and cerebrum.
 - a. The cerebrum is the largest part.
 - b. The brain stem controls the most basic functions.
 - i. Breathing, blood pressure, swallowing, pupil constriction
 - c. The cerebellum controls muscle and body coordination.
 - i. Walking, writing, picking up a coin, playing the piano
 - d. The cerebrum, located above the cerebellum, is divided into right and left hemispheres.
 - i. Each controls activities on the opposite side of the body.
 - ii. The front of the cerebrum controls emotion and thought.
 - iii. The middle part controls touch and movement.
 - iv. The back part processes sight.
 - v. In most people, speech is controlled on the left side of the brain near the middle of the cerebrum.

B. Messages sent to and from the brain travel through nerves.

1. Twelve cranial nerves run directly from the brain to parts of the head.
 - a. Eyes, ears, nose, and face
2. The rest of the nerves join in the spinal cord and exit the brain through a large opening in the base of the skull called the foramen magnum.
3. At each vertebra in the neck and back, two nerves branch out.
 - a. These are called spinal nerves.
 - b. They carry signals to and from the body.

III. Pathophysiology

A. Many different disorders can cause brain dysfunction and can affect the patient's:

1. Level of consciousness
2. Speech
3. Voluntary muscle control

B. The brain is very sensitive to changes in oxygen, glucose, and temperature.

1. A significant change in any one of these areas will result in a neurologic change.
2. General rule:
 - a. If a problem is caused mainly by disorders in the heart and lungs, the entire brain will be affected.
 - b. If a problem is mainly in the brain, only part of the brain is affected.
3. Stroke is a common neurologic condition that is potentially treatable.
4. Other brain disorders include infection and tumor, which may cause seizures, AMS, and headaches.

IV. Headache

A. One of the most common complaints you will hear from your patients in terms of pain is headache.

1. Headache can be a symptom of another condition or it can be a neurologic condition on its own.
2. Only a small percentage of headaches are caused by a serious medical condition.
3. Most headaches are harmless and do not require emergency medical care.
4. Sudden, severe headache, however, requires assessment and transport.
 - a. If more than one patient reports headache, consider carbon monoxide poisoning.

B. Tension headaches, migraines, and sinus headaches are the most common types.

1. These are not medical emergencies.
2. Tension headaches are the most common.
 - a. These headaches are caused by muscle contractions in the head and neck and are attributed to stress.
 - b. The pain is usually described as squeezing, dull, or as an ache.

C. Migraine headaches are the second most common type of headache.

1. They are thought to be caused by changes in the blood vessel size in the base of the brain.

2. The pain is usually described as pounding, throbbing, and pulsating.
3. Migraines are often associated with visual changes such as flashing lights or partial vision loss.
4. The patient will often have nausea and vomiting.
5. Migraine headaches can last for several days.

D. Sinus headaches are caused by pressure that is the result of fluid accumulation in the sinus cavities.

1. Patients may also have coldlike signs and symptoms of nasal congestion, cough, and fever.
2. Prehospital emergency care is not required.

E. Serious conditions that include headache as a symptom are hemorrhagic stroke, brain tumors, and meningitis.

1. You should be concerned if the patient complains of a sudden-onset, severe headache or a sudden headache that has associated symptoms.
2. You should suspect a stroke in patients with a severe headache, seizures, and AMS.
3. Your patient assessment should include asking the patient if he or she has experienced any recent head trauma.

V. Stroke

A. A cerebrovascular accident (CVA), or stroke, is an interruption of blood flow to the brain that results in the loss of brain function.

