Impact of Evidence-Based Practices on Outcomes for Acute Ischemic Stroke Patients

The purpose of this educational activity is to highlight for nurses the essential components of a collaborative effort in the hospital for rapidly identifying and treating patients with an ischemic stroke and leading efforts in preventing stroke reoccurrence. This focus of the article is the nursing care of the patient from presentation to the Emergency Department through discharge, using evidence based guidelines.

At the completion of the article and the post test, the reader should be able to:
- Describe the pathophysiology and impact of stroke.
- Identify the risk factors for stroke.
- Define ischemic stroke categories.
- Discuss the best practices and guidelines for acute ischemic stroke management.

Writers

Hollie Gehring, RN, BSN, CEN, has been the Emergency Department Nurse Clinician at Medical Center of Plano since 2000. With over fifteen years experience in Emergency Nursing, she brings great skills and knowledge as the Clinical Educator for the ED, while also being very involved in evidence based practice and research. She has been an integral part of the Stroke Team at the Medical Center. Ms. Gehring graduated from The University of Texas at Arlington School of Nursing, and is currently enrolled in the Emergency Nurse Practitioner program at UTA.

Nicki Roderman, RN, MSN, CCRN, is currently the Clinical Specialist for Critical Care at Medical Center of Plano. With over twenty years experience in critical care, and a passion for evidence based practice and research, she has been a key leader in the Stroke Center Team at the Medical Center. Ms. Roderman graduated with her baccalaureate degree in nursing from College of St. Scholastica in Duluth, MN and received her MSN from the University of Missouri-Columbia in Columbia, Missouri.

Ms. Gehring and Ms. Roderman recognize the importance of ED and CCU nursing collaboration as an essential element to the achievement of positive outcomes for critically ill patients.

The authors reports no relevant financial relationships or conflicts of interest.

A 75 year old male with a history of coronary artery disease, hypertension, hyperlipidemia, and a permanent pacer with an underlying rhythm of atrial fibrillation was found on the floor at home by his wife at approximately 1:30 a.m. with weakness. After the symptoms continued, the patient’s wife called 911, and he was brought to the Emergency Department. The initial CT scan of his head showed no signs of cerebral hemorrhage. His clinical assessment showed the following neurological deficits: slight left facial droop, severe left arm and leg weakness, and slurred speech.

Over 700,000 Americans suffer from strokes every year with one occurring every 45 seconds. About 400,000 are acute, ischemic strokes, approximately 200,000 are recurrent strokes, and as many as 160,000 die as a result of the stroke. There are more than 4 million stroke survivors in the United States today, and according to the American Heart Association/American Stroke Association (AHA), 90% of stroke survivors suffer permanent deficits. Overall, stroke is the third leading cause of death and leading cause of disability in the US. The incidence is expected to increase dramatically as more of the 75 million baby boomers reach the age of 65. Every day, nurses and their professional colleagues have the ability to positively impact these statistics through their expert care of stroke patients.
Pathophysiology and Classification of Stroke

Stroke is defined as an “acute neurologic dysfunction of vascular origin with a sudden or at least rapid occurrence of symptoms.” A stroke is due to a local disturbance in the cerebral circulation or an irreversible brain injury due to cerebral ischemia. This results in the development of a neurological deficit.

During a stroke, permanent cerebral injury occurs. In all cases of stroke, specific areas of the brain are deprived of an adequate supply of oxygen. If the blood flow ceases for an extended period of time, the tissue will die, causing permanent neurologic deficits. The two main types of stroke are ischemic and hemorrhagic. Ischemic strokes account for approximately 85% of all strokes (Hinkle & Guanci, 2007).

The AHA classification of ischemic stroke is categorized according to the presumed mechanism of the focal brain injury and the type and location of the lesion. An infarct is classified as large-artery atherosclerotic infarct, embolic from a cardiac source, small-vessel disease or other causes, including artery dissection, hypercoagulable states, or sickle cell disease. Lastly, the infarct can be from an unknown cause. Determining the source of the infarct is important for ongoing care and prevention of further damage.

Ischemic Strokes

Atherosclerotic Ischemic Stroke

Most strokes occur prior to 6 a.m. The patient with an atherosclerotic ischemic stroke typically awakens with stroke symptoms or is resting when the symptoms occur. This is because blood pressure begins to fall during sleep or rest, and less arterial pressure is available to push blood through the lumen of cerebral arteries that have been occluded by atherosclerotic plaque. An atherosclerotic ischemic stroke is often preceded by one or more Transient Ischemic Attacks (TIAs).

