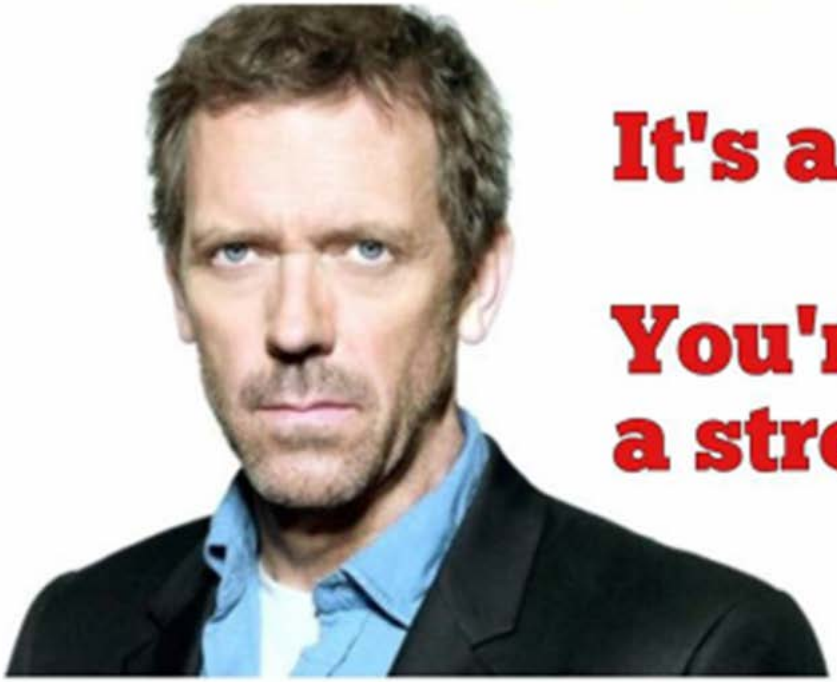
STROKE IS AN

EMERGENCY

Rapid Evaluation & Treatment for Patients with Symptoms of Stroke

"I can't feel my face when I'm with you!"

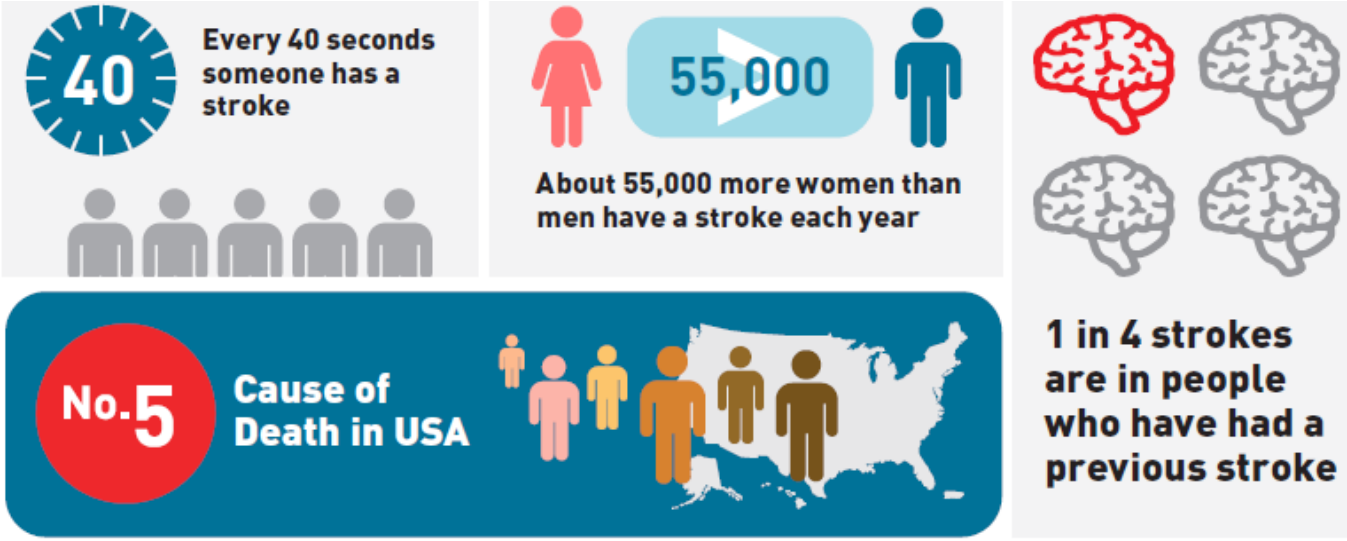


It's a stroke.

You're having a stroke.

