Pre-Hospital & Emergency Care of Acute Stroke

Thanks to: Katie Leonard, RN, NP, Stroke Nurse Practitioner & Coordinator, Tracey Anderson, RN, NP, Neuro Nurse Practitioner; Al Anderson, MD; and various other sources.

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The condition of stroke is a significant issue in health care for all those in the US. Part of the significance lies in the extreme number who do not receive acute treatment, for a variety of reasons.
Why is stroke so difficult to treat?

- Symptoms are not recognized early
- Lack of organized stroke care
- Treatment for ischemic stroke – IV tPA
  - must be given within 3 hours
  - significant risk of bleeding
- Treatment for hemorrhagic stroke – cerebral coil
- 24/7 Neurology Coverage

The lack of 24/7 neurology coverage refers to a neurologist that specializes in stroke and has the tools necessary, i.e. specialized radiological device capable of isolating the cerebral artery affected; radiological intervention suite; etc.. In our area, no hospital has a designated “Stroke Team”. However, they all have some program to treat the stroke patient. Once the stroke is classed as hemorrhagic or ischemic, a decision is made to transfer or not, and if transfer is indicated, to which hospital. This may involve calling the helicopter, especially since they are now so close.
Understanding the pathophysiology of stroke and the areas and function of the brain, will help in recognizing the more subtle signs/symptoms of stroke and thus help in faster recognition and care.
The signs/symptoms that occur depend on the area of the brain affected. The L side of the brain controls the R side of the body and vice versa. There are a few exceptions, such as speech. In 85% of the population, both speech centers (one to interpret speech and one to form speech) are on the L.
A thrombus is a narrowing of a vessel due to a fixed clot, i.e. fixed to the side of the vessel. An emboli is a small clot, usually a part of the thrombus that has broken off. Both types cause stroke. The difference is the stroke caused from an emboli is sudden. A stroke caused from a thrombus is more gradual.
Stroke Pathophysiology

- Interruption of blood flow in the brain. Either:
  - 1. Artery becomes blocked
     - by a clot or plaque build up
     - Prevents blood flow to tissue and tissue dies due to lack of oxygen and nutrients
  - “Ischemic Stroke”
  - 2. Artery ruptures and bleeds into brain
     - Small vessel (Intercerebral Hemorrhage)
     - Aneurysm in large vessel (Subarachnoid Hemorrhage)
  - “Hemorrhagic Stroke”

There are two types of stroke, ischemic and hemorrhagic. Of the two, hemorrhage strokes are the ones that can occur at any age. Ischemic strokes tend to effect those over the age of 50. That’s due to the cause, such as high blood pressure, coronary artery disease and/or atrial fibrillation; which tend to occur in older patients. This is in contrast to hemorrhagic strokes which can occur because of the presence of aneurysms, some of which are inherited (berry aneurysms), as well as high blood pressure.
Of the two types of stroke, hemorrhagic has the greatest death rate and highest rate of permanent damage. Hemorrhagic strokes also have a greater chance of causing a seizure. The reason the take stats 30 days out is because strokes can extend themselves from secondary damage.
Cerebral embolus refers to a clot that comes from somewhere outside the brain, such as the carotid artery or the heart when atrial fibrillation is present. Cerebral thrombosis refers to a gradual narrowing of the cerebral arteries themselves due to atherosclerosis (the type of arteriosclerosis that is specific to the brain, heart and kidneys). Note: You can always depend on medical terminology to come up with a complicated term.

In general, there are 2 types of stroke: ischemic and hemorrhagic. Ischemia means deficiency of blood, usually due to constriction or occlusion (obstruction) of a blood vessel. About 85% of all 700,000 strokes in the United States are ischemic strokes. About 12% of strokes are hemorrhagic.

In addition, there is about a 3% incidence of transient ischemic attacks (TIAs), which the National Institute of Neurological Disorders and Stroke (NINDS) includes within its statistical data for ischemic strokes. During a TIA, a region of the brain temporarily experiences a lack of perfusion. TIAs have the same symptoms as stroke, but the symptoms resolve completely in less than 24 hours. A TIA is a warning sign for stroke. Hemorrhagic strokes are characterized by bleeding within the brain.

Cerebral thrombosis (formation of a blood clot within cerebral arteries damaged by atherosclerosis) causes about 61% of all ischemic strokes in the United States.

