Staff development special

Update: Stroke

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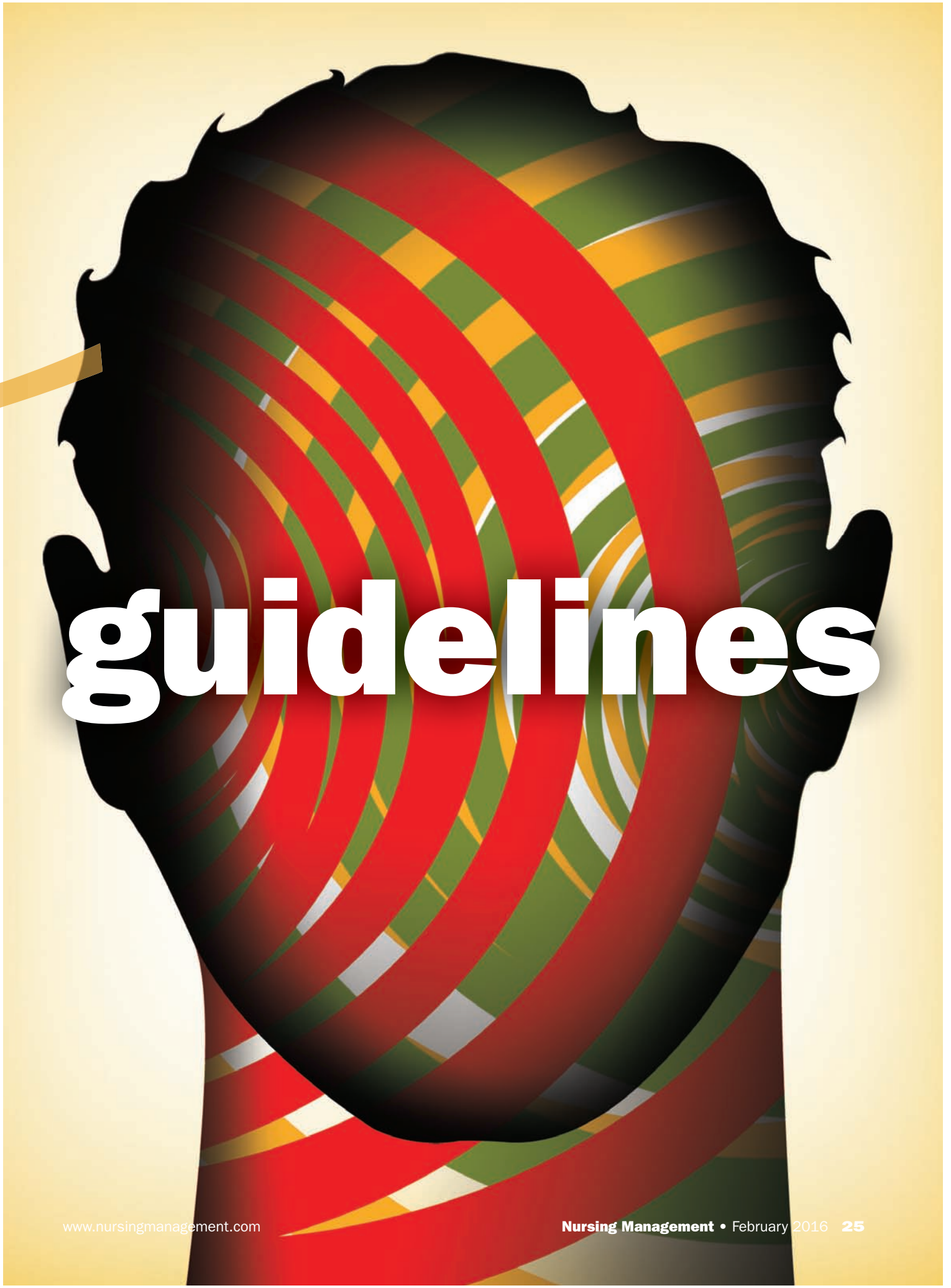
According to the American Heart Association (AHA), someone has a stroke every 40 seconds in the United States; a person dies of one approximately every 4 minutes.[1] This translates into 1 in every 20 deaths in the United States resulting from stroke, making it the fifth leading cause of death for Americans.[2-4] Stroke has also remained the leading cause of disability for the last decade. Currently, there are 3.8 million women and 3 million men living with disabilities as a direct result of stroke.[1,4] Research has shown that early evaluation and treatment are directly linked to reduced motor and cognitive deficits, as well as lower mortality. (See *Introduction to The Joint Commission stroke core measures and stroke center certification.*)

