STROKE

INTRODUCTION

Stroke is the medical term for a specific type of neurological event that causes damage to the brain. A commonly used term for stroke is cerebrovascular accident, typically shortened to CVA. Stroke is caused by a very large and very sudden interruption of blood flow to the brain. There are two types of stroke, but both cause the same type of damage. Some people may recover from a stroke, but for many people a stroke is an absolutely devastating event because the neurological damage is severe and irreversible. A stroke victim may never be able to speak, walk, or live independently.

Stroke is the most common neurological emergency. Approximately 800,000 Americans suffer a stroke each year, and stroke is the third leading cause of death in the United States. It is also the leading cause of disability in the United States.

There is no cure for a stroke. However, strokes can be prevented by identifying risk factors and living a healthy lifestyle. It is also vital to recognize when a stroke is happening and get immediate medical attention. The sooner a stroke victim reaches a hospital, the greater the chances are that the possible damage caused by a stroke can be limited.

OBJECTIVES

When the student has finished this module, he/she will be able to:

1. Identify the correct definition of stroke.
2. Identify the two types of stroke.
3. Identify the two basic causes of stroke.
4. Know the difference between a TIA and a stroke.
5. Identify three of the biggest risk factors for stroke.
6. Identify three most common signs and symptoms of a stroke.
7. Know three serious consequences of a stroke.
8. Identify three actions that must be taken if someone is having a stroke.
9. Identify the three types of therapy stroke victims need.
10. Identify three consequences of a stroke encountered during daily care.
WHAT IS A STROKE?

There are two basic types of stroke, although some experts will divide strokes into smaller and more specialized categories. However, all strokes can be defined in this way:

A stroke is a sudden and serious loss of blood flow to the brain

The brain is the most metabolically active organ in the body. The average brain only represents approximately 2% of the body weight. However, for the brain to function it requires almost 25% of the total blood flow the heart pumps in a minute. The brain is also one of the most vital - if not the most vital - organs. The brain controls movement, circulation, breathing, digestion, the power of speech, etc., and it is the source of consciousness and our higher intellectual functions.

It is obvious then that any significant disruption of blood flow to the brain can have very serious consequences, and that is what happens with a stroke. The disruption in blood flow during a stroke happens for two reasons:

- Blood clot: A stroke that is caused by a blood clot is called an ischemic stroke or an embolic stroke. This type of stroke happens when a blood clot called an embolism breaks off, travels through the circulation, and lodges in the brain. Many people have clots in their circulation: the condition is very common. If these clots are small enough and stable enough they will not cause harm. However, if a section of a blood clot breaks off, it can move through the arteries and veins. Eventually the clot will become stuck in an artery or a vein - the embolism is too big to fit through the blood vessel - and if this occurs in the brain, blood flow and oxygen supply are completely shut off. Most strokes (approximately 60%) are ischemic strokes caused by blood clots.

- Bleeding: The other type of stroke is caused by bleeding, a sudden rupture of a blood vessel in the vein. This type of stroke is called a hemorrhagic stroke.

Learning Break: There is a type of ischemic stroke that is not caused by blood clots. If a patient has a rapid and severe drop in blood pressure (a large heart attack can cause this, or massive bleeding in some place other than the brain), there will not be enough blood flow to the brain and a stroke is possible.

In either type of stroke, the blood supply to the brain is suddenly and drastically cut off. The brain depends on a constant supply of oxygen and nutrients such as blood sugar (glucose) to survive and function, and oxygen and glucose are transported by the blood. Of course, this is true of all of the organs and tissues of the body. However, because the brain is so metabolically active and because it has such a high need for oxygen and nutrients, even a short period of disruption in the circulation of the brain can cause enormous and irreversible damage. It has been estimated that if the brain is deprived of oxygen for greater than six minutes, irreversible damage will occur. (Note: Six minutes is merely an estimate)
There is another neurological emergency that closely resembles a stroke. A *transient ischemic attack* (TIA) is virtually identical to a stroke, and like a stroke a TIA is caused by a blood clot or bleeding. But in a TIA the signs and symptoms are temporary, the patient will recover, and there is no permanent damage. Many people refer to a TIA as a “mini stroke” but this does not mean that a TIA is benign. True, a TIA does not cause permanent damage, but a TIA is a very serious medical event because someone who has had a TIA is much more likely to develop a stroke than someone who has not had a TIA. Also, it can be difficult to distinguish between a stroke and a TIA while they are happening. Approximately 10% of all people who have a TIA will have a stroke within the next seven days, and approximately 25% of all people who have had a TIA will have a stroke within the next few years.