Cerebral embolism causes 24% of ischemic strokes. Cerebral embolism occurs when a circulating blood clot lodges in the brain. Embolic strokes, which are more common in younger patients, develop rapidly, with maximum deficit usually evident within seconds to minutes.

Hemorrhagic stroke, which accounts for 12% of all strokes in the United States, may be due to intracerebral hemorrhage (9%) or subarachnoid hemorrhage (3%). An intracerebral hemorrhage (also called a parenchymal hemorrhage) occurs when a diseased artery within the brain ruptures, flooding the surrounding brain tissue with blood. Hypertension is the major risk factor for intracerebral hemorrhage. Most signs and symptoms associated with intracerebral hemorrhage are caused by the compression of brain structures and blood vessels. Subarachnoid hemorrhage (bleeding into the skull or cranium that occurs when a blood vessel on the surface of the brain ruptures and bleeds into the meninges) usually follows the rupture of an aneurysm or an arteriovenous malformation.

**TIA - Transient Ischemic Attack**

**Stroke Warning Sign!**

- A TIA is a brief episode of cerebral ischemia.

- Average time for a TIA is 10-15 minutes.

- Requires immediate medical attention to prevent a possible full-blown stroke.

- All should be admitted and worked up like a stroke.

- 35% patients with a TIA will have a stroke in the next 5 years . . .
  - 70% of these will occur within 2 weeks of the TIA!

TIA is often resolved by the time we arrive or by the time we arrive at the ED. It is very important that we do a thorough assessment of the deficient so the ED doc can relay that information to the patient’s personal physician. This will help with decision making in the ED. If signs and symptoms are resolved and the patient refuses transport, this is an AMA refusal.
Risk Factors for Stroke

- **Modifiable Risk Factors**
  - **Hypertension** (Goal <120/<80)
  - **Diabetes**
  - **High Cholesterol** (Goal LDL < 100, <70 if risk factors)
  - **Cigarette smoking** (11x increased stroke risk 1 PPD)
  - **Alcohol consumption** (J shaped relationship)
  - **Carotid artery stenosis**
  - **Abdominal Obesity**

- **Non-Modifiable Risk Factors**
  - Age – Gender – Race - Genetics

Some risk factors we can’t avoid, such as age, gender (men have more strokes than women but women tend to live longer and have a higher fatality rate), race (blacks and Hispanics have more strokes than whites and the Japanese have less strokes than anyone), genetic tendency (if one of your parents suffered a stroke, you have a higher likelihood).

The modifiable risk factors are more manageable. For instance, high blood pressure puts continual strain on the walls of the vessels, predisposing them to a build up of fat and cholesterol (protective mechanism) and if the walls are weak (as in aneurysm formation) or are part of an AV malformation (a clump of arteries and veins) a vessel may burst.

Diabetes predisposes to a buildup of fat and cholesterol due to a lack of functioning insulin. Insulin helps the body allocate fat and cholesterol to the glands that use them and to their storage places. A lack of functioning insulin will cause fat and cholesterol to build up in the blood stream because they don’t know where to go without insulin to tell them.

High cholesterol levels beg for a deposit site.

Alcohol consumption is “J” shaped because in moderation (1 6 oz. glass of red wine a day) alcohol will actually protect the heart and vessels. The problem is in the word “moderation”. Many who ingest alcohol on a regular basis think a 6-pack a night is moderate. The term is relative. So lets clear it up. In this context, moderation is **one 6-oz glass of red wine a day**. AND NO MORE. . .
The biggest problem is that people don’t want to give up their habits, nor do they want to moderate what they like. . .so the incidence of stroke continues to rise.
Cardioembolic Risk Factors

- Atrial fibrillation
- Myocardial Infarction
- Left Ventricular dysfunction with Ejection Fraction <25%
- Valvular heart disease
- PFO
- Atrial septal aneurysm
- Aortic arch atheroma
- Bacterial endocarditis

There are specific risk factors associated with the heart itself. Those include all those listed. A PFO is a patent foramen ovale. That’s a medical term for the opening between the atria, (sometimes called an atrial septal defect) that usually closes shortly after birth. In the adult who still has a patent foramen ovale, blood may catch on the opening and form a microemboli that may travel from the L atria to the L ventricle and out the aorta to the body. If it goes to the brain a stroke may result. If it goes to the other organs, nothing much happens because the organ will break it down. Because the L side has a higher pressure, usually the clot will stay in the lower pressure side, the R atria, and may travel from the R ventricle to the lungs and cause a pulmonary emboli.