Stroke Epidemiology

- Acute Stroke
  - 87% Ischemic
  - 10% Hemorrhagic (Intracerebral)
  - 3% Hemorrhagic (Subarachnoid)
- Acute AND Chronic health problem that poses significant impact on individuals, families, and health care systems
  - 5th leading cause of death in the US for men (4th leading cause of death in the US for women)
  - Leading cause of disability



Hemorrhagic Stroke

- Occurs when blood spills into the brain tissue after a cerebral blood vessel abnormally opens
- The abnormal extravasation of blood in the brain tissue results in damage to surrounding tissue

- **Intracerebral Hemorrhage (ICH):** bleeding within the parenchyma of the brain
  - Symptoms more associated with irritation of blood
    - Rapid or severe decrease in LOC
    - Severe headache
    - Intolerance to light
    - Nuchal rigidity
    - N&V

- **Subarachnoid Hemorrhage (SAH):** bleeding within the subarachnoid space
  - Aneurysmal SAH (aSAH)
    - When an aneurysm ruptures, it can cause various issues in the brain including:
      - Early Brain Injury (EBI)
        - Occurs in the hours and first several days after an aneurysm rupture
      - Cerebral Vasospasm (delayed cerebral injury)
        - Large vessel vasospasm may occur on day four after an aneurysm rupture and may last as long as 21 days
  - Classic symptom: sudden onset of “worst headache of my life”
    - Up to half of patients may have no neurological deficits
  - Patients often experience poor outcomes after SAH

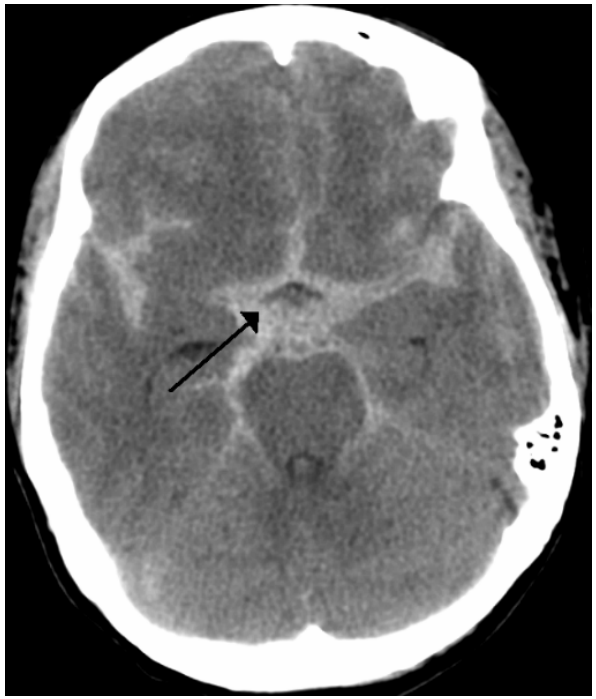
Stroke Epidemiology

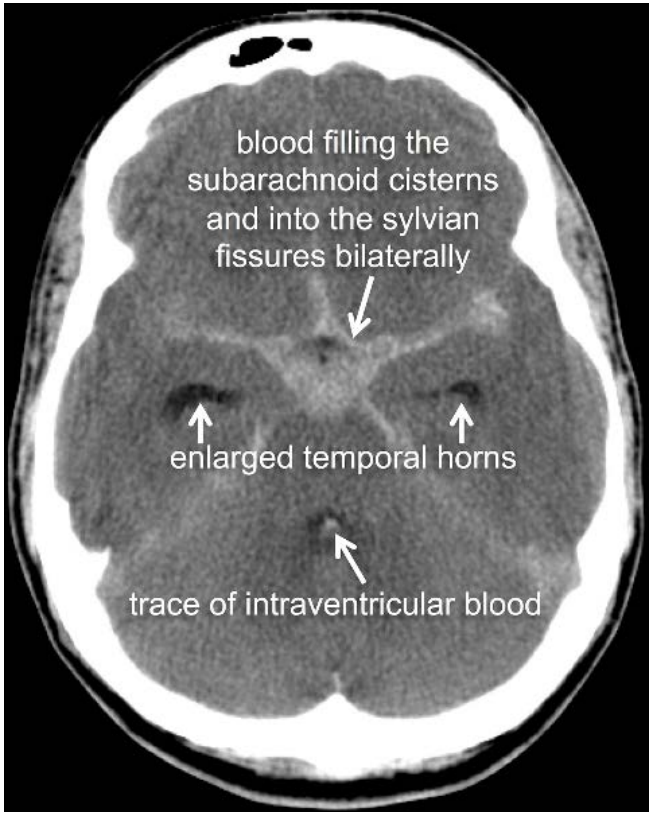
Risk Factors for Intracerebral Hemorrhage

- Age (risk increases with every 10-year increase in age)
- Gender (more common in men)
- Race (increased risk in African-American, Hispanic and Asian populations)
- Genetics (clotting and APOE disorders)
- **HTN (most important modifiable risk factor for ICH)**
- High alcohol intake
- OAC treatment (up to 10% ICH)
- Use of sympathomimetic drugs (cold remedies, weight loss drugs)
- Use of illegal substances (cocaine, meth, ecstacy)
- Hemorrhagic transformation of ischemic stroke

