MANAGEMENT OF ACUTE STROKE

Presented by: Garden City Hospital
Professional Nursing Development

Garden City Hospital is an approved provider of continuing nursing education by the Wisconsin Nurses Association, an accredited approver by the American Nurses Credentialing Center’s Commission on Accreditation
Management of Acute Stroke

Purpose of Activity: To demonstrate increased knowledge relative to the management of cerebrovascular disease and to remain current with advancements in the identification and treatment of acute stroke.

Objectives of the Program:
1. Differentiate the signs/symptoms of acute ischemic stroke versus acute hemorrhagic stroke.
2. Describe changes and conditions that necessitate rapid response interventions.
3. Define strategies to prevent stroke related complications.
5. Recall management of acute stroke treatment modalities.

Target Audience: Registered Nurses and Licensed Practical Nurses.
Date: September 1, 2011

5.5 Contact Hours awarded if completion of entire educational activity, passing score of ≥80% on post-test, and completion/submission of evaluation form. Must be completed by June 22, 2014 to receive contact hours.

Planning Committee/Presenters: Susan Karasinski RN MSN, Fawn Covert RN BSN, Allison Mardeusz RN BSN, Vicki Ashker RN MSA CCRN, Nancy VanCleave RN BSN CNOR, Adriana Comsa RN, Yvonne Cleaver RN

Garden City Hospital is an approved provider of continuing nursing education by the Wisconsin Nurses Association, an accredited approver by the American Nurses Credentialing Center’s Commission on Accreditation
Management of Acute Stroke
General Information Regarding the Program

Successful Completion: To receive 5.5 contact hours, for the Management of Acute Stroke, participants must read the entire self-learning module, complete the post-test with a passing score of >80% and complete/submit an evaluation form.

Conflicts of Interest: The activity planners and presenters for the Management of Acute Stroke have reported no relevant financial relationships with commercial interests or conflicts of interest related to their presentations.

Commercial Support: Commercial support was not received for the Management of Acute Stroke program.

Non-Endorsement of Products: The presence of commercial products does not imply endorsement by Garden City Hospital, Wisconsin Nurses Association, or the American Nurses Credentialing Center’s Commission on Accreditation.

Off-Label Use: All presenters have agreed to disclose to participants prior to their presentations if off-labeled (or unlabeled uses) of commercial products will be discussed during their presentation(s).

Expiration: The expiration date for this educational activity is June 22, 2014. No contact hours will be awarded to participants who submit evaluation forms and post-tests after this date. Please contact Professional Nursing Development with questions.

Thank you
Acute Ischemic Stroke VS Acute Hemorrhagic Stroke

**ISCHEMIC STROKE:** Ischemic strokes are commonly caused by atherosclerotic disease of extracranial or intracranial vessels that circulate blood to the brain. (Summers et al, 2009).

**Causes of Acute Ischemic Stroke (AIS):**
- Atherosclerotic disease
  - Extracranial vessels (approximately 20%)
  - Intracranial vessels (approximately 25%)
- Cardiogenic embolism (approximately 20%)
  - Atrial fibrillation
- Cryptogenic (approximately 30%)
  - Exact cause unknown

**Signs and Symptoms of AIS:**
- Gaze preference
- Visual field deficits
- Hemiparesis
- Hemisensory loss
- Nausea/vomiting
- Diplopia, dysconjugate gaze, gaze palsy
- Dysarthria
- Dysphagia
- Vertigo
- Tinnitus
- Quadraplegia
- Decreased level of consciousness (LOC)
- Hiccups
- Abnormal respirations
- Truncal/gait ataxia
- Limb ataxia, neck stiffness

**HEMORRHAGIC STROKE**

**Types of Cerebral Bleeds:**
- Intracerebral hemorrhage (ICH): Bleeding within the brain tissue
- Intracranial hemorrhage:
  - Epidural: Bleeding between the skull and the dura
  - Subdural: Bleeding between the dura and the brain
  - Subarachnoid (SAH): Bleeding in the subarachnoid space

The primary cause of SAH is a ruptured cerebral aneurysm (Summers et al, 2009).
Causes of ICH:
✓ Arteriovenous malformation
✓ Aneurysm rupture
✓ Cerebral venous thrombosis
✓ Coagulopathies
✓ Eclampsia
✓ Infection
✓ Neonatal germinal matrix or subependymal hemorrhage
✓ Sickle Cell disease
✓ Illicit or sympathomimetic drug abuse
✓ Trauma
✓ Vasculitis

Signs and Symptoms of ICH:
✓ Headache (Extremely painful)
✓ Altered Level of Consciousness (same as AIS)
✓ Nausea and vomiting (same as AIS)
✓ Seizures
✓ Light intolerance
✓ Neck pain
✓ Gaze preference (same as AIS)
✓ Visual field deficits (same as AIS)

**Differentiation of Ischemic VS Hemorrhagic Stroke**

Although presenting symptoms can be similar, with the exception of the severe headache associated with a hemorrhagic stroke, radiologic imaging studies will provide the clinician with the differential.

