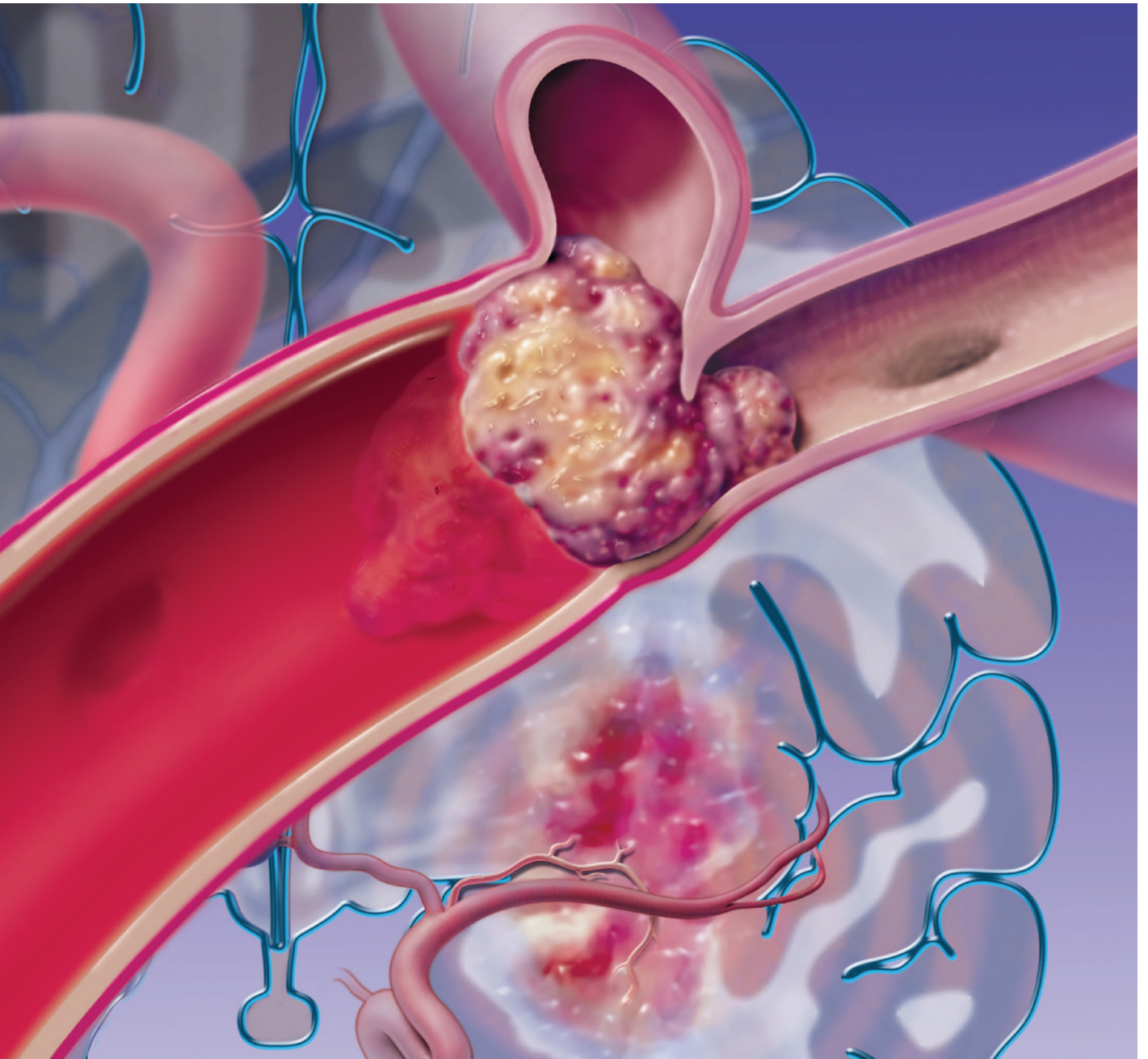


Stroke





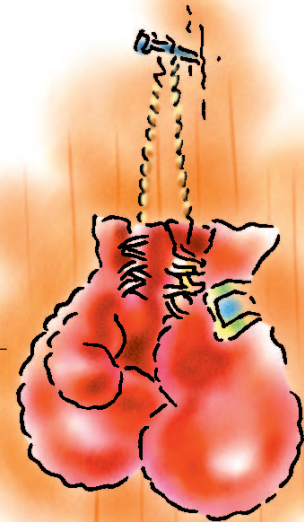
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It's a knock-out punch

Stroke disables and kills millions and costs the health care system billions of dollars. Learn the risk factors, preventive strategies, care options, and promising research for these devastating attacks on the brain.

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The author has disclosed that she has no significant relationships with or financial interest in any commercial companies that pertain to this educational activity.



A STROKE IS an all-out assault on the brain, and it's one of the most devastating events that can befall an individual. It can start insidiously, with weakness in an extremity or blurred vision, and progress to a major cerebrovascular event, leaving the patient profoundly disabled or dead.