Risk Factors for Subarachnoid Hemorrhage

- Age
- Gender (women have a 1.6 times higher risk of aSAH)
- Race (African-American populations)
- Genetics (hx. of previous aSAH, family history of aneurysm)
- **Cigarette smoking (most important modifiable risk factor for SAH)**
- HTN
- High alcohol intake
- Use of sympathomimetic drugs (cold remedies, weight loss drugs)
- BMI < 23
- Diet
- Increased caffeine intake (>5 cups/day)




blood filling the subarachnoid cisterns and into the sylvian fissures bilaterally
enlarged temporal horns
trace of intraventricular blood

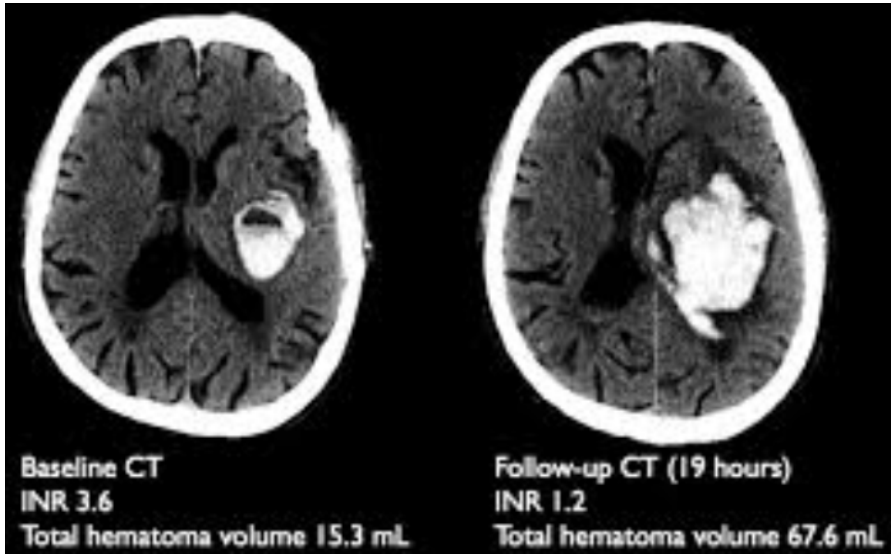
Treatment of Hemorrhagic Stroke

- Treatment
  - Close monitoring of airway
  - Reversal of anticoagulation
  - Strict management of blood pressure
    - Typically maintain SBP < 140 mmHg for ICH
    - Typically maintain SBP < 160 mmHg for SAH
    - Labetalol 5-20mg IVP, Nicardipine 5-15 mg/hr (AVOID nitroprusside and NTG gtts)
  - STAT Neurosurgery consult
    - Surgical evacuation
    - Surgical clipping for aSAH
    - Ventriculostomy drainage
    - Medical monitoring
  - Treat pain, anxiety, and nausea
  - Strict administration of nimodipine for SAH
  - Management of Intracranial Pressure (ICP)

Treatment of Hemorrhagic Stroke

- Reversal of anticoagulants
  - Coumadin (warfarin)
    - Vitamin K 10mg IV one time
    - 4-factor PCC (Kcentra)

      **DO NOT use in patients with history of HIT/heparin allergy*
      - INR 2 – 3.9: 25 units/kg to maximum dose of 2,500 units
      - INR 4-6: 35 units/kg to maximum dose of 3,500 units
      - INR >6: 50 units/kg to maximum dose of 5,000 units