1. Lacking oxygen, brain cells stop working and begin to die.
2. Once brain cells die, not much can be done.
3. It may take several hours or more for cell death to occur because small trickles of blood may be keeping ischemic cells alive.
4. Prompt restoration of blood flow can preserve or restore function.
 - a. Time is brain.
5. There are two main types of stroke: ischemic and hemorrhagic.
 - a. An ischemic stroke is due to the direct blockage of blood flow through the cerebral arteries.
 - b. This blockage can be due to thrombosis, where a clot forms at the site of blockage, or due to an embolus, where the clot forms in a remote area and then travels to the site of blockage.
 - c. In hemorrhagic stroke, a blood vessel ruptures, causing increased pressure in the brain and subsequent brain damage.

B. Types of stroke

1. Ischemic stroke
 - a. Most common, accounting for more than 80% of strokes
 - b. Results from an embolism or thrombosis
 - c. Atherosclerosis in the blood vessels is often the cause.
 - i. Disorder in which calcium and cholesterol build up, forming a plaque inside the walls of the blood vessels.
 - ii. This plaque may obstruct blood flow and interfere with the vessels' ability to dilate.
 - iii. Eventually, it causes complete occlusion of an artery.

- iv. Even if the blockage in the carotid artery is not complete, smaller pieces of the clot may embolize deep into the brain, heart, or lungs.
- v. A cerebral embolism could block blood flow.
- d. Symptoms may range from nothing at all to complete paralysis.

2. Hemorrhagic stroke

- a. Accounts for 10% to 20% of strokes
- b. Results from bleeding inside the brain
 - i. Blood forms a clot, which squeezes the brain tissue next to it.
 - ii. When that tissue is squeezed hard enough, oxygenated blood cannot get in and cells begin to die.
- c. People at high risk include those experiencing stress or exertion.
- d. People at highest risk are those who have very high blood pressure or long-term elevated blood pressure that is not treated.
 - i. Blood vessels in the brain weaken.
 - ii. If a vessel ruptures, the bleeding in the brain will increase the pressure inside the cranium.
- e. Cerebral hemorrhages are often fatal.
- f. An aneurysm is a swelling or enlargement of an artery due to weakening of the arterial wall.
- g. A symptom may be the sudden onset of a severe headache.
- h. When a hemorrhagic stroke occurs in an otherwise healthy young person, it is likely caused by a weakness in a blood vessel called a berry aneurysm.
 - i. Patients experience a sudden severe headache.
 - ii. Surgical repair may be possible if care is sought immediately.

3. Transient ischemic attack (TIA)

- a. Normal processes in the body will break up a blood clot in the brain.
 - i. Blood flow is restored.
 - ii. The patient regains use of the affected body part.
 - iii. However, this often indicates that the patient has a serious medical condition that may prove fatal.
- b. When stroke symptoms go away on their own in less than 24 hours, the event is called a transient ischemic attack.
 - i. Some patients call these ministrokes.
- c. Although most patients with TIAs do well, every TIA is an emergency.
- d. It may be a warning sign of a larger stroke to come.
 - i. About one third of patients who have a TIA will experience a stroke soon after.
 - ii. All patients with a TIA should be evaluated by a physician.

C. Signs and symptoms of stroke

1. General signs and symptoms include the following:

- a. Facial drooping
- b. Sudden weakness or numbness in the face, arm, leg, or one side of the body
- c. Loss of movement and sensation on one side of the body
- d. Lack of muscle coordination (ataxia)
- e. Sudden vision loss in one eye, blurred and double vision
- f. Difficulty swallowing
- g. Decreased or increased level of responsiveness
- h. Speech disorders (dysphasia)
- i. Difficulty expressing thoughts or inability to speak