Atrial septal aneurysms occur when the septum between the atria has a thin spot and bulges out, collecting blood and forming a clot. Because the L heart has higher pressure, the aneurysm tends to from on the L side, thus the tendency for strokes versus pulmonary emboli.

An atheroma is a large plaque formation. This can produce smaller fragments that break off causing emboli to travel and if they go to the brain, a stroke may occur.

Bacterial endocarditis may cause strokes when the endocardium – the inner lining of the heart – is inflammed. Inflammed tissue tends to trigger clot formation, especially if the clot forms on the valves (which are made of the same tissue as the lining of the heart). Thus a pulmonary emboli or a stroke may occur.
Another cause of stroke is a separation of the layers of an artery that results in either a blockage of blood flow or the formation of a clot from which smaller clots may break off and travel to further areas.

Causes of arterial dissection in the carotid or vertebral arteries include trauma to the neck, such as that which results from a severe whip-lash, impact from martial arts maneuvers, or extreme manipulations of the c-spine. Keep in mind, that any procedure by a health care professional has its own risks, no matter the maneuver or procedure. Those risks are there because they do occur and as prehospital providers, we often are the first called to transport such patients. This is true of out-patient surgery centers, dialysis centers as well as chiropractic centers.
The intracerebral hemorrhage noted as the white area within the red circle, is deep within the brain structures and has a high fatality rate. The subarachnoid hemorrhage, noted as the white and black area within the red circle, is more to the outside and has an air pocket (the black area). Subarachnoid hemorrhages have a greater chance for successful management.
The term, intracranial hemorrhage (ICH) includes intracerebral, subarachnoid, subdural and epidural hemorrhages.

There are many causes of spontaneous Intracranial Hemorrhage (ICH)\(^1\,^2\)

ICH in response to the most common causes represents approximately 85% of all spontaneous ICH\(^2\)

Pathologic change associated with chronic hypertension is the most common cause of spontaneous ICH, and cerebral amyloid angiopathy is the second most common cause.\(^1\) Cerebral amyloid angiopathy refers to abnormal starch-like carbohydrate deposits in the walls of the arteries of the brain. They weaken the walls of the vessels predisposing to leaking blood and aneurysm formation.

Less common causes of ICH are represented by CNS vascular malformations, aneurysms, tumors, hemorrhagic transformation of cerebral infarction, and Moyamoya disease\(^1\)

### References:


The mass effect and shift of ventricles are a result of the swelling of brain tissue. Swelling can occur with any type of stroke and is usually due to secondary injury such as hypoperfusion, hypoglycemia and/or hypoxia. All of which can be controlled in the field.

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**Lecture notes**

A noncontrast computed tomography (CT) scan is considered the “gold standard” of diagnostic imaging in patients with stroke symptoms. It should be performed quickly to differentiate between a hemorrhagic and ischemic stroke.¹,²

In the scan on the left, a small infarct is visible. In the center scan, a hemorrhage is visible, which means that the patient is not eligible for thrombolytic therapy. In the scan on the right, a mass-effect midline shift is apparent, which is a warning to thrombolysis.

For patients considered eligible for Alteplase treatment, the goal is for this scan to be completed within 25 minutes of arrival in the Emergency Department (ED) and interpretation completed within another 20 minutes. During the first few hours of an ischemic stroke, noncontrast CT scans may not reveal signs of brain ischemia. However, if the scan shows no evidence of hemorrhage, patients may be considered candidates for Alteplase.³

**References:**

The first scan shows two areas of ischemic stroke – prognosis is not good due to multiple areas being involved. The second scan shows a significant area. If caught soon enough, secondary injury may be limited or prevented.
MRIs are magnetic resonance imaging that look at the function of brain tissue versus the character of it. The technique uses radio-frequency radiation versus the ionizing radiation of CT scanners and x-rays. This technique offers superior soft tissue contrast resolution and the ability to image in multiple planes. This becomes necessary for some of the finer points of diagnosis and treatment. The newer devices show the brain in color, where the various colors correspond to blood flow and thus function.
Neurovascular Anatomy
Each lobe of the brain has its specific function. Knowing the function will help you determine what specific assessments need to be done to determine the presence of and the extent of a deficit.