In this article, I'll explain what stroke is, how it affects the brain, which signs and symptoms to watch for, how it's treated and diagnosed, and who's at risk for one. I'll also give you some pointers on what to include in patient teaching, as well as tell you which preventive strategies are most effective.

Let's start with a look at the various kinds of strokes.

By the numbers

- **Every 45 seconds, someone in the United States has a stroke.** That translates to about 700,000 individuals who have a new or recurrent stroke each year. About 4.7 million stroke survivors are alive today, making stroke the leading cause of serious, long-term disability. For 2005, the estimated direct and indirect cost of stroke is \$56.8 billion, up from an estimated \$53.6 billion in 2004.
- **Every 3 minutes, someone dies of a stroke.** Over half of these deaths occur in women. Although stroke is the third leading cause of death in the United States, it's the most preventable of all of the catastrophic illnesses. Death rates from stroke are significantly higher for minorities, particularly African-American men and women.

Life interrupted

A stroke occurs when blood flow to the brain is disturbed, resulting in focal neurologic deficit and tissue damage. The brain has the highest metabolic rate of any of the organs in the human body, and it receives 25% of cardiac output through the internal carotid and vertebral arteries. Although a large amount of oxygen is delivered to the brain, the tissue can't store it, so any disruption in blood flow results in rapid cell death if collateral circulation is unavailable.

Blood flow can be disturbed by occlusion or rupture of a vessel. Ischemic strokes caused by vessel occlusion account for about 88% of strokes; they're the focus of this

article. Hemorrhagic strokes due to vessel rupture account for the remaining 12%.

Ischemic strokes can be subdivided either by the vessel or vessels involved or by the cause of the infarct. In 1993, investigators in the Trial of ORG 10172 in Acute Stroke Treatment (TOAST) developed a classification system to define five causes of ischemic strokes because, they felt, “the etiology of ischemic strokes affects prognosis, outcome, and management.” The classifications are:

- large-artery atherosclerosis
- cardioembolism
- small vessel occlusion (also called lacunar strokes)
- strokes of other determined etiology (such as cardiac arrest or pulmonary embolism)
- strokes of undetermined etiology.

Strokes from *large-artery atherosclerosis* occur when greater than half of the vessel is occluded by atherosclerosis and a thrombus (clot) obstructs the remaining area. The middle cerebral artery stem or branches of it are the most frequent sites of occlusion, although the internal carotids, anterior cerebral artery, vertebral arteries, basilar arter-

ies, and posterior cerebral arteries can also be affected. This type of stroke carries a high mortality rate.

Cardioembolism, an embolism that travels from the heart to the brain, can be caused by changes in cardiac structure or function, infection, an untoward event during childbirth, cancer, or trauma (particularly long-bone fracture). This type of stroke carries the highest 1-month mortality rate. Changes in structure and function of the heart result in most of the strokes caused by cardioembolism. Rhythm disturbances (predominantly atrial fibrillation) are a major cause, but valvular heart disease, prosthetic valves, endocarditis, and acute myocardial infarction (particularly of the anterior wall) are also culprits. The embolus may be composed of blood clots, bacterial clumps, neoplastic tissue, amniotic fluid, or fat cells.

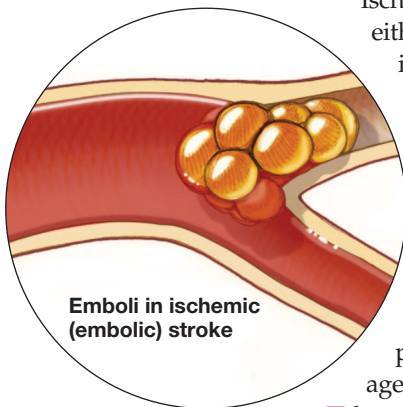
Lacunar strokes, which are the result of small vessel occlusion, are more frequent in patients who smoke or who have hypertension or diabetes. Motor, sensory, or sensorimotor deficits may be seen; ataxic hemiparesis (muscle weakness or partial paralysis) is also possible with this type of stroke. The prognosis for a patient who’s had a lacunar stroke is favorable.

Risk factors for stroke are labeled modifiable or nonmodifiable. The most treatable (modifiable) risk factor is hypertension. Studies have shown that anywhere from a quarter to over half of stroke patients had a history of hypertension. In fact, an individual with hypertension has a fourfold greater likelihood of having a stroke than someone who is normotensive. See *Change it...if you can* for more on modifiable and nonmodifiable factors.

Other conditions can mimic stroke symptoms, so how can we be sure it really is a stroke? Let’s find out.

A look inside your head

Generally, the diagnosis of stroke is straightforward and can be made based on the history and physical exam. Look for



Change it...if you can

Modifiable risk factors

- Atrial fibrillation
- Cardiac disease
- Carotid or other artery disease
- Cigarette smoking
- Cocaine abuse
- Diabetes mellitus
- Heavy alcohol use
- Hypercholesterolemia
- Hypertension
- High red blood cell count
- Metabolic syndrome
- Physical inactivity and obesity

Nonmodifiable risk factors

- African-American ethnicity
- Age >65 years
- Female gender
- History of transient ischemic attack, stroke, or heart attack
- Sickle cell disease

rapid onset of focal neurologic symptoms, little change in the level of consciousness, headache (in about a quarter of patients), and nausea and vomiting (which indicate the brain stem or cerebellum is involved). See *All of a sudden...Is it a stroke?* for more on stroke symptoms.

