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This book is not intended to serve as a substitute for a physician. Nor is it the author’s intent to give medical advice contrary to that of an attending physician.

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To my wife, Christine, and my mother, Betylou. Through their love, I have learned my most important lessons.
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Introduction

As a rehabilitation physician, I have treated hundreds of stroke patients for almost thirty years. I have seen patients and families being swept into a tailspin of confusion and overpowering emotion as the result of stroke. One of the biggest fears, for both patients and families, is the fear of the unknown. What to expect? What happens next?

My goal in writing this book is to provide answers to some of your questions so that you’ll be better prepared to navigate your way through this stressful time. Remember, every patient is different, so it’s not possible to cover individual issues here. Instead, I’ve tried to provide a basic knowledge of strokes.

If you are a family member or friend of someone who has had a stroke, I would first advise that you educate yourself about stroke and rehabilitation. Secondly, I suggest that you communicate with your loved one’s caregivers. Effective communication can go a long way toward reducing your anxiety. Patients who have supportive families and friends have better recovery outcomes. As much as possible, get involved in the recovery and rehabilitation process.

Remember also, that when someone is suddenly afflicted by a devastating illness, the patient often withdraws mentally and emotionally as a way to cope. Unfortunately, then, the patient doesn’t always hear or understand what he or she is being told—all the more reason for families to be informed and participating. My final word of advice is: Be patient and supportive with the stroke patient in your life.
Although the world is full of suffering, it is full also of overcoming it.

Helen Keller
1880–1968
Imagine, for a moment, you’re going through your day and suddenly you have a pounding headache and, although you’re in familiar surroundings, nothing looks familiar.

Suddenly, you’re aware of a spreading warmth between your legs. You’ve wet your pants. You’ve also fallen to the floor. No matter how hard you struggle to get up, you can’t. Neither your arm nor your leg will move. You try calling for help, but the words coming out of your mouth are gibberish. If you’re alone, a frightening thought overwhelms you: What if no one finds me?

This scenario describes what it might be like if you suffer a stroke. A frightening proposition, indeed, especially in those first hours and days. You wonder if you will live. Will you be impaired? How long will rehabilitation take? How complete will recovery be? These are just a few of the questions that might race through your mind or the minds of loved ones.

Unfortunately, there are no standard answers to these questions. However, for most individuals, the ability to understand and adapt to this new reality depends largely on their attitudes and efforts as well as on support from family, friends, healthcare professionals, and caregivers.
In this chapter, we’ll discuss the complexities of strokes and how they occur. In order to better understand how strokes affect the brain, let’s first review the basics of how the brain works.

Brain Anatomy

The upper brain, or *cerebrum*, is divided into two *hemispheres*. The cerebrum contains the *cortical area*, used for thinking, and the *subcortical area*, a complex network of nerves that act as relay centers and linking pathways. Each
The Brain and How Strokes Occur

hemisphere has four separate lobes: frontal, parietal, temporal, and occipital. Frontal lobes—located in the front of the brain—control thinking, behavioral functions, and body movement. Parietal lobes assist in sensation, concrete thinking (such as math), abstract thinking, vision-space orientation, and language. The temporal lobe is part of the emotional and memory center and also contains language functions. The occipital lobe is the part of the brain that interprets what we see.

The back part of the brain, the cerebellum, controls balance and coordination. Under the cerebrum lies the brain stem. It controls involuntary and automatic survival processes we don’t need to think about, such as heart rate, body temperature, breathing, sleeping cycles, and the regulation of some hormones.

How Blood Flows to the Brain

Blood moves from the heart to the brain through the large carotid arteries, which travel up each side of the neck along the windpipe. Once inside the skull, the carotid arteries divide into front and side branches. These blood vessels supply the front two-thirds of the brain’s outer surface. The vertebrobasilar arteries travel upwards and serve this region as well as the coordination centers and the brain stem.

How the Brain Sends Signals

The wiring of nerves in the brain is complex. Although the two hemispheres of the brain look identical, they handle separate functions. Each hemisphere controls movement and

My mother has changed in many ways from her stroke, but she is still the matriarch of our family. This bittersweet change has taught us to value every moment with her. I’ve learned to cherish the depth, beauty, and mystery of life.

–John
Age 40
The Stroke Recovery Book

sensation on the opposite side of the body. For example, if you put your left hand under hot running water, the right cerebral cortex interprets the stimulus as pain. To reach for an ice cream cone with your right hand, the left side of the brain generates a signal. The left part of the brain is dominant in right-handed people, while the right portion of the brain is dominant in left-handed individuals.

Stroke: “Brain Attack”

A stroke is a “brain attack” in the same way a blockage of blood flow to the heart is a “heart attack.” A stroke occurs when an area of the brain is deprived of blood flow. Most commonly, this happens when blood vessels are blocked by a clot or have become too narrow for blood to pass through. A stroke may
The Brain and How Strokes Occur

also occur when a blood vessel bursts and leaks blood into the brain, causing damage. A lack of blood pumped to the brain, the result of a heart attack, may also cause a stroke.

When blood flow to the brain stops suddenly, a person will fall unconscious in about twelve seconds. Since the brain relies on the glucose and oxygen carried by blood cells for energy, brain cells will begin to die after about four minutes without these nutrients. This is a critical situation. Unlike other body tissues that have the ability to repair themselves over time, brain tissue is highly specialized and is less able to recover.

If Someone Is Having a Stroke

Are you aware of the signs of a stroke? Do you know what action to take if you think a loved one or friend is having a stroke?

Symptoms include: numbness or weakness in the face or limbs, sudden confusion and trouble speaking, trouble seeing, sudden dizziness or loss of balance, and sudden headache. Getting emergency medical care quickly is critical. The majority of strokes (80 percent) occur as a result of blood clots in the brain. Individuals having this type of stroke are often candidates for a clot-busting drug called tPA, tissue plasminogen activator. The drug can significantly reduce brain damage and the resulting disability after a stroke.

Warning Signs of a Stroke

- Sudden numbness or weakness of the face, arm, or leg, especially on one side of the body
- Sudden confusion, trouble speaking or understanding
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, loss of balance or coordination
- Sudden, severe headache with no known cause

If someone has any of these symptoms, seek emergency medical care. Even if the symptoms go away, they could still be a sign of stroke.

Source: American Heart Association
However, the drug must be given within three hours of the onset of symptoms. Therefore, it’s also important to tell hospital personnel when the stroke patient’s symptoms started.

Unfortunately, most people delay calling for help, according to a 2010 study completed by researchers at the Michigan Department of Community Health. The researchers reported that in a survey of 4,800 people, only a fraction said they would call 911 if they observed a relative or friend showing symptoms of stroke.

Remember also that you may be the person who needs to call 911. A stroke can injure a person’s brain, and he or she may not be able to tell you of their symptoms. Therefore, the best thing you can do if you think someone is having a stroke is to call for an ambulance immediately. The difference can save a life and reduce the chance for permanent disability.

Those conducting the Michigan study also urge the public to call 911 for an ambulance rather than transport a stroke victim themselves to a hospital emergency room. Patients who are transported by ambulance can begin receiving treatment immediately upon the arrival of emergency medical personnel. Also, patients transported by ambulance reach hospitals sooner and receive treatment sooner than those who are taken to the hospital by relatives or friends.

**Major Causes of Stroke**

*Thrombosis*

The leading cause of stroke is *thrombosis*, or blood clots. Clots develop gradually when the inner lining of blood vessels become clogged with the build-up of cholesterol and fatty substances. This clogging is similar to the deposit of lime scale in water pipes: Eventually enough scale accumulates to narrow or totally shut off the flow of water. In blood vessels, a build-up of cholesterol from years of eating a high-fat diet may have the same effect.
Embolism

The second major cause of stroke, *embolism*, occurs when a clot formed in a blood vessel somewhere in the body breaks off, enters the brain’s circulatory system, and travels until it encounters an artery it can’t pass through. The *middle cerebral*
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artery, located in the middle portion of the brain, is most often affected by emboli. Clots may be caused by platelets, components of the blood’s clotting mechanism, or by cholesterol in the neck arteries that softens and breaks off into a blood vessel. When a clot lodges in a blood vessel, the area of the brain served by that blood vessel may die. Clots sometimes break up into smaller pieces quickly enough to restore the blood flow. Some embolism patients experience a secondary problem: bleeding from damaged vessels where the emboli lodge.

The heart, as well as the neck arteries, is a major source of clots. Clots from the heart can arise from abnormal heart rhythms, heart attacks, the surgical placement of artificial heart valves, heart bypass operations, infections inside the heart, damage to the heart valves from rheumatic heart disease, or mitral valve prolapse (valves collapse inward, allowing blood to enter a chamber inappropriately) If a large clot that originates in the heart fragments, the brain may be showered with small pieces, causing multiple patterns of brain damage. These patterns often help a physician identify a stroke caused by emboli.

A physician may perform a test, a transthoracic or transesophageal echocardiogram, to help determine whether an abnormality inside the heart is responsible for emboli. This procedure involves placing a special probe into the esophagus.
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the swallowing tube in the throat, and bouncing sound waves off the back of the heart to reveal pictures of the heart’s structures and function. These pictures will show clots inside the heart that may be responsible for the stroke.

Hemorrhages

Hemorrhage is the third major cause of stroke. Hemorrhages can be caused by aneurysms, weakened blood vessels that form bubble-shaped projections and then break. A subarachnoid hemorrhage results from bleeding in the deeper cavities of the brain. An intracerebral hemorrhage occurs when a blood vessel bursts, leaking blood into the firm tissue of the brain. Pressure or blood vessel spasm from the bleeding can pinch surrounding blood vessels, shutting off more blood flow and producing further stroke effects.

Hemorrhagic strokes are the most deadly, due to the pressure they can produce on vital parts of the brain. Patients who survive bleeding strokes for more than thirty days often have fairly good functional outcomes. The most common cause of stroke by hemorrhage is poorly controlled high blood pressure, also known as hypertension. Other causes include malformations of blood vessels inside the brain, blood clotting diseases, some types of liver disease, and brain tumors.

Hypotension

The fourth major cause of stroke, hypotension, occurs when blood pressure falls to dangerously low levels. Not enough blood is being pumped to the brain. The medical

After I had a stroke, I was worried about being able to earn a living. The stroke affected my right side so I’m learning to compensate with my left side. I will not stop trying to make progress.

– Mary
Age 44
term for this resulting brain damage is *anoxic encephalopathy*. These patients differ from all other stroke patients in that all, not just part, of the brain may lose its blood supply. This can happen in cases of severe heart failure, with certain abnormal heart rhythms, and in some heart attacks when the heart fails to adequately pump blood. Some survivors of cardiopulmonary resuscitation (CPR) may also fall into this group.

**Blood Clotting Abnormalities**

Blood clotting abnormalities are responsible for a far less common type of stroke. In these cases, the body’s balance between making blood clots and breaking them down shifts, with an increased tendency to make clots that are large enough to cause strokes. Medical scientists are still studying the reasons for this imbalance.

**Transient Ischemic Attacks (TIA)**

*A transient ischemic attack (TIA)*, often called a mini-stroke, is a temporary blockage of an artery. Neurological symptoms go away within twenty-four hours, depending on which artery is blocked. TIAs leave no permanent brain tissue damage. When a person with TIA symptoms arrives in a hospital emergency department, it may initially be difficult for doctors to tell if the patient is having a TIA or a full-blown stroke. The patient will likely be admitted to the hospital for further examination.

However, TIAs are often warnings of strokes to come. An estimated 40 percent of people who suffer TIAs ultimately have strokes, often within a year. People who have several TIAs within a short period of time have a higher risk of developing full-blown strokes. Still, not all TIAs result in stroke. Some people have TIAs that will disappear. Others have TIAs that persist but never progress to stroke. Clearly, medical evaluation at the earliest stage, when brain damage is reversible, is the best way to prevent permanent brain damage.
The Brain and How Strokes Occur

Location of Strokes in the Brain

Strokes are labeled according to the area of the brain that is damaged. For example, if the right hemisphere of the brain loses its blood supply, a right hemisphere stroke is said to have occurred. A stroke on the left side of the brain is referred to as a left hemisphere stroke. If an individual suffers a right hemisphere stroke, the left side of the body will be affected. If a stroke occurs in the left side of the brain, the right side of the body will be affected.

Four areas of the brain (artery blood-flow centers) are most commonly affected by stroke. A list of these areas follows, along with an explanation of the deficits that frequently result from these strokes. Deficits are deficiencies in mental or physical functions that result from damage to the brain. Common deficits include weakness or paralysis; loss of sensation; problems walking or speaking; and difficulties with activities of daily living (ADLs) such as dressing, eating, speaking, and grooming.

Middle Cerebral Artery Stroke

A stroke occurring in the middle cerebral artery may cause:

- loss of feeling on the opposite side of the body
- the arm to usually be weaker than the leg
- significant drooping of the lower half of the face, and drooling
- loss of strength, varying from slight weakness to complete paralysis
- loss of vision, or blind spots
- communication problems, including the inability to understand and produce language
- confusion differentiating between left and right
Anterior Cerebral Artery Stroke

Damage to the anterior cerebral artery may cause:

- weakness or paralysis on the opposite side of the body
- the leg to usually be weaker than the arm
- trouble with bowel and bladder control
- opposite-side sensation loss
- intellectual disturbances, including repetitive thought and speech
- disorientation (who and where the patient is and problems understanding aspects of time)
- confusion, forgetfulness, distractibility, and slowed thinking
- an inability to perform tasks when asked, even though the patient has the physical ability to perform the task automatically at other times (apraxia)
- facial weakness
- problems with grasp reflex so strong that the patient cannot let go of objects

Posterior Cerebral Artery Stroke

Strokes occurring in the posterior cerebral artery affect the back part of the brain. This artery serves a wide area of brain tissue. Deficit patterns vary depending on which areas are impacted, but may include:

- blind spots on the side opposite where the brain damage occurred
- memory problems and difficulty reading
- severe loss of touch sensation
- burning sensation in the limbs (thalamic pain syndrome)
- weakness and involuntary movement disorders
- lack of coordination (ataxia)
- cortical blindness, of which the patient is not fully aware
Brain Stem Stroke

Blockages in the vertebral and basilar arteries at the base of the brain may damage the brain stem. This particularly vulnerable area includes tightly packed nerve cells, similar to the filaments in a telephone cable. The brain stem controls automatically regulated functions such as heartbeat and breathing. Damage to this area may result in coma or death. Depending on which small blood vessel is blocked, numerous combinations of deficits and syndromes may occur, including:

- sensory loss
- weakness on one side of the body and poor coordination
- swallowing difficulties
- loss of emotional control
- slurred speech
- visual problems, double vision
- dizziness/vertigo
- seizures
- headaches

If the lower portion of the brain stem is deprived of blood, extreme injury can result. Such an injury can create a “locked-in syndrome,” in which a patient is virtually “locked” inside the body. The patient is aware but unable to move any limbs. Thinking may be normal, but communication is limited to movement of the eyes and eyelids. Fortunately, this is a rare condition.
Impairments Caused by Stroke

The brain is a vastly complex organ. No one has solved all its mysteries and its amazing capabilities. However, we know the unique human ability to process information occurs in the outer layer of the brain called the cerebral cortex. Damage to these brain tissues can result in a number of changes in cognition, a term that refers to the process of thinking and knowing things. It includes awareness, reasoning, remembering, perception, and problem solving. A stroke can also affect sensation, or the senses—smell, sight, hearing, touch, and taste.

To better understand how stroke can affect cognition and sensation, let’s examine four basic elements: perception, intellect, behavior, and emotions.

Perception

Perception refers to the way we perceive the world around us. Perception includes depth perception, spatial orientation, and balance. It also includes vision, hearing, taste, smell, and touch. Of all the senses, vision and touch are most often affected by stroke.

Strokes can affect vision in several ways. Blind spots may occur when blood clots travel to the back part of the eye and
Impairments Caused by Stroke

damage the retina. A patient with a blind spot from a right hemisphere stroke may not see a cup of coffee placed on the left side of a breakfast tray. If a blind spot lasts longer than one month after a stroke, it will likely remain a problem. Therapists and nurses teach patients to remember to turn their heads to scan the total environment using their residual vision. Many patients need continued reminders to use this compensatory technique.

Damage to other visual pathways in the brain can result in visual field cuts. This impairment can be likened to covering half the lenses of your eyeglasses with black paint so that a portion of vision is blocked. A patient with a visual field cut may trip over unseen obstacles. Patients with visual field cuts often have a gaze preference. They seem to look only in the direction of the vision that remains.

Double vision, or diplopia, may result when a stroke affects the brain stem. Some cranial nerves coming out of the brain stem control muscles that move the eyes. If one or more of these nerves is injured, the eyes are not able to move together. This produces two somewhat overlapping images that the brain interprets as double vision. To make only one image reach the brain, some patients will close one eye while others will wear an eye patch, alternated daily between the eyes.

Injury to both occipital lobes in the brain causes cortical blindness, a loss of the ability to interpret visual input. Some individuals may suffer total blindness, while others may be able to distinguish between light and dark. The most peculiar form of cortical blindness is Anton’s syndrome, in which a patient is

After my wife’s stroke, her personality changed. She was very angry, and unpleasant to be around. Fortunately, she recovered nicely. My advise to others is try to be understanding and patient.

–Gene
Age 67
not aware that he is blind. The patient may even insist that all he needs is a pair of glasses to correct his vision.

Touch is the second sense most commonly affected by stroke. Strokes can cause the loss of touch sensation, pressure, vibration, and temperature—hot and cold.

Consider the complexity of the sense of touch. If you prick your finger on a pin, a nerve receptor sends a message to the thalamus, the brain’s “relay” center. From there, the message is sent to the parietal lobe of the brain, and you receive the message that you’ve stuck your finger. Your reaction is to jerk your finger away from the source of the pain. The entire sequence occurs in an instant. However, a patient who has suffered injury to the parts of the brain responsible for touch sensation may be unaware that his finger was pricked.

Loss of touch sensation is commonly marked by numbness in the limbs. This makes various tasks more difficult. For example, a patient with a numb hand may crush a paper cup when he picks it up because he can’t feel the pressure he’s applying. Inability to grasp also interferes with dressing, eating, brushing the hair or teeth, and walking with canes or walkers.

Joint position (proprioception) refers to knowing the position of your hand, arm, or leg in space or in relation to other objects. If this sense of joint position is lost, patients can’t feel the position of limbs. This creates problems when walking, because patients can’t tell when their feet hit the ground. Balance is affected because the ability to feel shifting weight is lost. These patients must learn to use their eyes to judge the relationship between their feet and the floor.
Impairments Caused by Stroke

**Intellect**

Intellect, or intelligence, refers to our ability to learn, understand, and act in a purposeful manner. The development of these abilities is influenced by heredity, learning experiences, and motivation. Intellect also includes memory, insight, judgment, orientation, attention span, concentration, problem solving, reasoning/logical thought, abstractions, and ambition. After a stroke, learning may be slower and incomplete because patients are less able to understand. The effects of stroke on the ability to think depend on the area of the brain affected.

**Behavior**

Behavior is a complex process of actions and responses influenced by our thinking, emotions, and past experiences. Behavior also includes initiative, self-image, decision making, goal-directed behavior, and sexuality. Like other elements of cognition, it's a complex process that can be affected in any number of ways when damage to the brain occurs. For example, a person with brain damage may lose the ability to behave in ways we consider “normal.” The result might be a show of anger, agitation, inappropriate laughter or crying, altered sex drive, or sleeping and eating disorders. When serious damage occurs to the frontal lobes of the brain, a patient may show a lack of motivation or may sit for hours unless prompted to act.

**Emotions**

Damage to the parts of the brain that control emotions can result in personality changes. If the ability to control emotions is lost, patients may display emotionally extreme behaviors. They may cry over situations that would make other people happy. Other times, they may laugh inappropriately—at a funeral, for example. Such poor emotional control is known as emotional liability. It can be confusing to the patient and to observers since the patient’s feelings will not be matched by
his behaviors. To clarify the real emotion experienced by the patient, caregivers should simply ask the patient to describe what he is feeling, and compare this with the demonstrated behavior. Families might try changing the topic or distracting the patient to deter the inappropriate behavior.