The primary motor cortex governs skeletal muscle. This area in the L cerebral cortex governs movement of the R side of the body. This same area in the R cerebral cortex governs movement of the L side of the body.

The primary somatosensory cortex governs sensation. This area in the L cerebral cortex governs sensation on the R side of the body and vice versa.

As you can see, the superior division of the middle cerebral artery supplies the motor and sensory cortex as well as the frontal eye field and Broca’s area. Wernicke’s area is supplied by the inferior division of the middle cerebral artery. Broca’s area and Wernicke’s area both refer to speech. Broca’s area governs muscle movement and speech production.

Wernicke’s area governs the ability to comprehend speech.
These arteries are the most common arteries of the brain affected by stroke, either through emboli, thrombosis or leaking/aneurysm. If you note which part of the brain is supplied by these arteries, you can figure out typical signs/symptoms.
This picture helps determine which psychomotor deficits are associated with which artery. Basically, any skeletal motor or sensory deficit of the trunk, leg or foot is associated with the anterior cerebral artery; deficits of the arm, hand or face are associated with the middle cerebral artery.
The middle cerebral artery (MCA) has a large area of face, arm and hand function. The reason why is the thin branches that penetrate the basal ganglia and internal capsule.
The real issue is, how does all this related to us in the field?
The answer is in our assessment. Are we assessing the right things and is our assessment thorough enough. The problem is that many strokes have subtle signs and symptoms so if we are looking for them we may miss them. Even if we discover a problem, do we recognize it for what it is? So, now what???
To figure out what assessments we really need to do, it helps to know a bit about how things work in the brain and the pathway from the brain to the rest of the body. As you can see, the motor pathway from the brain to any skeletal muscle, is rather complex. Stroke symptoms may occur at any point. The vast majority of stroke symptoms occur in the brain (cerebral cortex to the medulla) or in the cord. However, it is more common for cord injuries to suffer damage due to the resultant ischemia of trauma, versus a spontaneous rupture of a blood vessel or a clot.
Because most persons are R handed, a left hemisphere stroke is termed a “dominant hemisphere stroke”. Depending on the area of the L brain that is affected, for example, aphasia or the inability to control the muscles of the face and tongue (Broca’s area) is more likely with a L hemisphere stroke. Hemiparesis refers to weakness. Right homonymous hemianopia is the medical term for blindness in the R half of the normal visual fields of both eyes. There is a left gaze preference because that is the visual field that is still working. The deficit occurs in the R visual field because the optic nerve crosses in the mid-brain. The patient is going to complain of difficulty seeing but may not know exactly what is wrong.
The R hemisphere stroke has the same problems but on the other side. Keep in mind that only one of these deficits may occur. That makes assessment really important so that these aren’t missed. If only one problem is present, the patient may see no need to go to the doc.
Difficulty speaking may take two forms, difficulty understanding speech and difficulty talking. It is very important to get the patient to talk in a sentence versus one-word responses. Both expressive and receptive aphasia are L brain problems for 85% of the population. For the remaining 15% of the population, they can have any combination. For instance, you may expect with expressive aphasia, the patient may not speak well and have R sided weakness or paralysis. For 15% of the population they may drop things with their L hand and tend to word-stutter – and get very frustrated! The madder they get the worse the speech problem. Some of the receptive aphasia patients speak gibberish, are unaware of the problem and don’t understand you. They may act as if you aren’t there.

Slurred speech is a primary motor problem, they recognize they aren’t speaking well and usually have other motor problems but those may be more subtle, as in a cranial nerve dysfunction.
Ataxia is balance while doing a motor skill, such as walking. Ipsilateral malfunction refers to a malfunction on the same side of the body as the problem in the brain. For instance, you may have an infarct in the L cerebellum and the patient has problems with coordination on the L side. This is why you always have a patient get up and walk under their own steam when they want to refuse care. That includes the patient with alcohol on board.
Brain Stem Stroke

- Posterior Circulation
- Vertebro-Basilar Circulation

- Hemiparesis or quadriparesis
- Abnormal Eye Movements
- Dysphagia, Dysarthria
- Nausea, Vomiting
- Cranial Nerves