Also, keep in mind the conditions that can mimic a stroke and must be excluded: unrecognized seizures, confusional states, syncope, metabolic disorders, hypoglycemia, brain tumors, systemic infections, positional vertigo, and subdural hematoma. Many of these disorders have global, rather than focal, neurologic symptoms, and can be readily detected with standard diagnostic tests.

Diagnostic testing confirms the location and severity of damage from stroke. Commonly ordered tests include complete blood count, basic chemistry panel, coagulation studies, cardiac biomarkers and an ECG.

Imaging studies help guide the selection of acute interventions. They most often include an emergent, noncontrast computed tomography scan of the head. Once the patient stabilizes, magnetic resonance

imaging may be done.

Other adjunct exams that may be ordered include an electroencephalogram, which measures brain waves, and the evoked response test, which measures how the brain handles different sensory information. Blood flow tests may also be ordered; these include B-mode imaging, transcranial Doppler ultrasound, carotid duplex scanning, echocardiography, and angiography.

Is it really a stroke? You be the judge!

Salvage operation

Once an ischemic stroke is diagnosed, the goal during the hyperacute and acute phases is to limit or reverse the damage caused by the stroke. (The first week after a stroke is often referred to as the acute phase; the first 24 hours is sometimes referred to as the hyperacute phase.) Depending on stroke severity and the use of thrombolytics, the patient may or may not be admitted to the intensive care unit. Interventions include



Deficits by the area of the brain affected

Left hemisphere

- Aphasia (inability to speak)
- Right-sided:*
- Hemiparesis (muscle weakness or partial paralysis)
- Sensory loss
- Spatial neglect (failure to recognize the affected side)
- Homonymous hemianopsia (loss of half of the visual field in each eye)
- Impaired right conjugate gaze (eyes don't track together when looking to the right)

Right hemisphere

- Aphasia
- Left-sided:*
- Hemiparesis
- Sensory loss
- Spatial neglect
- Homonymous hemianopsia
- Impaired left conjugate gaze

Deep hemisphere

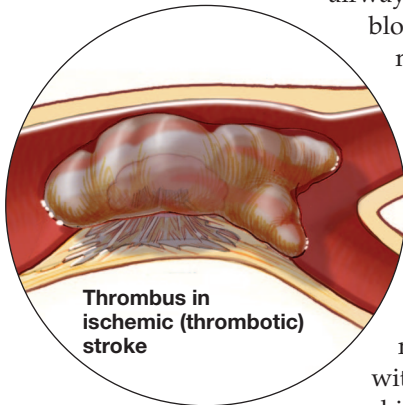
- Hemiparesis with no change in sensation (pure motor stroke) *or*
- Sensory loss (pure sensory stroke) *and*
- Clumsy-hand dysarthria syndrome (impaired speech due to loss of muscle control combined with unilateral hand weakness)
- Ataxia (lack of motor control on the affected side)
- No abnormalities of cognition, language, or vision

Brain stem

- Motor or sensory loss in all extremities
- Crossed signs (ipsilateral motor and sensory cranial nerve signs or symptoms and contralateral hemiplegia, hemianesthesia, or both)
- Dysconjugate gaze
- Nystagmus (rapid eye movement)
- Ataxia
- Dysarthria (impaired speech)
- Dysphagia (difficulty swallowing)

Cerebellum

- Same-sided limb ataxia
- Gait ataxia



evaluation for and use of thrombolytics, airway protection and oxygenation, blood pressure control, management of hyperthermia, hyperglycemia treatment, control of arrhythmias, and anticoagulation. Let's take a closer look.

■ **Thrombolytic therapy.**

Only one thrombolytic agent is currently approved by the Food and Drug Administration for use in patients with acute ischemic stroke, recombinant tissue plasminogen activator (tPA). Some patients treated within 3 hours of the onset of symptoms appear to benefit from thrombolytic therapy. Use of

tPA remains controversial, however, because of the risk of intracranial hemorrhage it poses (about 5% of patients who receive tPA hemorrhage). Any patient given intravenous (I.V.) or intra-arterial tPA should be admitted to the intensive care unit initially; they're at highest risk for bleeding in the first 36 hours after administration of the drug. Monitor and immediately report any of these signs of overt or occult bleeding: leaking from puncture sites; frank bleeding from the gastrointestinal, respiratory, or urinary tract; and decreasing level of consciousness (may indicate an intracerebral hemorrhage).

See *Are you in or out?* for more on tPA.