Anger often accompanies personality changes. Patients who previously had loving and gentle manners may now seem very angry. This may be due in part to the overwhelming frustration of handling all the changes caused by the stroke. On the other hand, injury for some patients may have the opposite effect. They instead may become agreeable and cheerful. Often, these personality changes seem impulsive or even bizarre.

Depression

Of all the emotional changes that stroke patients may experience, depression is one that certainly deserves special mention. Understandably, the effects of a stroke can spark major depression. Imagine that you have spent weeks or months in a hospital, unable to function as you normally would. As the mental fog lifts, you realize that no matter how hard you try to imitate a therapist’s movements, your arm and leg just won’t move. The chance of ever walking around the house seems an improbability. Negotiating steps into your home is impossible. Everything you do from the time you wake until you go to sleep requires someone else’s help. Your mind becomes preoccupied with thoughts of never going home. This is an example of how depression can set in after a stroke.

In the early stages of injury to the brain, some people aren’t really aware that they are unable to perform basic daily tasks. Their moods may be pleasant. Others may deny problems and deficits during much of their rehabilitation as inpatients. This may be a natural defense against the stress of such a major health problem. However, later on, depression may ensue as patients begin to grieve the loss of functions such as speech and walking.
Impairments Caused by Stroke

Depression focuses energy and attention on the problem rather than on recovery. Patients may “shut down” and not participate in therapies. If the depression is severe enough, their physical performance may continue to decline over time.

Some studies conservatively estimate that about 8 percent of new stroke patients suffer minor depression, while up to 15 percent experience major depression. Other studies indicate an overall 40 percent rate of depression. Although research is not definitive, it seems that damage to the left side of the brain more frequently results in depression than damage to the right side.

Depression is a deep sadness, along with feelings of hopelessness and helplessness. Below are some of the symptoms of depression.

- lack of energy
- loss of interest in people or things that were once enjoyable
- crying for no apparent reason
- agitation for no apparent reason
- decrease in body movements as the patient withdraws from the world
- sense of guilt or desire to die (perhaps feeling like a burden to others)
- sleep disturbances (insomnia or excessive sleeping)
- changes in eating patterns (eating too much or not enough)
- weight changes
- vague complaints of body pains without other medical explanation

Even medical professionals sometimes have difficulty identifying depression because the symptoms may be masked by a patient’s dulled levels of consciousness, fatigue from therapy, altered sleeping and eating abilities, and the inability to communicate. People close to a patient who acts depressed
should contact a physician immediately, especially if the patient expresses suicidal thoughts.

There are several ways to treat depression. Psychiatrists, psychologists, or counselors may discuss depression with patients and provide counseling to help them adjust to their new disability. This type of help may not be appropriate for all people. A patient who is barely alert or who has communication impairment, for example, will be unlikely to benefit from counseling.

Antidepressant medications, prescribed for varying periods of time, are usually started at low doses and increased based on a patient’s response. Medical supervision ensures effectiveness and monitors possible side effects.

Family and friends can also play a major role in a patient’s recovery from depression and in rehabilitation. It is a fact that strong family support increases a patient’s chances for improvement. Family members may participate in support groups and in various therapies. Patients often respond more favorably to family than to therapists, and such team effort is necessary for patients to realize gains. Families can encourage patients to perform activities, giving them a feeling of success and self-esteem, which usually motivates them to progress to more-difficult tasks. Patients who formerly rose to life’s challenges should be reminded by loved ones that they can use the same determination to battle the effects of stroke.
Most of us take speaking for granted. It seems simple—we’ve been talking since early childhood. But in truth, speech is a remarkably complex process. Speech starts with a thought in the brain. The brain then sends signals to nerves that move the mouth, tongue, throat, voice box, and lungs. The result is what we call speech or language. We can also control our tone of voice, volume, and the speed of our speech. Physical gestures add yet another dimension to our communication skills. A stroke may damage brain tissues that control these complex communication functions.

For stroke patients who have suffered a great deal of brain damage, their main means of communication may fail them. Or the effects of the stroke may lessen their level of consciousness enough to prevent them from speaking clearly. For patients who suffered little brain damage, a good deal of speech recovery may be possible. Recovery of speech, however, is as unpredictable as other types of functional recovery. The best way to assess improvement is to analyze progress over a period of time and to then determine if further therapy can be beneficial.
What Is Aphasia?

When a stroke causes damage to the left hemisphere of the brain, a patient almost always has aphasia, which is difficulty and hesitancy forming words and difficulty understanding language. Aphasia can affect any aspect of our ability to communicate—speech, comprehension, and gestures. The effects of aphasia can vary from patient to patient. Some patients may be completely unable to speak or may have limited vocabularies that may not make sense to the rest of us. Other aphasic patients may be able to speak but do not understand what they are saying or what others are saying to them. It is as if they were suddenly dropped into another country, where a foreign language was being spoken. Still other patients may understand speech but be unable to think of the correct words to respond. Or they may be so drowsy from medications that they aren’t able to pay attention long enough to understand what is being said.

Patients with aphasia are initially confused by their inability to understand and form words. This can lead to panic and anxiety, and, for some, depression. Psychiatrists and psychologists may evaluate these patients, but counseling success may be limited by the language barrier. On the other hand, some patients may not experience these negative emotions because they lack insight into the fact that others do not understand what they say. These people may remain content even though their language deficits are severe.

Problems common to most types of aphasia include an inability to process long words and infrequently used words. Family and friends should use short, commonly used words.
Aphasia: Speech and Language Disruptions

when speaking with, or writing to, an aphasic stroke patient. It also helps to speak slowly and clearly, using gestures and repetition. Family and caregivers can also learn to recognize that patients with speech difficulties may use subtle variations in tone to communicate more effectively. Since loss of facial muscle strength may cause aphasic patients to drool when they speak, it is helpful to keep tissues close at hand.

Patients may be distracted by surrounding movement and noise, so it is useful to eliminate the source of distraction (TV, radio, a crowded room) when communicating with them. An alphabet board or pencil and paper may be used to spell out words.

Types of Aphasia

Global Aphasia

The most damaging language disturbance is called global aphasia. Patients with global aphasia seem to understand very few words, either spoken or written. They may be completely unable to speak, or their speech may be hesitant and broken. Most are unable to repeat words. If they can speak, they may have a limited vocabulary and may not make sense to the rest of us. For some unknown reason, profanities are sometimes the only words a patient with global aphasia can utter. This may happen even to previously even-tempered individuals. Although this can be disheartening to family and friends, it is a good sign, suggesting that the patient’s speaking ability may improve.

Global aphasia can limit chances for successful rehabilitation since both the ability to produce language and

I’m lucky to have survived a cerebellar stroke. The most frustrating thing was regaining my speech. I knew what I wanted to say, but the words would not come. After months of therapy, I made a good recovery.

–Ramona
Age 67
understand it are seriously impaired. If global aphasia does not improve, patients may require considerable help from family or other caregivers. In addition to having difficulty in relearning activities of daily living (ADLs), patients with aphasia tend to have more problems with bladder control, in part because they can’t communicate their needs to use the bathroom. However, the hope is that, with time and repetition of ADLs, these patients will eventually be able to perform all or some activities independently. Some patients may relearn self-care skills but may not really comprehend why they are doing them.

**Broca’s Aphasia**

Patients with *Broca’s aphasia* know what they want to say and try to say it but are unable to find the right words. The impairment may be mild or severe. These patients may have some, though usually not severe, problems with comprehension. Communication can best be facilitated by asking a patient questions that can be answered with “yes” or “no.” Speech therapists may use a technique known as *melodic intonation therapy*, in which familiar songs are used to tap into parts of the brain that can overcome this speech deficit. Pictorial communication boards can help some patients. Some improvement may be expected in patients with Broca’s aphasia.

**Wernicke’s Aphasia**

Individuals with *Wernicke’s aphasia* can neither make sense of what is being said to them nor monitor what they are saying. Damage to speech centers in the back of the brain causes this deficit. Speech may be very fluent but may not make much sense, even though grammar may be correct and the speech not slurred. The ability to repeat words and name objects is often impaired. Some patients may make up nonsense words that have meanings only to them. Treatment involves trying to increase a patient’s understanding of what he hears
and improving speech output. Varying levels of improvement are seen with Wernicke’s aphasia.

**Dysarthria**

*Dysarthria* is slurred speech. It results from damage to the nerves that serve the voice box, tongue, and mouth. Usually, patients are able to say words and understand language but their articulation (mouth and tongue movement) is poor. Patients also may not be able to control their breathing well enough to produce loud vocal sounds, and slurring may result. They should be encouraged to take a deep breath before trying to speak. Brain damage may cause their speech to sound hypernasal or monotone.

**Speech Therapy**

Speech therapy is important to the process of regaining speech and language abilities. Speech pathologists teach patients overarticulation exercises, which involve overexaggerating tongue and mouth movements while speaking. A mirror may be used to help visualize facial muscles as words are formed. Patients who tend to speak too quickly need to be reminded to speak slowly to prevent further slurring of words.

**Speech Therapy Evaluation**

Speech pathologists may need to spend a fair amount of time with aphasic patients before being able to determine the extent of damage to their communication abilities. An evaluation typically involves assessing:

- the ability to speak
- hearing
- auditory comprehension (the ability to understand what is said)
- the ability to follow both simple and complex spoken
and gestural commands

- thinking abilities (memory, abstraction, organization skills, decision-making skills)
- the ability to move the cheeks, tongue, and lips (to check for weakness or paralysis)
- writing skills
- reading comprehension

Based on this analysis, speech pathologists will attempt to design strategies to help patients overcome speech deficits. There may be times in the course of speech therapy that the activities—such as matching colors and patterns or words to pictures—may seem silly or simplistic to observing family and friends. But for stroke patients, these tasks may be as difficult to learn as they were in childhood. This truly is a process of starting over. Communication foundations need to be established before more-complex tasks may be learned. It is important for friends and family to be supportive of patients during this time, rather than judgmental or critical. Any lack of progress while learning skills is probably due to brain damage rather than laziness or lack of effort.

In addition to therapy, some patients may improve as a result of the brain's plasticity, the ability of undamaged brain tissue to take over functions previously handled by a part of the brain that was damaged. In some left cortical strokes where language ability is disrupted, the right cortical brain may assume some language functions. Research indicates that the left frontal...
Aphasia: Speech and Language Disruptions

lobe may also increase its activity to help recover language. Also, a chemical called synaptophysin actually increases in both sides of the brain after a stroke and may assist in recovery by strengthening the connections among nerve cells.

Left-handed people may have a better chance to recover from aphasia. Why? It seems there is a spreading out of language functions within the brain, and some parts of the brain may sustain less damage.

Accessory Communication

In addition to speech therapy, some patients may need help with accessory communication skills. For example, some patients may need eyeglasses to help with vision problems. Special glasses are available for those who may have double vision, or diplopia. Others may need hearing aids to improve hearing. Some patients may need dentures. Teeth are important to the pronunciation of words, and a good set of fitted dentures can go a long way toward correcting slurring. If the ability to write or gesture is impaired as the result of weakened arm muscles, an occupational therapist may help patients learn to write as well as gesture with their nondominant hands.
Hemiplegia: Weakness on One Side

The most common impairment resulting from a stroke is hemiplegia, a weakness on one side of the body. It can affect the entire side, or only an arm or a leg. The weakness will affect the side opposite the brain damage. If the stroke injured the right side of the brain, the weakness or paralysis will be on the left side of the body, and vice versa.

Patients may show a variety of weakness patterns immediately after a stroke. For some, a limb may be weak, even totally limp. Others may experience a progression of weakness. Initially, the fingers and hand may become weak, then the paralysis may move up the entire arm. Interestingly, recovery of function often seems to occur in the reverse order, with the fingers being the last to recover movement.

Apraxia and Neglect

Apraxia is the inability to make a voluntary movement in spite of being able to demonstrate normal muscle function. For example, a patient may not be able to move an arm when asked.

Other patients may have a problem with neglect, a lack of awareness or recognition of some parts of their environment. A
Hemiplegia: Weakness on One Side

Patient with neglect may not only ignore the side of the body that is weak but also that side of his environment. For example, if the weakness appears on the left side, the patient may not eat food from the left side of the plate. This condition creates problems for people who are relearning how to feed, dress, or groom themselves. Women may put makeup on only one side of the face, while men may show up half shaved. In mild cases, patients may understand their lack of awareness and can compensate. However, in a severe case, a patient may be unable to tell the difference between his own arm and someone else’s. Neglect can also affect mobility. Patients may walk or steer their wheelchairs into objects they don’t see on their “neglected” sides.

Recovering Muscle Strength

Strength recovery is the process of reestablishing connections from the brain to the muscles. The recovery from muscle weakness can range from almost unnoticeable to regaining normal strength. As signals from the brain begin to reach the muscles, a recovering patient develops voluntary motion. Muscles may gain strength with time, healing, and exercise, but most stroke patients will suffer some level of

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The goal of therapy is to restore as much strength and movement as possible. But before therapy exercises can be prescribed for weak limbs, therapists must first evaluate the patient's muscle strength, joint range of motion, balance, coordination, vision, hearing, and ability to understand instructions. Once the evaluation is complete, exercises can begin for each major muscle group. The intensity of exercise increases as muscles develop, improving both strength and coordination.

Therapists test muscle strength and grade it on a 0 to 5 scale, with 0 indicating no muscle motion and 5 indicating normal motion. Exercise is then prescribed based on strength and ability to move. For example, an arm with a grade of 2/5 may move if placed in a position where the effect of gravity is eliminated. The same arm may not be able to lift against gravity, so the use of resistance weights would not only be futile but dangerous. A muscle must have some strength before active-motion exercises can help.

**Overcoming Spasticity**

A stroke can result in spasticity, involuntary muscle movement in which certain muscles are continuously contracting or tightening. In an arm, spasticity usually brings the arm into a bent position. In a leg, it commonly causes the leg to stay extended. However, it's possible for the reverse to occur—the arm stays extended and the leg is bent. Over time, spasticity can cause shortening of the muscles and tendons.
Hemiplegia: Weakness on One Side

and affected joints may become stiff and eventually become difficult to move. Spasticity can also be a source of pain that interferes with daily activities.

Treatment involves stretching therapy. These exercises are often done with range-of-motion exercises. Use of a tilt table can also help stretch the feet and heel cords, using the body’s own weight as resistance. Anti-spasticity medications may help, too. In some cases, injections of botulinum toxin may be given. Very small doses of this neurotoxin protein paralyze muscles, lessening the spasticity. (Botulinum is the same toxin found in Botox, which is used for cosmetic purposes to relax the creases in facial muscles.)

**Functional Electrical Stimulation (FES)**

Another form of treatment for strengthening muscles that have become weakened is *functional electrical stimulation* (FES). This treatment uses electrical currents to stimulate the nerves that control muscles so that the weak muscles can be made to move. Then hopefully, as the patient recovers, his or her own nerves will take over the movement of the muscles. Meanwhile, the stimulation will have caused the muscles to contract and become stronger. Blood flow will be improved, and range of motion in the joints will be maintained. As a result, the patient will have more muscle cells available if the nerve-muscle connection is reestablished during healing.

FES is typically performed by a physical therapist who attaches electrodes to the surface of the skin; electrical current is turned on and the muscles are stimulated. FES stationary cycles are also available. The cycles use electrical stimulation pads that are placed on specific muscles of the legs.

FES has significantly improved the ability to walk among people whose strokes have caused them to have a condition known as foot drop. This condition is caused by weakness in the lower leg muscles involved in lifting up the ankle and
Functional electrical stimulation (FES) uses electrical impulses to activate nerves in paralyzed muscles resulting from a stroke.

Functional electrical stimulation (FES) uses electrical impulses to activate nerves in paralyzed muscles resulting from a stroke.

The Stroke Recovery Book

toes; the toes and foot drop downward and impair one’s ability to walk. The electrical stimulation can allow for safer, steadier walking. The newer FES units have small, lightweight microprocessors, so they are more comfortable to wear than a bulky leg brace made of plastic or metal.

FES needs to be applied over a fairly long period of time—perhaps months—in order for it to be helpful. During this time, the patient may need to use the device anywhere from a few times a week to several times a day, depending on his or her goals. Since not all devices are available for home use, visits to the rehabilitation center may be required. Be advised that FES units are expensive, so it’s important for the patient to determine whether they are helpful during physical therapy before purchasing one.

Even though FES can be helpful, not all patients are candidates for the treatment. Patients with pacemakers should not use them; the device could interfere with the pacemaker. Patients with unhealed bone fractures should not use FES. Other conditions that may prevent a patient from using FES are severe spasticity, severe osteoporosis, and some joint and pain problems.
Body-Weight Supported Ambulation System

The body-weight supported ambulation system is a newer walking system. As the name suggests, it supports a patient’s body weight while he or she practices walking. To use it, the patient is first fitted with a harness that is attached to an overhead support bar. The bar is attached to a tower that adjusts up and down. The patient is then placed over a treadmill to walk. The tower can be raised or lowered, increasing or lessening the support suspension. As the patient grows stronger over time, he can gradually support more of his own body weight so that he is depending less on the support device.

The system may be used without a treadmill, but the advantage to using the treadmill is that more footsteps can be taken during therapy sessions. It’s believed that this practice may improve the patient’s gait motion. Even if a patient has paralysis in one or both legs, the device may still be helpful. A therapist can assist in moving the patient’s legs.

Other Factors Affecting Muscle Strength

Some patients with tendencies to lean to one side may have pusher syndrome; with this condition, the patient believes his or her body is oriented upright when the body is actually tilted to the side. The patient is usually overbalancing.
by pushing with the muscles of the stronger side, tilting him or her toward his or her weaker side. This is a safety concern if the action is strong and persistent, because it can cause falling episodes.

These patients and those with other balance problems may find a full-length mirror placed at the end of parallel bars a helpful source of visual feedback. Joint function is also important to muscle strength. Joints must be flexible for us to move our limbs. Therapists may say that a joint has functional range, which means there is enough joint mobility to perform everyday tasks. Range-of-motion and stretching exercises can prevent joint contractures, where soft tissue shortens and prevents a full range of movement of the limbs. A therapist may also use passive range-of-motion exercises, moving parts of the body for a patient who is unable to perform the motion independently.

Also, fluid buildup in the hands, caused by immobility, can make it difficult for a patient to grasp objects. Occupational therapists may massage the fingers and hands to keep swelling at a minimum. Compression gloves also serve this purpose and prevent more swelling.

**Regaining Coordination**

Lack of coordination is especially noticeable in patients who had strokes affecting the cerebellum and its pathways. The cerebellum, located at the back of the brain, is the coordination center. To make a coordinated movement, the brain tells which muscles to move. For example, to scratch the nose, the brain

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*Even though my father suffered paralysis on his left side, he never gave up hope of getting back to the golf course, even if he had to play with one hand. When he finally took a few steps with a walker, we were elated, and reminded him of how far he had come.*

—Karen

Age 38
Hemiplegia: Weakness on One Side

instructs muscles in the arm to move. But, after a stroke, what once seemed an automatic process has suddenly become a major project. If the brain can’t coordinate its signals, the stroke patient may poke his eye instead of scratching his nose. Inhibition is a brain signal that tells a muscle not to move. Damaged inhibition causes more muscles to move than is necessary.

To regain coordination, persistence and the repetition of exercises cannot be overemphasized. Why? It is believed that to produce muscle coordination, a movement must be repeated hundreds of thousands of times. Experts believe that motor loops develop in the brain as an activity is repeated and learned. These motor loops are called engrams. A normal brain performs hundreds of thousands of correctly performed signals to achieve coordination. Many types of strokes injure engram pathways, and they must be rebuilt through repetition. This means practice is very important. Caregivers can help patients with exercises outside therapy sessions, increasing their potential for progress.