**WHY DO STROKES HAPPEN? WHAT ARE THE RISK FACTORS?**

Blood clots and bleeding are the basic causes of strokes, but the blood clots and the bleeding themselves are caused by specific risk factors. These risk factors increase the chances of developing either the bleeding or the blood clots that cause stroke.

- **Age:** Strokes are much more likely to happen in people over the age of 65. Advancing age increases the incidence and the severity of the other risk factors (e.g., atherosclerosis, obesity) so the older one is, the greater the chances of suffering a stroke.
- **Atherosclerosis:** Atherosclerosis is very common and widespread medical condition. It is characterized by blood vessels that have been partially or completely obstructed by deposits of cholesterol called plaques. Pieces of these plaques can break off, form an embolism and cause a stroke.
- **Coronary artery disease:** Coronary artery disease is atherosclerosis that occurs in the blood vessels of the heart. The presence of coronary artery disease increases the risk of having a stroke.
- **Diabetes:** People who have either type of diabetes, type I or type II, often have many of the risk factors (e.g., advanced age, atherosclerosis, and obesity) that increase the chances of having a stroke.
- **Gender:** Men are much more likely to have a stroke. This may be because men are more likely to have some of the risk factors such as atherosclerosis, cigarette smoking, and hypertension that increase one’s chances of having a stroke.
- **Heart arrhythmias:** A heart arrhythmia called atrial fibrillation increases the risk for stroke by increasing the risk of blood clots forming in the circulation. Atrial fibrillation is very common.
- **Heredity:** There is an increasing amount of evidence that suggests that the tendency to be at risk for developing a stroke may be, in part, genetic.
- **Hypertension:** An elevated blood pressure increases the risk for stroke, especially hemorrhagic stroke.
- **Illicit drug use, especially amphetamine and cocaine.**
- **Obesity:** People who are obese often have atherosclerosis, coronary artery disease, diabetes, and hypertension.
- **Oral contraceptives:** The use of oral contraceptives increases the risk for stroke.
- Previous history of stroke.
- Smoking: Cigarette smoking increases blood pressure and increases the risk for developing atherosclerosis - both of which increase the risk of developing a stroke.
- TIA.
- People who have had heart bypass surgery.

Some of these risk factors such as age, family history, and gender can’t be changed, but some of these risk factors are clearly related to personal health habits and lifestyle. High blood pressure, age > 65, and atherosclerosis are probably the most significant risk factors for a stroke.

WHAT ARE THE SIGNS AND SYMPTOMS OF A STROKE?

Different parts of the brain are responsible for controlling the different vital functions, both conscious functions (speech, memory, awareness) and unconscious functions (circulation, breathing, digestion, etc). So, the signs and symptoms of a stroke can vary depending on what area of the brain is affected. If one part is damaged, the patient will not be able to speak. If another part is damaged, the patient will not be able to walk.

The signs and symptoms of a stroke may vary from person to person, but the American Stroke Association notes that following are the most common indications that someone may be having a stroke:

- Sudden numbness or weakness, especially on one side of the body.
- Sudden difficulty in speaking or inability to speak.
- Sudden severe headache.
- Sudden onset of blurred vision.
- Sudden onset of confusion.
- Sudden inability to walk.

It is important to know all of the signs and symptoms in the list. However, the three most common you should keep in mind are: 1) Sudden weakness/numbness on one side of the body; 2) Sudden difficulty in speaking/inability to speak; and 3) Sudden onset of confusion.