Treatment of Hemorrhagic Stroke

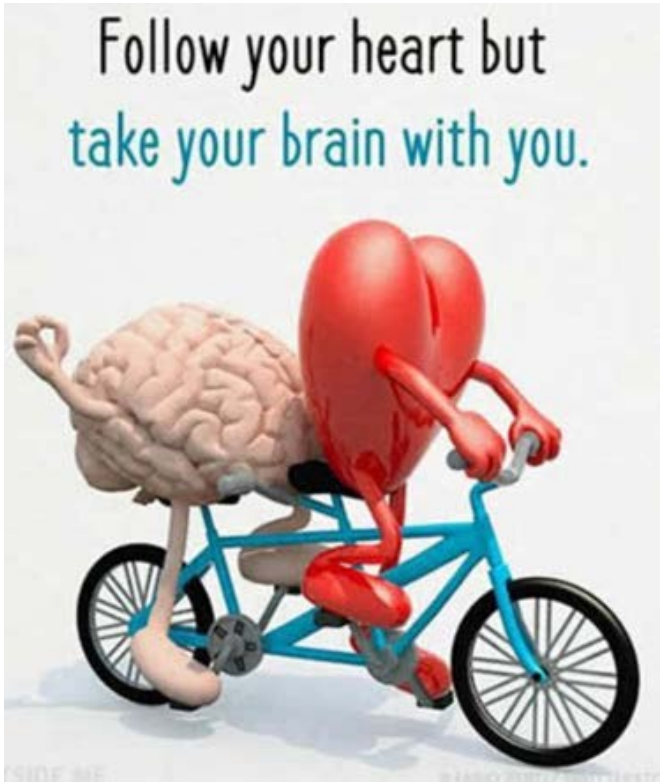
- Reversal of anticoagulants
  - Pradaxa (dabigatran) ~ Direct Thrombin Inhibitor
    - Activated charcoal 50g PO/NG tube x 1 for patients who present within 2 hours of ingestion of an oral direct factor Xa inhibitor (only recommended in patients who are intubated or patients who are at low risk of aspiration)
    - Praxbind (idarucizumab) 5 gm (100 mL) IV x 1
      - Praxbind is indicated for the reversal of Pradaxa when **life-threatening or uncontrolled bleeding** is present or emergency procedures / surgery are required
        - Praxbind should be given if the last dose was within 3-5 terminal half-lives
          *Half life of pradaxa is 12-17 hours
      - Administer slow IVP over 3 – 5 minutes
  - Xarelto (rivaroxaban), Eliquis (apixaban), Savaysa (edoxaban) ~ Direct Factor Xa Inhibitors
    - Activated charcoal 50g PO/NG tube x 1 for patients who present within 2 hours of ingestion of an oral direct factor Xa inhibitor (only recommended in patients who are intubated or patients who are at low risk of aspiration)
    - PCC (Kcentra) 50 units/kg to a maximum dose of 5,000 units
      - Administer Kcentra if last dose was within 3-5 terminal half-lives
        *Half life of Xarelto is 5-9 hours
        *Half life of Eliquis is 12 hours
        *Half life of Savaysa is 10-14 hours

Transient Ischemic Attack

- Approximately 15% of strokes are preceded by a TIA
- Predictors of stroke occurrence after a TIA include:
  - Age > 60 years
  - DM
  - Unilateral weakness or speech impairment
  - Symptoms that last > 10 minutes
- Meta-analyses of cohorts of patients with TIA have shown the short-term risk of stroke after TIA to be:
  - 3% to 10% at 2 days
  - 9% to 17% at 90 days

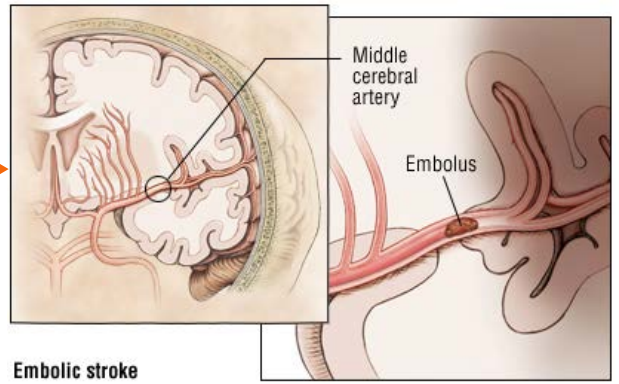
Stroke Epidemiology

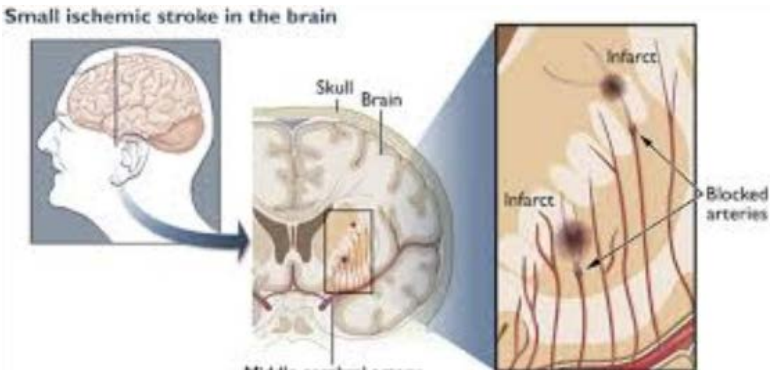
- **Risk Factors for Ischemic Stroke**
  - Age (risk doubles each decade after 55 yrs)
  - Gender (women)
  - Race
  - HTN (MOST important modifiable risk factor)
  - Smoking tobacco
  - Diabetes
  - Hyperlipidemia
  - Coagulopathy
  - Low Birth Weight (< 5 lb 8 oz)
  - Atrial Fibrillation
  - Carotid Artery Stenosis
  - Oral Contraceptives & HRT
  - Obesity
  - Migraine Headaches
  - Sleep Disorders
  - Etc., etc., etc.