CT scan is the first diagnostic tool to evaluate for the difference between ischemic or hemorrhagic stroke. It can locate the site of bleeding and indicate any displacement of tissue, hemorrhage or hematoma. If bleeding is present on the CT scan, the patient is disqualified as a candidate for tissue plasminogen activator (tPA). If blood is present on CT scan, a Neurosurgery consult is completed to determine whether the patient is a candidate for surgical intervention. If no bleeding is present on CT scan, it is termed “CT Negative”; treatment for reversal of stroke will continue as this ONLY refers to the absence of blood NOT the absence of stroke.

An MRI can provide the same valuable information; however the CT scan can be completed more rapidly and does not have the same amount of contraindications as MRI. If a study of vascular formation within the brain tissue is necessary, angiography studies can be completed, though not as a first line study. If a clinician is concerned with ruling out meningitis, a lumbar puncture can be performed as well.

**Condition Changes Requiring Rapid Response Intervention**
(Sudden Onset of Symptomatology)

**Decreased Level of Consciousness:** Patient’s that have a sudden onset of symptoms that would include the inability to remain awake, inability to focus attention without any other reasonable cause need to be considered for stroke assessment.

**Facial Droop:** Acute onset of facial droop can indicate stroke, having the patient attempt to smile to assess for symmetry can provide an indicator to the clinician that the patient may need to be evaluated for stroke. Facial droop is often categorized as a motor deficit.

**Change in Speech Patterns:** Dysphonia-whispering or hoarse speech, complete inability to speak, slurred speech, Aphasia-difficulty saying or expressing words clearly, Dysarthria-problems using language or inappropriate speech.

**Motor Changes:** Often described as ‘weakness’, ‘heaviness’ or ‘clumsiness’. The patient may concurrently experience sensory symptoms such as numbness. Complaints of generalized weakness should be taken into consideration when assessing the patient as both sides can experience motor symptoms simultaneously. Downward drifting of the patients outstretched/pronated arm are indicative of a hemiparesis and should be taken very seriously. The anatomical extent of the motor deficit is an important factor for determining the patient’s prognosis in the acute phase.

**Strategies to Prevent Stroke Related Complications**

**DVT:** Deep venous thrombosis (DVT) of the legs is common in patients with a recent stroke, particularly older patients with a severe hemiplegia who are immobile. DVT’s are most often asymptomatic, or unrecognized, but may still lead to further complications and must be prevented and/or investigated in the post-stroke population. DVT should be suspected if a patient’s leg becomes swollen, hot or painful or if the patient develops a fever. It can be difficult to assess if the patients paretic leg becomes swollen as the effects of gravity and immobility will cause the leg to swell. If the patient develops swelling while the patient is still being nursed in bed DVT is the likely cause because the dependent effects of gravity have not affected the extremity. Stroke patients who have communication deficits may not be express the discomfort associated with acute DVT so the diligent assessment of the multidisciplinary team will be the key in early diagnosis.

**PE:** Pulmonary embolism (PE)

Maneuvers to reduce the risk of DVT and PE include:
• **Early mobilization:** Avoidance of prolonged bedrest, evaluation and treatment utilizing physical and occupational therapy when patient is stabilized.

• **Hydration/Fluids:** An elevated urea, likely indicating dehydration, is associated with higher risk of DVT. Additionally, hydration is generally indicated in part because acute stroke patients are often unable to take in adequate fluids orally.

• **Full-length graduated compression stockings:** Patients undergoing surgery have shown a significant reduction in DVTs with the application of stocking prior to surgery. Unlike surgery, stockings cannot be applied before the onset of insult, so there is a chance the patient will develop a DVT prior to stocking application. When utilized stockings should be fitted in accordance with the manufacturers guidelines and removed daily to check for skin problems.

• **Aspirin:** When started within 48 hours of ischemic stroke it has been shown to reduce relative risk of PE and improves patients' overall outcome.