Aspirin is recommended for most patients

Are you in or out?

tPA administration inclusion/exclusion criteria for ischemic stroke

Patient inclusion criteria

- Age 18 years or older
- Clinical diagnosis of ischemic stroke causing measurable neurologic deficit
- Neurologic signs that don't clear spontaneously and that aren't minor and isolated
- Clearly defined time of stroke onset (within 180 minutes of stroke onset)
- No evidence of intracranial hemorrhages or mass on baseline CT scan
- Neurology consultation
- Informed consent (if possible)

Patient exclusion criteria

- Rapidly improving or minor neurologic symptoms
- Evidence of intracranial hemorrhage on CT scan
- History of seizure at stroke onset; postictal residual neurologic impairment
- History of stroke, serious head trauma, or myocardial infarction during the preceding 3 months
- History of intracranial hemorrhage that could increase the risk of intracranial hemorrhage with tPA administration
- History of major surgery or other serious trauma during the preceding 2 weeks
- Gastrointestinal or urinary tract hemorrhage during the preceding 3 weeks

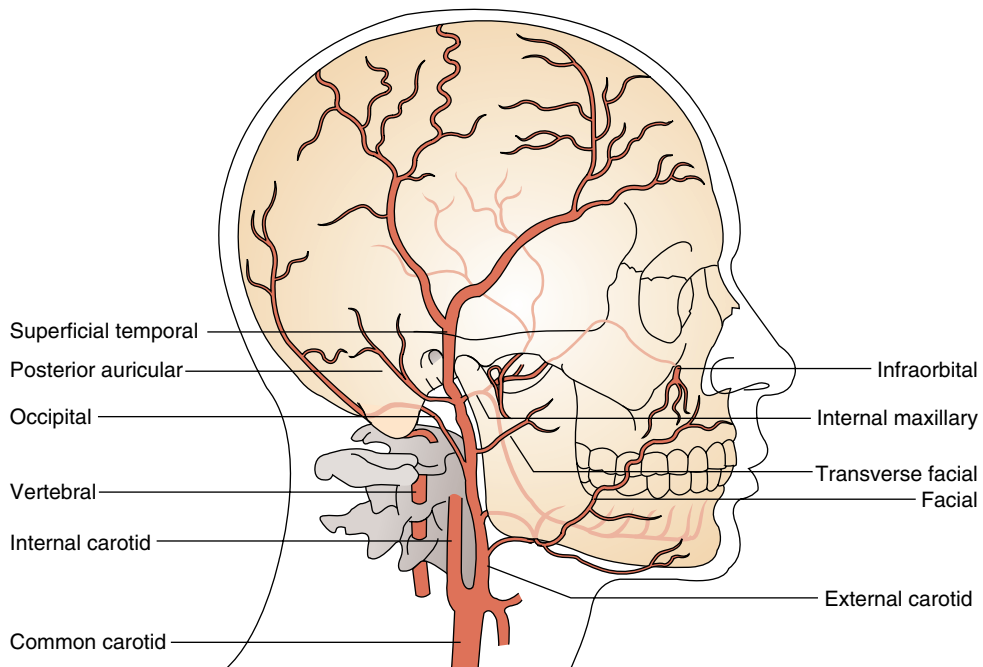
- Systolic blood pressure >185 mm Hg or diastolic blood pressure >110 mm Hg at the time of tPA infusion
- Blood pressure at or above 185 mm Hg systolic and 110 mm Hg diastolic
- Blood glucose level <50 mg/dl or >400 mg/dl
- Symptoms of subarachnoid hemorrhage
- Arterial puncture at a noncompressible site during the preceding 7 days
- Platelet count <100,000/mm³ (tPA can be started before CBC results are received, but should be discontinued if the platelet count is <100,000/mm³.)
- Heparin during the preceding 48 hours associated with an elevated activated partial thromboplastin time
- Clinical presentation suggesting pericarditis or myocardial infarction
- Pregnancy
- Currently taking oral anticoagulants with an INR >1.5

Relative contraindications

- Early signs or large cerebral infarction: edema, hypodensity, mass effect, and obliteration of sulci in more than one-third of middle cerebral artery territory on CT scan
- National Institutes of Health Stroke Scale score >22
- Difficult-to-control hypertension
- Age >85 years
- History of arteriovenous malformation or aneurysm

Carotid system

Branches of the carotid artery supply blood to the brain.



within 48 hours of a stroke. Effects are modest, and it's not an alternative to I.V. thrombolysis or other acute therapies. But hey, it doesn't hurt.

■ **Airway protection and oxygenation.** Because hypoxia can worsen neurologic injury, maintaining adequate oxygenation via an effective airway is critical. Patients may even need to be intubated; they'll probably also require rigorous pulmonary care to prevent partial airway obstruction, hypoventilation, aspiration pneumonia, and atelectasis, the most common causes of inadequate oxygenation in stroke patients.

Immobility, decreased level of consciousness, respiratory muscle deconditioning, ineffective cough, and altered breathing patterns can put patients at risk for mucous plugs, atelectasis, and pneumonia. Aspiration pneumonia is the most common reason for nonneurologic death during the first

month following stroke. Both neurogenic pulmonary edema and pulmonary embolus can be complications of stroke, compromising oxygenation.