- j. Slurred speech (dysarthria)
 - k. Difficulty understanding others (receptive aphasia)
 - l. Decreased or absent movement in one or more extremities
 - m. Sudden and severe headache
 - n. Sudden loss of balance or trouble walking
 - o. Confusion
 - p. Dizziness
 - q. Weakness
 - r. Combativeness
 - s. Restlessness
 - t. Tongue deviation
 - u. Coma
2. Left hemisphere
- a. Stroke in the left cerebral hemisphere may cause aphasia.
 - i. Aphasia is the inability to produce or understand speech.
 - ii. Speech problems can vary widely.
 - b. Strokes that affect the left side of the brain can also cause paralysis of the right side of the body.
3. Right hemisphere
- a. Strokes that affect the right side of the brain can cause paralysis of the left side of the body.
 - b. Usually, patients will understand language and be able to speak, but their words may be slurred and hard to understand.
 - c. Patients may be oblivious to their problem; this symptom is called neglect.
 - i. Patients with a problem affecting the back part of the cerebrum may neglect certain parts of their vision.
4. Bleeding in the brain
- a. Patients will have very high blood pressure.
 - i. May be the cause *of* the bleeding
 - ii. May be caused *by* the bleeding, as a compensatory response
 - b. Monitoring the blood pressure and watching for a trend of increasing blood pressure is an important sign.
 - c. Significant drops may occur as the patient's condition worsens.

D. Conditions that may mimic stroke

- 1. Hypoglycemia
 - a. Not enough blood glucose
- 2. Postictal state
 - a. Period following seizure that lasts between 5 and 30 minutes, characterized by labored respirations and some degree of AMS
- 3. Subdural or epidural bleeding
 - a. A collection of blood near the skull that presses on the brain

VI. Seizures

A. A seizure, or convulsion, is a temporary alteration in consciousness.

1. Seizures account for up to 30% of EMS calls.
2. In the United States, it is estimated that 4 million people have epilepsy.
3. Generalized seizure
 - a. Formally called a grand mal seizure
 - b. Typically characterized by unconsciousness and a generalized severe twitching of all muscles
 - c. This type of seizure results from abnormal discharges from large areas of the brain, usually involving both hemispheres.
4. Partial seizure
 - a. Begins in one part of the brain and is classified as simple or complex
 - b. Simple partial seizure
 - i. No change in the patient's level of consciousness
 - ii. May have numbness, weakness, dizziness, visual changes, or unusual smells and tastes
 - iii. May also cause some twitching or brief paralysis
 - c. Complex partial seizure
 - i. The patient has an AMS and does not interact normally with his or her environment.
 - ii. Results from abnormal discharges from the temporal lobe of the brain
 - iii. Other characteristics may be lip smacking, eye blinking, and isolated jerking.
 - iv. Patients also may experience uncontrollable fear and perform repetitive physical behavior.

B. Tonic-clonic seizure

1. This seizure is characterized by sudden loss of consciousness, chaotic muscle movement and tone, and apnea.
2. Often preceded by an aura
3. During a tonic-clonic seizure, a patient may exhibit bilateral muscle rigidity (tonic phase), and muscle contraction and relaxation (clonic phase) follows, lasting 1 to 3 minutes.
 - a. The patient exhibits tachycardia, hyperventilation, sweating, and intense salivation.
 - b. Most seizures last 3 to 5 minutes.
 - c. A postictal state (5 to 20 minutes) follows, in which the patient is unresponsive at first and gradually regains consciousness.

C. In contrast, an absence (formerly called petit mal) seizure can last for just seconds, after which the patient fully recovers with only a brief lapse of memory of the event.

1. Seizures lasting more than 5 minutes are likely to progress to status epilepticus.
2. Seizures that continue every few minutes without the person regaining consciousness or last longer than 30 minutes are referred to as status epilepticus.

D. Causes of seizures

1. Some seizure disorders, such as epilepsy, are congenital.
 - a. The patient was born with the condition.
2. Others may be caused by:
 - a. High fever
 - b. Structural problems in the brain
 - c. Metabolic or chemical problems in the body
3. Epileptic seizures usually can be controlled with medications.