A very simple and very useful way to determine whether or not someone is having a stroke is to remember the mnemonic phrase F.A.S.T. If you suspect that someone may be having a stroke check for, and remember:

F - Facial drooping
A - Arm weakness
S - Speech difficulties
T - Time

Very often a stroke will affect one side of the body but not the other. So while the stroke is happening, it is very common for the muscles of the face on one side to be affected and that side of a stroke victim’s face will droop. The muscles of the arms on
one side of the body will be affected, so the stroke victim will be unable to raise her/his arm up and hold it in position. And finally, speech difficulties are very common during a stroke. The speech will be garbled, nonsensical, and/or incomprehensible. So to use F.A.S.T mnemonic: 1) look for facial drooping and/or ask the person to smile and see if one side of the face droops; 2) ask the person if he/she can lift an arm and hold it up, and; 3) assess the quality of speech.

The T stands for time, and even though it is not part of determining whether or not someone is having a stroke, it is the most important part of F.A.S.T. Someone who is having a stroke needs immediate medical attention. A stroke is caused by an interruption of blood flow to the brain, and the longer the brain is deprived of blood and oxygen the greater the damage will be. Also, there are effective treatments for stroke but to be the most effective they need to be given as soon as possible after the stroke has begun. The longer the amount of time between the onset of the signs and symptoms of a stroke, the less effective stroke treatment will be and the greater the risks that neurological damage will be severe and permanent.

Learning Break: The signs and symptoms of a stroke and a TIA are virtually identical. People recover from a TIA, but a stroke is a medical emergency. However, both of these are very serious medical conditions and the patient needs immediate care. Without a physician’s exam and especially without specific tests, it is impossible to know if someone is having a TIA or a stroke. Because of that no one, regardless of her/his medical training background, should try and distinguish between a stroke and TIA “in the field.” If there is a suspicion that someone is having either a stroke or a TIA, call 911.

Stroke can also cause an elevated blood pressure, abnormally low heart rate, coma, decreased and inefficient respirations, and death. Approximately 20% of all people who have a stroke will die within the year. The death rate for people who have had a hemorrhagic stroke is much higher, and hemorrhagic strokes tend to cause more damage. The disabilities of a stroke such as the inability to speak, walk, or move parts of the body can resolve or they can be permanent.

If someone experiencing a stroke gets skilled medical attention within the first three to four hours, the damage can be limited. Unfortunately strokes can happen when someone is sleeping. A stroke can also happen when someone is alone, making it impossible to call for help. A stroke may be mistaken for something else. A stroke can go unrecognized by the victim or the people who are with the victim and unfortunately, in many cases people who are having the signs and symptoms of a stroke will be in denial - they do not want to believe that a serious medical emergency is happening.

WHAT HAPPENS TO SOMEONE WHO HAS HAD A STROKE?

The outlook for a stroke victim depends on many things: how soon the victim arrives at hospital, how serious the stroke is, how severe the signs and symptoms are, the patient’s age, and what types of pre-existing medical problems the patient has. The following figures are estimates.

- 10% of all stroke victims recover completely
- 25% recover with a minor impairment
- 40% have a moderate to severe impairment and require special care
- 10% require nursing home care
- 15% die
- 15% have another stroke within a year

Many stroke victims suffer from disabilities. Some of these disabilities include:

- Aphasia: Inability to speak
- Hemiparesis: Weakness affecting one side of the body
- Quadriplepsis: Weakness affecting all four limbs
- Hemiplegia: Paralysis affecting one side of the body
- Quadriplegia: Paralysis all four limbs
- Urinary incontinence
- Bowel incontinence
- Dysphagia: Inability to swallow
- Dysarthria: Difficulty speaking or altered speech
- Difficulty understanding oral communication
- Confusion
- Depression
- Sleep disorders

Many stroke victims will recover some or most of their ability to function independently. Rapid progress after a stroke is a good sign, and if the patient regains a large amount of his/her ability to independently ambulate, speak, and perform activities of daily living function in a few weeks the outlook is good. For most patients, the majority of function they will recover occurs within the first three months after the stroke, but some patients may continue to make progress after that time.