• **Heparin:** It has been shown to reduce the risk of DVT in ischemic stroke, but can complicate treatment if hemorrhagic complications arise. Low molecular weight heparin (LMWH) has been used in populations with a very low likelihood of hemorrhage after ischemic stroke yet remains at extremely high risk for DVT/PE. Examples of patients that meet this criteria would be patients with severe leg weakness and immobility, cancer, thrombophilia or previous venous thromboembolism.

• **External pneumatic compression:** Studies have shown that when coupled with the use of graded compression stockings, they can greatly reduce the incidence of DVT/PE related complications post stroke.

**Hypertension (HTN):** Blood pressure is generally higher with hemorrhagic stroke patients rather than ischemic stroke patients. Patients that have a history of hypertension tend to have higher blood pressures post infarct; the acute on chronic hypertensive effect. Extremely high blood pressure after stroke has been associated with poorer outcomes independent of age and stroke severity. During the first few days after stroke blood pressure should be monitored and treated only if end organ damage is evident. Conditions that would necessitate lowering of blood pressure immediately post stroke include: Papilloedema or retinal hemorrhage and exudates, marked renal failure with microscopic hematuria and proteinuria, left ventricular failure diagnosed on clinical features and supported by evidence from chest X-ray and/or echocardiogram, features of hypertensive encephalopathy (seizures, reduced conscious level), or aortic dissection. Hypertension must be managed very carefully because an acute reduction in cerebral perfusion can further increase cerebral ischemic damage. When lowering blood pressure the target should be to gradually lower the pressure over hours-days, not minutes.
Cardiac Arrhythmias: Routine management of the patient’s cardiac rhythm, either at the bedside or with ambulatory systems that don’t inhibit early mobilization will help identify abnormalities. The most common arrhythmia associated with stroke is atrial fibrillation. Anticoagulation may be considered in this population as to prevent thromboembolism related to cardiac arrhythmias. At a minimum is recommended that patients exhibiting palpitations, syncope, unexplained breathlessness or recent myocardial infarction are placed on a cardiac monitor.

Myocardial Infarction (MI): Cerebral and coronary atheromas are often present in the same patient, so it is not a surprise that an acute stroke patient may have a history of myocardial infarction. Risk factors that can be modified are one way to reduce the risk of myocardial infarction after stroke (discussed later in this module). If there is a hypercoaguability factor in the patient who has not at this time had a history of an MI then anticoagulation should be considered if its benefits outweigh the risks (blood pressure under control, not high risk for bleed, ischemic infarct over hemorrhagic infarct).

Urinary Tract Infection (UTI): Urinary tract infections affect about a quarter of the post stroke population. Methods used to avoid UTI’s include: Maintaining adequate hydration and avoiding unnecessary catheterizations. Incomplete bladder emptying can contribute to UTI’s so it is recommended to avoid constipation and drugs with anticholinergic effects.

Aspiration Pneumonia: Bedside swallowing screen should be completed by a suitably trained nurse or healthcare provider to determine whether the patient is able to take oral food and fluids safely versus requiring a more detailed assessment. A structured approach to swallow screening and appropriate feeding has been associated with fewer episodes of aspiration pneumonia. The gag reflex is not a useful indicator of a stroke patient’s swallowing ability. A more detailed assessment of a patient’s swallowing ability would ideally be performed by a Speech and Language Pathologist and potentially supplemented by videofluoroscopy. Evaluation should also take place to determine the strength of the patient’s laryngeal cough reflex. If it is found that the patient is having difficulty safely swallowing or if the clinician is unsure, the patient should be made NPO and hydrated via an alternative route until the results of a detailed assessment have been completed. Aspiration pneumonia should be treated promptly and aggressively so to prevent further complications potentially leading to sepsis.

Dehydration: Multiple factors place post stroke patient’s at risk for dehydration, these include: Swallowing difficulties, immobility-depending on others for help with drinking, communication problems-they cannot ask for drinks, hemianopia or visual neglect-they may not see the water sitting next to them, elderly-have a reduced sensitivity to thirst, fever/chest infection/hyperglycemia/diuretics-all increase their fluid losses, and self restriction of fluid intake-to reduce their
chance of incontinence. Patients that require thickened fluids and patient’s on diuretics are at the highest risk for dehydration. Elevated serum osmolality and elevated serum urea associated with dehydration have been shown to place patients at high risk for DVT’s as well. Patient’s who are unable or unwilling to take fluids orally in an adequate volume should be hydrated by another route either intravenously (IV), subcutaneously (SQ), or via nasogastric tube (NGT). If supplemental hydration is being administered, monitoring of serum electrolytes and urea should be completed. If the patient is able to take adequate fluids orally they should be given adequate access to do so. Place the water/fluids within reach of the patient in their visual field, additionally the patient should receive regular encouragement to drink.