Two types to know

There are two types of stroke: ischemic and hemorrhagic. Both result in vital oxygen-rich blood depletion to areas of the brain. Emergent diagnosis and treatment must be implemented quickly to prevent brain tissue hypoxia and death. Although both types may cause similar clinical presentation, each requires a different approach to treatment.



Ischemic stroke

An ischemic stroke is caused by a thrombus that blocks blood supply to a cerebral artery, which supplies oxygen-rich blood to brain tissue. The thrombus causes both glucose and oxygen deprivation, with subsequent mitochondrial cell death. According to the AHA, 45% of all ischemic strokes are caused by a small or large arterial thrombus, 20% are venous emboli that migrate, and the remaining 35% are of unknown origin.[1] Microembolic showers as a result of untreated atrial fibrillation, arteritis, patent foramen ovale, left ventricular dysfunction, and refractory septic shock can also cause an ischemic stroke. Other less common causes of ischemic stroke are carotid dissection, the acute phase of traumatic brain injuries, and coagulopathy states such as disseminated intravascular coagulation.

An ischemic stroke may initially present as a transient ischemic attack (TIA), which is commonly referred to as a "mini-stroke" or a precursor to a future ischemic stroke. A TIA occurs when there's a temporary occlusion or blockage of blood flow to a portion of the brain. This transient occlusion can cause symptoms that mimic a stroke, such as slurred speech; visual disturbances; weakness in an extremity; or brief changes in level of consciousness (LOC), lasting between 1 and 30 minutes and disappearing without any long-term effects. With a stroke, the symptoms last longer than 30 minutes.

It's imperative that any symptoms of a TIA or stroke be evaluated immediately so that diagnostic and treatment interventions can be initiated to minimize the likelihood of long-term cognitive, sensory, and physical impairment. According to the AHA, approximately one-third of patients who experience a TIA will have an ischemic stroke within 1 year.[2,4]

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Hemorrhagic stroke

A hemorrhagic stroke occurs when areas of the cerebral arterial system become weakened or thin due to long-term or acute episodes of hypertension. This weakened or thin area of the vessel wall can either result in an outpouching of the arterial blood vessels (aneurysm) or it can rupture as the arterial pressure rises, exerting pressure on the thinned fragile wall during periods of acute hypertension. Both the aneurysm and thin arterial vessel areas are prone to rupture. Intracerebral hemorrhages are typically caused by rupture of vessels due to long-term atherosclerotic damage and arterial hypertension.

Risk factors

Common risk factors include:

- age older than 45
- smoking[5]
- atrial fibrillation
- female sex (current AHA research reveals that women ages 55 to 75 have a 20% risk of having a stroke compared with 17% for men)[2,4,6]
- sleep apnea
- hypertension
- heredity
- Black, Hispanic, or Asian ethnicity[7]
- history of TIA, previous stroke, or myocardial infarction
- substance abuse or alcoholism (some illicit drugs, such as cocaine, can cause profound vasoconstriction to the cerebral arteries, dramatically reducing or occluding blood supply to the brain tissue, which can result in impaired blood flow, clot formation, and an evolving ischemic stroke).[5,8]

Symptoms watch

Despite the AHA's public education campaign on stroke warning signs, many patients postpone medical treatment after they begin to experience stroke symptoms. It's vital that symptoms be recognized early and time-sensitive interventions be performed within the recommended guidelines to improve clinical outcomes, minimize neurologic dysfunction, and reduce mortality.