How Long Will Recovery Take?

The amount of time it takes to regain muscle strength is unpredictable. If a comparison were made of all stroke patients with damage to the same area of the brain, the amount of time needed for recovery would vary greatly. For muscles to work, signals from the brain must reach them again. Often, the signals may reconnect once swelling decreases and/or when undamaged portions of the brain take over the functions of damaged cells. Brain scans help determine the amount of damaged tissue, which in turn helps the medical team estimate how much recovery to expect. But even scientific tools and doctors’ best estimates can be wrong.

Rehabilitation professionals tend to agree that patients who have the potential to make functional gains do better if therapy is started as soon as possible after a stroke. There are different schools of thought on how much recovery is possible.
The Stroke Recovery Book

One study of stroke patients in Copenhagen showed that, by the end of three months (including rehabilitation), 95 percent of patients recovered the most functional recovery they could ever hope for. On the other hand, the medical community is recognizing new studies that cite cases in which improvement is shown at six months and beyond. Authors of one study report cases of improvement seven years after a stroke. Accordingly, there is a place for rehabilitation therapy beyond just the first few weeks after a stroke.
When stroke damages the muscles that control the throat, cheek, jaw, and tongue, it can cause *dysphagia*, which is difficulty with swallowing. About half the people who have strokes have some problems with swallowing. For these individuals, eating may be troublesome. With dysphagia, any of the swallowing stages can be affected.

**Stages of Swallowing Food**

In a normal swallow, once a bite of food_near the voice box, a flap of tissue (epiglottis) comes down to cover the windpipe (trachea) to let the food slide past into the body’s swallowing passage (esophagus). There is a “danger zone” where the breathing and swallowing tubes meet. Even for people with normal swallowing abilities, food and fluids will sometimes slip into the trachea rather than the esophagus.

*Penetration* is the term used to describe what happens when food lodges near or slightly below the vocal cords. If a piece of poorly chewed food is big enough, it may stick in the airway and block it. At best, this is a scary situation. At worst, a patient may choke and die unless the obstruction is quickly removed. Loss of control of the food may cause it to pocket in the cheeks and spill backward into the open airway.
Aspiration

Among the most serious complications resulting from dysphagia is *aspiration*, the suction of food or fluid into the lungs. Aspiration occurs when food washes mouth and throat bacteria past the vocal cords and into the lungs. This can result in aspiration pneumonia, which can be mild or severe. One of the frightening aspects of dysphagia is silent aspiration. With this condition, a patient may appear normal while eating and drinking but has sucked food into his or her lungs. Up to 40 percent of stroke patients are believed to experience silent aspiration. This seems to be a particular problem in patients who have damage to the brain stem. A complicated set of motions, involving several nerves that originate in the brain stem, are involved in transporting food.

Silent aspiration can also occur when the protective cough mechanism disappears. A sensitive patch of tissue exists at the bottom of the windpipe where it branches off to each lung. If food or fluid touches this area, the normal reaction will produce a strong cough reflex to force out the foreign substance. If this reflex is not working, patients may show no signs of choking or coughing even while pneumonia-causing
Dysphagia: Swallowing Difficulties

materials are entering the lungs.

Other problems can also cause aspiration. In the esophageal stage of swallowing, the inability of muscles to propel food into the stomach may cause the food to come back up the esophagus and be sucked into the trachea. A medication, metoclopramide, may help; it works by increasing contractions of the intestines, moving the food farther down into the stomach.

In other cases, an operation may be needed to open up the top of the swallowing tube to allow food to pass into it if the ring of muscle at the top of the swallowing tube is so tight it can’t open at the right time. Some patients may require surgical placement of a tube in the windpipe, called a tracheostomy tube. This tube protects the airway and gives immediate access if the lungs need to be suctioned.

Aspiration may occur even if a tracheostomy tube is in place. If a patient has a delayed swallowing reflex, food may lodge in the back of the throat. Bits of it may then fall into the unprotected airway. If the ring of muscle at the top of the swallowing tube doesn’t open up, the food has nowhere to go except around the airway.

Diagnosing Dysphagia

Dysphagia isn’t always obvious. When caused by a brain-stem stroke, dysphagia may be present even when a brain scan looks normal. If silent aspiration is suspected, it is best to have a videofluoroscopy, or a modified barium swallow test. This X-ray test shows food and fluid movement during a swallow.

Right after my mom’s stroke, I saw her take a sip of fluid. It ran right back out of her mouth. It was really frightening. I wondered if she would ever be able to eat again. We are grateful that she did recover.

–Rod
Age 47
Rather than producing a single picture, an X-ray video camera tapes a patient swallowing food of different consistencies. The various stages of swallowing are then observed by a medical team. The test identifies food consistencies that might cause problems. Based on test results, doctors and speech therapists decide whether the patient may safely eat different types of foods or drink fluids.

It is important to understand that this test is not infallible. Test results might vary from day to day. The swallowing reflex might be fine if the patient is having a good day. On another day, perhaps when the patient is tired, swallowing limitations and a greater risk of aspiration may be evident.

**Therapies for Dysphagia**

A speech therapist may decide that a patient may benefit from swallowing therapy. Therapy goals include the ability to ingest adequate amounts of food and fluids, the ability to prevent aspiration pneumonia and airway obstructions through safe swallowing, and finding a diet the patient can tolerate. Pureed foods and thick liquids often provide the safest initial nutrition because they are substantial enough for the patient to hold in the mouth until it is time to swallow. Food of regular
Dysphagia: Swallowing Difficulties

consistency may be tried later when the patient is able to chew and swallow well enough to prevent airway blockages.

Speech pathologists can help patients learn to chew and swallow if these functions are impaired or lost. Exercises include food control using the lips and tongue while food is in the mouth. Videofluoroscopy may indicate that a chin-tilt maneuver may help use gravity to keep the food at the front of the mouth until the patient can initiate the swallow. Trying to suck ice cream through a straw can strengthen swallowing muscles. The patient may also be taught to check for leftover food by sweeping the mouth with a finger.

Rehabilitation for the pharyngeal stage, when food and fluid are in the throat, often centers around speeding up the swallowing reflex. This reflex should normally take about one second. But in some patients it can be delayed for many seconds, or it may not occur at all. Therapists may try thermal stimulation. Here, a long-handled mirror, like those used by dentists, is cooled in ice water and placed at the sides of the inner throat. Thermal stimulation improves swallowing by increasing the speed of the swallowing reflex. This is a simple technique for caregivers to learn.

Occupational therapists may teach patients the essentials of maneuvering food and fluids from the meal tray to the mouth. They may teach patients who eat impulsively to eat more slowly and safely. Special adaptive equipment can make moving food from the dish to the mouth easier. A patient may also learn to use his nondominant hand. Dietitians can help develop the right consistencies of food and fluids and monitor other factors such as salt or calorie restrictions.

I was devastated when I had a stroke. It really changed my life. I learned to focus on one goal at a time...It helped me make progress. Remember, set goals and continue therapy.

– Don
Age 72
The Stroke Recovery Book

Like other forms of therapy, treatments to improve swallowing will include some successes and some failures. Again, outcomes are hard to predict. Much of the progress depends on the patient’s ability to cooperate and learn.

**Alternative Feeding Methods**

Patients who are unable to swallow food of any consistency may be restricted from taking any type of nutrition by mouth. This is called keeping patients NPO, an abbreviation for the Latin words *nothing by mouth*.

Other patients may have the ability to swallow, but brain damage prevents them from eating enough to receive adequate nutrition. In either case, patients must be fed to prevent malnutrition or dehydration.

**Nasogastric Tubes**

Until swallowing problems can be fully evaluated, doctors may insert a *nasogastric tube*, or *NG tube*. This flexible plastic tube is inserted through the nose and threaded through the esophagus into the stomach. An NG tube can provide a patient with a means to take in water and a special feeding solution. The tube bypasses the lungs, preventing the risk of aspiration pneumonia. Insertion of an NG tube is usually done at bedside while the patient is awake. It is an uncomfortable procedure, for the tube stings the back of the nose and throat as it is inserted. But once installed, it is usually not too uncomfortable. Even if a videofluoroscopy shows that the patient is able to eat some types of food, an NG tube may still be needed to help supplement nutrition.

**Intravenous Feedings**

Patients may initially receive nourishment through a tube inserted into a vein in the arm, an intravenous (IV) line. Intravenous solutions and some medications are contained in bags. The solution is slowly pumped into the veins. IV solutions
Dysphagia: Swallowing Difficulties

may irritate the veins and limit the amount of nutrition that may be given. Use of IVs is usually temporary unless there is a problem with the stomach or intestines, in which case a central IV line may be needed. The central IV line is placed into one of the large veins at the base of the neck. Since larger veins are used, more-concentrated nutritional solutions may be given.

Gastrostomy Tubes

Another feeding alternative is the gastrostomy tube, called a G-tube. (It’s also called a percutaneous endoscopic gastrostomy tube or PEG tube.) Each of these tubes requires a minor surgical procedure, usually lasting less than thirty minutes, during which a flexible tube is inserted directly through the abdominal wall and into the stomach. The G-tube replaces an older method of surgically implanting a feeding tube, which caused more infection and bleeding and required more sedation. In most cases, the G-tube is usable in a day or two. Until then, the patient is fed intravenous fluids.

A G-tube is a good alternative for many patients. At least one study suggests there are fewer deaths associated with the use of G-tubes than with the continual use of NG tubes. An NG tube may still allow contents of the stomach to track back up the esophagus and into the back of the throat, where aspiration may occur.

Because G-tubes create a surgical opening in the abdominal wall, the cut tissue may become infected. Antibiotics are prescribed if a patient develops a skin infection at the insertion site. In extreme cases, the tube may need to be removed. Rarely,

Having a stroke can bring a drastic change in your way of living. Through my therapy and educational support of therapists, doctors, and family members, I am able to get back to my way of living.

–Anna
Age 84
some of the stomach fluids may leak out and irritate the skin. Use of special skin barriers may prevent this.

Depending on the need, the G-tube may be used for either a short period of time or long-term use. Often, over the course of several weeks to several months, another videofluoroscopy may be performed to see if the swallowing function has improved. If so, the patient may try taking some food and fluid orally. Many families insist that the G-tube come out as soon as a swallowing test looks normal. This can prove to be a mistake due to the test’s limitations. It is usually better to leave the tube in until the patient proves, over time, that he or she can swallow well without developing pneumonia, coughing, or choking.

Removing the G-tube is a simple procedure. In most cases, the hole shrinks and closes on its own. Rarely, doctors will need to loop a few stitches around the hole to help it close. Expect a small, button-sized scar to remain after the tube comes out. Overall, G-tubes have been of great benefit to patients of all diagnoses who need them.
Bowel, bladder, and sexual dysfunctions are some of the most challenging and discouraging issues a stroke patient and caregivers can face. Loss of any of these functions can produce feelings of depression and inadequacy. To the patient, these dysfunctions may represent “badges” of disability. Friends and family need to provide support and encourage loved ones to regain as much normal activity as possible.

Managing Bladder Problems

Loss of bladder control, or bladder incontinence, shows up as urination or leakage that is out of one’s control. Incontinence tends to occur more often in women because of the effects of childbirth and because the urine tube, or urethra, is much shorter in women than in men.

Normally, the bladder stretches like a balloon and stores urine made in the kidneys. Then, when it is filled, the bladder signals the brain to inform it that there is a need to void, or urinate. When we reach the toilet, the brain coordinates relaxation of the bladder neck, allowing the bladder to contract and eliminate the urine.

Stroke damage to these nerve pathways can impact
bladder functions in several ways. First, a patient may have lost the sensations that signal a need to urinate. Predictably, the patient becomes incontinent. Second, the bladder may send false signals. A patient may feel like he or she has to go to the bathroom frequently but in reality does not need to urinate. In yet other cases, a urine buildup can push urine back up into the kidneys and cause damage or infection. This may occur if a muscle tightens at the bladder outlet. Rather than emptying the urine normally, it creates a backup. Third, problems with urinating will occur if the bladder loses its tone. It will act like a passive sack and will retain urine. In this situation, a person may be incontinent only after the bladder fills up with extremely large volumes. Medications are available to help add tone to the bladder.

In the early stages of a stroke, communication impairments can cause bladder problems. A patient may be unable to let caregivers know that he needs to urinate. The patient may not be able to delay urinating long enough for someone to understand and assist him.

Additional help for bladder problems can be sought from urologists, doctors who specialize in the urinary system. As part of an evaluation, a urologist will study a patient’s urinating pattern. The specialist may perform detailed studies to evaluate bladder pressures and urine flow. Such testing can also determine whether the patient can feel the bladder filling and the contraction of the bladder neck and sphincter muscles. Using this information, the doctor may prescribe medications

Initially, I had poor bladder control and needed medication to help me until my body could heal. I hated therapy at first, but later realized the value of putting in a hard day at it. My husband and I are closer now because of all the support he has given me.

–Chris
Age 40
that may help to strengthen the bladder or relax it, depending on the nature of the problem.

**Urinary Tract Infections**

Urinary tract infections (UTIs) are a fairly common complication of a stroke. It is believed they are caused by catheterization, post-stroke disability, inability to urinate, and increased age. How do these infections develop? In a normal bladder, few bacteria are present, certainly not enough to make someone sick. Additionally, the bladder has an inner lining of mucus, a thick, sticky substance that traps bacteria. However, if the bladder retains urine, more bacteria than usual may collect. Germs may get past this layer and enter the bloodstream. If this happens, a person can become very sick with a high temperature, loss of appetite, chills, sweating, and even a dangerous drop in blood pressure. This group of symptoms is called *urosepsis* and requires antibiotics, often given intravenously. Urosepsis is the most severe UTI involving either the bladder or the kidneys.

To make it through a stroke, both patient and family must have faith that you can handle it. My husband can only walk short distances; the lack of movement makes his bowels sluggish. I think it’s important to pray a lot and get away for short periods to take time for yourself.

-- Norma

Age 61

A more common but less serious UTI occurs when germs are confined to the bladder. Symptoms include low-grade fever, burning on urination, frequent urination, and cloudy, foul-smelling urine. Some of these infections may seem to cause incontinence. However, it may be instead that the germs irritate the bladder wall, causing the bladder to contract repeatedly as a protective reaction to get rid of the germs. This type of UTI may be handled with oral or intravenous antibiotics, depending
Doctors diagnose UTIs by evaluating symptoms. They may also screen a urine sample for signs of infection, such as white blood cells and bacteria. The lab may use a urine specimen to grow the bacteria and test antibiotics to see which ones will work effectively. This can take several days and lead to changes in antibiotic treatment. If symptoms are minimal, doctors may prefer to wait until the urine culture grows identifiable bacteria before they choose an antibiotic.

Managing a Neurogenic Bladder

A neurogenic bladder is one that is working poorly due to nerve damage in the brain. The goal of treatment is to allow sufficient storage and emptying of urine. Accordingly, fluid intake may be limited so that the bladder doesn’t overfill. Patients still unable to void on their own must have their bladders passively drained by caregivers. This involves intermittent use of a catheter, a tube inserted up the urethra into the bladder, to drain the urine. This procedure is called an intermittent catheterization program (ICP).

For some patients, an indwelling catheter, one that is left in place, may be needed to drain urine into a bag; this bag may be worn under the clothing, attached to a leg, or placed at the side of a bed. Statistically, an indwelling catheter causes more urinary tract infections than an intermittent catheter, but in some circumstances the former may be the only practical solution.

Less commonly, a urologist may insert a suprapubic catheter, or SP catheter. The tube is placed in a surgically made hole low in the abdomen, just above the pubic bone.

Since any type of catheter may introduce bacteria into the bladder, it is important for the patient to maintain sufficient fluid intake to help flush bacteria from the bladder.
Bladder, Bowel, and Sexual Problems

Managing Bowel Problems

During the process of digestion and elimination, the food we eat enters the stomach and moves through the small and large intestines. The waste products then pass on to the rectum. When the walls of the rectum stretch and fill with stool material, a signal sent to the brain encourages us to find a bathroom. But just as some individuals have bladder-control problems as a result of stroke, others have problems with bowel incontinence.

Bowel-control problems may result from the inability to hold the stool inside the rectum or from the inability to communicate the need to use the toilet. The goal of bowel management is to keep the bowels moving regularly and to help patients avoid spilling stool contents between evacuations.

Constipation

Bowels may become sluggish and constipation may result when the body is limited to bed rest. Once a patient gets out of bed and becomes more active, especially when walking, constipation often resolves or lessens. However, if the patient stays inactive, stool may accumulate and become impacted. This condition may require medication to push the stool through to the rectum. Some impactions may require removal of the stool by a professional using a finger inserted in the rectum. Although not a pleasant experience, this procedure can be quite effective.

Stool softener is a medication that causes water from the digestive tract to mix with the stool to make it softer. This makes it easier and less irritating to have a bowel movement.

At age twenty-two, my wife had a cardiac arrest and her brain was deprived of oxygen. She suffered brain damage and was in a coma for weeks. For a long time, she didn’t even recognize her two children. We have found comfort focusing on the progress that has been made.

–James
Age 26
Stool softeners may also be useful if a person has hemorrhoids, enlarged blood vessels in the rectal area. Hemorrhoids may be painful during some bowel movements, especially if the stool is hard.

A laxative is another medication used for constipation. There are several types of laxatives. Bulk laxatives are usually made of powdered fiber formed into tablets or mixed into water or juice and swallowed. These laxatives absorb water in the digestive tract, which in turn swells the fiber. The volume of the fiber stretches the rectal walls and comes closest to reproducing the body’s natural function. Stimulant laxatives cause bowel movements by irritating the digestive tract and forcing the gut to push waste toward the rectum. However, if these laxatives are used too often, the bowels may become dependent on them. Stimulant laxatives can be given orally or rectally, as a suppository or enema. Use of mineral oil as a laxative should be avoided in patients with swallowing problems. Mineral oil, if aspirated into the lungs, may cause irritation and even pneumonia.

Some rehabilitation centers have programs to help patients monitor their bowel functions and find appropriate medications to prevent abdominal problems. It is not uncommon for patients in these programs to take several bowel medications. One goal of a bowel-management program is to help patients produce a bowel movement every one or two days, at a regular time. To accomplish this, a suppository may be inserted into the rectum just before a meal. Patients then try to have a bowel movement thirty to sixty minutes after the meal. This sequence helps produce a gastrocolic reflex; an action in the bowel that occurs when the digestive tract senses incoming food. The reflex causes the bowel to evacuate any solid waste that is present.

Diarrhea

Diarrhea is stool that comes out with a thin, loose consistency or in excessive amounts. Diarrhea may cause
cramps because the gut muscles are pushing the stool through at a rate much faster than normal.

Patients who are unable to take nutrition by mouth and are fed by an NG tube or stomach tube often get diarrhea. This may happen until the bowel gets used to that form of feeding, especially if the feeding solution is given in a concentrated form and at a high rate. Rather than trying to medicate the diarrhea, the concentration or amount of food may be reduced for a while.

If diarrhea is caused by bacteria, antibiotics will usually clear up the problem. To determine if medication is needed, a stool sample is evaluated for the presence of bacterial toxins.

Odd as it seems, diarrhea might actually be a sign of constipation and impaction higher up in the colon. The trapped stool blocks solid stool as it is produced. Looser stool may run around the obstruction. The patient and nursing staff may notice only the diarrhea, a false signal. Medication may only worsen the diarrhea. Abdominal X-rays can help show if stool is collecting in the colon.

Coping with Sexual Problems

A stroke may severely disrupt normal sexual activities. A partner may be afraid that sexual activity could hurt the patient or even trigger another stroke. Sexual activity may be further complicated for patients who suffered a heart attack at the same time as a stroke. The couple may have concerns about the effect of physical exertion on the heart. Individuals should also be aware of high blood pressure and be sure it is satisfactorily under control, especially if it contributed to the stroke. These concerns may cause couples to struggle to regain closeness and intimacy. A doctor can address both general health concerns and the patient’s physical readiness for intercourse.