**Poor Nutrition:** Malnutrition is a common and often under recognized problem with patients admitted to the hospital; many come from institutional living, poor social circumstances, having prior cognitive impairment, physical disability or gastrointestinal disease. Being admitted to the hospital with any acute illness has a negative energy balance and greater nutritional demands further placing them at risk for malnutrition. Often patients that can swallow well have an altered taste sensation post stroke due to their medications, concurrent illness, depression, apathy or from the actual stroke itself so their oral intake is reduced due to their reduced desire to eat. Poor nutrition has been associated with reduced muscle strength, infections and pressure ulcers particularly in the stroke population. Supplementation is recommended for the malnourished population as well as for those at risk.

**Metabolic Disorders:**

- **Dehydration:** (See above)
- **Hyponatremia:** Not as common with ischemic or hemorrhagic strokes but more common with subarachnoid hemorrhage. An increased likelihood is associated with the loss of sodium due to diuretic administration but can also be dilutional related to inappropriate secretion of antidiuretic hormone in response to brain injury, medication or medical complications. Electrolytes and urea should be monitored at baseline and regularly to assess for any abnormalities. Treatment of hyponatremia depends upon the cause. It is recommended that hyponatremia is reversed very slowly over days to reduce the risk of central pontine myelinolysis.
- **Hyperglycemia:** Studies have shown that hyperglycemia associated with stroke has poorer outcomes than that of the normo-glycemic population. The correlation was made based upon the stress response from the body meaning the more severe the stroke, the higher the stress response leading to higher blood glucose. Additionally, animal studies have shown that hyperglycemia can exacerbate ischemic neuronal damage. It is recommended that a random blood glucose be measured in all stroke patients and in those found to be hyperglycemic.
that a HgbA1C be completed to distinguish diabetes from stroke induced hyperglycemia.

- Hypoglycemia: Hypoglycemic symptoms can mimic that of a transient ischemic attack (TIA) and should be ruled out once suspected in the stroke population. Patients are less likely to suffer from hypoglycemia as a cause of stroke but may be placed at risk by clinicians when trying to correct hyperglycemia. If a patient has a diagnosis of diabetes and has a reduced oral intake due to complications of stroke they too may be placed at higher risk for hypoglycemia. Blood glucose in this population should be regularly monitored and recorded to evaluate and trend fluctuations.

**Skin Breakdown:** Stroke patients are at risk for skin breakdown because of loss of sensation and impaired circulation, older age, decreased level of consciousness, and inability to move themselves because of paralysis. Related complications such as incontinence can accelerate skin breakdown. Patients should be examined for skin breakdown after being repositioned or sitting. Special care should be taken when moving patients to avoid excessive friction or pressure. Patients should not be left in any single position for longer than 2 hours. The skin must be kept clean and dry, and special mattresses should be used where indicated (Summers et al, 2009)

**Airway Obstruction:** Patients with a decreased level of consciousness, impaired bulbar function or those who have aspirated may have an obstructed or partially obstructed airway. Central cyanosis, noisy airflow with grunting, snoring or gurgling, an irregular breathing pattern and retracting of the suprasternal area and intercostal muscles may indicate an obstruction. Transient obstruction is common in the acute phase of stroke during sleep and it is important that apneic spells due to an obstructed airway are not mistakenly attributed to periodic respiration and so ignored. If an obstructed airway is suspected, the oropharynx should be cleared of any foreign matter with a gloved finger sweep, the patient’s jaw pulled forward and the neck extended to stop the tongue from falling back and occluding the airway. Placement of an oropharyngeal or nasopharyngeal airway may be necessary and the patient should be evaluated for potential intubation.

**Seizures:** A small percentage of stroke patients will have a seizure within the first week or two of their stroke; these are referred to as ‘onset seizures’, most occurring within the first 24 hours. Onset seizures are more common in severe strokes, hemorrhagic strokes and strokes involving the cerebral cortex. Diagnosis of seizure should be done utilizing an accurate description from the patient, any witnesses and may require confirmation via electroencephalography (EEG). Anti-epileptic drugs should be used in their usual fashion to treat seizures, though there is no evidence to support the use of anti-epileptic drugs on at risk populations with no evidence of seizure. Precautionary measures at the bedside include: Padding the bedrails and fall prevention guidelines.
Application of the National Institute of Heath Stroke Scale (NIHSS)

The National Institutes of Health Stroke Scale (NIHSS) is a user-friendly, valid and reliable tool for the assessment of brain attack. It is utilized for defining stroke severity and measuring the effects of interventions. It includes an evaluation of eye movement, visual fields, coordination, motor strength, sensation and it also detects the presence of aphasia and neglect.