Acute Ischemic Stroke

- **Thrombotic**
  - Blood clot that forms within the arteries of the brain, typically from atherosclerosis or high cholesterol
- **Embolic**
  - Blood clot or plaque that forms elsewhere and travels to the cerebral arteries
- Large Vessel Disease
  - Approx 75% of ischemic strokes
- Small Vessel Disease
  - Approx 25% of ischemic strokes
  - Lacunar infarcts are typically thrombotic events that occur in the deep penetrating arteries, closely linked to hypertension



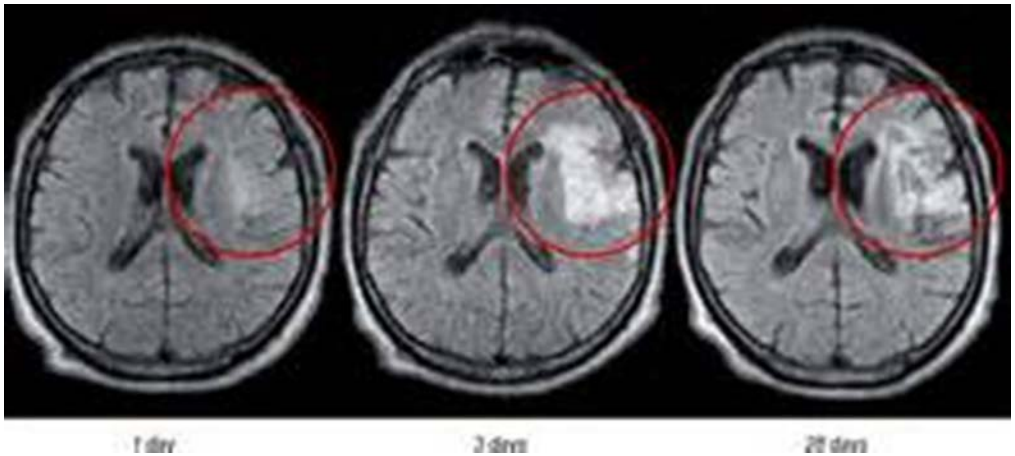


Acute Ischemic Stroke Pathophysiology

- Arterial blood flow to the brain fails to meet metabolic demands
  - Ischemia → Cellular death

- Zones of ischemic injury
  - Core
  - Penumbra
    - **PRIMARY GOAL of acute ischemic stroke intervention is to restore adequate blood flow to penumbra**

Acute Ischemic Stroke Pathophysiology



Several factors affect the rate at which brain tissue dies:

- Onset of ischemia
- Duration of ischemia
- Collateral circulation
- Systemic circulation
- Metabolic & hematologic factors

Stroke Symptoms

BE FAST

How to Spot a Stroke

B **Balance:** Does the person have a sudden loss of balance or coordination?

E **Eyes:** Is your loved one experiencing double vision or are they unable to see out of one eye?

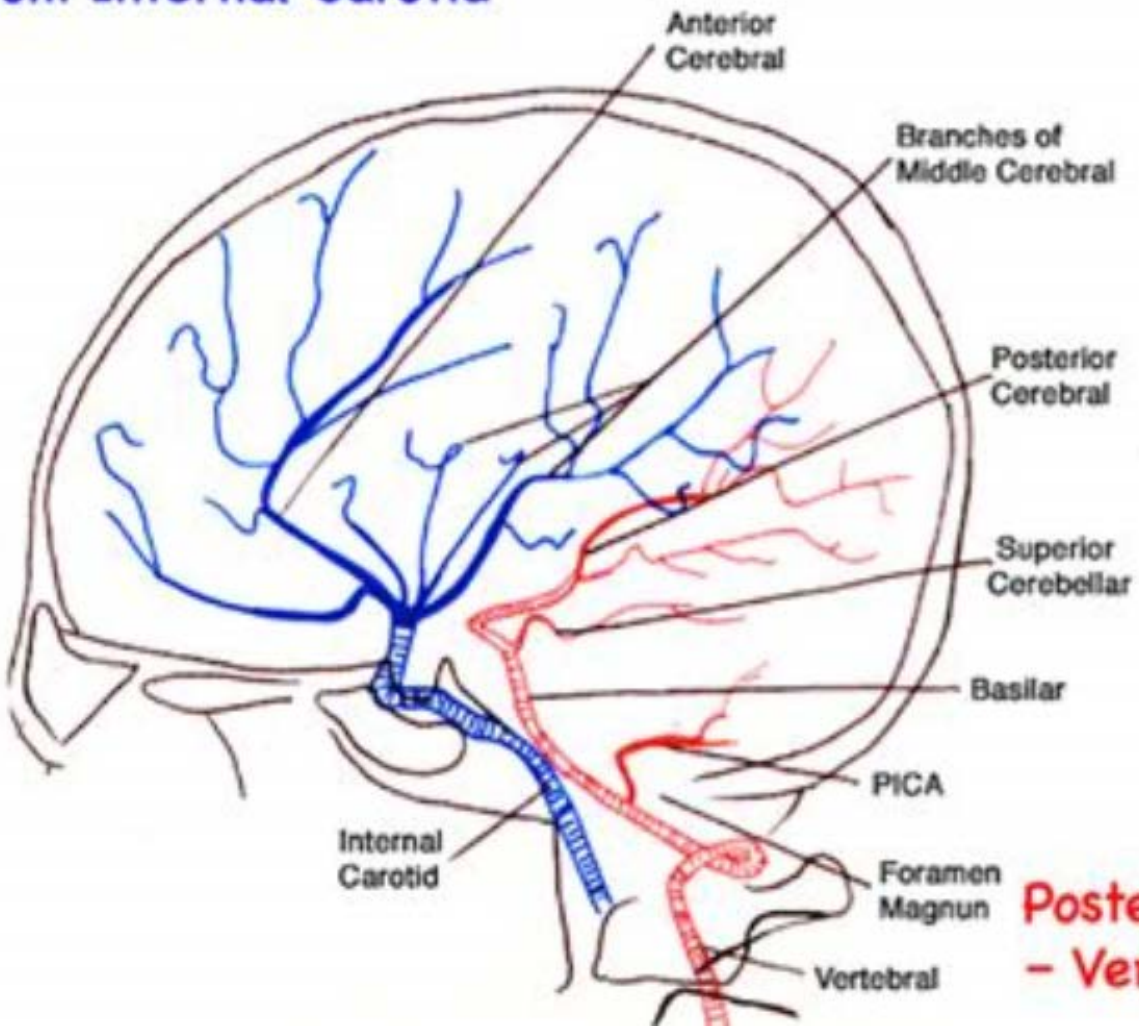
F **Face:** Is one side of the face drooping? Ask the person to smile.