Currently, the AHA and the National Institute of Neurological Disorders and Stroke (NINDS) recommend that healthcare facilities strategically place community education posters in heavily trafficked areas displaying the FAST mnemonic:

- facial drooping
- arm weakness
- speech slurred
- time to call 911.

Assessment stat

The NINDS recommends utilizing a specific stroke assessment tool to evaluate patients suspected of having a stroke. Two common stroke assessments are the Cincinnati Prehospital Stroke Scale (CPSS) and the National Institutes of Health Stroke Scale (NIHSS).

The CPSS is commonly utilized by emergency medical services personnel and paramedics.[9] It consists of performing the following assessment:

- facial droop
  —normal: both sides of the face move equally
  —abnormal: one side of the face doesn't move at all
- arm drift
  —normal: both arms move equally or not at all
  —abnormal: one arm drifts compared with the other
- speech
  —normal: the patient uses correct words with no slurring
  —abnormal: the patient uses slurred or inappropriate words or is mute.

The NIHSS was developed to help nurses and physicians objectively identify the severity of ischemic strokes by assessing 15 specific areas for abnormalities or disabilities. The modified version only assesses 11 specific physical areas.

An elevated NIHSS score correlates with the size of the infarction on both a computed tomography (CT) scan and magnetic resonance imaging (MRI).[2,6] Scores should be assessed initially when a stroke is suspected, 24 hours after fibrinolytic therapy, 7 days post stroke, and 30 days post stroke. Scores assessed at 48 hours following a stroke have been directly correlated with clinical outcomes at the 3-month and 1-year mark.

According to the NINDS, patients with a NIHSS score of 4 or less have been linked to a high likelihood of functional independence regardless of treatment. Patients with a high score (greater than 22) may experience severe debilitation and be dependent on assistance from others to perform basic activities of daily living.

The Miami Emergency Neurologic Deficit, or MEND, exam is another stroke scoring tool that healthcare facilities may utilize, which incorporates all three components of the CPSS (speech, droop, drift) and eight additional components from the NIHSS, such as LOC, eye gaze, orientation, commands, visual fields, leg motor strength, ataxia, and sensation.[10]

A noncontrast CT scan should be performed within 25 minutes of time zero (arrival to the ED), with diagnostic results made available to the stroke team within 45 minutes so that a decision can be made on the most appropriate treatment plan. Contrast isn't used if a stroke is suspected because it will mask blood in the cranial vault, making it difficult to differentiate between ischemic and hemorrhagic stroke.

The most common type of stroke is nonhemorrhagic-ischemic (approximately 87%), which may not be readily visualized on the CT scan.[1,2] MRI may be needed in addition to a CT scan to diagnose ischemic stroke and confirm the presence of the thrombus or embolism occluding specific vessels within the brain. Magnetic resonance angiography and cerebral angiography are useful if the stroke team suspects that the thrombus is in a location where a thrombectomy may be a feasible treatment option. For example, if the patient is experiencing hemianopsia (decreased vision or blindness in half of the visual field), the stroke team may suspect a posterior cerebral artery occlusion/clot that may be resolved with thrombectomy.

Time-sensitive interventions

Early intervention when a stroke is suspected is vital to optimize neurologic outcomes. According to recent research, the ischemic brain ages 3.6 years each hour that treatment is delayed.[4] When a large vessel ischemic stroke occurs, 1.9 million neurons, 14 billion synapses, and 12 km (7.5 miles) of myelinated fibers are destroyed every minute.[11]

After the patient enters the ED, the 1-hour clock should be started so that all staff members are aware of when each time-sensitive intervention should be performed. The AHA recommends that all EDs have a clock or stopwatch that the healthcare team activates at time zero. This is the time from which all further ED interventions will start. The team member in charge of time should remind each staff member of how many minutes have passed since each intervention has been performed.