The scale’s 11 categories are listed in the first column. In column 2, the observer selects –from a choice of 3 to 6 numbered descriptors for each item- the one that best depicts the patient’s response. Results are then totaled. A score of zero is considered normal, and 42 is the worst possible examination, reflecting the most severe neurologic deficits. (See example scale below)

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Score</th>
<th>Date/Time/Initials</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a. Level of consciousness</td>
<td>Alert</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drowsy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Stuporous</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Coma</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>1b. LOC, questions (month, age)</td>
<td>Answers both correctly</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Answers one correctly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>1c. LOC, commands (Open/close eyes, make fist, let go)</td>
<td>Obeys both correctly</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Obeys one correctly</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Incorrect</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>2. Best gaze (Eyes open-patient follows examiner’s finger or face)</td>
<td>Normal</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Partial gaze palsy</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Forced deviation</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3. Visual (Introduce visual stimulus/threat to pt’s visual field quadrants)</td>
<td>No visual loss</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Partial hemianopia</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete hemianopia</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bilateral hemianopia</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>4. Facial palsy (Show teeth, raise eyebrows, squeeze eyes shut)</td>
<td>Normal</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Minor</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Partial</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Complete</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>5a. Motor arm-Left (Elevate extremity to 90˚ and score drift/movement)</td>
<td>No drift</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drift</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can’t resist gravity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No effort against gravity</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No movement</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amputation, joint fusion etc.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>5b. Motor arm-Right (Elevate extremity to 90˚ and score drift/movement)</td>
<td>No drift</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drift</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can’t resist gravity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No effort against gravity</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No movement</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amputation, joint fusion etc.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6a. Motor leg-Left (Elevate extremity to 30˚ and score drift/movement)</td>
<td>No drift</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drift</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can’t resist gravity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No effort against gravity</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No movement</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amputation, joint fusion etc.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>6b. Motor leg-Right (Elevate extremity to 30˚ and score drift/movement)</td>
<td>No drift</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drift</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Can’t resist gravity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No effort against gravity</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No movement</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amputation, joint fusion etc.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>7. Limb ataxia (Finger-nose, heel down shin)</td>
<td>Absent</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Present in one limb</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>8. Sensory (Pin prick to face, arm, trunk, and leg-compare side to side)</td>
<td>Present in two limbs</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partial loss</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe loss</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Best Language (Name item, describe a picture and read sentences)</td>
<td>No aphasia</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Mild to moderate aphasia</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe aphasia</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mute</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Dysarthria (Evaluate speech clarity by pt repeating listed words)</td>
<td>Normal articulation</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Mild to moderate dysarthria</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Near to unintelligible or worse</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intubated or other physical barrier</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Extinction and inattention (Use information from prior testing to identify neglect or double simultaneous stimuli testing)</td>
<td>No neglect</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Partial neglect</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete neglect</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Score</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*(Criddle, Bonnono, and Fisher, 2003)*

**Advanced Cardiovascular Life Support (ACLS) Treatment Algorhythm**

Goals set forth by the American Heart Association (AHA) regarding stroke identification and management are as follows:

1. Immediate general assessment by the stroke team, emergency physician, or another expert within 10 minutes of arrival; order urgent non-contrast CT scan.
2. Neurologic assessment by the stroke team or designee and CT scan performed within 25 minutes of hospital arrival.
3. Interpretation of the CT scan within 45 minutes of ED arrival.
4. Initiation of fibrinolytic therapy in appropriate patients (those without contraindications) within 1 hour of hospital arrival and 3 hours from symptom onset.
5. Door-to-admission time of 3 hours.

(AHA, 2010)

*Refer to American Heart Association: Adult Suspected Stroke Algorithm, 2011.*
Case Study: Best Practices in Stroke Rapid Response (for review)

Initial presentation. C.W. was a 78-year-old male diagnosed with colon cancer. He underwent an elective colonoscopy as an outpatient, which revealed a lesion in the proximal area of the hepatic flexure. The patient's physicians decided to treat the patient surgically and scheduled C.W. for an elective colon resection. The patient also presented with a history of chronic atrial fibrillation, hyperlipidemia, diabetes, gout, hypothyroidism, coronary artery disease, and cerebrovascular disease.