TIAs and ischemic strokes are caused by the same mechanism, but they differ in the length of ischemic insult. Most TIAs last only a few minutes because of the rapid lysis of the occluding thrombus. By definition, a TIA lasting longer than one hour is considered a stroke. Patients who have a TIA have a high risk of early, recurrent stroke. Patients with carotid artery disease are at especially high risk of having a stroke after a TIA. It is important that a TIA be treated as a medical emergency, as the greatest risk for a stroke after TIA is within the first week. 10.5% of individuals who have a TIA suffer a stroke within 90 days.

Cardiogenic embolic strokes

The primary precursors sources of cardiogenic emboli are atrial fibrillation, ventricular thrombi, myocardial infarction, congestive heart failure, patent foramen, ovale, atrial septal aneurysm, and other cardiac problems. The cardiogenic emboli break off from the systemic circulation and enter the cerebral circulation most often through the carotid arteries. The emboli travel in the circulation until it occludes the lumen of a vessel. The left middle cerebral artery is the vessel most often affected because it is a relatively straight vessel with a direct connection to the heart via the carotid system. About 20% of ischemic strokes are caused by cardiogenic emboli. Cardiogenic strokes are seen in younger patients and tend to occur when the patient is awake and active. The onset of cardiogenic stroke is rapid, with maximal deficits occurring seconds to minutes after onset.

Small penetrating artery (lacunar) strokes

Approximately 45% of ischemic strokes are caused by small or large artery thrombus. The thrombus can form in the extracranial and intracranial arteries when the intima is roughened and plaque forms along the injured vessel. This allows platelets to adhere and aggregate, causing coagulation to be activated, and thrombus to develop at the site. A lacunar stroke is a type of ischemic stroke caused by thrombosis of small arteries that penetrate into the deep white matter structures of the brain. The term “lacuna” refers to the small cavities left in the brain tissue that develop after necrotic thrombosed tissue has been absorbed. Lacunar strokes occur primarily in the basal ganglia, the internal capsule, and the pons. Although a lacunar stroke may affect a small area, it can produce a significant amount of damage if it occurs in an area such as the internal capsule, where many brain fibers converge in close proximity to each other. Lacunar strokes are most frequently seen with hypertension.

Stroke Risk Factors

Recognizing risk factors for stroke will assist nurses in the early identification of strokes and help guide care in the long-term for prevention of stroke recurrence. Risk factors can be divided into non-modifiable risk factors, such as age, sex, race, and family history, and potentially modifiable risk factors. Advancing age is an important risk factor for stroke. The incidence of stroke doubles in each successive decade after age 65. Men are approximately 30% more likely to have a stroke than are women. Although women have fewer strokes than men, they account for 62% of stroke deaths. One explanation may be that women live longer than men and stroke mortality increases with advancing age. Women over age 30 who smoke and take oral contraceptives have a stroke risk 22 times higher than the average incidence. African Americans have a much higher risk for death or disability from stroke than do white Americans.

The primary modifiable risk factor for stroke is hypertension. It is estimated that more than 30 million Americans have high blood pressure, half are over age 65. The relationship applies to both systolic and diastolic blood pressure and is particularly strong for blood pressure levels over 160/97 mmHg.

Time is Brain

Due to the aggressive nature of brain cells dying with lack of blood flow and the possibility of restoring perfusion to the surrounding area of infarct, it is critical to have established guidelines for care. Within the first three hours after stroke, as many as two million neurons die every
Stroke Syndromes