All stroke patients should receive supplemental oxygen on admission. Oxygen saturation (SpO_2) should be kept at least at 94%, so monitor it closely and take these steps to keep it at the right level: Elevate the head of the bed to 30 degrees to prevent aspiration, suction secretions as needed, position for maximal chest expansion (frequently turning the patient to avoid pooling of secretions), and coach the patient to take deep breaths and cough to prevent atelectasis. Auscultate breath sounds frequently, and keep a sharp lookout for signs of respiratory distress.

■ **Blood pressure control.** Right after the stroke, monitor the patient's blood pressure at least every 4 hours. Wide swings in blood pressure should be avoided. Ele-

vated blood pressure can result from the stress of the stroke, a full bladder, pain, preexisting hypertension, hypoxia, or increased intracranial pressure. In most cases, the blood pressure will decline without treatment; persistent hypertension will eventually be treated.

There is little scientific basis for and no known clinical benefit to lowering blood pressure following acute ischemic stroke. The current recommendation is that antihypertensive agents shouldn't be given unless the diastolic is greater than 120 mm Hg or the systolic is greater than 220 mm Hg — unless the patient is receiving tPA; more on that in a bit.

Lowering blood pressure should be done cautiously to avoid wide variations in the level. Expect to use the I.V. agent labetalol (Normodyne) or sodium nitroprusside (Nitropress) or the oral agent captopril (Capoten) or nicardipine (Cardene). Avoid the use of sublingual calcium antagonists like nifedipine (Procardia) because they lower the systemic blood pressure too much, which can lead to inadequate cerebral perfusion.

The exception to the rule of leaving mild hypertension untreated is any patient given tPA. This class of patients must have careful management of blood pressure to prevent parenchymal hemorrhage. tPA is contraindicated if the systolic pressure is above 185 mm Hg or the diastolic pressure is above 110 mm Hg.


Persistent hypotension is fortunately rare

following stroke; if it does occur, it may be the result of aortic dissection, volume depletion, or decreased cardiac output.

■ **Hyperthermia.** Hyperthermia during the acute phase of stroke is associated with poor neurologic outcome and marked increase in morbidity and mortality. Antipyretics (acetaminophen is the drug of choice) and cooling blankets should be used to control hyperthermia. Body temperature should be maintained at a normal level unless hypothermia is attempted. Hypothermia might be neuroprotective, and it's a promising area of research, but a randomized, controlled trial in humans has yet to be done.

■ **Hyperglycemia treatment.** Tight control of the blood glucose level is important throughout the acute phase. Severe hypoglycemia can lead to further brain injury, and hyperglycemia is associated with a poor outcome. Hyperglycemia may be a result of the stress response to the stroke. It may resolve spontaneously, or insulin may be needed to maintain the level between 80 and 110 mg/dl.

■ **Control of arrhythmias.** Patients with cerebral infarctions in the right hemisphere are at high risk for cardiac arrhythmias, presumably due to disturbances in the sympathetic and parasympathetic nervous systems. Atrial fibrillation, the most common arrhythmia seen in stroke patients, is



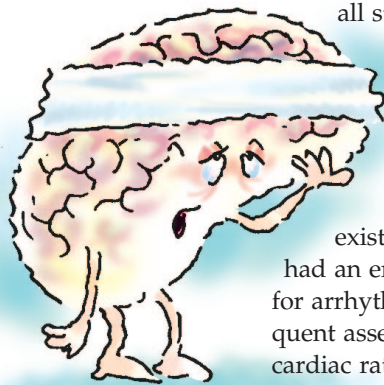
With BP, it's better to run a little high than a little low.

All of a sudden...Is it a stroke?

Because of the brief 3-hour window of opportunity for successful use of thrombolytic therapy following an ischemic stroke, the National Institutes of Health launched its "Know strokes: Know the signs. Act in time." public education campaign for stroke in 2002. Five general signs and symptoms of stroke are identified for lay people to use to determine the need for medical attention. They include:

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

This problem in my head can affect my heart!



also a common cause of embolic strokes. Electrocardiogram changes following stroke may include ST-segment depression and inverted T waves (indicating coronary ischemia), prominent U waves, and prolonged QT intervals. Some experts recommend continuous cardiac monitoring for all stroke patients because about 4% of stroke patients will develop a life-threatening arrhythmia, and about 3% will suffer a concurrent myocardial infarction. Cardiac monitoring is indicated for any patient with pre-existing cardiac disease or one who's had an embolic stroke and is at high risk for arrhythmias. Nursing care includes frequent assessment and documentation of cardiac rate and rhythm, heart sound auscultation with each assessment, and monitoring for and reporting of a new onset of any chest pain and/or arrhythmia.

■ **Anticoagulation.** Patients with neurologic injury frequently have clotting problems. Anticoagulation following stroke is controversial, however, because it hasn't been shown to lower the risk of early recurrent stroke or to reduce neurologic deterioration. Yet despite the lack of data, anticoagulants are frequently given. Care must be taken because parenterally administered anticoagulants are associated with increased risk for serious bleeding complications.

Now let's examine other complications you need to watch out for.