Predicting recovery after a stroke is difficult. The sooner someone gets to a hospital and receives treatment the better the outlook. Unfortunately, it is well documented that for various reasons, many stroke victims do not get to a health care facility during the optimal time period. Generally, the older someone is, the more severe the stroke, and the greater the number of medical conditions such as diabetes, hypertension, obesity, etc. the stroke victim has, the worse the outlook. Some of the possible consequences of a stroke were listed above, and approximately one-quarter of all people who have stroke will die within 30 days.

**WHAT SHOULD YOU DO IF SOMEONE IS HAVING A STROKE?**

If you are at work and you suspect someone is having a stroke, note the time; this is very important. Call for help or immediately notify your supervisor. Take the patient’s blood pressure, pulse, and count the respiratory rate. Perform the F.A.S.T assessment.

In the event that you suspect someone is having a stroke and you are not at work, follow these instructions.
The first step is to call 911; immediate transport to a hospital might save the person’s life. The next step is to check your watch or find out what time it is. This is very important because *some of the therapy for a stroke that might save someone’s life or limit the damage caused by a stroke cannot be used after a certain number of hours have passed.*

Once you have called 911 and established the time, either write down or make a mental note of what you are seeing. Remember the F.A.S.T. mnemonic. Pay particular attention to the person’s ability to speak and whether or not they can understand and respond appropriately to what you say. If it is possible, ask the person who may be having a stroke to take his/her hand and squeeze your hand; this will help determine if they have weakness on one side or the other, or both. If you have a watch check the person’s pulse, keep him/her comfortable, and wait for the ambulance.

You may have heard that stroke victims are given aspirin. This is true and it can be helpful in some cases. But it could also cause serious harm, so you should *never* give someone an aspirin to someone who may be having a stroke unless a physician or emergency medical services (EMS) personnel has advised its use.

**Learning Break:** Some people who are having a stroke will have very dramatic signs and symptoms, others may not. In either case, it is common for people to deny that anything is wrong and some may refuse transport to a hospital. If this happens, you should still call 911. The EMS personnel may be able to convince that person to get the help that is needed. You should also tell this person that if a stroke is happening, it is absolutely vital to get to a hospital as soon as possible. If someone is or may be having a stroke, that person can refuse medical care, but she/he should be informed of the risks.

**WHAT IS THE TREATMENT FOR A STROKE?**

Preventing a stroke is obviously much better than treating one. People should be informed by their physician about the risk factors for stroke and about the signs and symptoms of a stroke. Friends and family should be educated as well. Every effort should be made to encourage someone who has lifestyle-related risks factors for stroke to stop smoking, eat a healthy diet, lose weight, exercise, and have their blood pressure checked regularly.

If a stroke does occur, it is absolutely essential to seek help immediately. It has been proven that early intervention saves lives and can limit damage: timing is critical. Some of the medications that can be lifesaving and prevent permanent neurological damage must be used within 4.5 hours of the stroke, and studies have shown that for every 15 minutes of reduction time from the onset of stroke to treatment, the chances of survival and recovery are greatly increased. It cannot be emphasized strongly enough: time is the most important aspect of stroke care.

Unfortunately, because stroke may not be recognized by the victim or anyone else, because some strokes happen during sleep or while the person is alone, because of denial (“This can’t be serious, the symptoms will go away.”) and for various other reasons, most patients with a stroke get to an emergency room far too late: the average is 4 to 24 hours after the stroke.
Once the patient reaches the emergency room, the physician will determine if the patient is having an ischemic stroke or a hemorrhagic stroke. This is done using CT scan, MRI, and other diagnostic tools. If the patient is having an ischemic stroke, he/she will probably receive intravenous medication that will break up the blood clot that is causing obstruction. If the patient is having a hemorrhagic stroke, these medications will not be used. The care for these patients will be supportive and focus on treating the common complications of stroke. Surgery is rarely an option for treating hemorrhagic stroke.

**POST-STROKE TREATMENT**

After a stroke, treatment focuses on three specific goals: 1) preventing and treating acute, serious medical complications; 2) preventing and treating sub-acute medical complications, and; 3) maximizing the patient’s ability to function independently.