4. Seizures may also be caused by an abnormal area in the brain, such as:
 - a. A benign or cancerous tumor
 - b. An infection (brain abscess)
 - c. Scar tissue from some type of injury
5. Seizures from a metabolic cause can result from:
 - a. Abnormal levels of certain blood chemicals
 - b. Hypoglycemia
 - c. Poisons
 - d. Drug overdoses
 - e. Sudden withdrawal from routine heavy alcohol or sedative drug use
6. Seizures can also result from sudden high fevers, particularly in children.
 - a. Known as febrile seizures

E. The importance of recognizing seizures

1. You must recognize when a seizure is occurring and whether this episode differs from previous ones.
 - a. Patient may turn cyanotic from a lack of oxygen in the blood.
 - b. Seizures may prevent the patient from breathing.
 - c. In a patient with diabetes, the blood glucose value may drop.
2. You must look at other problems associated with the seizure.
 - a. Patients who have fallen during a seizure may have a head injury.
 - b. Patients having a generalized seizure also may experience incontinence.

F. The postictal state

1. Once a seizure has stopped, the patient's muscles relax, becoming almost flaccid, or floppy, and the breathing becomes labored (fast and deep).
 - a. This breathing pattern helps the body balance the acidity in the bloodstream.
 - b. With normal circulation and liver function, the patient will begin to breathe more normally within minutes.
2. In some situations, the postictal state may be characterized by hemiparesis, or weakness on one side of the body, resembling a stroke.
3. The postictal state is most commonly characterized by lethargy and confusion.
 - a. The patient may be combative.
 - b. You must be prepared for these circumstances.
4. If the patient's condition does not improve, you should consider other possible underlying conditions.
 - a. Hypoglycemia
 - b. Infection

VII. Altered Mental Status

A. The most common type of neurologic emergency that you will encounter is a patient with an AMS.

1. The patient is not thinking clearly or is incapable of being aroused.
2. In some cases, the patient will be unconscious; in others, the patient may be alert but confused.
3. Causes include:

- a. Hypoglycemia
- b. Hypoxemia
- c. Intoxication
- d. Drug overdose
- e. Unrecognized head injury
- f. Brain infection
- g. Body temperature abnormality
- h. Brain tumor
- i. Overdose and/or poisoning

B. Causes of altered mental status

1. Hypoglycemia

- a. Patients can have signs and symptoms that mimic stroke and seizures.
 - i. In these cases, the patient may have hemiparesis, similar to what occurs as a result of a stroke.
 - ii. The principal difference is that a patient who has had a stroke may be alert and attempting to communicate normally, whereas a patient with hypoglycemia almost always has an altered or decreased level of consciousness.
- b. Patients with hypoglycemia commonly, but not always, take medications that lower the blood glucose level.
- c. Patients with hypoglycemia can also experience seizures.
 - i. The mental status of a patient with hypoglycemia is not likely to improve, even after several minutes.
- d. Consider hypoglycemia in a patient who has AMS after an injury such as a motor vehicle crash.

2. Other causes of altered mental status

- a. Consideration of other possibilities becomes important because a patient with AMS may be combative and refuse treatment and transport.
- b. In most cases, a patient who appears intoxicated is just that; however, you must consider other problems.
- c. Psychological problems and complications of medications are also possible causes.
- d. Infections may cause AMS, particularly those involving the brain or bloodstream.

VIII. Patient Assessment

A. Scene size-up

1. Scene safety

- a. In some calls to the dispatcher, the description of the patient's signs and symptoms will give you a fairly good idea of what the problem may be.
- b. The most significant difference between an AMS and other emergencies is that your patient cannot tell you reliably what is wrong.
- c. Do not be distracted by the seriousness of the situation or by frightened family members.
- d. Look first for threats to your safety, and follow standard precautions.
- e. Consider the need for spinal precautions based on dispatch information and your assessment of the scene.
- f. Call for additional resources early.