Be on the lookout

A paralyzed lower extremity puts the patient at high risk for developing deep vein thrombosis (DVT) and subsequent pulmonary

embolism. Passive range-of-motion exercises for the paralyzed limb are essential, as are early mobilization and ambulation. A screening ultrasound is recommended at 1 week poststroke to assess the leg veins for thrombosis. The patient should be given subcutaneous unfractionated or low-molecular-weight heparin to prevent DVT. Sequential pneumatic compression devices should also be used if the patient is immobile and at high risk of developing DVT. Remember, unilateral leg swelling is the most accurate sign of DVT.

The patient should also be monitored for other complications, such as cerebral edema, that can lead to increased intracranial pressure, seizures, hemorrhage around the infarction with or without formation of a hematoma, and myocardial infarction or arrhythmia. Prompt recognition and treatment are necessary to limit further damage to brain tissue.

Following stroke, changes in the level of consciousness usually indicate that a complication is developing. The earlier the change is recognized, the sooner the complication can be diagnosed and treated, preventing additional morbidity and mortality. You'll need top-notch nursing assessment skills to recognize subtle changes in the patient's level of consciousness. Something as simple as slight changes in sleepiness or confusion in the early stages of stroke can indicate increasing intracranial pressure. Such changes should be reported immediately and closely monitored.

Pain following stroke can be caused by many problems, including poor positioning, central neurologic impairment, limited mobility, pressure ulcers, and infection. Codeine is a commonly used opioid for pain management in patients with a neurologic disorder. Acetaminophen is the most frequently used nonnarcotic pain reliever. If the patient can respond, frequently ask her about pain. If she can't respond, look for nonverbal cues, like grimacing, resisting movement, or withdrawing.

Help on the Web

American Association of Neuroscience Nurses
<http://www.aann.org>

American Stroke Association
<http://www.strokeassociation.org>

Brain Attack Coalition
<http://www.stroke-site.org>

National Institute of Neurological Disorders and Stroke
<http://www.ninds.nih.gov>

National Stroke Association
<http://www.stroke.org>

What else can go wrong?

Besides helping to prevent DVT, range-of-motion exercises and early ambulation will also keep the joints moving. Reposition the patient frequently, and use pillows, wedges, and pressure-reducing mattresses or surfaces to better distribute weight. Pressure ulcers are a complication of stroke recovery, especially in a patient who experiences major declines in muscle tone, movement capability, and cognitive status. Skin assessment should be performed with each nursing assessment. Pay particular attention to the sacrum area and the heels, where most pressure ulcers occur. Careful monitoring of food intake is essential; any patient with poor nutrition is at increased risk for pressure ulcers. Not only that, but studies also show that poor baseline nutritional status is associated with a worse outcome at 6 months. The bottom line is that you should implement measures to maintain or improve the nutritional status of any patient with a recent stroke.

Urinary incontinence is fairly common following stroke, and it can lead to tissue breakdown and pressure ulcer development as well. Effective preventive measures include correcting incontinence when possible, using pads or briefs that wick moisture away from the skin, using moisture-barrier creams, frequent changing and cleansing, and frequent assessment of the skin for maceration and yeast infections.

Bowel control may be affected, resulting in fecal incontinence (also a risk factor for pressure ulcers) or constipation. During rehabilitation, bladder and bowel training programs must be implemented to address these issues. The patient's continence status is often the deciding factor in discharge placement.

A stroke patient is at high risk for nosocomial infections. Invasive monitoring devices, urinary catheters, total parenteral nutrition, and tube feedings all increase the risk of dangerous bacterial growth. So too

can pressure ulcers, respiratory insufficiency leading to atelectasis and pneumonia, and the hypermetabolic state that occurs in response to the stress of the stroke or as a result of uncontrolled diabetes. To lower the risk, change invasive lines according to your institution's protocol, and discontinue urinary catheters as soon as possible. Prevent skin breakdown, encourage deep breathing and coughing to prevent atelectasis, and use strict universal precautions to decrease infection risk.

Be alert for urinary retention, which can increase the risk for urinary tract infection. Monitor urinary output and assess for a distended bladder as appropriate.

New ways, new days

Researchers are working feverishly to find better ways to prevent and treat strokes. The use of I.V. albumin within 5 hours of stroke onset is under investigation as a way to improve cerebral blood flow. Medically induced hypothermia, which slows metabolism and reduces the brain's need for blood, may limit the damage that lack of oxygen causes to the brain. Far-fetched as it may sound, some researchers hope that a "stroke vaccine" will one day protect at-risk individuals from the secondary ischemic injury caused by a stroke. The vaccine interferes with inflammation inside blood vessels and greatly reduces the frequency and severity of strokes in spontaneously hypertensive, genetically stroke-prone rats.

Two recent studies may help to better predict a patient's risk for ischemic stroke.