If the stroke has damaged the part of the brain responsible for personality, the change may impair the ability to be intimate.
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A stroke patient may express frustration, agitation, self-pity, depression, and even outward aggression as a result of brain damage or as an emotional response to the stroke. A patient’s self-image may deteriorate to the point that he no longer feels sexually attractive. The patient may even feel incapable of love and sexual relations. These emotions tend to keep a partner at a distance.

At the same time, providing the amount of care needed to help a severely affected stroke patient may physically wear out a partner. The partner may lack interest and energy.

If the stroke has resulted in loss of sensation in the face, limbs, trunk, or sex organs, partners must discover which areas remain sensitive to touch. Paralysis of the limbs may require learning and using different sexual positions. Spasticity may also interfere with sex. For example, spasticity may pull a woman’s hips together so tightly that penetration is difficult or impossible.

Language problems may block the ability to communicate the desire for, or the fear of, sex. This can lead to misunderstandings, further increasing a patient’s or partner’s sense of isolation.

If urinary devices such as indwelling catheters are in place, intercourse may be difficult or impossible. One option is to temporarily fold over a catheter inserted into the penis and place a condom over it. If the bladder of a person of either gender requires intermittent use of a catheter, it should be drained before intercourse.

Depression in male stroke patients may be severe enough to cause impotence. Physical causes of impotence may include

Patients seem to make more progress when they have a means to cope. Loved ones can provide the support that is so essential to recovery.

–Sharon Physical Therapist

Physical Therapist
medications, poor circulation, and diabetes. Reassurance may be all that is needed. If impotence persists, a patient may need a psychological or urological evaluation. Urologists have new methods to help men regain satisfying sexual relations. For example, urologists may prescribe a medication injected into the penis to cause an erection.

Overall, the quality of the couple’s relationship before the stroke is a good predictor of how things will go afterward. The loving and caring attitude that sustains many relationships can help a partner face the challenges of the stroke. Physical and emotional intimacy involves more than intercourse. It encompasses all the tender touches, loving looks, and caring words that bring two people together. Even though certain aspects of sex may change or be altered, some forms of intimate communication will still be available.

Often, it is difficult, perhaps embarrassing, for a couple to discuss sexual needs openly with each other. If attempts to communicate fail, it may be helpful to contact a rehabilitation psychologist for advice and counseling.
A variety of other conditions may affect a patient’s recovery from a stroke. This includes conditions such as circulatory problems, seizures, pain, fractures, skin ulcers (often referred to as bedsores), and edema, which is a buildup of fluid in the body. When the effects of a stroke complicate existing physical ailments, a patient’s disabilities can increase.

**Circulatory Problems**

Blood clots, especially those caused by immobility, are of special concern for stroke patients. Through movement, a normal body balances blood circulation and blood clotting. Because many stroke patients are at least partially immobile, blood clots may form, especially in the legs. When a leg is immobile, the blood flow in the leg veins may slow enough to turn to sludge and form clots. Pain, redness, and warmth appear as circulation is impaired.

Onset of these symptoms can be quite sudden and hard to diagnose because stroke patients may experience leg pain for other reasons, such as arthritis. About 30 percent of all stroke patients experience these leg clots, referred to as *deep venous thrombosis (DVT)*. In some rare cases, these clots may travel through a hole in the heart, then into the arteries, and on to the
Other Medical Complications Caused by Stroke

The spiral CT scan uses a computer linked to an X-ray machine to view tissues within the body. This scan may be used to check for blood clots that may have migrated to the lungs. Photo courtesy of Amber Diagnostics

brain, causing another stroke.

These clots also have the potential to travel to the right side of the heart and into the lungs. Clot migration into the lungs, called **pulmonary embolus**, occurs in about 10 percent of patients with blood clots. Symptoms such as a rapid heart rate, chest pain, and difficulty breathing may suddenly occur. If a clot is large enough, it may block the flow of blood from the heart to the lungs with deadly results. Pulmonary emboli constitute a medical emergency and must be treated in an intensive care unit, where a patient’s changing medical status can be closely monitored.

To test for pulmonary emboli, a doctor may order a ventilation/perfusion scan, which is actually two tests. The ventilation scan evaluates how well air reaches the lungs. For this scan, the patient inhales a radioactive gas and is placed under a scanner. The radioactive agent shows how well the
patient is breathing. The perfusion scan measures the blood supply through the lungs. For this scan, the patient is given an injection of radioactive material in the vein. When the lungs are scanned, doctors can see how well blood is circulating in the lungs.

Another test used to detect pulmonary emboli is a spiral CT scan. During this scan, an X-ray machine rotates continuously around the body, following a spiral path to take cross-sectional pictures of the body. This scan has the ability to scan faster and with higher definition of internal structures. It also provides a better view of blood vessels and internal tissues, such as those within the chest cavity.

If the test results show clots have reached the lungs, the doctor will decide whether to prescribe anticoagulants for the patient. Anticoagulation is the use of medicines, often called “blood thinners,” to prevent further blood clots. Anticoagulants will not, however, dissolve blood clots already present. These patients are typically given the blood thinner heparin through an intravenous line.

Later, the patient switches to an oral anticoagulant such as warfarin for three to six months. Not all stroke patients are good candidates for anticoagulation. For example, anticoagulants may worsen problems for a patient who has experienced a stroke due to bleeding in the brain. For these patients, a treatment alternative may be an inferior vena cava filter. This device is placed by snaking a tube through a leg vein into the large vein leading to the heart. The device is left there to prevent larger, life-threatening clots from reaching the heart, although smaller ones may still enter. Unfortunately, these filters cannot do anything to treat clots that have already traveled to the lungs.

Patients treated with anticoagulants are usually ordered
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to stay in bed so that blood clots in the legs are not dislodged. Active rehabilitation efforts such as dressing, transfers, leg strengthening, and walking are put on hold until it is safe to begin remobilization of the affected leg. Other rehabilitation processes, such as speech therapy and arm strengthening, may still be possible during this time.

Efforts to avoid blood clots may also include prescribing elastic stockings. These special stockings may prevent leg clots by compressing the veins in the legs and encouraging blood movement. Also, inflatable plastic sleeves that alternately pump and then release air may be placed on the foot or the calf to squeeze the veins and help pump blood. There is no perfect protection against clot formation, but these measures can help.

Seizures

Seizures may occur when the brain attempts to transmit electrical charges through the border zone between living tissue and dead tissue caused by a stroke. Roughly 15 percent of stroke patients experience seizures as a result of these interrupted signals. Some evidence suggests that patients who have seizures soon after, or at the time of, a stroke may be at higher risk for developing seizures later on.

Seizures are also referred to as epilepsy or convulsions. If the number of nerve cells involved is relatively low, a patient may experience a “light” seizure with temporary loss of control and/or shaking of a limb. The patient may also “blank out,” staring off into space for several seconds. If the disorganized signal spreads to other areas of the brain, the patient may experience a sudden loss of consciousness, difficulty breathing, violent shaking, and loss of bowel or bladder control. This is called a tonic-clonic seizure, also referred to as a “grand mal” seizure.

Some individuals have sensations that warn when a seizure is about to occur. They have a chance to sit or lie down before they lose consciousness. Seizure patients may be very
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groggy and confused for several hours after they wake up. They may experience Todd's paralysis, limb weakness that can last up to several days. Seizures may mimic initial stroke symptoms, making them difficult to diagnose and differentiate from strokes.

It is rare for seizures to continue. But if a patient experiences one seizure after another, or if the seizures do not end in a few minutes, the patient may be in status epilepticus. This condition is a life-threatening medical emergency because it vastly increases brain metabolism, which in turn uses up the brain's available oxygen and glucose, resulting in more brain damage or even death.

A neurologist may perform electroencephalograms (EEGs) to measure electrical impulses in the brain and pinpoint brain damage. Doctors may choose to place patients with abnormal brain waves on medications called anticonvulsants to prevent further seizures. Unfortunately, one side effect of these medications is drowsiness. This can slow rehabilitation progress because patients may not be alert enough to understand instructions, or they may be too tired to fully participate in physical activities.

Once a person experiences a seizure, he may no longer be able to drive a car. Every U.S. state has laws governing when people with seizures can drive. A doctor's statement showing the type and severity of the seizure and the prescribed medication must be presented to the licensing authorities. Individuals normally need to be seizure-free for a specified period of time before a department of motor vehicles will consider granting a driver's license.

Pain

Damage to nerve tissue may cause either a loss of sensation or pain. The subcortical brain contains the thalamus, a relay center that receives sensory signals from the body and spinal cord and sends new signals to the cortical brain to interpret
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a stimulus (light/deep touch, hot/cold, vibrations, and so on). Damage to this area may cause thalamic pain syndrome, in which the opposite side of the body feels intense, burning pain. Medications may be tried, but this syndrome can be very difficult to treat.

For reasons that remain unclear, the sympathetic nervous system may produce pain after a stroke. The sympathetic nervous system is part of the greater involuntary nervous system, which controls those things we do without trying, such as breathing. One theory is that the nerves of the sympathetic nervous system are arranged near those that transmit pain signals in the spinal cord. Some speculate that a “false” relay may develop between these two areas. The result may be reflex sympathetic dystrophy syndrome (RSD). It is also known as complex regional pain syndrome. Symptoms in the limbs may include pain, swelling, discoloration, alteration in blood flow, and uncontrolled sweating. Limbs may first turn red and feel hot, then later turn purple and feel cold. The pain can be excruciating. Walking, dressing, and other ADLs (activities of daily living) may become impossible. The sooner a diagnosis can be made and treatment started, the more successful the outcome.

Range-of-motion exercises to stretch the joints and hot and cold contrast baths can help some RSD patients. Others may need medication to break up the influence of the sympathetic nerves. Injections of an anesthetic agent into the neck or back may knock out the sympathetic nerves that flow into a limb. In some cases, surgery may be performed, but by the time a patient gets to that stage the chances for a cure are small. Unsuccessful treatment leaves a patient with a limb that is cold, discolored, painful, contracted, and useless.

Musculoskeletal pain is also common after a stroke, caused by muscles either pulling on joints or failing to support them. This can really aggravate existing pain from arthritis or bursitis.
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For example, a group of four muscles forms the rotator cuff in the shoulder. If the rotator cuff is significantly weakened, the arm is pulled downward by gravity. This action tugs on the tendons and nerves. Slings may provide some measure of support, as they counteract the pull of gravity. Yet some tugging may continue. Even worse, any movement of the shoulder may cause pain or tear the rotator cuff. Musculoskeletal pain is a real barrier to movement and rehabilitation.

Persistent headaches may be another source of pain following a hemorrhage in the brain. These headaches may be as incapacitating as migraines and may make a patient nauseated or sensitive to light. It is important to understand that some of these headaches may last several months and may not respond to pain medications. People with poor bed/wheelchair positioning or trunk/neck muscle weakness may also develop muscle-tension headaches, which may be helped by medication and physical therapy. Anxiety and depression can also produce headaches.

Fractures

If a patient is unable to move a limb, over time calcium escapes from the bones in that limb. Weakened, brittle bones may break with minimal stress. For stroke patients with limited mobility or impaired balance, even seemingly minor falls can result in broken bones. Depending on the area involved and the severity of the break, a patient may need a cast or an operation.

Edema

Immobility can result in abnormal swelling or fluid buildup, called edema. In a normal body, muscle contractions help “pump” fluid out of the limbs. But when limbs are paralyzed or immobilized, fluid instead collects in the spaces between tissues. If a limb is below the level of the heart, gravity will pull fluid into the limb. This is why many people who develop edema may experience very little swelling in the morning but collect a lot of fluid by the end of the day.
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Edema can be treated in a variety of ways. Diuretic medications, commonly called *water pills*, may help rid the body of extra fluid. Compression stockings or elastic wraps may put pressure on the capillary beds to prevent fluid from resting in the tissues. If swelling is severe—even to the point of making the skin stretch so much that it breaks open—a mechanical edema pump may be used. An edema pump uses external pressure to force fluid out of the tissues and back into circulation. Edema in the loose skin at the back of the hands may affect the ability of the fingers to bend and grip, resulting in contractures. Wearing an elastic glove, elevating the arm on foam wedges, and placing the hands on a lapboard can help drain fluid. Edema pumps for the arms may also be prescribed. Therapists may apply compression wraps to each finger and massage them to encourage fluid mobility.

**Decubitus Ulcers**

Also called bedsores, *decubitus ulcers* usually form as the result of prolonged pressure on the skin. Normally, the sensation of touch prompts us to move around when we sit or lie down, relieving the pressure. Stroke patients may lose this ability, or they may not have the strength or coordination to shift away from the pressure. Decubitus ulcers typically form over bony areas such as the heels, ankle bones, and several areas around the pelvis.

Elderly stroke patients are at high risk of developing decubitus ulcers since they may have lost skin elasticity as well as some of the fat underneath their skin. This makes their skin more fragile. The simple act of pulling off an adhesive bandage may tear the top layer of their skin and cause bleeding. Raising the head of a hospital bed can cause a patient to slide down, and the friction against the buttocks may contribute to the development of skin sores.

Doctors grade the amount of damage to the skin by the appearance of skin redness or the depth of skin breakdown.
Treatment is based on the severity of the wound.

Grades 1 and 2 include the most superficial breakdowns that may extend into the fat layer. Removing pressure points is the first step toward healing and prevention of decubitus ulcers. If the surface area is large or infected, surgery may be required to clean up dead tissue. The patient may also require a split thickness skin graft, in which skin from another area is used to cover an open wound. The graft will promote faster healing.

### Decubitus Ulcer Grades

<table>
<thead>
<tr>
<th>Grade 1</th>
<th>Redness does not blanch to finger pressure and may not break down. Usually treated conservatively.</th>
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<tbody>
<tr>
<td>Grade 2</td>
<td>Erosion down to the fat under the skin. This does not blanch to finger pressure. May be treated conservatively or with a skin graft.</td>
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<tr>
<td>Grade 3</td>
<td>Erosion down to the level of muscle. Requires surgical correction.</td>
</tr>
<tr>
<td>Grade 4</td>
<td>Erosion down the level of bone. Requires surgical correction.</td>
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If the wound is deep enough to reach muscle tissue or bone, it will not heal well without an operation such as a muscle rotation flap, in which muscle and skin from an adjoining area are rotated over a wound.

Special mattresses or padded coverings around the feet can help prevent skin ulcers. Wheelchair cushions may help prevent sores on the buttocks caused by sitting too long in one position. However, even with proper precautions, there
Other Medical Complications Caused by Stroke

is no guarantee that skin will not break down. Stroke patients with diabetes may have an even more difficult time feeling the effects of pressure against the skin because the disease can damage the small nerves of the hands and especially the legs. Unaware of cuts and burns, their wounds may become infected. A diabetic’s metabolism doesn’t promote normal healing.

Patients with leg numbness are at higher risk of developing skin sores because they may not feel pressure or may not have the strength to reposition themselves. If they have a language disability, they may not be able to tell others that they feel pain from pressure against the skin. Patients who are poorly nourished or have a low red blood cell count (anemia) may be more prone to skin sores and may heal more slowly. Proper nutrition with necessary proteins will provide the building blocks for healing wounds. Rarely, a blood transfusion is used to increase the red blood cell count and to encourage the skin to heal.

In recent years, hospitals have developed specialty centers to provide care for difficult wounds and skin damage. One promising technique sometimes used by wound centers is platelet-derived growth factor. Here, special components of the patient’s own blood are cultivated and then applied to the wound to promote healing.
Recovering from a Stroke

The first question usually asked by stroke survivors and their loved ones is “How much recovery can be expected?” Unfortunately, healthcare professionals cannot absolutely predict the outcome of the rehabilitation process. The best they can do is make estimates based on clinical studies and expertise, taking into account a patient’s individual pattern of improvement.

How Severe Was the Stroke?

Overall, successful recovery from a stroke depends on the extent of damage to brain tissue and the location of the damage in the brain. Many of the brain’s functions seem to be localized in specific regions. Therefore, the injury will affect the body functions governed by a particular region. For example, a marble-sized area of damage in the upper cortical levels of the brain may cause weakness in the hand. Yet the same size damage in the brain stem may result in worse symptoms, such as paralysis of an arm and a leg, because so many more nerves funnel into this area. Blockages of the brain’s larger blood vessels, caused by heavy bleeding into the skull cavity, usually causes irreparable damage. Severe brain damage may result in death.
Recovering from a Stroke

Patients who have other diseases that might worsen during the rehabilitation process may not be good candidates for therapy. This is particularly true of elderly stroke patients. Likewise, comatose patients or those supported by high-tech equipment are not ready for rehabilitation, although some bedside therapies may be appropriate.

Neurological Recovery

*Neurological recovery* is a medical term used to describe the healing of brain tissue. The brain forms an extremely complex web of nerve tissue that controls the body through electrical impulses, much the way a fuse box in a house controls electricity leading to various circuits, lights, and outlets. Assume for a moment that lightning strikes the house. It may be difficult to determine which circuits were affected. It may be even harder to determine if appliances were damaged. The brain is millions of times more complex than house wiring. Therefore, it is difficult to say with precision how much neurological damage might have resulted from a stroke.

Neurological recovery will also depend on the extent of *unmasking* that occurs. Unmasking is the process in which undamaged brain tissue assumes some of the functions of the damaged brain tissue. When living nerves are “unmasked,” or opened up, they help with recovery. Nerves may also heal by what's called *sprouting*. When a nerve connection is lost, nerve cells may send out new “sprouts” in search of connections. If connections are made, improved functioning may occur.

When my stroke hit, I felt numb all over. I was scared and confused. I forgot my family’s names. I’m glad for the aggressive rehabilitation I’ve had; it keeps my mind focused on what I need to get better.

–Ken
Age 53
The Stroke Recovery Book

However, sprouts may not be able to reestablish old connections if large parts of the brain are damaged or if sprouts become trapped in scar tissue.

Brain functions may also improve once swelling from a stroke diminishes. Just as a finger swells with inflammatory fluid after it is crushed, the brain swells inside the skull when it is damaged by a stroke. Nerves do not function well under this type of pressure. Swelling and pressure inside the head usually subside within days or weeks, restoring some nerve functions. If the swelling doesn’t subside, a patient may not survive.

Functional Recovery

Functional recovery describes a patient’s ability to regain activities of daily living—ADLs. Functional recovery is affected by both neurological recovery and rehabilitation.

The patient’s age is also a factor in recovery. Generally, chances of recovery decrease with increasing age. This is partially due to the brain’s healing process—plasticity—the ability of the remaining healthy brain to take over the functions of the damaged brain. As we age, this process becomes less effective.

Another factor in recovery is how soon rehabilitation begins after a stroke. The goal is to have patients begin therapy as soon as possible. Those who begin therapy right away, rather than weeks or months later, will make more progress.

Finally, functional recovery is also influenced by positive attitudes—both a patient’s and those of family members. Noted psychologist William James teaches that attitude is the most

As social workers, we help resolve financial concerns, provide emotional support, help coordinate services, help discharge planning, and direct families to appropriate resources.

–Roghie Case Manager
Recovering from a Stroke

important determinant to success. We can all apply his teachings to stroke recovery. If the patient is unable to develop a positive attitude as a result of brain damage, it is important that friends and family create a supportive, positive environment. When “problems” are viewed instead as “challenges” they are more easily overcome. Such gentle shifts in thinking can be very effective. The key to rehabilitation is to use whatever works.

It is also important that family and friends do as much as possible to educate themselves about stroke and recovery. Information may be gleaned from a variety of sources—the healthcare team, educational books and videos, and stroke education classes.

Medical Conditions Affecting Recovery

Anemia

Anemia, a low number of red blood cells, limits the ability of the blood to carry oxygen to the brain. This in turn limits a patient’s physical abilities since exercise consumes more oxygen than immobility. Most therapeutic functional rehabilitation involves physical exertion.