A **Arms:** Does one arm drift downward? Have the person raise both arms in the air.

S **Speech:** Is he or she slurring their speech or having difficulty getting the words out right? Have the person repeat a simple phrase.

T **Time:** Time to act! Call 9-1-1 and get the person to a certified stroke center immediately, such as Adventist Medical Center.

Anterior Circulation
- from Internal Carotid



Posterior Circulation
- Vertebral-Basilar

Anterior Circulation Stroke Symptoms

- Stroke involving Internal Carotid Arteries
  - Aphasia, if the dominant hemisphere is involved
  - Neglect, if the nondominant hemisphere is involved
  - Contralateral homonymous hemianopia
  - Contralateral motor and sensory loss of face, arm and leg,
  - Ipsilateral eye deviation

- Central Retinal Artery Occlusion
  - Occurs when central reginal artery is occluded as a result of ICA atherosclerosis
  - Sudden, painless, unilateral loss of vision
  - Marcus Gunn Pupil may be present

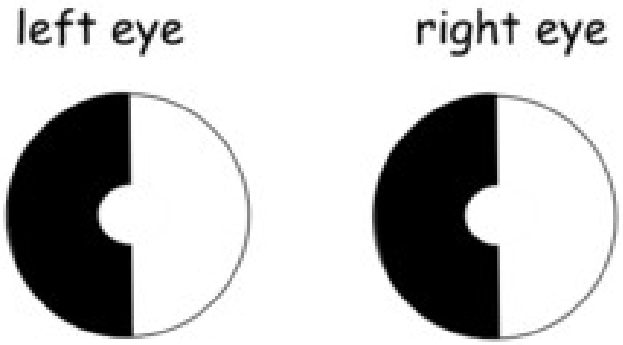
Anterior Circulation Stroke Symptoms

- Stroke involving Middle Cerebral Arteries
  - Aphasia, if dominant hemisphere is involved
  - Neglect, if nondominant hemisphere is involved
  - Contralateral motor and sensory loss of face, arm and leg
    - Leg commonly less involved than arm
  - Homonymous hemianopia
  - Eye deviation toward the side of the lesion
  - May exhibit anosognosia (unawareness of neurological deficit)

- Stroke involving Anterior Cerebral Artery
  - Contralateral motor and sensory deficits
    - Deficits commonly affect leg more than arm
    - Face and tongue more commonly spared
  - Abulia (disinhibition)
  - Primitive frontal lobe reflexes may be present if large infarct is present
    - Suck
    - Grasp