This patient may present like a spinal cord injury patient with weakness or paralysis in all four extremities. They may not be able to control their airway even though they may speak (granted, the speech may be slurred). Aspiration pneumonia is common with this patient – especially since they have a tendency to vomit. In this patient the cranial nerves have a high probability of being effected.
The 5 Most Common Stroke Symptoms

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

With all that detail, what can we take away that is useful. The 5 most common stroke symptoms are good to know.
**Rapid Identification = FAST**

**Cincinnati Stroke Scale**

**Facial Droop**
- Normal: Both sides of face move equally
- Abnormal: One side of face does not move at all

**Arm Drift**
- Normal: Both arms move equally or not at all
- Abnormal: One arm drifts compared to the other

**Speech**
- Normal: Patient uses correct words with no slurring
- Abnormal: Slurred or inappropriate words or mute

**Time Last Known Normal**

*Sensitivity 66%; Specificity 87%*


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- So you did the history, now is the physical. Remember the picture of the MCA territory? This is the region of brain you are assessing by performing the Cincinnati Stroke Scale.

- Remember the acronym FAST. **F** = face. **A** = arm. **S** = speech. **T** = time.

- 66% Sensitivity means that by doing these three tests, you will detect 66% of all strokes. The strokes that aren’t detected by this scale are strokes in the posterior circulation, when patients have symptoms like ataxia, nausea, vomiting, poor coordination. But at least with the Cincinnati scale you’re statistically getting 2/3 of all strokes.

- 87% sensitivity means that if you detect one or more of these deficits in a patient, there is an 87% chance that the patient is having a stroke.

- Paramedics are expected to do the Gross Cranial Nerve Exam and the Gross Motor/Sensory Exam. That will help detect an additional 10% of those with stroke symptoms.

- So, by doing all those exams, the Cincinnati Stroke Scale, the Gross Motor and Gross CN exam, you will be detecting 76% or more of all strokes. You are increasing the odds to 75%.
The “Stroke Chain of Survival”

- Rapid Recognition and Reaction to Stroke Warning Signs
- Rapid EMS Dispatch
- Rapid EMS Transport
- Hospital Pre-notification
- Delivery to a Stroke Center*
- Rapid Diagnosis and Treatment in Hospital
  - * No Stroke Centers in our immediate area

The most important thing we can do is recognize the potential for a stroke (i.e. good assessments), notify the hospital, then get the patient there as soon as possible. The most important piece of information the ED needs is when, in actual time, the patient was last seen normal. To document, it isn’t “two hours ago”, it is “at 1445 hours”. The hospital will then screen for imposters and do a CT scan. Once those results are read then a determination will be made as to what to do.
Stroke Criteria

- Known time of onset
  - TIME LAST KNOWN NORMAL
- Any neuro deficit
- Blood glucose level
- ETA
- ED report should include all the above

It is important to emphasize here we are not concerned about HIGH blood sugar as a stroke mimic. Increased blood sugar is a natural response to stress or injury so many people may have a slightly elevated sugar. BUT, patients with hypoglycemia may have weakness and trouble speaking so it is important to rule out hypoglycemia as the reason for the symptoms. That we can treat in the field.
Length of time to recover depends of severity of stroke.
50% - 70% of stroke survivors regain functional independence
15%-30% are permanently disabled
20% require institutional care at three months after onset
Cost of stroke: 57 billion dollars in 2005 for stroke, direct and indirect costs
Acute Stroke Treatment

What is going on after we leave the ED?
Stroke is an **EMERGENCY**

**Time is Brain!!**

Time is
Quality of
Life!
Time is Brain; Time is Quality of Life
911 called to respond to stroke
Door to ED physician exam = 10 minutes
Door to Stroke expertise = 15 minutes
Door to CT scan of brain = 25 minutes
Door to CT interpretation = 45 minutes
Door to Drug (rt-PA) = 60 minutes
Consider Stroke Mimics

- Seizure / Todd’s paralysis (result of seizure)
- Hypoglycemia
- Complex migraine
- Psychiatric
- Retrospective review of misdiagnosis of ischemic stroke 6/151 pts who received t-PA were ultimately found not to have an ischemic event. Most common diagnosis was conversion disorder [4] complex migraine [1], Todd’s paralysis [1].