2. Mechanism of injury/nature of illness

- a. Look for clues to help you determine the nature of illness.
- b. There are special considerations for a patient with a suspected neurologic emergency:
 - i. An evaluation of the potential trauma

- ii. Indications of a previous medical condition
- iii. Evidence of a seizure

B. Primary assessment

1. Remember that your first priority is to look for and treat life-threatening conditions.
2. Perform a rapid scan.
3. Form a general impression.
 - a. Gather information from the scene.
 - b. Note the patient's body position and level of consciousness.
 - c. You should be able to tell if a seizure is still taking place.
 - i. Unless you are stationed extremely close to the scene, most seizures will be over by the time you arrive.
 - ii. If the seizure is still occurring, status epilepticus may be present.
 - d. Use the AVPU scale.
4. Airway and breathing
 - a. Stroke patients may have difficulty swallowing and are at risk for choking on their own saliva.
 - b. Evaluate the airway of an unresponsive patient to make sure it is patent.
 - c. Check for foreign body obstruction.
 - d. Assess the patient's breathing.
 - i. All patients with an AMS, regardless of the cause, should receive high-flow oxygen.
5. Circulation
 - a. Begin by checking the pulse if the patient is unresponsive.
 - b. If no pulse is found, immediately begin CPR and attach an AED.
 - c. If the patient is responsive, determine if the pulse is fast or slow, weak or strong.
 - d. Evaluate the patient quickly for external bleeding.
6. Transport decision
 - a. Establish your priorities based on your assessment of the patient's level of consciousness and ABCs.
 - b. If you suspect the patient is having a stroke, you should rapidly transport the patient to an appropriate facility.

C. History taking

1. Investigate the chief complaint.
 - a. If the patient is unresponsive, gather any history of the present illness from family or bystanders.
 - b. If no one is around, quickly look for explanations for the AMS.
 - c. In a responsive patient, ask him or her what happened.
 - d. Evaluate the patient's speech.
 - e. Gather a SAMPLE history.
 - i. Remember that time can be critical in a neurologic emergency.
 - ii. Make a special effort to determine the exact time that the patient last appeared to be healthy.
 - iii. Collect or list all medications the patient has taken.
 - iv. Patients who have had a stroke may appear to be unconscious and unable to speak, but they may still be able to hear and understand what is taking place.
 - v. Try to establish effective communication.
 - vi. Your history should reveal if the patient has a history of seizures.

- vii. Find out if this episode differs from previous ones and what medications the patient takes.
- viii. If the patient does not have a history, a serious condition should be suspected.

D. Secondary assessment

1. Physical examinations
 - a. Your assessment should continue with a full-body scan.
 - b. If you suspect your patient is having a stroke, direct particular attention to your neurologic assessment.
2. Stroke assessment
 - a. Rapidly identify stroke in the field with the Cincinnati Prehospital Stroke Scale or the Los Angeles Prehospital Stroke Screen.
 - b. Stroke scales evaluate the face, arms, and speech.
 - i. To test speech, ask the patient to repeat a simple phrase.
 - ii. To test facial movement, ask the patient to show his or her teeth.
 - iii. To test arm movement, ask the patient to hold both arms in front of his or her body, palms up toward the sky, with eyes closed, and without moving.
 - c. All patients with an AMS should also have a Glasgow Coma Scale (GCS) score calculated.
3. Vital signs
 - a. Patients with significant intracranial bleeding may have a great deal of pressure in the skull that is compressing the brain.
 - i. This slows the pulse and causes respirations to be erratic.
 - ii. Blood pressure is usually high to compensate for poor perfusion in the brain.
 - iii. Changes in pupil size and reactivity indicate significant bleeding and pressure on the brain.
 - b. If the patient has an AMS, you should check the glucose level if you have the equipment available.
 - c. During most active seizures, it is impossible to evaluate vital signs.
 - d. Unless the situation is unusual, vital signs in a postictal state will approximate normal.
 - e. Monitoring devices
 - i. Use a portable blood glucose monitor to check blood glucose levels.
 - ii. You may also use noninvasive blood pressure methods to monitor blood pressure.