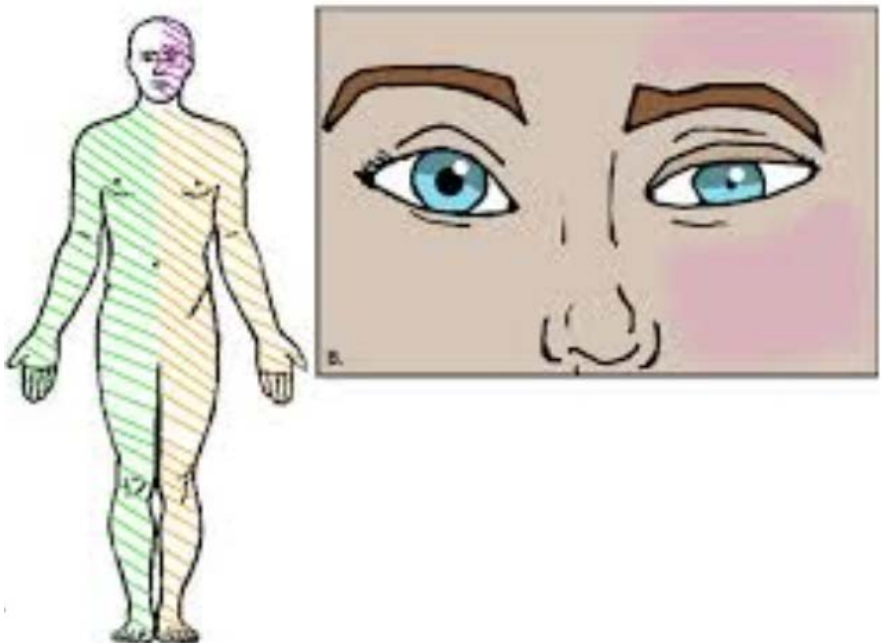
Posterior Circulation Stroke Symptoms

- Stroke involving Posterior Cerebral Artery
  - Contralateral visual field **homonymous hemianopia**
  - Visual agnosia (inability to recognize familiar objects by sight)
  - Alexia (inability to understand written language)
    - with or without agraphia (inability to write)and prosopagnosia (inability to recognize familiar faces) if stroke occurs in dominant hemisphere



Posterior Circulation Stroke Symptoms

- Stroke involving **Posterior Inferior Cerebellar Artery**
  - Wallenberg Syndrome (AKA lateral medullary syndrome)
    - Ipsilateral facial analgesia, contralateral truncal analgesia, ataxia, dysarthria, dysphagia
  - Dysphonia
  - Ipsilateral loss of the corneal reflex



Posterior Circulation Stroke Symptoms

- **Stroke involving Anterior Inferior Cerebellar Artery**
  - Speech dysfunction
  - Tremor
  - Abnormal gait
  - Abnormal finger-to-nose or heal-shin testing
  - AICA syndrome or **lateral pontine syndrome**
    - Vertigo
    - Vomiting
    - Nystagmus
    - Falling forward towards the side of the lesion
    - Ipsilateral loss of sensation to the face/facial paralysis
    - Ipsilateral hearing loss

Posterior Circulation Stroke Symptoms

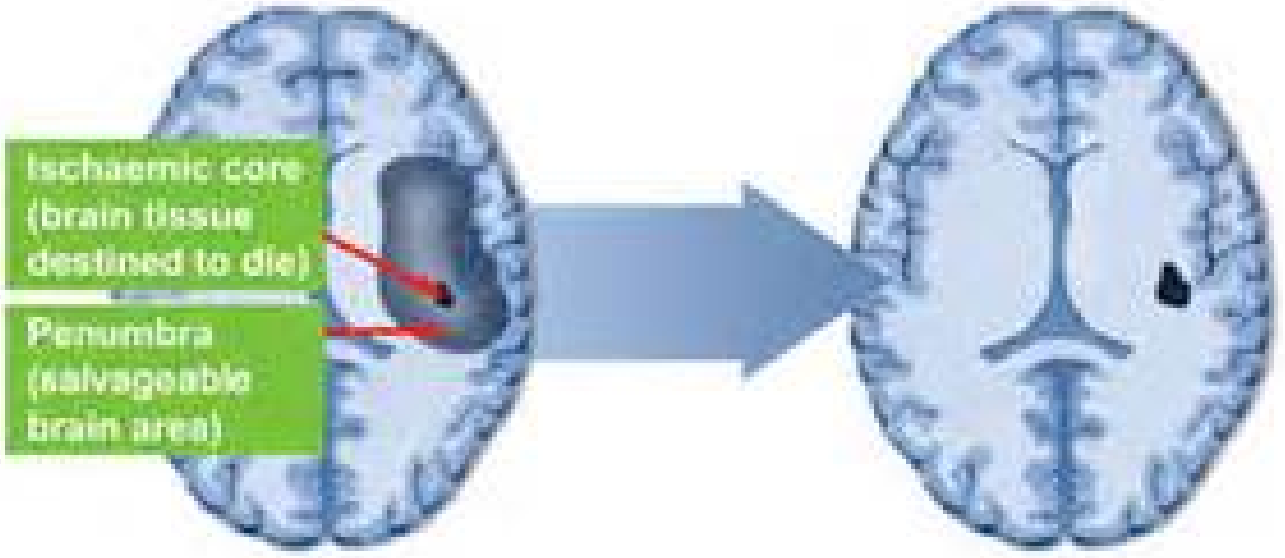
- Stroke involving Basilar Artery
  - Vertebrobasilar Artery Syndrome
    - Coma
    - Quadriparesis
    - Ataxia
    - Dysarthria
    - Cranial nerve dysfunction
    - Visual deficits
    - Nausea / vomiting
  - Locked-in Syndrome (occlusion causing pontine infarct)
    - Quadriparetic
    - Unable to speak, but cognition remains intact
    - Gaze paresis
    - Intranuclear opthalmoplegia
  - Millard-Gubler Syndrome
    - CN VI and VII damage
    - Diplopia
    - Inability to rotate affected eye outward
    - Ipsilateral weakness of facial muscles
    - Loss of corneal reflex
    - May have contralateral weakness

