

STROKE

Abstract

A stroke, also referred to as a cerebrovascular event, is a neurological event that causes damage to the brain. Stroke is caused by a large, sudden interruption of blood flow to the brain, and can result in severe, irreversible neurological damage. A stroke victim may permanently lose the ability to speak, walk, or live independently. Blood clots and bleeding are the basic causes of strokes and involve specific risk factors. Strokes can be prevented by identifying risk factors and by making healthy lifestyle choices.

Learning Goal:

1. Identify the types of a stroke and the difference between a TIA and a stroke.
2. Identify the basic causes of a stroke.
3. Describe the major risk factors for stroke.
4. Identify the common signs and symptoms of a stroke.
5. Describe a stroke patient's daily care needs.

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 (CVA)*. Stroke is caused by a large, sudden interruption of blood flow to the brain. Some people recover from a stroke but for many others a stroke is a devastating event that causes severe, irreversible neurological damage. In some cases, a stroke victim will permanently lose the ability to speak, walk, or live independently. A patient may minimize the effects of a stroke if the patient receives immediate medical attention. Strokes can be prevented by identifying risk factors and by making healthy lifestyle choices.

Prevalence of Stroke

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.

Causes and Types of Stroke

A stroke is a sudden and serious loss of blood flow to the brain. There are two basic types of stroke but some experts divide strokes into smaller, more specialized categories. The type of stroke does not affect the consequences a patient may suffer; all stroke types cause the same damage.

The brain is a vital organ. The brain controls movement, circulation, breathing, digestion, speech, amongst other things, and it is the source of consciousness and of higher intellectual functions.

The brain is the most metabolically active organ in the body. The brain requires almost 25% of the total blood flow the heart pumps in a minute for it to function, even though the average brain only represents about 2% of a person's body weight. It should be obvious then that any significant disruption of blood flow to the brain can have serious consequences.

The disruption in blood flow during a stroke happens for two reasons. First, a stroke can be caused by a blood clot and 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.

Clots are a common condition. If a clot is small and stable, it 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. Approximately 60% of strokes are ischemic strokes caused by blood clots.

Secondly, the other type of stroke is caused by bleeding, which is a sudden rupture of a blood vessel in the vein. This type of stroke is called a *hemorrhagic* stroke.

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, caused by a large heart attack, or massive bleeding outside 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 bodily organs and tissues. 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.

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. However, 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. A TIA is a 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 when an event is 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.

Stroke 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. Risk factors for stroke are outlined next.

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 (*i.e.*, atherosclerosis, obesity) so the older one is, the greater the chances of suffering a stroke.

Atherosclerosis

Atherosclerosis is a 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 (*i.e.*, 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 their 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

Illicit drug use is a stroke risk factor, 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.

Smoking

Cigarette smoking increases blood pressure and increases the risk for developing atherosclerosis - both of which increase the risk of developing a stroke.

Other Risk Factors

- Previous History of Stroke
- A prior transient ischemic attack (TIA)
- People who have had heart bypass surgery

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

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 risk factors for stroke to stop smoking, eat a healthy diet, lose weight, exercise, and have the blood pressure checked regularly.

Signs and Symptoms of Stroke

Different parts of the brain are responsible for controlling different, vital functions. These include conscious functions such as speech, memory, and awareness, and unconscious functions such as circulation, breathing, digestion, etc. 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 has listed the most common indications that someone may be having a stroke:

- Sudden numbness or weakness, especially to 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 the stroke signs and symptoms; however, there are three more common signs of a stroke: 1) sudden weakness or numbness to one side of the body, 2) sudden difficulty in speaking or an inability to speak, and 3) sudden onset of confusion.

A simple and useful way to determine whether 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, remember and check for:

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. While the stroke is happening, it is 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 an arm up and hold it in position. Finally, speech difficulties are very common during a stroke. The speech will be garbled, nonsensical, and/or incomprehensible.

Applying stroke signs to the F.A.S.T mnemonic: 1) look for facial drooping and/or ask the person to smile and see if one side of the person's face droops, 2) ask the person if he or she can raise an arm and keep it raised, and 3) assess the quality of the person's speech.

The **T** stands for time, and even though it is not part of determining whether someone is having a stroke, it is the most important part of the mnemonic. A person 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 these treatments are most effective if given as soon as possible after the stroke has begun.

The more time that passes after 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.

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. Both

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. For this reason, no health clinician should try to distinguish between a stroke and TIA "in the field." If there is a suspicion that someone is having either a stroke or a TIA, 911 should be called immediately.

Stroke can 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 in many cases people who are having the signs and symptoms of a stroke may be in denial; they do not want to believe that a serious medical emergency is happening.

Stroke Outcomes and Physical Functioning

The outlook for a stroke victim depends on many things: how soon the victim arrives at a hospital, how serious the stroke is, the severity of

signs and symptoms, the patient's age, and what types of pre-existing medical problems the patient had. The following figures are estimates of a stroke victim's outlook:

- 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% have another stroke within a year

From this group, about 15% will die shortly after a stroke. One-quarter of stroke victims will die within 30 days.

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

- Aphasia: Inability to speak
- Hemiparesis: Weakness affecting one side of the body
- Quadriparesis: 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. If a patient regains a large portion of his or her ability to ambulate, speak, and perform activities of daily living function within a few weeks of the stroke, the patient's prognosis is good. Most patients will recover functions within the first three months following a stroke but some patients 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 healthcare facility quickly enough. An older person is likely to have a more severe stroke. A person with other medical conditions such as diabetes, hypertension, obesity, *etc.*, is likely to have a poorer outcome following a stroke.