- In the November 28, 2005, issue of *Archives of Internal Medicine*, researchers reported that a particular enzyme and protein found in the blood could help identify middle-aged men and women at increased risk for ischemic stroke. The levels of two inflammatory markers, C-reactive protein (CRP) and the enzyme lipoprotein-associated phospholipase A₂ (Lp-PLA₂) were higher in middle-aged Americans who subsequently had an ischemic stroke than in those who didn't have a stroke.
- In the January 2006 issue of *Archives of Neurology*, investigators reported that two biomarker levels in survivors of ischemic stroke may provide predictive information for stroke recurrence beyond traditional risk factors. Levels of the biomarkers, soluble vascular cell adhesion molecule 1 (sVCAM-1) and N-terminal pro-B-type natriuretic peptide (NT-proBNP), were higher in individuals who had a recurrent ischemic stroke than in those who didn't have another stroke.

Experts are hopeful that identifying these and other risk predictors may lead to improved treatments as well as preventive strategies.

Both sides now

Symmetry describes the similarity of the affected and unaffected sides of the body. A baseline comparison should be made to gather details about the affected side's deficits. Continued comparisons can help you and others on the patient's health care team document improvements. A marked decrease in symmetry following baseline measurement indicates a developing complication or a recurrent stroke.

Neurologic impairment in the muscles on the affected side of the body can result in rapid deconditioning. Early ambulation is recommended, as I mentioned, so consult physical therapy on admission to begin the planning for an ambulation program. Use appropriate assistive devices to mobilize the patient. If the patient can't walk, maintain frequent range-of-motion exercises.

A stroke patient may lose her sense of the affected side of her body. This can be so severe that a condition called "one-side neglect" occurs. The patient not only doesn't use the affected side, but she's even unaware that it exists. Interventions that can improve awareness of the neglected side include approaching the patient from the affected side, placing the night stand with the TV remote and water carafe on the neglected side, and including the neglected hand in daily care activities. Make sure the call button stays on the unaffected side.

Seizure precautions should be implemented and the patient should be closely monitored for about a month poststroke. A patient who's had an embolic stroke has a higher risk for seizures and epilepsy. Seizures may be the result of brain irritation. Those that occur more than 2 weeks after the stroke are probably a result of scar formation and are likely to recur. Fosphenytoin (Cerebyx) and pheny-

toin (Dilantin) are the preferred antiseizure medications.

Tough to swallow

For various reasons, a poststroke patient can become dehydrated and malnourished unless preventive measures are taken. Changes in consciousness, inability to swallow, excess antidiuretic hormone release that causes fluid overload, diabetes insipidus that causes fluid deficit, and inadequate nutrition are all possibilities underlying the problem. Laboratory tests assessing nutritional status, serum electrolytes, and serum osmolarity will help to identify reversible causes.

Because half of stroke patients experience dysphagia, dietary modifications may be needed to maintain nutrition. A consult with a speech pathologist should be requested to obtain a swallowing study for any patient who's having difficulty with liquids or food. Ensure proper nutrition through enteral or parenteral routes; feeding tubes may be needed on a temporary or permanent basis.

Intake and output should be carefully monitored. Tachycardia may be an indication of hypovolemia. Crackles in the lungs or edema can indicate hypervolemia.

Teetering on the edge

Because the patient is at high risk for falls poststroke, fall precautions (including bed alarms) should be implemented, and the call button should be within easy reach. Physical therapy should coordinate ambulation, ensuring that sufficient personnel are available to help and that appropriate assistive devices are used.

The presence of anosognosia, the inability to acknowledge physical impairments from the stroke, creates a false sense of security in the patient and increases the risk of injury. A bed alarm may be needed to prevent the patient from getting out of bed unattended. Family members or professional sitters may be required around-the-clock to protect the patient from injury.

Hey! What's this other hand doing here?



About two-thirds of stroke patients develop spasticity, a condition in which certain muscles are continuously contracted, causing stiffness or tightness that may interfere with movement, speech, and ambulation. It's usually caused by damage to the portion of the brain that controls voluntary movement. Drugs most frequently used for general spasticity include tizanidine (Zanaflex), baclofen (Lioresal), diazepam (Valium), and dantrolene sodium (Dantrium). Focal spasticity can be helped by repeated injections of botulinum toxin type A (Botox). Physical therapy is often helpful; regimens may include muscle stretching and range-of-motion exercises to help prevent shrinkage or shortening of muscles and to reduce the severity of symptoms. For certain patients, surgery to cut or transfer tendons may be necessary to relieve spasticity. Nursing interventions include monitoring response to medications, assessing functional ability, and maintaining joint mobility.

The mind's willing...

A stroke patient may have a dramatically shortened attention span. Apraxia, or dyspraxia if it's mild, is the loss of ability to

execute or carry out skilled movements and gestures, despite having the desire and the physical ability to perform them. Apraxia results from dysfunction of the cerebral hemispheres of the brain, especially the parietal lobe.

To accommodate these deficits, patient teaching should be divided into short segments. Short-term memory loss is common too, making reinforcement necessary. The stroke patient may ask the same question over and over; give the same simple answer each time.

About a quarter of stroke patients are affected by some type of aphasia, making communication difficult. A patient with aphasia can partially or completely lose her ability to understand spoken words, speak, read, write, or add and subtract. Only about half of stroke patients affected by aphasia regain language skills within a year. A speech therapist should be consulted as soon as aphasia becomes evident to plan interventions.