The AHA and the American Stroke Association (ASA) developed the 60 minute or less stroke protocol that all healthcare facilities should follow, with specific time-sensitive interventions that must be performed at 10 minutes, 15 minutes, 25 minutes, 45 minutes, and 60 minutes after the patient enters the ED. These protocol-directed interventions are designed to improve neurologic outcomes based on clinical research findings.

The AHA/ASA stroke protocol recommends the following sequence of events during the first hour after the patient's arrival:

- 10 minutes—patient seen by the ED physician for an initial assessment

• 15 minutes—patient seen by the stroke team
• 25 minutes—noncontrast CT scan performed
• 45 minutes—CT scan results available to the stroke team and decision made for treatment
• 60 minutes—initiation of fibrinolytic therapy within 3 hours of stroke symptoms unless contraindicated.

Medications

According to the AHA, tissue plasminogen activator (tPA) is the gold standard for treating ischemic stroke. It's contraindicated in hemorrhagic stroke because it can dramatically expand the area of intracranial bleeding and worsen the stroke. It's the only FDA-approved drug for administration in the acute care of ischemic stroke when systolic BP is below 185 or diastolic BP is below 100.[12] tPA is a fibrinolytic medication that works by stimulating the production of the enzyme plasmin, which digests fibrin strands and restores oxygen-rich blood flow to the brain. However, tPA puts the patient at risk for bleeding.[13] In a 2014 research study, 22.8% of all ischemic stroke patients treated with tPA experienced bleeding complications, including intracranial bleeding.[12]

Getting a history as complete as possible from the patient or caregiver, including the time last known well, and verification of ischemic stroke are required before administration of tPA. Door-to-admission time of 3 hours is the widely accepted timeline for tPA administration. However, it can be administered in well-screened patients who are at low risk for bleeding for up to 4.5 hours.[14] tPA is contraindicated in patients with an international normalized ratio of greater than 2, those with a recent history of a traumatic brain injury (less than 90 days), and those with a history of hemorrhagic stroke.[15]

Other medications that may be administered include:
• furosemide—a loop diuretic utilized to reduce intracranial volume in hemorrhagic stroke, resulting in

Introduction to The Joint Commission stroke core

As nursing leaders, we're responsible for ensuring that our staff members participate in evidence-based practice and maintain compliance with widely established national guidelines that govern care standards. With the prevalence of ischemic stroke occurrence increasing within all healthcare settings, a key focus is The Joint Commission stroke core measure set and stroke center certification.

When caring for patients experiencing stroke, we must create a culture of early recognition and intervention. In this environment, the nurse manager's role in clinical collaboration, development of multidisciplinary teams, and communication across service lines is critical. As we look to The Joint Commission, the American Heart Association (AHA), and the American Stroke Association (ASA) for guidance, we clearly understand that nurses at the point of care are vital to positive patient outcomes.

Stroke core measures

The Joint Commission stroke core measures were developed collaboratively with the AHA, the ASA, and the Brain Attack Coalition. The eight core measures are as follows:
• STK-1: venous thromboembolism prophylaxis
• STK-2: discharged on antithrombotic therapy
• STK-3: anticoagulation therapy for atrial fibrillation/flutter
• STK-4: thrombolytic therapy
• STK-5: antithrombotic therapy by the end of hospital day 2
• STK-6: discharged on statin medication
• STK-8: stroke education
• STK-10: assessed for rehabilitation.[1]

STK-1

All patients diagnosed with either hemorrhagic or nonhemorrhagic stroke should have deep vein thrombosis (DVT) prophylaxis implemented or documentation as to why it's contraindicated. This is required due to the high risk of DVT in stroke patients. Note that aspirin therapy isn't considered adequate to meet this standard.