<table>
<thead>
<tr>
<th>Artery/Syndrome</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anterior cerebral artery syndrome</strong></td>
<td>Paralysis of opposite foot and leg</td>
</tr>
<tr>
<td></td>
<td>Impaired gait</td>
</tr>
<tr>
<td></td>
<td>Sensory loss affecting toes, foot, and leg</td>
</tr>
<tr>
<td></td>
<td>Flat affect</td>
</tr>
<tr>
<td></td>
<td>Cognitive impairment</td>
</tr>
<tr>
<td></td>
<td>Urinary incontinence</td>
</tr>
<tr>
<td><strong>Middle cerebral artery syndrome</strong></td>
<td>Hemiplegia</td>
</tr>
<tr>
<td></td>
<td>Sensory deficits on the opposite side of the body</td>
</tr>
<tr>
<td></td>
<td>Aphasia</td>
</tr>
<tr>
<td></td>
<td>Homonymous hemianopsia (blindness of the nasal half of the visual field</td>
</tr>
<tr>
<td></td>
<td>of one eye and temporal half of the other visual field</td>
</tr>
<tr>
<td></td>
<td>Face and arm deficits more common than leg</td>
</tr>
<tr>
<td></td>
<td>Visual and sensory neglect on left side</td>
</tr>
<tr>
<td><strong>Posterior cerebral artery syndrome</strong></td>
<td>Potentially severe visual deficits:</td>
</tr>
<tr>
<td></td>
<td>cortical blindness</td>
</tr>
<tr>
<td></td>
<td>loss of depth perception</td>
</tr>
<tr>
<td></td>
<td>inability to see objects not centrally located</td>
</tr>
<tr>
<td></td>
<td>visual hallucinations</td>
</tr>
<tr>
<td><strong>Vertebral artery syndrome</strong></td>
<td>Difficulty swallowing and speaking</td>
</tr>
<tr>
<td></td>
<td>Impairment of pain and temperature sensations</td>
</tr>
<tr>
<td></td>
<td>Cerebellar disturbance:</td>
</tr>
<tr>
<td></td>
<td>muscular weakness</td>
</tr>
<tr>
<td></td>
<td>dizziness</td>
</tr>
<tr>
<td></td>
<td>ataxic or staggering gait</td>
</tr>
<tr>
<td><strong>Right and left hemisphere syndromes</strong></td>
<td>Left side stroke:</td>
</tr>
<tr>
<td></td>
<td>Hemiplegia on the right side</td>
</tr>
<tr>
<td></td>
<td>Expressive, receptive, or global aphasia</td>
</tr>
<tr>
<td></td>
<td>Intellectual impairments</td>
</tr>
<tr>
<td></td>
<td>Slow and cautious behavior</td>
</tr>
<tr>
<td></td>
<td>Defects in the right visual field</td>
</tr>
</tbody>
</table>

The brain's arterial blood supply and stroke syndromes

The brain is highly dependent on a continuous supply of oxygenated blood, receiving approximately 750 mL of blood per minute, or 15% to 20% of the total resting cardiac output.

There are four major arteries that supply the brain with arterial blood: the two internal carotid arteries and the two vertebral arteries. The cerebral circulation can also be classified into anterior and posterior circulation systems. The anterior circulation refers to the internal carotid arteries, the middle cerebral arteries, and the anterior cerebral arteries. The posterior circulation refers to the vertebral arteries, the basilar artery, and the posterior arteries. The circle of Willis, located at the base of the skull, joins the anterior and posterior circulations.

Stroke syndromes

A stroke syndrome is a form of cerebral injury caused by a ruptured blood vessel or by ischemia that develops over time or suddenly, as may occur with thrombotic or embolic strokes. If the brain's specialized cells are deprived of their blood supply for an extended period of time, the patient may experience permanent neurological deficits. The signs and symptoms that the patient experiences depends on the extent and location of blood vessel damage. (See Fig. 1).

Stroke intervention

New pharmacological agents designed to minimize neurological damage, including the use of thrombolytic and neuroprotective agents in the early treatment of ischemic stroke, and continued refinement of surgical interventions are changing the way stroke is treated.

In 1996, the FDA approved tissue plasminogen activator (rt-PA) to dissolve blood clots obstructing blood flow to the brain. Tissue plasmi-
nogen activator targets the ischemic penumbra, causing dissolution of the obstructing clot and restore perfusion to the surrounding area, but it must be administered within a three-hour time frame to be effective in limiting neurologic damage (Hinkle & Guanci, 2007).

Initial recognition of a stroke often begins with a family member or other observer noting that a person is acting abnormally. Time is vital, as the clock starts running for a three-hour treatment window with the first recognition of symptoms. The severity of neurological injury occurs in direct proportion to a reduction in cerebral blood flow.

Recent guidelines from the Stroke Council of the American Stroke Association strongly recommend IV rt-PA at 0.9 mg/Kg as a maximum dose in carefully selected patients within three hours of the onset of ischemic stroke. If the hospital has facilities for intra-arterial administration of rt-PA, there is a six hour window. The most serious and potentially life-threatening risk of thrombolytic therapy is intracranial hemorrhage. Patients should not receive drugs that prolong coagulation, such as aspirin, heparin, or warfarin for the first 24 hours after rt-PA is given. Contraindications to rt-Pa therapy should be evaluated prior administration consideration as well.