When caring for the aphasic patient, try to understand what the patient is saying, speak slowly and clearly, use hand gestures, and encourage the patient to use hand gestures to convey thoughts. Focus on the patient's

At a loss for words: Types of aphasia

Type	Description
Anomic aphasia	Inability to name items. Occurs when the angular gyrus, part of the inferior parietal lobule of the brain, is damaged.
Broca's aphasia	May be expressive or motor. Occurs when the Broca's area in the frontal lobe is affected.
Conduction aphasia	The patient comprehends spoken and written language, but she can't repeat the words spoken or read. Occurs when the fibrous tract between Broca's and Wernicke's areas is affected.
Global aphasia	Severe receptive and expressive aphasia that occurs when the frontal, temporal, and parietal lobes are damaged.
Transcortical motor aphasia	Similar to Broca's aphasia, but the patient can repeat information.
Transcortical sensory aphasia	Similar to Wernicke's aphasia, but the patient has difficulty initiating verbalization or following commands.
Transcortical mixed aphasia	Similar to global aphasia, but the patient can repeat what's spoken or read.
Wernicke's aphasia	A receptive aphasia that occurs when the Wernicke's area in the temporal lobe is affected.

Source: Fedorov EM. Helping patients with aphasia. *American Journal of Nursing*. 101(1):24GG,24II-24KK, January 2001.

These tools
can make
assessment
more accurate.



On a scale of...

The National Institutes of Health Stroke Scale (NIHSS) is currently the most widely used assessment tool for stroke patients. It provides a means for standardized assessment by all health care professionals. Extensive research has shown that 60% to 70% of patients with an acute ischemic stroke and a baseline NIHSS score of less than 10 will have a favorable outcome at 1 year poststroke, while only 4% to 16% of patients with a baseline NIHSS score greater than 20 will have a favorable outcome at 1 year. The NIHSS is available online at <http://www.strokecenter.org/trials/scales/nihss.pdf>. Free online certification in using the stroke scale is also available to all health care professionals at <http://asa.trainingcampus.net/uas/modules/trees/windex.aspx>.

Less frequently used acute phase assessment tools include the Fisher scale, Glasgow Coma Scale, Glasgow Outcomes Scale, Ogilvy-Carter outcome grading system, and the World Federation of Neurological Surgeons scale.

During recovery, the most frequently used scale is the Barthel Index, which measures progress in activities of daily living. The Barthel Index is available at <http://www.strokecenter.org/trials/scales/barthel.pdf>.

remaining abilities. Minimize loud noises when trying to communicate. Patience and understanding are essential tools when dealing with aphasic patients (see *At a loss for words: Types of aphasia*).

Emotional lability is common after stroke. Feelings evoked following such a catastrophe include fear, anxiety, frustration, anger, sadness, and grief. A mental health consult should be included in the treatment plan.

Clinical depression is the most common emotional disturbance seen poststroke; it affects up to half of patients. Antidepressants, typically selective serotonin reuptake inhibitors, are indicated to treat poststroke depression.

Depression can arise at any time after stroke. It can complicate rehabilitation, limit progress, and negatively impact mental functioning. Monitor your patient for symptoms of depression, and report them promptly. A mental health provider should be called in to assess the problem.

Collateral damage

Stroke is a catastrophic, sudden event that can have a dire effect on the patient's whole circle of family and friends. Often

it's the primary breadwinner who's incapacitated, creating a financial as well as a health crisis. A case manager or social worker should begin working with the patient and the family at the time of admission to help them cope with the crisis, assess their need for community services, serve as a liaison to the support services, and help put together a realistic and appropriate discharge plan.

During the rehabilitation phase, efforts focus on improving function and quality of life. A multidisciplinary team is needed to accomplish these tasks, including rehabilitation providers and nurses; physical, occupational, and recreational therapists; speech-language pathologists; vocational therapists; mental health professionals; and social workers. Poststroke care can be done in various settings, including inpatient rehabilitation units, outpatient units, skilled nursing facilities, and the home.

If a patient is discharged to home, a major issue of concern is caregiver burnout. Caregivers, frequently a spouse or partner, have a significant impact on stroke patients' recovery and well-being, but they themselves may be older with their own health problems, and unprepared for the rigors of caregiving. It's easy to appreciate why being in the role of caregiver for a stroke patient is

so stressful. In a recent article in the *Rehabilitation Nursing Journal*, family caregivers of stroke patients identified the top five areas of concern as preventing falls, maintaining adequate nutrition, staying active, managing stress, and dealing with emotional and mood changes. Community support groups for both stroke patients and caregivers exist in most large cities. For those households connected to the Internet, online support may be a viable alternative if no local support organizations are in place (see *Help on the Web*).

Aging boomers under the gun

Stroke is one of the most devastating preventable diseases in the developed world. The incidence of stroke increases with age, so the number of stroke victims and survivors is bound to grow by leaps and bounds as boomers mature.

Quality nursing care—and some luck with finding effective treatments—will help more patients survive with a better quality of life after stroke. ■

Learn more about it

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