Arthritis

Moderate to severe arthritis, inflammation of the joint tissue, may cause enough pain to prevent patients from ever again being able to walk. Arthritic patients may not be able to tolerate the weight of standing, even with the support of canes or walkers. Other painful joints may interfere with activities such as dressing, grooming, and transfers.

Heart Disease

Severe heart problems may prevent any rehabilitation efforts. A fair number of stroke patients have heart attacks in addition to a stroke, making heart damage an immediate
concern. Doctors use their best judgment when deciding if a patient’s heart is strong enough to handle therapeutic exercise.

Angina, chest pain due to a lack of oxygen to the heart, may become so painful that the patient cannot exercise. Patients with angina may even suffer heart attacks when they exert themselves. Medical conditions in which the heart’s pumping function is marginal, as in congestive heart failure, may not permit patients to perform enough physical work to participate in therapies.

*Atrial fibrillation (AF)* is a condition in which irregular heartbeats can allow blood to sludge within the heart and form clots. AF adds two complicating factors to the rehabilitation process. First, it may increase the possibility of further strokes from emboli. Second, the blood-pumping ability of the heart is reduced by 10 to 15 percent, further depriving the body of oxygen and limiting exercise tolerance.

*Lung Disease*

Any type of lung disease limits the amount of oxygen that enters the body, thus limiting a person’s ability to exercise. Many people who have strokes are longtime smokers. Smoking can result in lung diseases such as asthma and emphysema. Smokers and others with chronic lung diseases usually do not exercise much. Therefore, they are often already in poor physical condition when they have a stroke.
Recovering from a Stroke

Skin Problems

In the previous chapter, we examined how bedsores can eventually result from a stroke. Similarly, if skin breakdown is already a problem, it will impair recovery efforts. Patients with these problems are not good candidates for rehabilitation because any movement may stretch and tear their skin. Although these people cannot usually participate in activities involving walking or sitting, they may be able to rebuild strength by participating in limited activities.

Low Endurance

Bed rest can be debilitating. One week of strict bed rest can result in up to a 15 percent loss of muscle strength and endurance. These problems get worse the longer a patient is in bed. Regaining strength takes at least twice as long as it did to lose, even if no complicating medical problems exist. This deconditioning, or immobilization syndrome, significantly prolongs the remobilization process.

There is an extraordinary healing power in love. I never underestimate the healing power of a kind word of encouragement, a smile, a gentle touch, or a shoulder to cry on. Patients need to be told that they will make it and that they are not alone.

–Jean
Hospital Supervisor

Impaired Eyesight, Hearing, and Touch

Vision and hearing problems may interfere with the ability to communicate and relearn ADLs. If a patient can no longer understand speech, therapists may need to use hand signals to communicate. Progress becomes quite difficult if the patient can neither see the gestures nor hear well enough to understand spoken instructions.
Diabetes

Diabetes can cause deterioration of the small vessels of the eyes. This leads to poor vision, even blindness. It can also result in a stroke. Diabetes may damage the small nerves in the hands, legs, and feet, making limbs numb. This numbness may affect activities such as dressing and walking and may make diabetics prone to injuries that they can’t feel. If these injuries become infected, amputation can result, further hampering rehabilitation.

Malnutrition

Studies have shown that people who are malnourished tend to need extended hospital stays and also may have lower functional outcomes. Although hospital dietitians can design menus to try to overcome this problem, stroke patients with difficulty swallowing may have trouble consuming adequate quantities of food.
Rehabilitation

Approximately 30 percent of strokes are mild and cause no disabilities. About 20 percent of strokes cause serious disabilities. It’s estimated that 50 percent of all individuals who suffer a stroke will need some form of rehabilitation.

Rehabilitation is the process by which healthcare providers systematically work to help patients restore as many mental and physical functions as possible. Most rehabilitation centers have developed carefully tailored programs for those patients who are ready for rehabilitation. A patient’s medical stability and endurance are the first considerations in determining his or her readiness for rehabilitation. Readiness also requires motivation on the part of the patient. At this stage, motivation is key.

Levels of Care

Rehabilitation goals are constantly assessed to determine where patients fit in the spectrum of care. The most intense level of rehabilitation care is acute care delivered in the hospital. At this level, patients are actively involved daily in any combination of physical therapy, occupational therapy, and speech therapy for three hours a day, five days a week.

Patients who do not meet the strength and endurance
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criteria may best be served at a lower level of medical care, such as that offered by a subacute rehabilitation unit or a skilled care unit. Here, they can build endurance until they are ready to begin more-demanding therapy. Subacute rehabilitation usually accommodates people who need about two hours of therapy per day. Skilled care is for patients who may be able to handle one therapy session per day but who also have other skilled nursing needs. Patients who have reached a plateau but who are still not able to go home may find nursing home care an alternative. Some nursing homes may offer physical, occupational, and speech therapy to help patients continue to make progress toward eventually returning home.

Levels of Assistance

A level of assistance refers to the amount of help needed to perform self-care activities or ADLs. The rehabilitation team evaluates each patient's assistance levels to determine how much assistance will be needed once the patient returns home.

A patient at the dependent assist level needs caregivers to provide all ADLs. For example, the patient may need the help of several nurses to move from a bed to a wheelchair.

Maximum assist level describes someone who needs 75 percent of ADLs performed by a caregiver. A patient at this level typically needs a caregiver to do most of the work during an activity such as standing to dress. A patient able to perform about half the ADLs is ranked at the moderate assist level. At this point, some patients are able to go home successfully if someone there is available to help them.

My husband’s therapy began soon after his stroke. At first, he needed two people to help him walk. After one month, only one therapist was needed. Now, he can get in and out of a chair with only a little help.

—Marie
Age 79
Rehabilitation

A minimal assist level a patient needs about 25 percent help for ADLs. Contact guard assist is the level at which some “hands-on” help is provided for activities during which a person could be injured by falling, such as walking. A person who has recovered quite well but still has minor balance or safety risks is rated at the standby assist level. Finally, if a patient can perform a specific task alone, he is considered independent in that skill.

Monitoring Progress

On a regular basis, a rehabilitation team will measure and score a patient’s ability to perform a variety of activities such as walking, transferring, speaking, and going to the bathroom. The scores will reflect how dependent or independent the patient is in each area. The trends in progress help determine the length of the patient’s stay in a rehabilitation unit. The patient can continue to stay as scores improve. Once scores do not change, the patient may be ready for discharge. However, even if scores level off and the patient is discharged, he or she may still strive for improvement. Although these scores are not an exact predictor of recovery to come, they may give friends and families some idea of how much improvement they may expect in the future.

It is important for nurses to give patients as much emotional support as possible. Nurses can also anticipate the needs of patients’ communication problems; speak slowly and in short sentences for the aphasic patient.

–Mary
Registered Nurse
Rehabilitation Professionals

During rehabilitation, a patient will meet a number of rehabilitation professionals, all of whom are usually part of a team. Usually a rehabilitation physician directs the team effort. A number of other professionals are involved in a patient’s recovery from stroke. They include rehabilitation nurses, physical therapists, occupational therapists, speech pathologists, neuropsychologists, psychologists, social workers, therapeutic recreation specialists, orthotists, and prosthotists. Hospital chaplains and other physicians may also join the rehabilitation team.

Rehabilitation Physicians

Rehabilitation physicians, also referred to as physiatrists, are medical doctors who are trained to treat injuries or illnesses that affect how you move. Experts on how nerves, muscles, and bone function, they treat those who have suffered strokes, spinal cord injuries, traumatic brain injuries, and sports-related injuries. Rehabilitation physicians have completed training in the medical specialty physical medicine and rehabilitation. Their goal is to decrease pain and enhance function. They design treatment plans for members of the rehabilitation team to follow as they work with recovering stroke patients.

Nurses

Rehabilitation nurses specialize in taking care of stroke patients going through rehabilitation. They provide direct

Take everything one day at a time. Realize early on that recovery takes time and patience. If you give up, your progress will go much slower or will stop.

– Linda
Age 47
Rehabilitation

medical care—giving medications, assisting with feeding, and providing bladder and bowel care. They also play a vital role in rehabilitation, communicating information to physicians and other team members. Since they spend more time with patients than do other team members, nurses are in a unique position to observe and assess patients. Nurses are also the ones who often educate patients and their families and friends about medical care.

Physical Therapists

Physical therapists (PTs) focus on maximizing a patient’s mobility and independence. With safety always in mind, PTs help patients improve walking, balance, strength, leg coordination, and range-of-joint motion. Learning to walk again is usually a rigorous challenge. How do PTs approach this task? They may have patients begin the walking process using parallel bars, similar to those used by gymnasts. A gait belt is fastened around the patient’s waist or under their arms to help safely guide them as they shift their weight and take their first steps.

Walking required much patience and determination. New accomplishments do not come daily. Patients like to hear praise even for small accomplishments. On days a patient seems uncooperative, do not pressure him. Try to be sensitive to his feelings.

–Mary Jo
Age 73

Then, depending on improvement, walking equipment may be introduced, including an elevated walker, a hemi-cane (a large, four-legged device), or other types of walkers, canes, or crutches. To help overcome balance problems and weakness, PTs may help patients with a variety of exercises. Other therapies often directed by PTs include upper and lower limb cycles and weights to build strength and endurance.
Occupational Therapists

Occupational therapists (OTs) focus on patients’ regaining the ability to do basic daily activities—dressing, grooming, and using the toilet. OTs show patients how to use many types of adaptive equipment—wheelchairs, home bath benches, special eating utensils, and long-handled doorknobs. OTs may visit patients’ homes to identify any needs for adaptive equipment. Normally, equipment is ordered and installed before hospital discharge. It is very helpful if a patient can accompany an OT during a home assessment to discuss individual needs and possible obstacles such as narrow doorways, thick carpets, or small bathrooms.

OTs also help patients learn to make transfers. The word *transfer* is used a lot during the rehabilitation process. It refers to the process of moving from one surface to another. Typical transfers done in the course of a hospital day include bed to wheelchair, wheelchair to toilet, wheelchair to mat, and wheelchair to shower chair.

Speech Pathologists

Speech pathologists help restore language skills and help patients learn other ways to communicate, if necessary. Speech pathologists also work with patients who may need swallowing therapy as a result of dysphagia.

Neuropsychologists and Psychologists

Most comprehensive rehabilitation centers have neuropsychologists, who diagnose and treat stroke patients who may be facing changes in thinking, memory, and behavior after stroke. They also administer specialized psychological tests and other tests to measure how specific areas of the brain are working.

The work of neuropsychologists is closely related to that of clinical psychologists, who help patients adjust to new
Rehabilitation

circumstances, especially if a stroke has affected the part of the brain that regulates personality. Emotional recovery from a stroke is challenging, to say the least, and working with a psychologist can help patients develop balance in their lives. Psychologists help patients direct their energy toward new goals—returning home and taking the best possible care of themselves.

Social Workers

Medical social workers, also called hospital case managers, are actually an “advance team” working to make sure that patients have the skills and services they need once they leave the health-care environment. The medical social worker’s goal, from day one, is to help patients plan for discharge from the hospital. For example, if a patient needs to go to a nursing home, the social worker can help find the most suitable, affordable, and convenient place available. Many nursing homes have a long waiting list. Social workers can help cut through the red tape.

Medical social workers often play an important role in helping families identify financial resources to pay for hospital stays and ongoing expenses. Social workers will be aware of help available through various social and governmental agencies, and they can speed much of the paperwork, which can range from obtaining a handicapped parking permit to filling out Medicaid applications. These services can be most helpful to those coping with both the physical and emotional

Pet therapy can be very motivating. As one patient told me, “Dogs have an amazing knowledge of what each patient needs. Animals seem to distance patients from a consuming sense of loss.”

– Kris
Recreational Therapist
consequences of stroke.

It is important to note that patients and families often confuse medical social workers, employed by a hospital, with case managers who work for insurance companies. There is a big difference between the two. The insurance case manager’s goal is to analyze the cost to the insurance company and to make sure that costly, “unnecessary” care is not provided.

**Therapeutic Recreation Specialists**

These recreation specialists strive to provide recreation—a break from the concentration required for medical therapies. Having fun is important to a balanced life, and patients may need to learn new activities or modify the types of activities they previously enjoyed. A patient whose stroke has affected a dominant arm might strengthen the nondominant arm by working on crafts and writing skills. Other recreation therapies might include painting or playing cards and board games. Later, patients may be involved in community reentry activities, in which they take field trips, go shopping, or go to the bank.

An important part of therapeutic recreation is socialization, in which patients join in planned activities that provide them an opportunity to interact with others with disabilities. The goal is to lessen patients’ feelings of isolation and to make them aware that they are not the only ones to face the challenges of a stroke. Speaking to other patients in similar situations may help reduce their fears. This may foster a sense of mutual encouragement and lead to friendships that extend past the hospital stay.

A popular program offered by some rehabilitation centers is pet therapy. Animals, usually dogs and cats, are brought in to visit the patients. Interacting with animals can help patients relieve stress and depression and even tap unrealized speech potential.
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Orthotists and Prosthotists

Orthotists are specialists who make braces and splints for limbs. Sometimes a brace is needed to better position a limb or to help compensate for weakness caused by a stroke. Many patients will need leg support to make walking possible again. Leg braces can be custom-made by the orthotist to improve balance, safety, and walking efficiency. Prosthotists make and adjust artificial limbs. The loss of limbs, through amputation, may occur in stroke patients who are diabetics or who have extremely poor circulation in the legs.

Hospital Chaplains

Commonly, spiritual support is provided by hospital chaplains. They visit patients on a regular basis and are on call in times of crisis. They provide spiritual counsel, advice, and prayer that many people find comforting. Chaplains try to calm fears by discussing stroke disabilities in a spiritual context.

Other Physicians

People affected by stroke often have complex diseases and medical needs best addressed by physician specialists. Internal medicine and family-practice physicians provide care for ongoing medical conditions such as diabetes and blood pressure. Cardiologists and pulmonologists specialize in heart and lung problems. Urologists evaluate bladder problems. Psychiatrists may provide medication and counseling for patients with depression or behavioral problems. Visual problems are assessed by ophthalmologists. Plastic surgeons may provide wound care management if skin ulcers, or bedsores, become a problem.
Care after a Stroke

Planning for the return home begins the day a stroke patient enters the hospital. The term aftercare encompasses all the processes involved in discharging a patient from the hospital and arranging for a comfortable living environment. The first consideration is where the patient will be living—in a care facility, at home, or in a relative’s home. Aftercare plans are customized to the needs of the patient.

Planning for Going Home

Once it’s determined where a patient will be living upon discharge from a care facility, rehabilitation professionals try to make it possible for patients to continue making progress in the rehabilitation effort. For example, hospital case managers may set up handicapped transportation, acquire equipment, and schedule subsequent therapies, lab tests, and follow-up visits with physicians. They may also act as intermediaries between the patient/family and insurance companies to determine what moneys are available to help pay for aftercare needs.

To plan for a patient’s discharge from the hospital to home, everyday skills must be reevaluated. Occupational and physical therapists can address the functions needed to resume living at home. The medical team will decide whether the patient
Care after a Stroke

will be able to travel to the hospital, rehabilitation center, or other location for therapy services or whether these will need to be provided in the home. Home healthcare agencies can provide nursing, therapies, and treatments to patients who are homebound or extremely disabled. Outpatient visits to the hospital or rehabilitation center are preferred if more than one therapist is needed, or if specialized equipment, available only at a rehabilitation hospital, is required.

Therapists and doctors will see that appropriate therapies are provided. Usually, once the patient has reached a plateau or has achieved his goals, formal therapy is discontinued. This does not mean, however, that the patient has achieved full potential.

Patients may continue to improve mentally and physically after formal therapies have ended by performing a program of exercises, either alone or with the help of friends and family. Therapists and doctors will be available to offer suggestions and help determine when these activities have helped the patient reach full potential.

To assist in driving, we can get all kinds of adaptive equipment—special turn knobs, left foot gas pedal, hand controls, special mirrors. If it is safe for you to drive, but you have some physical weakness, we can help you drive again.

—Rick OT/Driving Instructor

Durable Medical Equipment (DME)

As a patient gets ready to leave the hospital, the physician, physical therapist, and occupational therapist determine what types of equipment will be needed to help with ADLs at home. Equipment designed for long-term use is called *durable medical equipment (DME)*. These items can be most helpful but can be very expensive. Because patients may regain functional skills
over time, it may be worth renting durable medical equipment rather than buying it. The rehabilitation team may take quite a while to experiment with different devices before they find the best equipment for each patient. As a general guideline, patients should not purchase any durable medical item until they have discussed it with the appropriate medical professional.

At times it may not be possible for the right equipment to be acquired until after discharge. Shorter hospital stays often mean having less lead time to make arrangements for equipment and home modifications before a patient is discharged. This frustration is shared by patients, loved ones, and healthcare workers alike.

Since insurance, Medicare, and Medicaid coverage constantly changes, it is impossible to be sure for what equipment and medical expenses these plans might reimburse. Be sure to ask therapists, medical case managers, insurance case managers, and government representatives specifically what will or won’t be covered before a service or piece of equipment is provided.

**Braces and Walking Devices**

A brace is also known as an *orthosis*. The most common leg brace used after a stroke is an ankle-foot orthosis (AFO). This L-shaped leg brace is available in two types. The first is a double-upright AFO built into a shoe with two long calf bars and a tie band at the upper calf. A mechanical joint is placed near the patient’s ankle joint. The ankle joint may be mobile or stationary to accommodate and control ankle and knee motion. The other kind of AFO is made of polypropylene
Care after a Stroke

plastic. It has the advantage of being more cosmetic, lighter weight, and transferable between different shoes if heel heights are the same. It may also have a moving or rigid ankle joint. There is also a type of spring-steel brace that attaches to a shoe for people who don’t need a lot of extra support.

An orthotist will see that all braces are selected or custom-made to provide the best comfort, fit, and ankle-knee control. Use of a physical therapy department’s various “stock” AFOs will help determine whether a patient needs a custom-made brace.

Arm and leg braces are often prescribed early in the hospital stay if a patient shows a pattern of complete hemiplegia. Some patients recover well enough and fast enough that an expensive or bulky brace is unnecessary. Others may progress to a lighter brace.

Some patients have knee instability and could fall while

Ankle-foot braces, used after a stroke, control position and motion of the ankle and compensate for muscle weakness.
walking. Control may be achieved by altering the angle of the ankle joint in the brace. The foot portion of an AFO can tilt the foot down, providing a force against the leg to keep the knee supported in extension. Setting an AFO at a slightly upward angle causes the knee to bend, helping people whose knees tend to overextend backward. Braces like these help with safety by passively lifting the foot during walking to prevent foot drop. As mentioned earlier, foot drop occurs when the foot drops down toward the ground, or drags, making walking difficult and unsafe. Braces also help decrease the amount of energy it takes to walk. For those people who do not find them too heavy to use, braces can make the difference between walking and being confined to a wheelchair.

Braces may also help people who lack knee mobility. Use of a knee-ankle-foot orthosis that comes up over the knee may provide enough stability. The trade-off of this type of support is the increased weight and related energy needed to walk compared to using an AFO.

The usual progression of gait and walking devices is as follows: parallel bars, wheeled walker, regular walker, quad cane (one with four feet to improve balance), single-point cane, and, hopefully, independent ambulation. Depending on their initial walking ability, patients may start out using any of these devices. It is not uncommon for a person who has had a stroke to need some sort of walking device for mobility and safety permanently.

Physicians and therapists may wait weeks or months before formalizing a prescription for expensive braces while assessing a patient’s improvement. A prescription will be finalized after

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When I first began walking, the therapist tried a leg brace, but it didn’t hold my foot well. Then I tried a custom-made brace. It was easier to put on and more comfortable and made my walking more stable.

—Arnold

Age 79
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several follow-up clinic visits. Factors involved in prescribing the appropriate device include the patient’s strength, balance, safety, coordination, ability to sequence activities, visual loss, and the cognitive ability to use the device.