Thrombolytic therapy should be used only in hospitals that have neurological or emergency department expertise to assess the patient appropriately and to interpret the initial CT brain scan, a stroke unit or intensive care unit available for close monitoring of the patient for at least 24 hours, and access to neurosurgical expertise and care should the patient experience an intracranial hemorrhage. It is imperative to evaluate the inclusion/exclusion criteria for thrombolytics. Contraindications, and lack of, should also be well documented. (See Fig.2).

In-hospital Stroke Care

Pre-hospital and Emergency Department

According to the National Institute of Neurological Disorders and Strokes, the faster a stroke patient arrives at the hospital, the better the chances for recovery. Assessment of the patient with acute ischemic stroke begins in the pre-hospital setting. As with the patient in the beginning of this article, the stroke team was able to be activated prior to the patient arriving in the ED at 0259 because of the EMS assessment and pre-hospital report. The charge nurse, physician, primary nurse and tech are immediately mobilized for patient arrival, while the secretary activates the stroke team by using the stroke pager. The additional stroke team members who respond include radiology, CT, phlebotomy, registration, respiratory and house supervisor.

Upon arrival to the ED, the patient was immediately evaluated by ED nurses and physician. Physical exam with vital signs, complete neurological exam, including baseline NIH stroke scale, were completed while the history was being obtained. It is crucial to have an established timeline of symptoms and often involves family members and pre-hospital reports. The initial report given to EMS was that symptoms began about 0030, but further exploration and discussion with family revealed the last time patient was seen was earlier. The patient was in the CT scanner within minutes, and the pharmacist was asked to begin the reconstitution of rt-Pa due to the patient presentation and time constraint.

The initial non-contrast head CT was reported by the radiologist to the ED physician by 0311, which showed no signs of hemorrhage. A neurologist was consulted at 0315 and the ED physician reported the results. After receiving lab, chest xray and ECG results, the patient was ruled out for IV rt-PA due to the onset of symptoms. However, he was considered for Intra-arterial rt-PA. The on-call radiologist agreed, the interventional radiology staff was called in and the IA rt-PA was injected at 0458.

Ongoing Care

Prevention of secondary injury after initial insult is essential for comprehensive nursing management of the stroke patient starting in the ED through discharge (Bader, 2004). Certified stroke centers and those following evidence-based guidelines assure appropriate education for staff caring for stroke patients. Not only do nurses complete competencies annually such as assessing a patient using the NIH Stroke Scale, they are educated regarding prevention of a secondary injury. By definition, a secondary injury is “any complicating injury that occurs as a result of further physiological events at some point later in the clinical course” (Hinkle & Guanci, 2007).

The initial non-contrast head CT was reported by the radiologist to

**CONTRAINDICATIONS TO THE USE OF RT-PA:**

- Use of oral anticoagulants—PT > 15 seconds or INR 1.7 or more
- Use of heparin with a prolonged partial thromboplastin time
- Platelet count less than 100,000
- Prior stroke within the last three months
- Head trauma within the last three months
- Major surgery within the last 14 days
- Pretreatment systolic blood pressure more than 185 mmHg or diastolic blood pressure more than 110 mmHg
- Rapidly improving neurological signs
- Isolated mild neurologic deficits
- Prior or current intracerebral hemorrhage
- Blood glucose less than 50 mg/dL or over 400 mg/dL
- Vital signs for evidence of extracranial bleeding, e.g., gastrointestinal or urological bleeding
- Neurological signs that may indicate a deterioration in the patient’s status and increased intracranial pressure caused by intracerebral hemorrhage, increasing cerebral edema, or reperfusion injury
- Coagulation values
- Protection of the femoral catheter site
The most important secondary injury is hypotension, as it results in additional decreased cerebral blood flow and may increase the area of damage. Other important considerations for prevention of secondary injury include oxygenation level, low or high blood glucose, low or high body temperature, signs of cerebral edema or hemorrhage, and adequate nutrition (Hickey, 2003). Additionally, assessing swallowing ability prior to any oral intake is an important step for nurses in assuring the patient does not aspirate.

Nurses in stroke units provide round-the-clock care and monitoring of patients with a stroke and must be vigilant in identifying change of level of consciousness and onset of new headache. These two symptoms are cardinal signs of increased intra-cranial pressure from cerebral swelling or hemorrhage and must be reported to the physician immediately.