**Preventing/Treating Acute Complications**

Typical serious post-stroke medical complications include brain edema, fever, hyperglycemia, hypoglycemia, hypertension, hypotension, pulmonary embolism, respiratory infections, seizures, thrombophlebitis, and urinary tract infections. Patients are also at risk for suffering a myocardial infarction or another stroke. These complications occur in the first few hours and days while the patient is still in intensive care or an acute care facility.

**Preventing/Treating Sub-Acute Medical Complications**

Preventing and treating sub-acute medical complications is often initiated during the acute phase of stroke care. These problems are called sub-acute to distinguish them from the serious complications such as hypotension and seizures that can be life-threatening; the sub-acute complications can cause significant harm, but they are not immediately dangerous. The more common ones include:

- **Contractures:** Contractures can be prevented with proper positioning, range of motion exercise, splinting, and other preventive techniques.

- **Dysphagia:** Dysphagia literally means “difficulty swallowing.” Stroke is the most common cause of dysphagia. Approximately of 65% all people who suffer a stroke will have dysphagia and for many of them the condition will be permanent. The stroke affects the nerves and the muscles that control swallowing, and it can also damage the gag reflex. The gag reflex is essentially a sensitive area of tissue in the back of the throat that will sense if food is going into the lungs instead of the esophagus. If this happens, the gag reflex is initiated and the food or foreign body will be expelled with a forceful cough and by gagging. Dysphagia is a serious problem. It can affect hydration and nutrition status and if the gag reflex is damaged, food and liquids can be aspirated into the lungs and cause pneumonia. All patients who have had a stroke will be evaluated (Usually by a speech therapist) to determine if there are any swallowing difficulties.
Treatments for dysphagia include temporary placement of a feeding tube, controlling size and consistency of food portions, positioning strategies, supervision during meal times, and swallowing exercises.

- Incontinence: Loss of bladder and bowel control are common complications caused by stroke. Approximately 30% of all stroke victims will have some degree of urinary incontinence, and for many of the people the problem will persist. Fecal incontinence is also common, but less so than urinary incontinence. Treatments for bladder and bowel incontinence can include the temporary use of a urinary catheter for a period of time, medications that help control the bladder and the bowels, pelvic floor muscle strengthening exercises, and behavioral modification techniques such as scheduled toileting.

- Pressure sores: Some patients who have had a stroke will not be able to move, either from paralysis or the need to be immobile while being treated, and immobility is the basic cause of pressure sores. The development of pressure sores and the treatment of pressure sores is a complex subject. Experienced CNAs are familiar with how pressure sores start and how they are managed and the topic will not be discussed here except to note that pressure sores are not an inevitable consequence of immobility - they can be prevented with conscientious care.

Maximizing Independent Function

A stroke can have devastating effects on someone’s ability to live independently. As soon as possible after a stroke, occupational therapy, physical therapy, and speech therapy professionals will become involved. Physical therapy, occupational therapy, and speech therapy are essential parts of the recovery process for stroke victims. It has been proven that these treatments can help people regain function and independence.

At some point, a psychologist or psychiatrist will probably be asked to evaluate the patient, as well. Many patients who have had a stroke develop psychological problems: anger, depression, and fear are common. The patient has had a significant life change, his/her future is uncertain, and it is possible that the patient may never be able to live independently. Without counseling and support the psychological impact of a stroke can be as crippling as the physical damage.

The therapies that are commonly implemented for patients who have had a stroke are:

- Occupational therapy: Occupational therapy is similar to physical therapy, but the occupational therapy activities are designed to be very practical. This therapy is designed to help people who have had a stroke perform their activities of daily living (ADL) such as dressing, eating, bathing, and ambulating. The occupational therapist will use exercises, special tools, and lots of hands-on practice to simulate these activities so that the patient will be become skilled at the real-world self-care tasks. Occupational therapy also focuses on how to perform the ADL within the patient’s specific physical limits.

- Physical therapy: Physical therapy is an organized program of exercises. It is designed to strengthen the muscles and keep the joints flexible. Physical therapists
can also help people who have had a stroke learn ways to work with their disabilities.