Wheelchairs and Cushions

Occupational therapists usually decide on the best wheelchair and cushion for each patient. Virtually every component on a wheelchair can be customized. Occupational therapists keep catalogs listing the options. For example, tires may be air-filled or solid rubber. Swing-away footrests may help with safety during transfers. A brake-extension handle may mean greater independence and improved quality of life for a patient who depends on using a wheelchair as his main mode of mobility. A good seat cushion may reduce the development of decubitus ulcers on the buttocks of people who spend entire days sitting in a wheelchair. Like all equipment, however, the cushion must be used correctly and consistently to be effective.

Beds and Mattresses

Occasionally, recovering stroke patients will need a hospital bed or special mattress at home to ensure safe transfers, to reduce pressure on fragile skin, or to help change body positions. Hospital beds come in electric and semi-electric models. Overhead trapezes attached to the bed may help patients position themselves in bed to prevent skin sores and to assist in transfers to and from the bed. Beds that can be raised and lowered in height make transfers much easier, especially from a low wheelchair to a bed.

Special soft mattresses used to prevent skin breakdown may, however, make transfers difficult. The soft bed won’t provide as much support to a sitting person as will a normal, firm mattress. These soft mattresses may also be taller than a normal mattress, increasing the difficulty with transfers.
Some occupational therapy departments have beds of different heights available to try out before a bed is purchased. The patient’s physician and occupational therapist can determine if a special bed or mattress is necessary. Not everyone needs these devices. Medicare, Medicaid, and most insurance companies will limit coverage of these items and will not pay for them if they are not prescribed.

**Adaptations and Safety at Home**

Even the most common activities may become problematic after a stroke. For example, is the patient ready to cook over a hot stove or handle sharp knives in the kitchen? Other concerns include throw rugs, which can be hazardous for patients who have trouble with balance or eyesight. Stairs can be a problem, especially for those with muscle weakness.

Home modifications may add to a stroke patient’s quality of life, convenience, and safety. Occupational therapists are often very creative when it comes to home modifications for the disabled. Before discharge, if possible, it is best for a therapist to visit the patient’s home to identify and evaluate barriers and recommend changes. The popular term "handicapped accessible" means that people who have difficulty walking or who use a wheelchair may safely enter a building because it has been modified to handle their needs. Nowhere is accessibility more important than at home. Occupational therapists can point out many potential problems, especially safety issues.

**Handrails and Ramps**

Patients with mobility problems may have difficulty entering their homes if there are steps leading to the entrance. Sturdy handrails on each side of the steps will be helpful for people who can negotiate them. Ramps need to be installed to accommodate people using wheelchairs. For a person to move a wheelchair up and down a ramp independently, the
ramp should extend horizontally one foot for every one inch in vertical rise. For example, a ramp needs to be thirty feet long to replace five steps with a six-inch rise from each step. A ramp may be constructed of wood or have cement foundations. Usually, at least one turn will be built into the ramp. Placement of a ramp may be functional but not cosmetic.

Before a ramp is installed, homeowners should first estimate for how long a time it may be needed. If a patient is recovering fairly rapidly, building a ramp may not be worth the expense. However, if it appears that the stroke patient is going to need a ramp for years, a quality ramp will be a good investment. Therapists may be able to provide a list of contractors willing to provide cost estimates and design suggestions for ramp construction.

**Making Doors and Hallways Passable**

Once inside the home, doorways, hallways, and furniture arrangements may all be barriers. Wheelchairs can fit through most front doors, but turning in narrow hallways and small rooms, especially a bathroom, may be impossible. Contractors may be able to widen the doorways and refit a bathroom. Expect scrapes and nicks to appear if a patient has problems handling the wheelchair. Wall corners may be protected with
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inexpensive, hard plastic molding available from hardware stores. Offset hinges may enable doors to swing clearly, adding an extra inch of space and perhaps preventing the need to rebuild an entire doorway.

Making Bathrooms Accessible

Bathrooms are often the one place in the home that can’t accommodate wheelchairs. Sometimes the only bathroom in the house is located on the second floor. The least expensive alternative to adding or remodeling a bathroom is to invest in a commode with armrests. Even for patients who do not use wheelchairs, a commode may be the most practical choice.

In the bathroom, a raised toilet seat may help ease transfers. Some durable medical equipment toilet seats have armrests for safety and to help with transfers. A shower chair can provide a measure of safety for an unsteady person. Tub benches permit bathing while providing leverage when it is time to lift the patient out of the tub. Sturdy bars, installed diagonally rather than vertically or horizontally, should be installed in both showers and tubs. Especially in the bathroom, throw rugs should be removed to prevent tripping and falling.

Other household modifications include intercoms, buzzers, and other signaling devices that not only are useful forms of communication but also provide patients with a sense of security when they are left alone. Floor coverings may need to be reassessed. It’s amazing how well patients may be able to walk with a walker on a tile floor in a hospital but at home

One of the toughest things was dealing with the loss of independence, especially not being able to drive. The desire to drive again made me focus on hard work in therapy.

–Dorothy
Age 74
Care after a Stroke

may bog down in shag carpets as if they were walking in mud.

Occupational therapists can suggest numerous other home modifications based on a patient’s needs. Some are simple and inexpensive. Others are quite sophisticated and can be relatively expensive.

Useful Personal Equipment

A number of devices are available to help those with disabilities with activities such as dressing, bathing, and eating. Other devices are available to help provide comfort.

Dressing Devices

Patients may be taught hemi-dressing, using their working arm to dress. Poor balance or weakness may interfere with stroke patients’ ability to reach down and grasp clothes, socks, or shoes. A dressing stick or reacher stick can help patients grab articles of clothing and even maneuver them into place. Sock donners, devices that are helpful for putting on socks, are useful to those who have limited hand use or have trouble bending. Elastic shoelaces or shoes with hook-and-loop or Velcro fasteners may eliminate tedious and cumbersome tying of standard laces. Even a simple long-handled shoehorn can make life easier and promote independence.

Practice using home-assist devices is necessary to achieve optimum function. It may initially take patients nearly an hour to dress and they may get very frustrated. The dressing aids may seem cumbersome. But, like any motor skill, speed and accuracy should improve over time.

Arm Slings and Lapboards

Arm slings may provide relief when a stroke patient’s arm is immobile and hangs limply to the side. The pull of gravity may stretch tendons, soft tissue, and nerves, resulting in rotator cuff pain. Some patients, however, see such devices
Transfer boards are helpful in moving from one seated position to another. For example, from chair to wheelchair or from wheelchair to bed. *Photo courtesy of Kohl’s Pharmacy and Homecare*

as visible signs of disability and are reluctant to use them. The unfortunate result is more pain for these patients. Physicians often find themselves reminding patients that gravity doesn’t give up or take time off. Therefore, slings should be worn as directed during walking, transfers, and sometimes in the wheelchair. Some patients decorate the fabric and make slings in fabrics that match their clothing.

Like slings, lapboards can support the arms. Lapboards are small tables that attach to the wheelchair frame in front of the armrests. Foam wedges, placed under the hands, can also help reduce swelling in the hands, allowing gravity to drain some of the fluid.

**Compression Gloves and Stockings**

Fluid may build up in paralyzed limbs if they remain immobile. Muscles cannot “pump” blood and other fluids back through the body. At the same time, gravity draws the
Care after a Stroke

blood and other fluids downward. Fluid buildup can limit joint motion. Devices such as compression gloves and stockings, which inflate and deflate, help squeeze fluid from the limbs of those patients who have fluid buildup.

Compression stockings may be difficult for a patient’s home caregiver to put on and may be impossible for some patients to put on independently. The compressive stockings that patients use in the hospital to prevent blood clots usually can't provide enough compression to drive out much fluid. Sometimes the easiest way to compress the legs is to use four-inch elastic wraps. However, these wraps gradually lose compression and need to be rewrapped about every four hours.

Transfer Boards and Pivot Disks

Transfer boards, which act as a bridge between one surface and another, are helpful for patients who are unable to stand. They are useful for transfers from beds to wheelchairs, wheelchairs to cars, and wheelchairs to toilets. Some patients are able to stand with help but are unable to take many steps or make turns. Pivot disks, large plastic disks with ball-bearing bases, may help these patients. Transfer boards and pivot disks help reduce physical strain on the caregiver and may facilitate mobility without assistance from others.

Alphabet Boards and Computers

Inexpensive picture boards or alphabet boards can help bridge some stroke patients’ language barriers. Others may be able to learn to use laptop computers and small printers. Newer models can understand the human voice and can print the spoken word. Such aids are referred to as augmentative communication devices. Because these electronic devices are expensive and usually not covered by insurance, it is advisable to obtain a speech pathologist’s evaluation of a patient’s abilities before such a purchase is considered.
Eating Utensils and Other Adaptive Items

Plate guards, adapted eating and cooking utensils, hand braces, writing utensils, lever-type door handles, and other adaptive items are available and can be tailored to each patient’s needs. Spending time with a therapist to find and fit appropriate durable medical equipment can save both money and frustration.

Transportation

Transportation needs often change for a person now coping with a disability. For those who have been given permission by their doctor to drive, they may be aided by any number of adaptive devices. Special knobs and pedals can be installed to make driving easier and safer. However, for patients who are not ready to drive, it could be extremely dangerous for them to do so. For example, someone with a visual field cut may not see oncoming traffic. The results could be deadly.

Losing the ability to drive is often a crushing aftereffect of a stroke for many people and can be extremely depressing for those accustomed to driving. This is a time for families and friends to offer extra emotional support and, in some cases, make sure car keys are not accessible.

Some individuals may find themselves needing special transportation. Perhaps medical equipment will not fit into a standard car, or getting in and out of the car is difficult. There are numerous accommodating modes of transportation.
Care after a Stroke

These may include mass transportation systems designed to hold wheelchairs, specially adapted conversion vans, and cars retrofitted for medical equipment. Taxi services for people with disabilities may be available. Doctors may need to complete special forms to document disability and to authorize special transportation and handicapped parking privileges.

A power wheelchair and a van, adapted for wheelchair loading, make transportation easier. Such vehicles can be purchased; some companies make them available as rentals. Photo courtesy of Kohll’s Pharmacy and Homecare

Transportation services vary considerably from one community to another. Thanks to the Americans with Disabilities Act (ADA), communities that offer transportation systems are required to accommodate the needs of the physically challenged traveler. Some transportation services may require reservations up to one week in advance. Others may be able to pick up passengers from the curb but not from the door. An increasing number of companies are entering the field of
assisted transportaion as the average age of our population increases.

Despite the options available, transportation may still be a problem due to cost or the need for a traveling companion to assist with transfers. Public and accessible transportation may also be exceptionally difficult in rural areas, where it is often most needed. Hospital case managers and physicians may be able to schedule home health agency visits for rehabilitation and may know of hospitals, senior centers, or churches that offer voluntary or low-cost transportation.

**Returning to Work**

Returning to the workplace may not be a priority for all stroke patients. However, for younger patients, returning to work may be a critical issue. Not surprisingly, scientific studies indicate that young people with the fewest functional deficits are the most likely to be successful in returning to the workforce. Patients, particularly those with right hemisphere strokes, who have jobs that don’t require a lot of physical movement, tend to return to the workforce more easily; they are left with residual weakness that lends itself to adaptive resources. The same is not true for workers whose jobs depend on physical skill. In these cases, evaluations by physicians, neuropsychologists, and vocational counselors will help determine which patients are able to go back to work.

Therapists can give measureable estimates of physical and cognitive abilities. If a work release is granted, stroke patients still need to be aware that anxiety, depression, frustration, and

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My main obstacle was making transfers into the wheelchair—I needed two people to help me. But I overcame it once I started therapies. I learned to walk again. I tried to work hard in therapy; each day brought new rewards.

—Leone

Age 71
a sense of being overwhelmed by the work environment are still possible. Members of the rehabilitation care team may visit the workplace to check for potential safety problems and work environment challenges, as well as make other suggestions for a smoother transition back into the workplace.
Reducing Your Risk of Stroke

If you have had a stroke, there is a 10 to 18 percent risk of having a second stroke in the first year immediately following a stroke. The risk continues to grow about 10 percent each following year.

One of the major causes of recurrent stroke is a lack of change in lifestyle. Some people may not monitor their blood pressure or manage their diabetes; others may continue to smoke. Failure to take prescribed stroke medication is another significant cause of recurrence. Some patients stop medications because of the expense of drugs. Others may stop a drug because of its side effects.

It is important to understand that you can make lifestyle changes that can reduce your risk of having a second stroke. These same lifestyle changes can also help prevent stroke from ever occurring.

Reducing the Risk

Based on medical statistics, we know the risk factors that most frequently cause stroke are hypertension, diabetes, smoking, and some heart problems. Other diseases and lifestyle choices also influence the occurrence of stroke. Identifying these conditions and making appropriate lifestyle changes may significantly reduce one’s risk of stroke.
**Reducing Your Risk of Stroke**

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**Risk Factors for Stroke**

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<thead>
<tr>
<th>Risk Factor</th>
<th>Increase in Risk</th>
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<tbody>
<tr>
<td>Atrial fibrillation plus rheumatic heart disease</td>
<td>18 times</td>
</tr>
<tr>
<td>Prior stroke/TIA</td>
<td>10 times</td>
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<tr>
<td>High blood pressure</td>
<td>6 times</td>
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<tr>
<td>Atrial fibrillation</td>
<td>6 times</td>
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<td>Conjestive heart failure</td>
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<td>Heart attack/angina/sudden death syndrome</td>
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<td>Diabetes mellitus</td>
<td>2–4 times</td>
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<tr>
<td>Heavy alcohol use</td>
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<td>Smoking</td>
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*Manage High Blood Pressure*

Uncontrolled hypertension, or high blood pressure, is the most important risk factor for stroke. Hypertension is an elevated pressure of blood flow against the walls of the arteries. The most common symptom of high blood pressure is no symptom at all. It’s a silent killer. Undiagnosed hypertension can result in strokes, heart attacks, kidney damage, bleeding into the eyes, and even death.

Blood pressure is measured by assessing the force, or pressure, of blood flow inside the arteries during both the contraction and relaxation phases of the heart’s pumping cycle. The measurement of blood pressure is stated using two numerals. For example, an individual may have a blood pressure reading of 140/90, which is at the top level of the normal range. The top number, the systolic value, is related to heart muscle contraction. The bottom number, the diastolic value, relates to
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the cardiac relaxation cycle. A person is considered to have high blood pressure that should be medically treated and monitored if, after several blood pressure readings, either of these numbers is consistently high.

Reducing salt, or sodium chloride, in the diet may help lower blood pressure. Salt increases blood pressure because the body senses the elevated sodium level as abnormal. If excess sodium is present, the body will store water to dilute the sodium. The final effect is similar to adding water to a balloon: the greater the amount of water, the more pressure there is on the artery walls. Just like a balloon, excessive blood pressure can burst through a weakness in a vessel wall, causing a hemorrhagic stroke. Most processed foods contain extra salt. Check food labels while you are shopping to determine the sodium content. You may be surprised at how much salt is present in seemingly harmless products.

Medications may be used to lower blood pressure to normal limits to significantly reduce the risk of stroke. Lowering the diastolic blood pressure by six points may reduce the risk of stroke by 38 to 42 percent. Unfortunately, some people may experience unpleasant side effects from certain medications. If this happens, doctors may prescribe alternatives. It is critical that a person who is taking blood pressure medication not change the dose nor discontinue taking it without first discussing it with a physician. This is especially true for the elderly. Even if they have never shown any signs of high blood pressure, people over the age of fifty have an increased risk of developing high blood pressure. Why? Their blood vessels tend to lose elasticity with age. Blood pressure must be carefully monitored, even while taking medication, to prevent it from dropping too low and depriving the brain of blood or rising so high that blood vessels burst. Biofeedback, visual imagery, and relaxation therapy may also help lower blood pressure.
Reducing Your Risk of Stroke

Control Cholesterol Levels

Cholesterol is a soft waxy substance that is a natural component of the fats in the bloodstream and is used by all the cells of the body. However, there are “good” fats, which protect the heart and “bad” fats, which contribute to heart disease and other problems. The bad fats usually come from high-fat foods such as meats, whole-milk products, and coconut and palm oils.

When too much bad fat accumulates in the blood, it can create a condition known as *atherosclerosis*, or hardening of the arteries. This occurs when *plaque*, a buildup of fatty deposits, occurs on the inner lining of an artery. Eventually, blood vessels may become blocked. The tissue upstream may not receive the nourishment it needs to live. Atherosclerotic plaque may fragment, travel through the body, lodge in the brain, and cause a stroke. This is especially true of plaque originating in the neck arteries or the ascending aorta, the large artery that arises from the heart and feeds the neck arteries.

To prevent strokes in patients suspected of having atherosclerotic blockage, a Doppler test can be performed on the carotid arteries in the neck. During this procedure, sound waves are bounced off the artery walls to check for abnormal or absent blood flow. If a blockage is detected, and the person is medically stable enough for an operation, a vascular surgeon may order an arteriogram. A special fluid that shows up on X-rays is injected into the arteries. This test helps further define areas of narrowed or clogged vessels.

If a patient’s arteries have 60 to 70 percent or more blockage, a carotid endarterectomy operation may be performed to open the artery and remove the cholesterol. This is a major surgical procedure with risks that include stroke if the plaque breaks loose. Generally, men seem to fare better with this procedure than women.

Periodic blood cholesterol tests can help monitor the risk of atherosclerosis. In general, blood cholesterol levels should
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be below 200 milligrams per deciliter. Reducing fat in the diet is one of the best ways to reduce cholesterol levels. In some cases, medications may be prescribed to lower the blood fats and cholesterol. These drugs are especially useful for people diagnosed with a hereditary form of atherosclerosis. However, some individuals may have fat levels in the blood that are hard to control even with medication and a modified diet.

Manage Atrial Fibrillation

As noted in an earlier chapter, atrial fibrillation is a disease of the atrium, the upper left heart chamber. It causes an irregular heart rate and rhythm. In a normal heart, the atrium contracts and pumps blood into the chamber beneath it, the ventricle. The ventricle then contracts and forces blood into general circulation. If the atrium is diseased, it may begin to quiver rather than pump. Blood that is not squeezed into the ventricle may sludge and form clots. If the clots break loose, they may circulate and lodge in the brain, causing a stroke.

A person with atrial fibrillation also has a higher risk that clots may continue to be thrown from their heart, producing more strokes. Strokes resulting from atrial fibrillation tend to be severe, doubling the risk of death within the first month. When a clot breaks loose from the heart, it can fragment and damage multiple areas in the brain. Atrial fibrillation may be suspected if a computerized axial tomography (CT) or magnetic resonance imaging (MRI) scan shows multiple areas of the brain affected by the stroke.

Still, atrial fibrillation may be difficult to detect because the heart may alternate between fibrillation and normal rhythms. So a patient may be asked to wear a small, portable heart monitor for an entire day to check for atrial fibrillation or other abnormal heart rhythms. Atrial fibrillation tends to increase after age fifty. In some people atrial fibrillation may be chronic (lasting more than six months) and may not respond to medical
Reducing Your Risk of Stroke

therapy. Aspirin and warfarin, anticoagulant medications, may prevent clotting. Yet both have the potential to cause other bleeding problems. Other medications are available to regulate heart rhythms. Cardiologists may elect to try a cardioversion, which uses an electrical charge to convert the rhythm of the heart back to normal.

Manage Coagulation Disorders

Problems with coagulation, or blood clotting, inside arteries serving the brain or the heart may cause a stroke. The body is always working to break up any clots that may form. However, certain chemistries in the body may make one prone to clots. These clots may, in turn, bring on a stroke. Coagulation disorders are difficult to isolate. Even tests can miss the subtle changes in blood chemistry that may indicate a tendency toward clotting.

Other strokes may be caused by vasculitis, a condition in which blood vessels within the brain become so inflamed and swollen that blood flow is restricted. Both coagulation disorders and vasculitis respond to the drug warfarin, which helps prevent new clots.