On the evening prior to C.W.’s scheduled surgery, the patient first noted a change in his normal speech pattern. C.W. had slurred speech with a mumbling quality, and alerted his nurse of the change. The medical-surgical nurse evaluated the patient's neurologic condition and confirmed the speech difficulties. One hour prior to the development of slurred speech, the patient had received promethazine (Phenergan[R]) 12.5 mg IV for nausea. The patient's blood glucose and vital signs were obtained to rule out symptoms related to hypoglycemia and/or hypotension. The patient's initial blood glucose result was 62 mg/dl. The patient was given 25 cc of 50% dextrose intravenously. The patient's blood glucose was rechecked later, and the level had increased to 143 mg/dl. Because the patient continued to demonstrate slurred speech, his nurse performed a neurological assessment including the NIHSS. The patient's clinical findings met the elements of signs and symptoms of stroke. A rapid response was called and a STAT neurology consult ordered. The transportation department and CT scan tech’s were notified via pager that a stroke patient was to have an exam; the patient was transported via stretcher to CT scan. The scan was negative for bleed and the patient was prepared to undergo thrombolytic therapy and transfer to the ICU.

Initial and repeated nursing assessments of patients experiencing neurologic changes are essential in the early recognition and successful intervention of acute stroke emergencies. Hospitalized patients present unique challenges because other medical/surgical conditions, medications, and procedures may make decision making more complex.

Under the supervision of the physician, nurses administer intravenous weight-based thrombolytic therapy to the ischemic stroke patient who meets the National Institute of Neurological Disorders and Stroke (NINDS) inclusion criteria. During administration of thrombolytic medications, nurses continuously monitor electrocardiogram, blood pressure, and respiratory effort to ensure the patient's hemodynamic stability. Comprehensive neurologic examination by the ICU nurse or the neurologist is necessary to identify subtle changes, and includes performance of severity indices such as the National Institute of Health Stroke Scale (NIHSS). ICU nurses can assist other bedside clinicians to identify
neurologic findings accurately and integrate these with clinical history to assess rapidly for potential stroke treatments.

A rapid response team assist to respond to in-house stroke emergencies. RN responders provide support in completing a rapid neurologic assessment and screening for potential treatment with thrombolytic therapy. The RN responders are available around the clock every day to bring their clinical expertise to the patient's bedside.

Since the initiation of the Inpatient Stroke Alert Process, staff medical-surgical nursing units have a heightened awareness of the message that "time is brain." All bedside nurses receive education to identify stroke-like symptoms and to recognize a potential neurologic event.

**Continued care.** Within minutes, the Rapid Response team responded to C.W.'s bedside to offer rapid reassessment and confirmation of his nurse's findings. The rapid response/ICU nurse performed a complete neurologic assessment and scored the patient's stroke severity based on the NIHSS. Documentation on the Neurological Assessment Sheet indicated that the patient was alert and oriented to person, place, and time. The Glasgow Coma Score was 15. The patient's pupils were equal, reactive to light, and accommodated, and extraocular movements were intact. C.W. had a slight decrease in the right nasolabial fold; however, facial sensation was intact and the tongue was midline. The patient continued to present with slurred speech; a bedside swallowing evaluation was conducted prior to providing any oral medications. Sensory function and motor strength were intact to all extremities. (Med/Surg Nursing, December 2006)

**Management of Acute Stroke: Treatment Modalities**

**Thrombolytic Therapy:** The thrombolytic drug Alteplase or Activase is often referred to as tPA (tissue plasminogen activator). It is the only thrombolytic agent approved by the FDA for the treatment of AIS. Upon administration it: binds fibrin in a clot, converts the trapped plasminogen to plasmin, initiates fibrinolysis and systemic proteolysis (breaking down into smaller clots).