According to the 2006 AHA’s Get With the Guidelines for Ischemic Stroke Care (GTWG), the guidelines call for monitoring and initiating parameters for care. (See Fig. 3). All patients should be assessed for the initiation of antithrombotic medication, such as aspirin within the first 24 hours after admission to prevent stroke reoccurrence. With dyslipidemia and diabetes being significant risk factors for stroke, patients should get a fasting lipid profile to determine current LDL level. HgA1c is touted by the American Diabetes Association as the gold standard for determining average blood glucose before admission. During the hospital stay, blood glucose levels should be monitored. Studies have not determined a goal for maximum blood glucose levels. However, the Diabetes Association encourages all patients to have blood glucose near the normal range of 70-110mg/dL. Controlling the patient’s blood pressure to prevent hyper or hypotension is essential to protect the brain from further injury.

### Discharge and Beyond

In order for a patient who has a stroke with deficits to regain function; assessment by the rehabilitation staff should be performed soon after admission. Speech, occupational and physical therapy play an integral role in the patient’s ability to regain activities of daily living. Additionally, GTWGs provide elements to consider prior to discharge to assist in prevention of future stroke [See Fig. 3]. In addition to educating the patient on medications and treatment after discharge, nursing staff should provide stroke education that is directed to immediate family or caregivers. This is important in assisting with monitoring for future signs and symptoms of stroke and assuring early intervention if noted.

The patient featured in this article received his intra-arterial rt-PA, had full resolution of symptoms, except slight facial droop, was transferred from the ICU to the Neuro unit after two days and discharged to a rehab facility after four days. He was discharged on medications for his cholesterol, blood pressure, a thrombotic to prevent future clot, and an anticoagulant for the atrial fibrillation. The patient was discharged to home on day 10 with only a slight facial droop and had no motor deficits from his stroke. This is the outcome that nurses want for all of their stroke patients!

### References


### GTWG PARAMETERS FOR STROKE CARE

**Dysphagia Screening**
- Patient must remain NPO, including meds until bedside swallow evaluation completed

**DVT Prophylaxis**
- Implemented by the end of day two unless ambulatory
- Heparin, LMW, Anticoagulation
- SCDs/Foot Pumps ordered

**Antithrombotic Therapy**
- By end of hospital day 2
- ASA, Aggrenox, Ticlid, Lovenox, Coumadin, Plavix

**Assessed for Rehab services**
- PT, OT, ST
- Rehab unit placement-Discharge planning

**Fasting Lipid Profile obtained and consider HgA1C if diabetic.**

**Discharged on Cholesterol Reducing Medication for LDL>100.**
- If patient was admitted with cholesterol reducing medication, MUST be discharged home on medication
- If not must document diet, exercise, lifestyle change recommendations

**Discharged on Antithrombotic therapy**
- ASA, Aggrenox, Ticlid, Lovenox, Coumadin, Plavix

**Patients with Atrial Fibrillation discharged on anticoagulation**
- Physician must document reason for not doing

**Consider antihypertensive and diabetes medications for discharge.**

**Stroke Education Prior to discharge.**
- Personal modifiable risk factors for stroke
- Stroke warning signs and symptoms
- How to activate EMS
- Discharge follow-up
- Discharge medications prescribed

**Smoking Cessation Counseling**
Registration Form and Test for Continuing Education Credit

Program Evaluation
The purpose of this educational activity is to highlight for nurses the essential components of a collaborative effort in the hospital for rapidly identifying and treating patients with an ischemic stroke and leading efforts in preventing stroke recurrences. This focus of the article is the nursing care of the patient from presentation to the Emergency Department through discharge, using evidence based guidelines.

Objectives
At the completion of the article and the posttest, the reader should be able to:
1. Describe the pathophysiology and impact of stroke.
2. Identify the risk factors for stroke.
3. Define ischemic stroke categories.
4. Discuss the best practices and guidelines for acute ischemic stroke management.

Please rate how well the above objectives were met by circling the appropriate number:

<table>
<thead>
<tr>
<th>1 = Strongly Disagree</th>
<th>5 = Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 1 from above was met.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Objective 2 from above was met.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Objective 3 from above was met.</td>
<td>1 2 3 4 5</td>
</tr>
<tr>
<td>Objective 4 from above was met.</td>
<td>1 2 3 4 5</td>
</tr>
</tbody>
</table>

The article was effective as a learning resource/tool.

| 1 2 3 4 5 |

The objectives were relevant to the overall purpose.

| 1 2 3 4 5 |

The author’s competence and effectiveness.

| 1 2 3 4 5 |

The activity met your expectations.

| 1 2 3 4 5 |

List two ways that you will integrate what you learned in this activity into your practice and/or work environment:

The following were disclosed prior to beginning of this activity:

<table>
<thead>
<tr>
<th>Requirements for successful completion</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflicts of interest</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Non-Endorsement of Products</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Off-label use</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>

Did you as the participant, note any bias that was not previously disclosed in this presentation?

| Yes | No |

State the number of minutes it took you to read the article, complete the test and evaluation ____________min.