E. Reassessment

1. Focus on reassessing the ABCs, vital signs, and interventions provided so far.
 - a. Patients who have had a stroke can lose their airway or stop breathing without warning.
2. Interventions
 - a. Some conditions are easier to identify with treatment options that are readily available:
 - i. Stroke
 - ii. Seizure
 - iii. Hypoglycemia
 - iv. Hypoxia
 - b. The cause of other neurologic emergencies may not always be obvious to you.
 - i. This may make it difficult for you to provide definitive treatment in the field.
 - c. In most patients with a suspected stroke, physicians in the emergency department need to determine whether there is bleeding in the brain.
 - i. The only reliable way to tell is with a CT scan of the head.
 - ii. EMS systems designate specific hospitals for patients who may be having a stroke.
 - iii. Notify the hospital staff as early as possible if you have a "stroke alert" patient.

- d. Patients who have had a seizure require definitive evaluation and treatment in the hospital.
 - e. Supplemental oxygen is strongly advised.
 - f. Most seizures will not require a significant amount of intervention on your part.
 - g. For patients who are having a seizure:
 - i. Protect them from harm.
 - ii. Maintain a clear airway by suctioning.
 - iii. Provide oxygen as quickly as possible.
 - h. For patients who continue to have a seizure, as in status epilepticus:
 - i. Suction the airway.
 - ii. Provide positive-pressure ventilations.
 - iii. Transport quickly to the hospital.
 - iv. Rendezvous with ALS, if possible.
3. Communication and documentation
- a. Notify the receiving facility of your patient's chief complaint and your assessment findings.
 - b. Call a "stroke alert" to designated stroke centers.
 - c. Be sure to communicate:
 - i. The time that the patient was last seen to be healthy
 - ii. The findings of your neurologic examination
 - iii. The time you anticipate arriving at the hospital
 - d. A key piece of information to document is the time of onset of the patient's signs and symptoms.
 - e. Document your findings from your stroke scale and the GCS score.
 - f. Describe the seizure activity if known.

IX. Emergency Medical Care

A. Headache

1. Most headaches are harmless and do not require emergency medical care.
2. You should be concerned if the patient complains of:
 - a. A sudden-onset, severe headache
 - b. A sudden headache with fever, seizures, AMS, or following trauma
3. Migraine
 - a. Always assess the patient for other signs and symptoms that might indicate a more serious condition.
 - b. Apply high-flow oxygen, if tolerated.
 - c. Provide a darkened and quiet environment.
 - d. Do not use lights and sirens during transport.

B. Stroke

1. Support the ABCs, and provide rapid transport to a stroke center.
2. The patient may require manual airway positioning.
3. Use suction as needed, provide high-flow oxygen, and monitor the patient's oxygen saturation with a pulse oximeter.
4. A patient's paralyzed extremities will require protection from harm.
5. Continuously talk to the patient and inform him or her of what is going on.

6. Thrombolytic therapy (clot dissolvers) may reverse stroke symptoms.
 - a. Proceed under the assumption that an area of the brain can still be saved.
 - b. The sooner the treatment is done, the better the patient's prognosis.
7. Spend as little time at the scene as possible.
 - a. Stroke is an emergency, and "time is brain."

C. Seizure

1. The patient may be in postictal state on your arrival.
2. Alternatively, the patient may still be having the seizure.
 - a. Continue to assess and treat ABCs.
 - b. Try administering oxygen.
 - c. It is difficult to safely package a seizure patient for transport.
 - i. Assess for trauma.
 - ii. Use spinal precautions if indicated.
 - iii. Never attempt to restrain a patient having a seizure.
3. Not every patient who has had a seizure wants to be transported.
 - a. It is usually in the patient's best interest to be evaluated by a physician.
 - b. Your goal is to encourage the patient to be seen by a physician.
 - c. Be prepared to discuss the situation with the hospital staff if the patient still refuses transport.
 - d. Ask yourself the following questions:
 - i. Is the patient awake and completely oriented after a seizure (GCS score of 15)?
 - ii. Does your assessment reveal no indication of trauma or complications from the seizure?
 - iii. Has the patient ever had a seizure before?
 - iv. Was this seizure the "usual" seizure in every way (length, activity, recovery)?
 - v. Is the patient currently being treated with medications and receiving regular evaluations by a physician?