**Inclusion Criteria:**
- CT scan negative for hemorrhage
- 18 years of age or older
- Have a clinical diagnosis of stroke with a measurable deficit
- Onset of symptoms
  - Less than 3 hours
  - If greater than 3 hours and less than 4.5 hours, eligibility will depend on additional exclusion criteria
- Review and acceptance of additional laboratory studies
Exclusion Criteria:
✓ Evidence of ICH on CT scan
✓ Clinical presentation suggestive of SAH
✓ Active internal bleeding
✓ Intracranial surgery, serious head trauma or previous stroke within 3 months
✓ Any history of ICH, arteriovenous malformation (AVM) or aneurysm
✓ Blood Pressure: If blood pressure cannot be controlled after two attempts
  o Systolic > 185
  o Diastolic > 110
✓ Glucose < 50 per blood glucose monitor
✓ Known bleeding diathesis including:
  o Platelet count < 100,000
  o On heparin (within 48 hours) & elevated PTT
  o INR > 1.7
  o Low molecular weight heparin administered in the past 24 hours at therapeutic doses (Excludes prophylactic doses)

Additional Exclusion Criteria 3 hours to 4.5 hours:
✓ Age > 80
✓ Major neurological deficits with a NIHSS greater than 25
✓ History of stroke AND diabetes
✓ Receiving anticoagulant therapy regardless of INR, PT/PTT

Dosing: tPA is based on the patient’s weight
✓ 0.9 mg/kg
✓ Maximum dose ANY patient can receive is 90 mg
✓ Two-part administration process
  o IV Bolus
  o 1 hour infusion

Administration:
✓ 1st part:
  o 10% of the total dose is administered as an IV bolus
  o Bolus administration occurs over 1 minute
✓ 2nd part:
  o Remaining 90% is infused over 60 minutes
  o Must be administered via IV pump

Vital signs and NIHSS to be completed by nursing every 15 minutes during administration.

Complications and Side Effects: The most common complication with tPA administration is bleeding. Bleeding is further broken down into two broad categories.
✓ Internal
Intracranial
- Retroperitoneal
- GI
- GU
- Respiratory tracts

Superficial:
- Venous cut downs
- Arterial and venous puncture sites
- Catheter insertion sites
- Needle puncture sites
- Sites of recent surgical intervention

Precautions:
- Avoid IM injections
- Use extreme caution with venipunctures; only perform as required
- If arterial puncture is needed during infusion or after, utilize upper extremity. Manual compression will be required.
  - Pressure to be applied for 30 minutes
  - Pressure dressing to be applied to site
  - Frequent checks of the puncture site
- Pt must be placed on seizure precautions
- Bedrest x 24 hours
- HOB at 30 degrees, place tPA sign above bed
- NPO until evaluated by Speech Therapy or Neurology

Post tPA Assessment and Documentation:
- Vital signs and NIHSS by nurses
  - Q 15 minutes X 2 hours from start of tPA
  - Q 30 minutes X 6 hours
  - Q hour X 16 hours
- Temperature Q 4 hours X 24 hours
- Continuous pulse oximetry
- Blood glucose (may require tight glycemic control)
  - Upon admission
  - Q 6 hours if NPO
  - AC & HS once patient has resumed meal consumption
  - Notify physician if blood glucose > 140

Increased Intracranial Pressure (ICP): In the event of ischemia or infarction of the brain tissue, there are structural changes that occur causing a decrease in the collagen and connective tissues of the brain. This loss of vascular structure causes the breakdown of the blood brain barrier and contributes to cerebral edema. With the increase in brain tissue size, CSF and blood should get displaced allowing space for the increasing size of the brain tissue. Only so much space is allotted and the brain will eventually press against the skull causing an increased ICP.
Early Signs of Increased ICP:
✓ Change (decrease) in LOC:
  o Lethargy, confusion, disorientation, restlessness or apathy
✓ Headache
✓ Change in verbal/motor responses:
  o Slurred speech
  o Inability to move extremity
  o Facial droop
✓ Vomiting without nausea
✓ Pupils:
  o Pupillary changes on one side
  o Sluggish reaction to light bilaterally
  o Pupillary inequality
✓ Motor response:
  o Sudden weakness
  o Positive pronator drift
✓ Ocular palsy: Paralysis of the muscles used to move the eyes
✓ Papilledema: Swelling of the optic disc leading to blurred vision and blind spots

Late Signs of Increased ICP:
✓ Unarousable
✓ Pupils fixed and dilated
✓ Motor response: Profound weakness
✓ Abducens Palsy: Nerve problem resulting in double vision
✓ Cushings Triad: Increased systolic blood pressure, bradycardia, respiratory irregularity
✓ Widened Pulse Pressure: An increased distance between systolic and diastolic BP numbers

Nursing Interventions for Treating Increased ICP: Clustering activities is recommended to reduce the amount of prolonged time with increased ICP. Let your patient rest between activities to allow their ICP to return to baseline. Timely intervention for fevers is important as well to reduce the metabolic (oxygen) demands of the injured brain tissue.
To improve venous return, keep the patient’s head and neck aligned and keep the head of the bed above 30 degrees, but below 90 degrees (prolonged hip flexion can increase ICP). If your patient is intubated and/or mechanically ventilated, make sure that tracheostomy ties are not too tight. Limit suctioning to 2 passes with an insertion time of less than 10 seconds each; reduce cough stimulation when possible due to a risk for increasing the patient’s ICP.