HOW TO EARN ONE CONTACT HOUR: 1. Read the article.
2. Locate the answer sheet and post-test questions following the article.
3. Complete the post-test questions and program evaluation by circling the selected responses on the answer sheet.
4. Fill out the registration form.
5. Send registration form, answer sheet, and a check for $12.00 to:

Continuing Nursing Education
The University of Texas at Arlington
Box 19191
Arlington, TX 76019-0197


Within three weeks after receipt of your post-test and registration, you will be notified of your results. A passing score is 80%. If you miss your CE certificate will be forwarded to you. If you do not pass, you will be notified and may repeat the test once at no cost.

The University of Texas at Arlington School of Nursing is an approved provider of continuing nursing education by the Texas Nursing Association, an accredited approver by the American Nurses Credentialing Center’s Commission on Accreditation.

This activity meets Type I criteria for mandatory continuing nursing education requirements toward relicensure as established by the Texas Board of Nursing.

Registration Information:

Name: ______________________________
Address: __________________________
City/State/ZIP: _______________________
State(s) of Licensure: _____________________
Email ______________________________
Telephone Number: ____________________

Article: “Impact of Evidence Based Practices on Outcomes for Acute Ischemic Stroke Patients”

1. The FDA approved tissue plasminogen activator (rt-PA) is administered to:
   a. Prevent DVT
   b. Dissolve blood clots obstructing the blood flow to the brain
   c. Control atrial fibrillation in stroke patients
   d. Control hypertensive crisis in stroke patients

2. The administration of IV rt-PA for ischemic stroke must be initiated within ______ of the onset of symptoms.
   a. 24 hours
   b. 6 hours
   c. 3 hours
   d. 12 hours

3. After rt-PA administration, the RN should monitor the patient for:
   a. Hyperthermia
   b. Hyperglycemia
   c. Hypotension
   d. Intracranial hemorrhage

CE Questions: Please circle your response on the answer sheet.

Continuing Education Credit: 1.0 contact hours.

4. Symptoms of ischemic stroke that has involved the Middle Cerebral Artery (MCA) would include:
   a. Aphasia, homonymous hemianopia, hemiplegia
   b. Blindness and visual hallucinations
   c. Paralysis of opposite foot and flat affect
   d. Difficulty speaking and swallowing

5. All of the following are contraindications to the administration of rt-PA except:
   a. Prior stroke within 3 months
   b. Rapidly improving neurological signs
   c. Major surgery within last 14 days
   d. Pretreatment systolic blood pressure more than 160 mmHg

6. All of the following are true regarding stroke except:
   a. Stroke affects 700,000 Americans each year
   b. Stroke is the 3rd leading cause of death in the US.
   c. Few stroke survivors have permanent deficits.
   d. Approximately 160,000 people die each year from stroke.

7. Stroke education given prior to hospital discharge includes all of the following except:
   a. Personal modifiable risk factors for stroke
   b. Stroke warning signs and symptoms
   c. Cholesterol levels are not necessary
   d. Discharge medications and follow up

8. Which of the following is true of an atherosclerotic ischemic stroke:
   a. The patient often awakens with stroke symptoms
   b. Is often seen in a patient with atrial fibrillation
   c. Rarely preceded by a TIA
   d. Is due to cardiogenic emboli

9. The American Heart Association’s (AHA) Get with the Guidelines are used in stroke centers to do all of the following except:
   a. Provide evidenced based guidelines for stroke management
   b. Require monitoring and initiating parameters for care
   c. Increase the amount of CT scans performed
   d. Assist in the prevention of future strokes

10. Which of the following has the least risk factors for stroke:
    a. A 60 y.o. Hispanic male with uncontrolled hypertension
    b. A 55 y.o. Caucasian female with a grandfather who had a stroke at age 70.
    c. A 33 y.o. African American female who smokes and is on oral contraceptives
    d. A 65 y.o. African American male with history of diabetes.