- Psychotherapy: Individual counseling, group therapy, and anti-depressant medications are some of the treatment options.
- Speech therapy: Aphasia is very common in stroke victims: at least 1/3 of all people who have had a stroke have some degree of aphasia. Speech therapy and time can help approximately 50 percent of these people regain the ability to speak.

WORKING WITH SOMEONE WHO HAS HAD A STROKE

After a stroke, the patient may not be able to move, may not be able to speak, may not able to understand oral communication, and may be confused. Because of that, many victims of a stroke need almost complete care in the first few days and weeks after the event. When you are responsible for someone who has had a stroke, concentrate on these areas of care.

- Communication: When you are speaking, position yourself directly in front of the patient and make eye contact. Initially, keep your sentences short and simple. If you need the patient to perform a task or to move, try and demonstrate the action. It will take time for you to discover what each person can do and what his/her style of communication might be. Be patient. If you are having a hard time getting an idea across or the patient is having a hard time understanding, it might be more sensible – and less frustrating for everyone – to wait and try again later.
- Exercise: If a patient who has had a stroke cannot move his/her arms or legs or other parts of the body, the joints may become permanently stiff and immovable, and the patient can develop contractures. You may be asked to perform range of motion exercises. These consist of slowly flexing and extending the arms, legs, etc. within their normal range.
- Skin care: When someone is confined to bed or a chair for long periods because he/she can’t move, constant pressure of the body weight can cause skin breakdowns, also known as pressure sores or pressure ulcers. These can be very serious, and there are many techniques used to prevent these such as padding pressure points and frequent position changes. You will learn these in school and will be responsible for performing them.
- Assisting with ADL: People who have had a stroke will often need help dressing, bathing, and moving. Encourage the patient to do as much as possible, but only if these tasks can be performed safely. Falls are one of the biggest causes of injuries. Helping a patient ambulate will be taught in school.
- Nutrition: A stroke can cause dysphagia and damage the gag reflex. This reflex prevents food from going into out lungs; if that occurs, a normal gag reflex causes us to cough and expel the food. Supervise eating carefully and never rush someone through a meal. The size of each piece of food and its consistency will be determined by the physician and the dietician; do not go outside these guidelines.
SUMMARY

Stroke is the most common neurological emergency. A stroke - also called a CVA – happens when there is a sudden and significant disruption of the blood flow to the brain. Because the brain is so metabolically active and has such a high need for blood, any serious drop in blood flow to the brain can cause irreversible damage.

A stroke can be caused by: 1) A blood clot that travels from the peripheral circulation and lodges in a blood vessel in the brain, or; 2) A ruptured blood vessel. The first type of stroke is called an ischemic stroke and it is the more common of the two. The second type is called a hemorrhagic stroke. The signs and symptoms of ischemic and hemorrhagic stroke are identical, but hemorrhagic strokes tend to be more severe. Atherosclerosis, age > 65, and hypertension are the biggest risk factors for developing a stroke.

The signs and symptoms of a stroke can be mild or severe. The most common signs of a stroke are confusion, inability to speak, and weakness on one side of the body. A recommended way to determine if someone is having a stroke is to use the mnemonic F.A.S.T.: Check for facial asymmetry; check muscle strength by asking the patient to hold up one arm; assess the quality of the patient’s speech; and remember that time is critical – a person who is having a stroke needs immediate medical attention.

A stroke may begin as relatively mild and improve, but it can progress and cause irreversible brain damage. Common complications of a stroke include aphasia, dysphagia, and muscle weakness/paralysis. It is difficult to predict the level of recovery after a stroke, but the more severe the stroke, the older the victim, and the number and severity of pre-existing medical problems the worse the outcome. However, the sooner a stroke victim receives medical care, the better the chances for survival and recovery of function.

Ischemic strokes are treated with drugs that dissolve blood clots. Hemorrhagic strokes are treated with symptomatic/supportive care. The basic goals of stroke care are to identify and treat acute and sub-acute complications and then maximize the patient’s ability to independently function.