Hypertension (HTN): Hypertension aggravates atherosclerosis and increases vascular resistance (vasoconstriction) within the brain.
Positive effects: Increased vascular resistance protects the brain from the damaging effects of systemic hypertension.

Negative effects: HTN predisposes the brain to cerebral ischemia by impairing vasodilator responsiveness. When diastolic BP exceeds 120mmHg, the ischemic brain is at high risk of hemorrhage.

Acute on Chronic HTN: Acute increases in blood pressure superimposed on a chronic hypertensive state. On average these individuals will have higher blood pressures post acute stroke than those who were previously normotensive.

**Blood Pressure Management:** Treatment of hypertension should be done very cautiously. Neurological deterioration has been associated with precipitous decreases in blood pressure induced by emergency antihypertensive treatment. When blood pressure drops below the lower limit of cerebral blood flow autoregulation, it causes more widespread cerebral hypoperfusion.

Medications used for management of hypertension include:

- Labetelol (Trandate): Potent alpha and beta blocker, slows heart rate and decreases peripheral vascular resistance
- Nicardipine (Cardene): Calcium channel blocker, decreases systemic vascular resistance and blood pressure
- Nitroprusside (Nipride): Potent vasodilator used in emergent hypertensive conditions, acts directly on venous and arterial smooth muscle
- Enalapril (Vasotec): An ACE-inhibitor that prevents the conversion of angiotensin I to II, preventing vasoconstriction, decreasing peripheral arterial and venous resistance
- Hydralazine (Apresoline): Potent vasodilator with direct vasodilating effects on the arterioles

**Transfer Patient to a Higher Level of Care:** Relocation of a patient to a higher level of care may be necessary if the patient is recognized as having an acute stroke. Early assessment and rapid interventions are key to making the transfer and care of this patient population safe and seamless. As described earlier in this module there are changes that must be intervened upon including: change/decrease in LOC, facial droop, change in speech patterns and motor changes/deficits. When a rapid response has been issued for this patient, the rapid response RN will stay with the patient during the transfer process to ensure continuity of care during transition; this RN does not take the place of the bedside nurse who will remain with the patient as well. All patient relocations are based on a need for closer monitoring and potentially more invasive interventions that can be administered in higher level care areas.

**Rehabilitation:** The goal of rehabilitation is to enable an individual who has experienced a stroke to reach the highest possible level of independence and be as productive as possible. Because stroke survivors often have complex...
rehabilitation needs, progress and recovery are unique for each person. Although a majority of functional abilities may be restored soon after a stroke, recovery is an ongoing process (NIH, 2010). Ultimately, rehabilitation after stroke should include optimizing independence with ADLs, prevention of complications and further disability, maximizing function and mobility, improving safety, improving life satisfaction, providing effective coping mechanisms and access to quality social interactions.

**Nursing Considerations for Rehabilitation:**

- **Range of Motion (ROM):** ROM exercises stretch the muscles, ligaments and tendons surrounding a joint. They promote increased joint flexibility and movement reducing pain, stiffness and muscle spasms. Nursing personnel can assist with the procedure by encouraging activity progression according to physician orders and activity protocol.
- **Physical Therapy (PT), Occupational Therapy (OT) and Physical Medicine and Rehabilitation (PM&R) Consults:** This multidisciplinary team will work together in order to plan the best rehabilitation for each individual. Subjective and objective assessments are recommended as soon as possible for treatment plan development.

**Modifiable Risk Factors:** Multiple health-related risk factors can contribute to secondary stroke. These risk factors include:

- Hypertension
- Smoking
- Diabetes Mellitus
- Atrial Fibrillation
- Hyperlipidemia

Lifestyle modifications can assist the patient in the prevention of secondary complications from stroke. Per physician recommendations patients may be placed on medications to assist with this process.

Early recognition and intervention during stroke can save lives and reduce stroke related complications. Nurses are the front-line agents in the detection of changing conditions with their patients. Accurate and thorough assessments can guide clinicians in the appropriate treatment of patients with Acute Ischemic or Hemorrhagic Strokes.