STK-2

Patients diagnosed with ischemic stroke need to be discharged with some form of antithrombotic therapy. Research has shown that antithrombotic therapy helps decrease the high risk of stroke reoccurrence, as well as morbidity and mortality. This is especially important with patients whose stroke is attributed to a cardioembolic event.

a decreased incidence of transtentorial or uncal herniation
- mannitol—an osmotic diuretic used to decrease cerebral edema and tissue damage, and reduce the risk of transtentorial or uncal herniation[2]
- fosphenytoin—a water-soluble prodrug of phenytoin utilized to stabilize neuronal membranes and decrease seizure activity
- phenytoin—an antiepileptic drug used to inhibit the spread of seizure activity in the cerebral motor cortex, as well as in the brainstem centers that are responsible for the tonic phase of grand mal seizures
- benzodiazepine—a psychoactive drug utilized to reduce skeletal muscle spasms.[16]

Nursing interventions are centered on the support of airway, breathing, and circulation as a primary goal.

Surgical procedures
Endovascular thrombectomy is an option to remove the thrombus and reestablish blood flow for the ischemic stroke patient. The benefit of endovascular thrombectomy over tPA is that it can mechanically remove a thrombus in a matter of minutes, whereas tPA can take up to 2 hours to dissolve it.[12] Innovative endovascular catheter devices have shown to be the most effective at restoring blood flow and removing thrombi. However, an endovascular catheter has limitations, such as it can only remove thrombi from

measures and stroke center certification

STK-3
Patients with atrial fibrillation/flutter must be discharged with some form of anticoagulation therapy. The risk of stroke in patients with atrial fibrillation/flutter increases with age. Note that studies have shown a decrease in stroke occurrence by as much as 68% in patients treated with warfarin.[2]

STK-4
The use of specific thrombolytic agents has proven to be highly effective in patients who are carefully screened and meet specific criteria related to medical history, time of stroke onset, and current cause of presentation. The recommended medication is I.V. tissue plasminogen activator (tPA). Maintaining tPA administration compliance within the time requirements is vital for achieving and sustaining stroke center certification. Nursing management team members should be aware that a younger age, milder stroke, shorter door-to-needle time, normoglycemia, and absence of comorbidities are all linked to improved clinical outcomes, shorter length of stay, and reduced mortality.[3]

To minimize ischemic stroke mortality and disability complications, a growing trend in tertiary hospitals is the "drip-and-ship" method—transfer of the acute stroke patient to another facility after administration of I.V. tPA.[4] If utilizing the drip-and-ship method, management team members should closely monitor the clinical interventions performed before the patient is transferred and follow the clinical outcomes of those patients to monitor for positive results.

STK-5
Antithrombotic therapy must be started within 2 days of acute stroke in patient who meet the screening criteria. One of the limiting factors in stroke care is the time of onset, which is a major influence on treatment choices and known success rates (recovery). Note that DVT prophylaxis therapy is considered inadequate for this purpose.

STK-6
Increased serum lipid levels have proven to be a risk factor for both stroke and cardiac events. Patients with a low-density lipoprotein cholesterol level equal to or greater than 100 mg/dL should be started on and discharged with statin therapy.

STK-8
The patient must receive stroke education. Preventive health education on the control of risk factors is vital to recovery and prevention

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large cerebral vessels and, therefore, isn't an appropriate treatment option if the thrombus is lodged in a smaller arterial cerebral vessel.

Recent clinical research outcomes from the SWIFT-PRIME study released in February 2015 revealed that endovascular thrombectomy patients had better clinical outcomes and functional independence in 60.2% of cases of large vessel thrombi compared with 35.5% of tPA patients. In 4.3% of cases, the clinical outcomes remained unchanged.[1]

Surgical procedures that may be considered to treat hemorrhagic stroke include:

- superficial temporal artery to middle cerebral artery bypass graft—a small, superficial temporal artery can be grafted to bypass the cerebral vessel that has the thrombus or an unruptured aneurysm (can also be used to treat ischemic stroke)
- Guglielmi detachable coils—small, platinum coils are used to occlude an inoperable, ruptured, or unruptured aneurysm
- aneurysm clipping—surgical clips may be placed to seal bleeding from a fusiform aneurysm (ruptured or unruptured) or multiple small vessel aneurysms
- decompressive craniotomy—a cranial bone flap window is removed to allow for visualization of the aneurysm during surgical clip placement (a controversial and aggressive approach to managing a hemorrhagic stroke).