Stop Smoking

Smoking is a major risk factor for strokes. The substances in tobacco affect not only the lungs but also blood circulation. The more a person smokes, the greater the risk of permanent damage to the body. Smoking has been shown to lead to high blood pressure, strokes, heart attacks, emphysema, and lung cancer. It may contribute to atherosclerosis, diminishing blood flow to the brain. In a study of more than 7,000 men over thirteen years of age, smokers had four times as many strokes as nonsmokers. People who smoke two or more packs of cigarettes per day have twice the risk of stroke as those who smoke less than half a pack per day.
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Smoking is a complex behavior encompassing both nicotine addiction and habitual behavioral patterns. Physicians have an array of tools—from prescription medications to behavior modification methods—to help people who truly want to quit. Some smoking cessation medications such as nicotine gum and nicotine patches no longer require a prescription. For the best chance of success, these aids may need to be combined with a supportive formal smoking cessation program. Most communities offer such programs. It usually takes several serious attempts before someone finally quits smoking. It is encouraging that, after five years, people who have quit smoking have the same risk of stroke as nonsmokers.

Control Weight

Obesity doesn’t necessarily lead directly to a stroke. But the presence of a lot of fat tissue means the body has to make more blood vessels to nourish the tissue. And the heart has to work harder to pump blood. This extra work may contribute to high blood pressure and congestive heart failure, both risk factors for stroke.

Exercise

Regular and appropriate exercise not only helps control weight, but it also increases circulation and lung capacity and fights cholesterol buildup. The proper amount of exercise also seems to reduce the risk of stroke. Exercise needs to be regular and should reach an individual’s target heart rate for maximum benefit. To calculate target heart rate, subtract your age from 220, then multiply that value by 60 to 70 percent. Ideally, you should maintain your target heart rate for thirty minutes, three times per week.

Always check with a physician before starting an aerobic exercise program if you have had a heart attack or have a medical condition such as congestive heart failure, heartbeat
Reducing Your Risk of Stroke

irregularities, or asthma. A doctor may recommend that exercise be undertaken with appropriate supervision, such as that offered at a cardiac rehabilitation center.

Be Informed about Oral Contraceptives

Research suggests that birth control pills may cause stroke, especially in women over thirty-five who smoke. It is believed that the estrogen in birth control pills may cause clots that lead to stroke. Accordingly, in recent years, the estrogen content in birth-control pills has been lowered. Medication with less estrogen works just as effectively as a contraceptive and probably lowers the risk of stroke. It does not, however, completely eliminate the risk.

Limit Alcohol Consumption

Studies indicate that those who drink alcohol heavily (three or more drinks per day) are two to three times more likely to have a bleeding stroke. Heavy drinking, especially binge drinking, makes blood platelets more likely to clump together into blood clots, which can lead to stroke or heart attack.

Other Risk Factors

People who have obstructive sleep apnea, a condition that causes breathing to temporarily stop during sleep, may experience drops in blood oxygen levels that may initiate strokes.

After a stroke, the risk of death increases for diabetics, the elderly, those with severe neurological deficits from previous strokes, and individuals who have had heart attacks or have abnormal heart rhythms. Small blood clots, or microemboli, may cause strokes. These small clots may be caused by artificial heart valves, atrial fibrillation, heart attacks, and narrowing of the carotid arteries.
Being a caregiver for someone who has become impaired because of a stroke is difficult—emotionally, spiritually, and physically. Though caregiving is an expression of love, it is also frustrating, lonely, isolating, and at times overwhelming, even for the strongest and most dedicated people. There is much that you can do, however, to better cope with the rigors of caregiving.

Coping with Emotional Challenges

No one is prepared for a loved one to have a sudden and debilitating stroke. If someone you love has had a stroke, it may mean the lifestyle you have known will change dramatically. It may mean a future that is uncertain in many respects. At times like this it’s normal to feel worried and confused. It’s also common to experience feelings such as anger, sadness, hopelessness, resentment—and guilt for having those feelings.

Realize there’s nothing wrong with your feelings. Accept that many so-called negative feelings such as sadness, anger, frustration, guilt, and resentment are a natural reaction to the difficulties you face. Allow yourself to recognize all your feelings and let go of your guilt.

Explore ways that you can release negative feelings. Don’t let these feelings “gang up” on you until you are totally burned...
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out and unable to effectively help your loved one. Express your feelings, talking with supportive friends and family members. Ask questions of your doctors and medical staff. Exercise. Some caregivers find peace in meditating, writing in a journal, or utilizing stress-reduction techniques—all are good ways to help you let go of negative feelings.

Join a support group. You can find a tremendous amount of healing and support at support-group meetings. You won’t feel so alone and isolated when you realize many others are in situations similar to yours. If your community doesn’t have a caregiver support group, start one with help from your doctor, a hospital social worker, or a mental-health agency.

Recognize depression and get help if you need it. If your feelings of sadness and despair persist, seek help. Patients do worse in their recovery when their caregivers are depressed, over-protective, and not knowledgeable about stroke. Find a counselor or psychotherapist who can help you address your emotions. Today, a number of medications are available that can be quite helpful in alleviating depression.

Be willing to accept help from others. Often, we think we should do everything ourselves. However, caring for someone who is disabled can be overwhelming. Let others know how they can help and gratefully accept their assistance. It’s not uncommon to have many offers for help immediately after someone has returned home after a stroke; however, these offers often soon fade. When this occurs, be willing to ask for help.

If you don’t have help from family and friends, consider hiring an in-home caregiver or taking your loved one to an adult daytime care program from time to time while you “recharge your batteries.”

Ask yourself what you’re grateful for today. This is a good tool for chasing away the blues. Instead of telling yourself how bad things are, remind yourself of what you have. Be grateful for small improvements you see in your loved one. Remind
yourself that that you have successfully faced many challenges before.

Don’t be afraid to find humor in everyday life. Even difficult situations have their humor. Taking a lighter approach may reduce stress.

Take care of yourself. All too often, when caring for someone who is coping with disabilities as a result of a stroke, a caregiver will put their own needs last, failing to take good care of themselves. Remember to turn some of the loving energy you give to your loved one to yourself as well. It is crucial that you take good care of yourself and take time for yourself. You will be in a better frame of mind to care for your loved one if you are emotionally nourished.

Learn to accept a “new normal.” Your life as you have known it may never be the same again. Don’t insist on “normalcy.” Reconsider your priorities. You may need to eliminate or cut back on some responsibilities, whether they be housecleaning chores or social obligations.

Facing the Physical Challenges

Often, caregiving means being pushed physically beyond your endurance. For example, you may need to assist your loved one with such physical tasks as getting out of bed, bathing, dressing, and eating. You may become exhausted because your caregiving duties prevent you from getting a good night’s sleep.

Try to get plenty of rest. Lack of adequate sleep can quickly be physically and emotionally debilitating. It contributes significantly to depression. Figure out a way to get enough sleep. You may need to sleep in a separate room or in a separate bed.

Eat well. Good nutrition is critical for your well-being. Follow a healthful diet. Eat plenty of whole grains, fruits, and vegetables. Drink six to eight glasses of water per day. Reduce fat, caffeine, alcohol, refined sugar, and salt.

Exercise regularly. Research shows that keeping physically
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Fit helps reduce emotional and physical strain. It may also make you stronger and better able to meet the physical demands of caregiving.

Learn proper moving, lifting, and transferring techniques. Your loved one may need help with any number of activities of daily living. Talk with a doctor or physical therapist about the best lifting and moving techniques. Using proper body mechanics and the right techniques and equipment, such as those listed below, may prevent injuries to both you and your loved one.

- Encourage your loved one to move as independently as possible.
- Allow plenty of time for moving the patient, such as from a bed to a wheelchair.
- Move or support the patient from his or her strongest side.
- To avoid falls, check wheelchairs, walkers, and other equipment before using.
- Use brakes on wheels of beds, shower chairs, wheelchairs, and commodes. Lock side rails on beds.
- Use safety belts, lifts, and other aids to make lifting easier for you and the person you’re moving.
- Use good body mechanics when assisting someone:
  - Use your legs rather than your back.
  - Spread your legs to give yourself a wide base of support.
  - Move your whole body rather than just bending or twisting.
  - Keep the person close to you.
  - Avoid jerky movements and lifting whenever possible. Instead, use rolling, pivoting, or sliding to move the person.

Remember, it is not uncommon for caregivers to become
ill themselves. Research has shown that stress contributes to a host of ailments, including high blood pressure, ulcers, depression and anxiety, and heart disease. To cope with the physical, mental, and emotional challenges of caregiving, you must take good care of yourself physically, and get help when you need it.

**Getting Help**

Here’s an important concept to remember: part of being strong and independent is knowing when to ask for help. Many caregivers try to shoulder all the emotional and physical burdens by themselves. But at some point, for a variety of reasons, even the best caregiver may no longer be able to continue caring for his or her loved one alone. Where can you find help?

*Friends and family.* Let others know exactly what kind of help you need. Perhaps you can work out a schedule so that a relative or friend can stay with your loved one or take him or her for an outing to give you a break.

*Your place of worship.* Religious communities can be invaluable sources of support. Depending on the size and the level of organization, religious communities offer everything from prayer support and home-cooked meals to full-fledged senior programs and adult day care.

*Meals on Wheels.* If cooking meals becomes difficult on top of all your other responsibilities, social-service programs such as Meals on Wheels will deliver hot meals to your home at little or no expense to you.

*Community services.* Check your state’s Area Office on Aging for a list of the services offered in your community. Also, look in your local phone book under “community services” and “senior services.”

*Home-care services.* These provide either skilled nursing care prescribed by a physician or respite/support services for personal care and household chores. Be sure to shop around.
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and investigate credentials before selecting a home-care agency or an individual to provide these services. You'll want to know:

- About their experience working with stroke patients
- Whether they are licensed and bonded
- What references they can offer (and be sure to check them)
- The fees charged (Check with your insurance plan to see if any of the services are covered.)

Long-term Care: Making Difficult Decisions

There's no place like home, and, in the best of worlds, most of us would prefer to stay at home after a stroke, surrounded by endless reserves of energy, patience, and time. This isn't always possible, however. For some stroke patients, their disabilities or other health problems eventually make it difficult or even unsafe for them to remain at home.

As a caregiver, perhaps you are facing health problems of your own. Other family members may have more energy for caregiving but much less time. Moreover, it may not be financially feasible to continue caregiving at home, even though it is less expensive than a care facility. Financial resources to hire the extra help that would make home care possible are hard to find. Medicaid, for instance, which is available to low-income families, pays few home-care costs but covers full-time nursing-home costs.

Even when you can afford at-home care or day care, stroke patients with mental or emotional problems often feel threatened by any change. They may resist new caregivers, refuse to attend day-care programs, or lash out at their partner-caregivers. Mobility impairment can make at-home care impossible and even dangerous.

Deciding to move a loved one to a care facility can be extremely difficult emotionally for caregivers and their families. You may be torn by your loved one’s resistance to leaving home.
and your need for help.

Following are some suggestions for helping with the transition from at-home care to full-time placement:

_**Plan ahead.**_ Talk honestly with your loved one about the need for care facilities in the future. If possible, visit facilities with them and make choices before such care is necessary. For some people, it is impossible to face the impending loss of their independence and take these steps. This leaves the caregiver to make these decisions, often alone, and sometimes with criticism from other family members.

_**Work with your primary-care doctor.**_ Your doctor will determine what level of care is needed for your loved one. It is also likely that your doctor has established relationships with one or more care facilities in your area. Ask him or her for recommendations.

_**Ask for a Medicare assessment.**_ If your loved one is a senior, call your local Medicare office and ask for a nursing-home admission review. Medicare personnel will determine whether your loved one qualifies for coverage in a skilled-care facility. If you are under your state's insurance plan, staff members for that program can determine eligibility.

_**Treat the facility as your loved one's home.**_ Once your loved one has been moved to a care facility, make it feel homey. Take personal items to make the room feel familiar. A photograph of your loved one at a young age will help caregivers at the facility remember that your loved one was once youthful and independent.

_**Give it time.**_ Adjustment to a new place is always challenging. If your loved one has memory problems, avoid taking him or her for drives or visits home for at least six weeks or until he or she has accepted the facility as a new home. It may be difficult and heart-wrenching to persuade a confused loved one to go back to the care facility after a visit home.

_**Develop good relationships.**_ Remember that you and your family should strive for a cordial relationship with the care-
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care facility personnel. Avoid being hypercritical. No matter how
good the care facility, it is not home. Don’t misplace your guilt
by becoming angry with the facility.

Get a feel for the place. Make a habit of visiting the facility
at different times of the day. Attend an activity. Eat a meal there.
Try not to make snap decisions about the facility, especially
during the first few weeks of adjustment.

To determine whether your loved one is receiving good
care, ask yourself the following questions:

• How is he or she doing compared with their functioning
  at home?
• Is your loved one clean and dry?
• Is he or she encouraged to be as active as possible?
• Is he or she receiving the individualized care needed
to support mobility, functioning, and personal dignity?
• Is he or she receiving medications on time and in the
correct dose?

If you have concerns, talk with the nurse in charge or the
facility’s administrator.

Make sure the staff understands the particular challenges
your loved one is coping with since having a stroke. Some staff
may not have much experience caring for people who’ve had
a stroke. Make sure, for instance, that they understand how
important it is to administer medications exactly on time and to
provide opportunities for exercise. If you need help educating
the facility staff, discuss this with your doctor.

A Final Word

Caring for a loved one after a stroke can be a per-
sonally satisfying but can also be difficult and exhausting and
sometimes may seem like a thankless job. Be careful that you
do not let the task overwhelm you. Don’t neglect your own
health. Realize you are doing the best you can for the patient
and be realistic about your limitations.
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For more information on caregiver support, visit the caregiver Web sites listed in the Resources section at the back of this book.
# Stroke Rehab Settings

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<td>Acute care (inpatient) and rehab hospitals</td>
<td>24-hour medical care and a full range of rehab services</td>
<td>Hospital or special rehab unit of a hospital</td>
<td>Several hours each day (most demanding)</td>
<td>Survivors who have many medical issues and may develop problems without continued medical treatment</td>
</tr>
<tr>
<td>Sub-acute facilities</td>
<td>Provide daily nursing care and a fairly wide range of rehab services</td>
<td>Rehab center, rehab unit of a hospital, skilled nursing facility (short-term nursing care) or skilled nursing home (long-term), skilled nursing unit in a hospital</td>
<td>Less demanding than acute programs, but continue for longer periods of time</td>
<td>Survivors who have serious disabilities but are unable to handle the demands of acute programs</td>
</tr>
<tr>
<td>Long-term care facilities</td>
<td>One or more treatment areas</td>
<td>Nursing home, skilled nursing facility</td>
<td>2-3 days per week</td>
<td>Survivors who have their medical problems under control but still need 24-hour nursing care</td>
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<td>Outpatient facilities</td>
<td>One or more treatment areas</td>
<td>Doctor’s office, outpatient center of a hospital, other outpatient centers</td>
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<tr>
<td>Home health agencies</td>
<td>Specific rehab services in one or more treatment areas</td>
<td>In the home</td>
<td>As needed</td>
<td>Survivors who live at home but are unable to travel to get their treatment</td>
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Resources

Agency for Healthcare Research and Quality (AHRQ)
Office of Communications and Knowledge Transfer
540 Gaither Road, Suite 2000
Rockville, MD 20850
301-427-1364
www.ahrq.gov

Part of the U.S. Department of Health and Human Services, this agency supports research designed to improve the quality of health care. Offers practical, science-based information to health professionals and consumers.

Air Charity Network
4620 Haygood Road, Suite 1
Virginia Beach, VA 23455
800-549-9980
www.airlifeline.org

This is charitable organization, made up of 1,000 private pilots, who donate their time to fly ambulatory patients who cannot afford the cost of travel to medical facilities for diagnosis and treatment.
Resources

**American Health Assistance Foundation**
22512 Gateway Center Drive
Clarksburg, MD 20871
800-437-2423
www.ahaf.org
Provides research funding and public education for age-related degenerative disease, including Alzheimer’s disease, glaucoma, heart disease, and stroke.

**American Institute of Stress**
124 Park Avenue
Yonkers, NY 10703
914-963-1200
www.stress.org
This nonprofit organization is a clearinghouse for information on stress-related subjects, including the role of stress in cardiovascular, gastrointestinal, and skin diseases. Offers a library of articles and a monthly newsletter.

**American Stroke Association**
7272 Greenville Avenue
Dallas, TX  75231-4596
888-4STROKE (478-7653)
www.strokeassociation.org
Part of the American Heart Association, this organization offers patients information on risk factors, treatments, recovery, links to other resources, and a magazine, *Stroke Connection*. 
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CDC/Office on Smoking and Health (OSH)
4770 Buford Highway
Mail Stop K-50
Atlanta, GA  30341-3717
800-232-4636
www.cdc.gov/tobacco

Provides education material, publications, research, and statistics on disease caused by tobacco. Offers guidelines to help quit using tobacco products.

Easter Seals
233 South Wacker Drive, Suite 2400
Chicago, IL 60606
800-221-6827
www.easterseals.com

Easter Seals has been helping individuals with disabilities and special needs, and their families, live better lives for nearly ninety years. Easter Seals offers a variety of services to help people with disabilities address life’s challenges and achieve personal goals.

National Aphasia Association
350 7th Avenue, Suite 902
New York, NY 10001
800-922-4622
www.aphasia.org

A nonprofit organization that promotes public education, research, rehabilitation, and support services to assist people with aphasia.
Resources

National Institute of Neurological Disorders and Stroke
P.O. Box 5801
Bethesda, MD  20824
800-352-9424 or 301-496-5751
www.ninds.nih.gov

Serving the public and health professionals, the organization offers comprehensive consumer health information, publications, new treatment studies, clinical studies, clinical research training, and research funding.

National Rehabilitation Information Center (NARIC)
8201 Corporate Drive, Suite 600
Landover, MD 20785
800-346-2742 or 301-495-5900
www.naric.com

Offers comprehensive information about disability and rehabilitation, including free reference and referral in finding rehabilitation facilities, publications, or support groups. Also offers information about rehabilitative, assistive, and adaptive aids.

National Stroke Association
9707 East Easter Lane, Suite B
Centennial, CO  80112-3747
800-STROKES (787-6537)
www.stroke.org

A voluntary healthcare organization that focuses on stroke prevention, treatment, rehabilitation, research, and support for stroke survivors and families.
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The Stanford Stroke Center
701 Welch Road Building B, Suite 325
Palo Alto, CA  94304
800-800-1551
www.stanford.edu
The center is at the forefront of new developments in drug therapy and emergency treatment for stroke. Provides latest information on therapies and clinical trials.