Assisting A Person Having a Stroke

If a Certified Nursing Assistant (CNA) is at work and suspects a patient is having a stroke, the CNA should take the following steps. The first step is to note the time of the event - this is extremely important, secondly, the CNA should call for help or immediately notify a supervisor, thirdly, take the patient's blood pressure, pulse, and count the respiratory rate, and the last step is to perform the F.A.S.T assessment.

If a person is not at work and suspects someone is having a stroke, the following steps should be taken: The first step is to call 911; immediate transport to a hospital might save the person's life. The next step is to note the time of the event; this is very important

because some of the available therapies 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.

After calling 911 and establishing the time of the event, the person assisting should either write down or make a mental note of what was observed. Remember the **F.A.S.T.** mnemonic. Pay particular attention to the victim's ability to speak and whether or not the victim can understand and respond appropriately to verbal communication. If it is possible, the person assisting should ask the victim to squeeze a hand to help determine if the victim has weakness on one side or the other, or both. Finally, if possible, the victim's pulse should be checked, and effort made to keep the stroke victim comfortable while waiting for an ambulance to arrive.

Stroke victims are sometimes given aspirin. This can be helpful in some cases but it may also cause serious harm. Because of the potential for serious harm, a patient should not be given aspirin to treat a stroke unless a physician or emergency medical service (EMS) personnel has advised its use.

Some people who are having a stroke will have dramatic signs and symptoms while 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, the CNA should call 911 regardless. The EMS personnel may be able to convince that person to get the help that is needed. If someone may be having a stroke, that person can refuse medical care but should be informed of the risks and told that if

a stroke is happening, it is vital to get to a hospital as soon as possible.

Emergency Stroke Treatment

If a stroke occurs, it is essential to seek help immediately. It has been proven that early intervention will save lives and can limit neurological damage. 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 that *time is the most important aspect of stroke treatment*.

When a patient has a stroke, the patient will usually receive medical attention from 4 to 24 hours after the stroke. As mentioned above, the delay may be due to a stroke occurring while a person is sleeping, or while being alone. When a person is aware of stroke symptoms, he or she may deny that a serious event is occurring.

Once a patient reaches an emergency room, a physician will determine if the patient is having an ischemic stroke or a hemorrhagic stroke. This is done using computed tomography (CT) scan, magnetic resonance imaging (MRI), and other diagnostic tools. If the patient is having an ischemic stroke, he or 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 subacute medical complications, and 3) maximizing the patient's ability to function independently.

Preventing and Treating Acute Stroke Complications

Typical serious post-stroke medical complications include brain edema (swelling), fever, hyperglycemia (high blood sugar), hypoglycemia (low blood sugar), hypertension, hypotension, pulmonary embolism, respiratory infections, seizures, thrombophlebitis (inflammation of a vein that can cause blood clot formation and blockage in the vein), and urinary tract infections. Patients are also at risk for suffering a myocardial infarction (heart attack) or another stroke. These complications occur in the first few hours and days while the patient is still in the Intensive Care Unit (ICU) or an acute care facility.

Preventing or Treating Subacute Medical Complications

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

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 65% of 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 is 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. 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 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 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, the future is uncertain, and it is possible that the patient may never again 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, physical therapy, psychotherapy and speech therapy.

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 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 antidepressant medications are some of the treatment options.

Speech Therapy

Aphasia is very common in stroke victims. At least one-third 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.

Caring for the Stroke Victim

After a stroke, the patient may not be able to move, may not be able to speak, may not be able to understand oral communication, and may be confused. Because of these factors, many victims of a stroke need almost complete care in the first few days and weeks after the event.

A CNA who is responsible for a stroke patient should concentrate on the following areas of care.

Communication

When speaking to the patient, the CNA should take a position directly in front of the patient and make eye contact. Initially, short, simple questions should be used. The CNA should make an effort to demonstrate an action or task the patient needs to perform. It will

take time to discover what each person can do and what his or her style of communication might be.

The CNA caring for a stroke patient will need to show patience. If a CNA is 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 – for the CNA to wait and try again later.

Exercise

If a patient who has had a stroke cannot move the arms, legs or other parts of the body, the joints may become permanently stiff and immovable, and the patient can develop contractures. A CNA may be asked to perform *range of motion* (ROM) exercises. These consist of slowly flexing and extending of the arms and legs within their normal range.

Skin Care

When someone is confined to bed or a chair for long periods because of immobility, constant pressure of the body weight can cause skin breakdown, also known as *pressure sores* or *pressure ulcers*. These can be very serious, and there are many techniques used to prevent skin breakdown, such as padding pressure points and frequent position changes. The CNA will learn these methods 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. The CNA will need to 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 is one of the tasks a CNA must learn and perform.

Nutrition

A stroke can cause dysphagia and damage the gag reflex. This reflex prevents food from going into the lungs; and if food is going into the lungs, a normal gag reflex causes the person to cough and expel the food. The CNA should 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. The CNA should 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, 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 a blood clot that travels from the peripheral circulation and lodges in a blood vessel in the brain, or 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.

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**; **F**acial asymmetry, check muscle strength by asking the patient to hold up one **A**rm, assess the quality of the patient's **S**peech, and remember that **T**ime is critical. A person who is having a stroke will need 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 or paralysis. It is difficult to predict the level of recovery after a stroke but the outcome for the patient is worse if the stroke is more severe and if the patient is older. Recovery is also worsened depending on the number and severity of a patient's pre-existing medical problems. However, the sooner a stroke victim receives medical care, the better are the patient's chances for survival and recovery of function.