D. Altered mental status

1. Signs and symptoms vary from simple confusion to coma.
2. Regardless of the signs and symptoms, AMS is always an emergency that requires immediate attention, even if the cause appears to be intoxication or minor head trauma.

X. Summary

- A. The cerebrum, the largest part of the brain, is divided into right and left hemispheres, each controlling the opposite side of the body.**
- B. Different parts of the brain control different functions. The front part of the cerebrum controls emotion and thought; the middle part controls touch and movement; the back is involved with vision. In most people, speech is controlled on the left side of the brain.**
- C. Many different disorders can cause brain or other neurologic symptoms. As a general rule, if the problem is primarily in the brain, only part of the brain will be affected. If the problem is in the heart or lungs, the whole brain will be affected.**
- D. Stroke is a significant brain disorder because it is common and potentially treatable.**

- E. Seizures and altered mental status (AMS) are also common, and you must learn to recognize the signs and symptoms of each condition.**
 - F. Other causes of neurologic dysfunction include coma, infections, and tumors.**
 - G. Strokes occur when part of the blood flow to the brain is suddenly cut off; within minutes, brain cells begin to die.**
 - H. Signs and symptoms of stroke include receptive and/or expressive aphasia, poor articulation caused by neurologic injury (dysarthria), muscle weakness or numbness on one side of the body, facial droop, and sometimes high blood pressure.**
 - I. You should always perform at least three neurologic tests on patients you suspect of having a stroke, assessing speech, facial movement, and arm movement.**
 - J. In a transient ischemic attack (TIA), normal body processes break up the blood clot, restoring blood flow and ending symptoms in less than 24 hours. However, patients experiencing a TIA are at high risk for a completed stroke.**
 - K. Because current treatments for stroke must be administered within 1 to 3 hours (and preferably within 2 hours) of the onset of symptoms to be most effective, you should provide prompt transport.**
 - L. Always notify the hospital as soon as possible that you are bringing in a patient with a possible stroke, so that staff there can prepare to test and treat the patient without delay.**
 - M. Seizures are characterized by unconsciousness and generalized twitching of all or part of the body.**
 - N. There are three types of seizures that you should learn to recognize: generalized, partial, and status epilepticus.**
 - O. Most seizures last between 3 and 5 minutes and are followed by a postictal state in which the patient may be unresponsive, have labored breathing, have hemiparesis, and may have been incontinent.**
 - P. It is important for you to recognize the signs and symptoms of seizures so that you can provide the emergency department staff with information as you transport the patient.**
 - Q. AMS is a common neurologic problem that you will encounter as an EMT. Signs and symptoms vary widely, as do the causes for this condition.**
 - R. Among the most common causes of AMS are hypoglycemia, intoxication, drug overdose, and poisoning.**
 - S. As you assess a patient with an AMS, do not always assume intoxication; hypoglycemia is just as likely a cause. Prompt transport with close monitoring of vital signs en route is indicated.**
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Post-Lecture

Unit Assessment

1. What part of the brain controls the basic functions?
2. What part of the cerebrum controls touch and movement?
3. What does the abbreviation CVA stand for?
4. What causes a stroke?
5. What type of stroke results from a ruptured blood vessel?
6. If the signs and symptoms of a CVA resolve in less than 24 hours, the condition is called a(n) _____.
7. What sign does a patient who has had a left-sided stroke typically present with?
8. What is the term for a seizure that recurs every few minutes?
9. What are the three components of the Cincinnati Prehospital Stroke Scale?
10. If a patient in a postictal state refuses transport, what questions should you ask yourself?

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Knowledge Objectives

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