Aids for Daily Living

Wardrobe Wagon
555 Valley Road
West Orange, NJ 07052
800-992-2737
www.wardrobewagon.com

Advantage Medical
12415 Old Meridian
Carmel, IN 46032
800-577-5694
www.advantagemedical.com

Affiliated Medical Distributor Services (AMEDS)
P.O. Box 6887
Warwick, RI 02887
866-802-6337
www.ameds.com
Resources

For Caregivers

**Family Caregiver Alliance**
5180 Montgomery Street, Suite 900
San Francisco, CA 94104
415-434-3388
www.caregiver.org

**National Alliance for Caregiving**
4720 Montgomery Lane, 2nd Floor
Bethesda, MD 20814
www.caregiving.com

**National Family Caregivers Association**
10400 Connecticut Avenue, Suite 500
Kensington, MD 20814
800-896-3650
www.nfcacares.com

**National Organization for Empowering Caregivers**
www.care-givers.com

**Well Spouse Association**
63 West Main Street, Suite H
Freehold, NJ 07728
www.wellspouse.org
Glossary

A

Activities of Daily Living (ADLs): Daily functions of dressing, eating, walking, hygiene, going to the toilet, and communication

Acute medical care: The initial phases of care after a stroke in which the patient is stabilized and diagnostic studies are begun

Aftercare: The processes of arranging discharge and outpatient needs

Agnosia: Inability to recognize things

Ambulation: Walking or gait

Aneurysm: Small, bubble-like protrusion from the side of a blood vessel; this weakness can rupture and cause a stroke

Angina: Chest pain from lack of oxygen reaching the heart; this can be the warning sign of a heart attack

Angiography: An X-ray in which contrast dye is injected into the artery to “light up” arteries to evaluate sites of bleeding, blocked, or spasming vessels

Ankle-Foot Orthosis (AFO): Plastic or metal short-leg brace

Anomia: Inability to name objects, yet having ability to use and describe them

Anosognosia: Brain damage that results in denying or neglecting deficits

Anoxic encephalopathy: Brain damage from a type of stroke due to insufficient blood pressure

Anterior cerebral artery: An artery running up the front of the cerebrum

Anticoagulants: Oral and intravenous medications that block the formation of blood clots
**Glossary**

**Anticoagulation:** The process of preventing clot formation within blood vessels

**Anticonvulsant:** Medication used to treat and prevent seizures

**Antidepressant:** Medication used to treat depression

**Anton’s syndrome:** Cortical blindness where the patient does not realize he or she are blind.

**Aphasia:** A complex disturbance in expression and/or understanding of speech and language

**Apraxia:** Inability to perform a directed action, yet having physical ability to do the action

**Arteriogram:** Test in which contrast dye is injected into arteries to look for abnormalities such as narrowing

**Arteriovenous malformation:** Abnormal collection of blood vessels where arteries feed directly into veins without the usual capillaries in between; this creates an abnormal pressure situation that can allow bleeding into the brain

**Arthritis:** Painful inflammation of joints

**Aspiration:** When food or fluid is inhaled into the lungs instead of traveling down the normal swallowing tube

**Aspirin:** A nonsteroid anti-inflammatory medication used as an anticoagulant by inhibiting platelet clotting

**Ataxia:** Loss of coordination

**Atelectasis:** Small airway collapse in the lungs

**Atherosclerosis:** Deposition of fat into the walls of arteries that eventually reduces the diameter of the vessel and blocks blood flow

**Atria:** The two upper chambers of the heart

**Atrial fibrillation:** An abnormal heart rhythm; this can allow blood to sludge within the heart and can allow formation of a clot

**Augmentative communication:** Use of devices, such as a computer, to assist patients in communication

**B**

**Bedsore:** Pressure sores, or pressure ulcers, are areas of damaged
skin and tissue that develop when sustained pressure cuts off
circulation to vulnerable parts the body

**Behavior:** A person’s actions and reactions

**Bladder:** Bag-like storage organ for urine that contracts to empty

**Bolus:** Food or fluid formed into a ball by the mouth so it can be swallowed

**Bowel:** Long tubular abdominal organ that stores and empties feces

**Brain stem:** A lower area of the brain that is part of the involuntary nervous system and controls some functions necessary for life

**Broca’s aphasia:** The inability to express language

**C**

**Cardiologist:** Doctor specializing in diseases/disorders of the heart and circulatory system

**Cardiopulmonary resuscitation (CPR):** Technique of artificial breathing and chest compressions used for people whose heart and lung function has stopped

**Cardioversion:** The process of applying an electrical charge to the chest wall to convert a patient’s abnormal heart rhythm into a normal rhythm

**Caregiver:** Persons who provide unpaid care by looking after an ill, frail, or disabled family member, friend, or partner.

**Carotid arteries:** Paired arteries moving blood from the heart through the neck and into the head; often blocked by atherosclerotic plaque

**Carotid endarterectomy:** An operation to remove atherosclerotic plaque from the carotid artery to allow a clear channel for blood flow

**Case manager:** Specialist in assisting with admissions/discharges and social aspects of rehabilitation care

**Catheter:** A plastic tube inserted into the bladder to passively drain urine

**Central intravenous line:** A plastic tube inserted into a large vein in the neck to allow delivery of nutrition, medications, and fluid

**Cerebellum:** The back part of the brain, that controls coordination
**Glossary**

**Cerebrospinal fluid:** Nutritional fluid that circulates within and around the brain and spinal cord

**Cerebrovascular accident (CVA):** Stroke

**Cerebrum:** The upper part of the brain, which helps control thinking and voluntary action

**Cholesterol:** Fatty substance that can collect in the walls of arteries and block the flow of blood

**Circle of Willis:** A protective ring of blood vessels at the base of the brain

**Clonus:** A rapid, alternating motion of the ankle from spasticity

**Coagulation:** The process of forming a clot within a blood vessel

**Cognition:** The processes involved with thinking

**Collateral flow:** Where blood flow from other vessels substitutes for blood that is blocked in another vessel

**Coma:** Unconscious state from which a person cannot be aroused

**Comorbidity:** Other diseases a patient may have, some of which may impact on the effects of a stroke

**Constipation:** Poor ability to evacuate the bowel

**Contraceptives (oral):** Birth control pills

**Contractures:** Soft tissue shortening that restricts joint motion

**Convulsions:** See epilepsy

**Cortex or cortical area:** The outermost layer of the cerebrum

**Cortical blindness:** Damage to the back part of the brain (occipital lobes) that causes a person to not recognize blindness

**Cranial nerves:** Twelve pairs of nerves that function in the head and neck for smell, taste, swallow, tongue/face/eye motion and vision/hearing

**Cryptogenic stroke:** Stroke due to an undetermined cause

**CT Scan (Computerized Axial Tomography):** Sophisticated radiologic test to show the anatomy of internal body parts

**Decubitus ulcers:** Skin breakdown from excessive pressure or shear forces
Deep vein thrombosis: Blood clots in the leg, which can break free and travel to the lungs causing a pulmonary embolus

Deficits: Problems with functioning

Dementia: Deterioration of mental processes

Dependent level of assist: Caregivers are doing all tasks for a patient

Depression: Feelings of helplessness, hopelessness, despair, and possibly thoughts of suicide

Diabetes mellitus: A complex metabolic disturbance, especially of blood sugars

Diastolic value: The bottom number of the blood pressure reading

Diplopia: Double vision caused by damage to certain cranial nerves so the eyes do not work together

Disability: How an impairment affects ability to perform certain usual life functions

Diuretic: Also called a “water pill” because it causes loss of water from the body

Dizziness: Light-headed sensation

Dopplers: A noninvasive test to determine blood flow in a vessel

Durable medical equipment (DME): Equipment used for long-term needs, such as a wheelchair or walker

Dysarthria: Slurred speech because of weak or absent function of muscles

Dysfunction: Poor function

Dysphagia: Difficulty with swallowing

Echocardiogram: A test using sound waves to look for heart abnormalities

Edema: Swelling caused by fluid in the body’s tissues

Electroencephalogram (EEG): A test of brain waves to check for seizures, brain damage, and brain death

Elevated walker: A type of walker with a raised pad/hand grips to allow the patient to bear some weight through the pad
Glossary

**Embolism:** Blood clot that has broken free and traveled downstream in a blood vessel until it lodges and clogs a vessel

**Encephalopathy:** Any diffuse disease of the brain that alters brain function or structure

**Enema:** Putting fluid into the rectum to produce a bowel movement

**Engrams:** A patterned nerve-muscle loop developed over multiple repetitions that builds up coordination

**Epiglottis:** A flap of tissue that folds down to protect the open airway during swallowing

**Epilepsy:** A disorder in which the brain produces spontaneous discharges, which usually alter consciousness and cause convulsions

**Equilibrium:** Sense of balance

**Esophagus:** Swallowing tube running from the throat to the stomach

**F**

**Figure-ground perception:** Ability to distinguish between objects that are near versus far or distinct versus less formed

**Foot drop:** The foot drops down as the result of weak muscles on the front part of the lower leg

**Frontal lobes:** Paired lobes in the front part of the cerebrum

**Functional electrical stimulation (FES):** Uses low levels of electrical current to stimulate physical or bodily functions lost through nervous system impairment

**Functional range of motions:** Joint mobility sufficient to do normal tasks

**Functional recovery:** The return of abilities such as eating, walking, and dressing

**G**

**Gait:** Walking or ambulation

**Gait belt:** A strong belt placed around a patient's waist to assist with transfers and walking

**Gastrocolic reflex:** A reflex of the bowels that pushes stool along the colon after intake of new food
**Gastrostomy tube (G-tube or PEG tube):** A flexible tube surgically placed through the stomach wall to safely provide liquid food and water

**Gaze preference:** Tendency to look in one direction due to a visual field cut

**Global aphasia:** The most severe form of aphasia in which the ability to speak and understand language is nearly or completely disrupted

**Grand mal seizure:** See tonic-clonic seizure

**H**

**Heart attack (myocardial infarction):** Death of heart muscle when it is deprived of oxygen

**Hemianopsia:** Loss of one-half of a visual field

**Hemi-cane:** A large-based, four-legged device used to assist with walking a patient who has poor balance

**Hemidressing techniques:** Methods used to teach a patient with hemiplegia how to dress

**Hemiplegia:** Weakness or paralysis of the same-side arm and leg

**Hemisphere:** Half of the cerebrum or half of the cerebellum

**Hemorrhage:** Bleeding outside of the blood vessels

**Hemorrhoids:** Enlarged blood vessels in the anus/rectal region that can bleed and be painful

**Heparin:** A type of anticoagulant given by intravenous or intramuscular injection

**Herniation:** Protrusion of a body part out of its normal cavity

**Hydrocephalus:** Accumulation of extra fluid within the cavities of the brain

**Hypercoagulable state:** Condition where the body forms an excessive amount of blood clots, which can predispose to strokes

**Hypertension:** High blood pressure

**Hypotension:** Low blood pressure
**Glossary**

**I**

**Immobilization syndrome:** The deconditioning effects of prolonged bed rest or illness that decrease a person's strength and endurance

**Impotence:** Inability of a man to produce an erection

**Incontinence:** Inability to control bowel or bladder function, resulting in spilling fecal matter or urine

**Independent level:** The patient is able to do all of a task alone

**Indwelling catheter:** A plastic tube that stays in the bladder to drain it

**Infarction:** Tissue death due to extreme lack of oxygen

**Inferior vena cava filter:** A filter placed in the large vein leading to the heart for the purpose of stopping dangerous blood clots in the legs from reaching the heart and lungs

**Inhibition:** A signal to a muscle preventing its movement; a signal restricting a behavior

**Intellect:** The ability to learn, understand, and act in a purposeful manner

**Intermittent catheterization (ICP):** Bladder program of inserting a tube into the bladder at intervals, then removing it

**Internist or internal medicine physician:** Doctor specializing in diseases/disorders of adults

**Intracerebral hemorrhage:** Bleeding into the substance of the brain

**Intravenous line (IV):** A plastic tube inserted into the veins to provide fluid and to give a route to deliver medication

**Intraventricular hemorrhage:** Bleeding into the deep cavities of the brain

**Ischemia:** Relative lack of oxygen in tissues

**J**

**Joint contractures:** See contractures
The Stroke Recovery Book

K
Knee-Ankle-Foot Orthosis (KAFO): Plastic or metal long-leg brace

L
Lacunar stroke: Tissue death due to small vessel disease in the deep parts of the brain
Lapboard: Flat board that sits across the wheelchair armrests to allow the patient to use arms more easily
Level of assistance: The amount of help that is required for a task
Locked-in syndrome: Type of stroke due to damage at the base of the pons in the brainstem; patient cannot move or communicate except for eye blinks

M
Magnetic Resonance Image: Complicated radiologic test to detect abnormalities of internal organs
Mass effect: Pressure effect from bleeding or swelling reaction of damaged brain tissue that forces parts of the brain to move away from the pressure
Maximum assist level: Caregivers are helping with 75 percent of a task
Melodic intonation therapy: A speech therapy technique of having the patient sing to stimulate better ability to speak
Microemboli: Very small blood clots that can cause strokes
Middle cerebral artery: An artery serving the middle portion of the brain
Minimal assist level: Caregivers are helping with 25 percent of a task
Mini-stroke: A temporary blockage of an artery
Mitral valve prolapse: Heart condition in which the mitral valves collapse inward instead of preventing the back flow of blood; thought to be a possible source of embolisms
Moderate assist level: Caregivers are helping with 50 percent of a task
Modified barium swallow: See videofluoroscopy
**Glossary**

**Morbidity:** Diseased or damaged state

**Mortality:** Death

**Muscle rotation flap:** A plastic surgery procedure—muscle, skin, and its blood supply are rotated to cover a large decubitus ulcer area

**Musculoskeletal:** Pertaining to the muscles, ligaments, tendons, and bones

**Myocardial infarction:** See heart attack

**N**

**Nasogastric (NG) tube:** A flexible plastic tube inserted into the nose and down into the stomach, used for those with swallowing disorders

**Neglect:** Tendency to ignore or to be unaware of part of the environment

**Neurogenic bladder:** Damage to the brain resulting in bladder-control problems

**Neurologic recovery:** Healing and return of function of the nervous system

**Neuron:** A nerve cell

**Nursing home care:** A level of medical care involving less intense therapy

**O**

**Occipital lobes:** Paired lobes in the back part of the cerebrum

**Occupational therapy (OT):** Specialty designed to restore arm function, cognition, activities of daily living, and help with adaptive equipment

**Ophthalmologist:** Doctor specializing in diseases/disorders of vision

**Oral contraceptives:** Birth control pills

**Orthosis:** A brace for the arm, leg, neck, or spine

**Orthotist:** Specialist in making and fitting braces

**P**

**Parietal lobes:** Paired lobes in the upper sides of the cerebrum
**The Stroke Recovery Book**

**PEG (percutaneous endoscopic gastrostomy) tube:** A gastrostomy tube

**Penetration:** Food/fluid traveling down to the level of the vocal cords

**Perception:** The ability to know things by interacting with the environment

**Peripheral vascular disease:** The process of atherosclerosis excluding the heart arteries

**Perseveration:** Repetitive vocalization of same words or thoughts

**Physiatrist:** Doctor specializing in physical medicine and rehabilitation

**Physical Therapy (PT):** Specialty designed to help regain strength, coordination, balance, walking, endurance

**Plastic surgeon:** Surgical specialist dealing with skin and underlying structures

**Plasticity:** The potential of a healthy part of the brain taking over the functions of the damaged portion

**Platelet-derived growth factor:** Part of a patient’s own blood, which is harvested and grown to then be placed over a decubitus ulcer to speed its healing

**Platelets:** Irregularly shaped granules that circulate in the blood and are part of the formation of blood clots

**Pneumonia:** Infection of the lung

**Pons:** Part of the brain stem

**Posterior cerebral artery:** An artery serving the back parts of the cerebrum

**Proprioception:** Joint position sense

**Prosthetist:** Specialist in making and fitting artificial limbs

**Psychiatrist:** Doctor specializing in mental health diseases/disorders

**Pulmonary embolism:** Blood clot from the leg that has broken loose and travels to the lung

**Pulmonologist:** Doctor specializing in diseases/disorders of the lungs
Glossary

**Pusher syndrome:** Tendency to push with the strong side, which can lead to balance problems

**Q**

**Quadrantanopsia:** Loss of one-quarter of a visual field

**R**

**Range of motion:** Total motion produced at a joint; the process of doing joint motion to prevent joint contractures

**Reflex sympathetic dystrophy:** Damage to nerves where the sympathetic nerves contribute to a syndrome of pain, swelling and loss of limb function

**Rehabilitation:** The therapeutic process, trying to make functional gains and prevent the formation of new functional deficits

**Respite care:** Temporary patient care by another caregiver, while primary caregivers are allowed a rest period

**Rheumatic heart disease:** Heart valve damage from earlier bacterial infection of the valves, which results in emboli formation

**S**

**Seizures:** See epilepsy

**Shoulder subluxation:** The partial separation of the bones of the shoulder joint because of the unopposed pull of gravity

**Silent aspiration:** When food/fluid enters the lungs without signs of coughing or choking

**Skilled care:** A level of medical care where the patient may be able to handle only one therapy per day

**Sleep apnea:** A condition in which breathing stops during sleep and then starts again

**Social worker:** See case manager

**Sodium chloride:**

**Salt Spasticity:** Increased tone of a muscle due to a lack of inhibitory brain control

**Speech Pathology:** Specialty designed to restore language and help with cognitive and swallowing problems
Split thickness skin graft: A plastic surgery procedure, transplanting healthy skin to cover a decubitus ulcer

Sprouting: New connections formed between living nerve cells that survive after a stroke

Standby assist level: Caregiver is next to the patient during a task but is not touching the patient unless immediate help is needed

Status epilepticus: A medical emergency in which one seizure is followed by a cycle of seizures

Stroke: An abnormal neurological condition in which blood flow to part of the brain is interrupted, causing nerve damage

Subacute rehabilitation: A less intense rehabilitation program for those who have partially achieved their goals or for those who need to build up strength/endurance enough to participate in a more intense program

Subarachnoid hemorrhage: Bleeding in the subarachnoid brain space when an aneurysm ruptures

Subcortical brain: The cerebral hemisphere regions of the brain below the cortex

Subluxation: Partial loss of contact of the two surfaces contacting within a joint

Suppository: Medication inserted in the rectum

Suprapubic catheter: Surgically created tube placed above the pubic bone to act as a long-term method to drain urine

Sympathetic nervous system: Part of the involuntary nervous system

Synaptophysin: A chemical in the brain that helps in strengthening connections between nerve cells

Systolic value: The upper number of a blood pressure reading

Temporal lobes: Paired lobes in the lower sides of the cerebrum

Thalamic pain syndrome: Sensation of burning pain in a body part, as a result of damage to the thalamus

Thalamus: A deep region of the subcortical cerebrum that acts as a sensory relay center
Glossary

**Therapeutic Recreation (TR):** A specialty designed to assist in return of socialization, thinking, coordination, strength, and leisure activities

**Thermal stimulation:** Speech therapy technique in which a cold stimulus is placed in the lateral/back region of the throat to improve swallowing

**Thrombosis:** Process of clotting

**Thrombus:** Clot

**Ticlopidine:** Medication used to prevent clots that could cause strokes

**Todd's paralysis:** A paralysis that can last up to twenty-four hours after some seizures

**Tone:** The resistance of a muscle to passive motion

**Tonic-clonic seizure:** A dramatic form of epilepsy in which a patient becomes unconscious, shakes uncontrollably, and may be incontinent

**Trachea:** Windpipe

**Tracheostomy:** Surgical opening made in the windpipe to place a tube

**Transesophageal echocardiography:** Test in which a probe is inserted into the swallowing tube to allow ultrasound echo signals to check for clots in the heart

**Transfer:** The process of moving from one surface to another

**Transient Ischemic Attack (TIA):** Neurologic deficits that last less than twenty-four hours

**Triglycerides:** One of the components of fat that circulates in the blood

**U**

**Urethra:** Tube leading from the bladder for urination

**Urinary tract infection (UTI):** Infection from bacteria in the bladder or kidney

**Urodynamics:** Test done by placing a flexible tube in the bladder and inflating it with water or air to determine bladder function
The Stroke Recovery Book

Urologist: Doctor specializing in urinary and male reproductive systems

Urosepsis: Severe form of urinary tract infection

V

Vasculitis: Inflammation of a blood vessel, which may cause it to block blood flow

Vasospasm: Constriction of a blood vessel

Ventilation-perfusion scan: A test to detect pulmonary embolus

Ventricles: The four cavities deep within the brain; also, the two lower chambers in the heart

Vertebrobasilar system: Blood flow from the vertebral and basilar arteries, which come up the back of the brain and flow into the Circle of Willis

Vertigo: Sensation of spinning around

Vestibular system: Part of nervous system that monitors equilibrium

Videofluoroscopy: Test in which patient takes in food/fluid while an X-ray video camera monitors the travel of the bolus to check for aspiration

Visual field loss: Blind spot

Void: To urinate

W

Warfarin: Medication used as an anticoagulant

Wernicke’s aphasia: The inability to understand language
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