With all surgical interventions, the nurse needs to assess the

As the clock begins at time zero when a new stroke patient arrives at your facility, the nursing staff must be proficient in assessment and implementation of time-sensitive interventions.

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of reoccurrence. In addition, education about how to recognize stroke symptom onset and the importance of immediate response to the warning signs is needed.

STK-10

The process of recovery is immediate and ongoing. After the patient is stabilized, he or she should be assessed for rehabilitation needs, such as physical, speech, or occupational therapy. This should include a safe discharge plan and aftercare if needed. Rehabilitation should start as soon as the patient is able. This approach is associated with an increase in return to function and improved quality of life.

In addition to having comprehensive knowledge of these core measures, staff members should understand the AHA/ASA stroke protocol, which outlines time-sensitive interventions for the first hour of care after the patient enters the ED (time zero).[5] If you visit the AHA website at www.heart.org, there are numerous resources available, including the Get with the Guidelines stroke program. These are strong tools to facilitate your journey to stroke center certification and excellence.

Stroke center certification

The Joint Commission offers three levels of stroke program certification:

- acute stroke ready hospital
- primary stroke center
- comprehensive stroke center.[6]

Acute stroke ready hospital

To qualify as an acute stroke ready hospital, your facility must:

- have a dedicated stroke program
- be staffed with qualified healthcare professionals trained in stroke care
- have a qualified practitioner available to assess a patient suspected of experiencing a stroke within 15 minutes of arrival
- be able to quickly perform diagnostic imaging and lab testing to facilitate I.V. thrombolytic medication administration in eligible patients
- utilize AHA/ASA guidelines
- have transfer agreements with primary or comprehensive stroke centers.[6,7]

The goal is that acute stroke ready hospitals are prepared to treat, stabilize, and transport stroke patients to a primary or comprehensive stroke center in a timely fashion.

Primary stroke center

To be designated as a primary stroke center, your facility needs to:

- have a designated stroke unit
- utilize a standard care delivery method
- provide individualized treatments and interventions
- promote the flow of patient information across settings and providers
- promote patient self-management activities
- utilize AHA/ASA guidelines

surgical site at the beginning of each shift and frequently thereafter for either a puncture site hematoma formation or localized edema and erythema that may indicate infection. Changes in vital signs, such as tachycardia, hypo- or hypertension, and an elevated body temperature, may signal infection or unmet pain needs. If a hematoma or signs of localized infection are noted, the healthcare team should be immediately notified so that emergent evaluation, diagnostics, and treatments can be initiated.

A full neurologic assessment should be performed at least once an hour for the first 3 days after the procedure and thereafter if neurologic changes, such as a decreased LOC, new visual changes, and new-onset weakness, are noted. If changes are present, the healthcare team should be alerted immediately because this may signal an extension of the stroke area, cerebral vasospasm, or evolving cerebral brainstem herniation.

Minimizing complications

Aspiration is a potential complication of stroke. The nurse must ensure that the patient remains N.P.O. because he or she is at high risk for aspiration. The patient should successfully pass a bedside swallowing assessment before eating, drinking, or consuming as needed medications. A fluoroscopic swallowing exam should be performed to assess for prominent or silent aspiration—the aspiration of gastric or orogastric contents into the lung fields without causing immediate symptoms such as coughing. The nurse needs to ensure that the head of the bed remains elevated at a minimum of 30 degrees unless contraindicated to decrease the risk of aspiration and reduce cerebral edema.

Other complications include:

- cerebral edema
- pneumonia
- urinary tract infection and/or loss of bladder control
- seizures
- depression
- pressure ulcers
- limb contractures
- shoulder pain
- deep vein thrombosis
- ischemic stroke conversion to hemorrhagic stroke
- cerebral vasospasm
- hypotension or hypertension.