Most importantly, if the patient has neurological deficits, it’s a stroke until proven otherwise. Strokes may cause a seizure at onset (due to irritated brain tissue), so if there was witnessed seizure activity there may be an underlying stroke. That’s why the Stroke Criteria is very simple: clear deficits, known time of onset, and blood sugar >60. Let the neurologist do the rest!
Potential to reverse neurologic impairment with thrombolytic reperfusion

During an acute ischemic stroke, the average patient loses 32,000 brain cells every second. Reperfusion offers the potential to reduce the extent of ischemic injury.


Slide 10
Lecture notes

Immediately following formation of an infarct, there are 2 major zones of injury within the brain: the core ischemic zone and the "ischemic penumbra." This term is generally used to define ischemic, but still salvageable, cerebral tissue.

In the core ischemic zone, blood flow drops to below 10% to 25% of normal. The resulting loss of an adequate supply of blood rapidly depletes energy stores of oxygen and glucose. Ischemia this severe can result in necrosis of neurons and also of supporting cellular components.

Brain cells within the penumbra—a rim of mild-to-moderately ischemic tissue lying between tissue that remains normally perfused and the area in which infarction is evolving—may remain salvageable for several hours. This is because the penumbra is supplied with blood by collateral arteries that connect with branches of the occluded vascular tree.

However, even cells in this region will die unless blood flow is restored (reperfusion) during the early hours of a stroke, since collateral circulation is inadequate to maintain the brain cells' need for oxygen and glucose indefinitely. During an untreated stroke, the average patient loses 32,000 cells per second.

The penumbra is where pharmacologic interventions are likely to be effective. Early reperfusion with a thrombolytic agent during the course of a stroke can restore blood flow and potentially reduce the extent of ischemic injury.

Acute Ischemic Stroke Treatments

- **IV t-PA – “The Clot Buster”**
  - Must give within 3 hours of symptom onset
  - Sooner is better though!

- **IA = Intra-Arterial Treatment**
  - Up to 8 hours after symptom onset
  - IA t-PA
  - Clot Retriever
  - Balloon Angioplasty
  - Stent Placement
Look at the site of the clot in the first CT, then after t-PA directly administered, look at the resulting blood flow. Pretty cool!!
Neuroendovascular stenting is currently being evaluated as another treatment for carotid stenosis or narrowing – usually due to thrombosis or plaque. Stenting might be considered as an alternative to carotid endarterectomy based on features of the stenosis, such as the size of the artery and location of the blockage, or certain risk factors for an open surgical procedure that are patient specific.

In this procedure, an angioplasty balloon catheter is placed across the region of stenosis and inflated to expand the plaque. Then the collapsed stent, a wire mesh tube, is placed over the balloon catheter and moved into the area of the blockage. When the balloon is inflated, the stent expands, locks in place and forms a rigid support to hold the artery open. The stent remains in the artery permanently.
This is another alternative, a MERCI retriever, a device that goes in and actually snatches the clot and pulls it out.
This is the patient, in the angio suite, and in the far picture, here is the clot. This is Star Trek worthy . . . and what Swedish is now doing. Swedish is also using coils to stop aneurysms from leaking and to stop hemorrhagic strokes.
BP Management - Ischemic Stroke

- DO NOT TREAT HYPERTENSION IN THE FIELD!!
- Elevated BP is a natural, protective, and beneficial response during an acute ischemic stroke
- Higher pressure helps other vessels compensate for the vessel that is blocked and possibly save surrounding tissue
- Avoid Hypotension!

-While you’re transporting stroke patients, you should perform your regular protocol care and vital sign monitoring.

-Even if the patient has a high BP, it is still better to wait until after the CT scan to treat (unless signs of an MI are present).

-If nitro is given to lower high blood pressure, the dilating properties in arteries and veins could potentially increase intercerebral pressure, which is detrimental in both ischemic and hemorrhagic strokes.
For hemorrhagic stroke treatment in the field, we may not know except to note how fast the patient deteriorates and if seizures are present. Seizure activity must be stopped as soon as possible. Seizures will increase the bleeding.
Prehospital is being looked to more and more to help identify and begin early treatment of the suspected stroke patient. There are indications that we will have a stroke center with a stroke team in our area in the near future. When that happens, we will be asked to implement a Stroke Team request, similar to a Trauma Team request. That means, we need to be up on our assessment skills now, so we won’t be caught short then. The CE for this month will concentrate on your stroke assessment skills. Should be fun to do.