- analyze standardized performance measure data (eight required measures).[6]

Comprehensive stroke center

To become a comprehensive stroke center, your facility is required to:

- have significant resources to provide state-of-the-art care to all stroke patients
- have a dedicated neuro ICU that provides around-the-clock critical care for complex stroke patients
- have advanced imaging capabilities
- meet the minimum requirements for caring for patients diagnosed with subarachnoid hemorrhage
- coordinate posthospital care
- utilize a peer review process to evaluate the care provided
- analyze standardized performance measure data (16 required measures)
- participate in stroke research.[6]

The following three requirements must be met to apply for certification:

- standards: the program must meet the standards outlined in the Disease-Specific Care manual
- clinical practice guidelines: the program must demonstrate compliance with evidence-based clinical care guidelines outlined in the Disease-Specific Care manual
- performance measures: the program must meet specific performance measure requirements that address urgent care assessment, acute care hospitalization/treatment, risk factor modification, secondary prevention, education, and rehabilitation, with monthly data collection demonstrating compliance and improvement.[8]

The Joint Commission utilizes ORYX to analyze the data collected.[9] This method enables The Joint Commission and the applicant to gauge the facility's performance based on individual observed performance versus the standard norm, which is derived from analysis of similar organizations. The facility's norm is determined through the use of comparative historical data. This facilitates assessment of the facility's overall performance improvement process and its effectiveness. The result is a strong look at the facility's accountability and quality regarding research, proximity, accuracy, and adverse reactions.

On your radar

Preparation for certification starts a year or more in advance. The survey process requires a site visit in addition to a detailed application packet and data collected on core measure requirements (historical and current data, along with process improvements). Stroke certification is valid for 2 years and then must be renewed.

Regardless of the level of certification, the benefits not only extend to your patients, but also your organization's community standing and draw when recruiting qualified professional staff. According to The

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The nurse should monitor vital signs at least every 15 minutes. It's critical that patients who experienced an ischemic stroke avoid hypotension because they already have reduced oxygen-rich blood flow to the brain. If tPA is initiated, vital signs should be monitored before initiation and every 5 minutes for the first 15 minutes after administration, then every 15 minutes thereafter.[13] Nurses managing a patient with a diagnosis of hemorrhagic stroke should avoid hypertensive states because this can result in an expansion of intracranial bleeding, which will result in increased intracranial hypertension and predispose the patient to further neurologic injury.[15]

Nursing interventions are centered on the support of airway, breathing, and circulation as a primary goal. These patients may need ventilator support for respiratory depression or respiratory fatigue secondary to the neurologic injury. Neurologic assessments should be performed hourly or as needed to closely monitor for neurologic decline. An increased frequency may be needed if hemodynamic decline is present or signs of imminent brain stem herniation are noted (increased intracranial pressure, decreasing strength in extremities, focal or global seizure activity, or pupils becoming grossly asymmetrical).[17] Patients should be closely monitored for seizure activity, with seizure precautions in place at all times.

The earlier, the better

As the clock begins at time zero when a new stroke patient arrives at your facility, the nursing staff must be proficient in assessment and implementation of time-sensitive interventions. Adhering to the 2015 AHA/ASA stroke guidelines can improve patients' chain of survival.[17] As nurses continue to utilize these guidelines, lives are saved. NM

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Joint Commission, the benefits of stroke certification include:

- improving patient care quality through the reduction of clinical process variation
- providing structure for a disease management program
- facilitating opportunities for team members to hone their knowledge and skills within a framework of common goals
- promoting an organizational culture of excellence.[10]

Certification may be a prerequisite for insurance reimbursement eligibility, and it may also meet certain regulatory requirements in some states.[10]

Deep impact

Early recognition, timely intervention, and utilization of The Joint Commission stroke core measures and AHA/ASA guidelines save lives. Engaging in a journey to obtain stroke center certification can have a tremendous impact on your organization and the community that utilizes its care. Ensuring that your staff members receive initial and ongoing stroke education isn't only vital for accreditation compliance, but also to achieve positive patient outcomes.

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