Stroke Mimics

- Diseases that produce stroke like symptoms

- Mimics include:
  - Toxic Metabolic Syndromes (hypo/hyperglycemia, hypo/hypernatremia, hepatic encephalopathy, Wernicke's encephalopathy)
  - Seizure disorders
  - Migraine Headaches
  - Peripheral neuropathies
  - CNS tumor, Intracranial hypertension
  - Degenerative Neurological Conditions
  - Multiple Sclerosis, neuritis, myelopathy

Rapid recognition and treatment of acute ischemic stroke is the key to survival and improved outcomes for patients


Ischaemic core (brain tissue destined to die)
Penumbra (salvageable brain area)

Rapid Evaluation & Triage

- **1.9 million brain cells are lost every second during stroke**

- During acute ischemic stroke the brain ages:
  - 8.7 hours per second
  - 3.1 weeks per minute
  - 3.6 years per hour
  - 11 years in just 3 hours

Rapid Evaluation & Triage

- Work with local EMS providers to ensure prehospital notification of potential stroke patient en route
  - CT scanner should be held for use
  - Personnel, protocols and equipment should be ready

- An organized protocol for the emergency evaluation of patients should be immediately available
  - Consider utilizing a checklist that includes time expectations

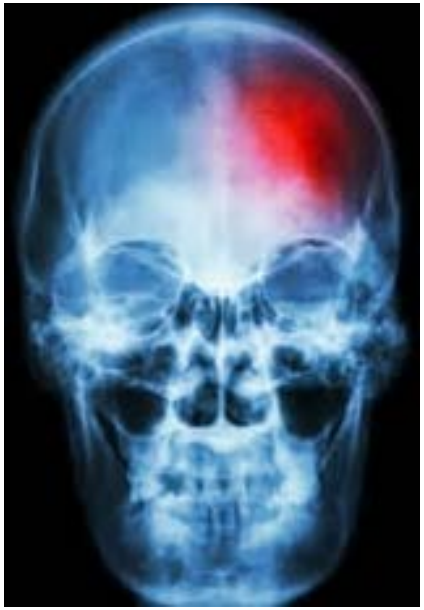
- A stroke rating scale, preferably the NIH Stroke Scale, should be utilized

AHA Recommendations for ED Triage & Eval

Door to Physician	≤ 10 minutes
Door to Stroke Team	≤ 15 minutes
Door to CT initiation	≤ 25 minutes
Door to CT interpretation	≤ 45 minutes
Door to drug (alteplase)	≤ 60 minutes
Door to stroke unit admit	≤ 3 hours

Immediate Triage

Date & Time of Last Known Well



- **MOST important piece of information**
  - Last witnessed / known time WITHOUT symptoms
    - **NOT** the time that patient woke with symptoms
  - For patients with previous neurological symptoms that completely resolved consider the onset of new symptoms a new episode with its own date & time of last known well

Rapid Assessment

- Glucose value
  - ONLY lab value that is required to assess prior to initiation of fibrinolytic therapy
- Physical Assessment
  - ABC's
  - Detailed neurological assessment (BRIEF but THOROUGH)
  - Vital Signs
- Patient History
  - Past Medical History
  - Past Surgical History
  - Current Medications

Immediate Diagnostic Studies

- Noncontrast brain CT (or MRI)
- Blood Glucose
- Oxygen Saturation
- *Serum Electrolytes / Renal Function Tests
- *CBC with Platelets
- *Cardiac Markers
- *Prothrombin / INR
- *Activated Partial Thromboplastin Time
- *ECG

**although it is desirable to know the results of these tests prior to fibrinolytic therapy, therapy should not be delayed while awaiting results unless there is clinical suspicion of bleeding abnormality or thombocytopenia, or the patient has received heparin or warfarin, or the patient has received other anticoagulants*

Goal of Acute Ischemic Stroke Care

The goal of rapid evaluation and triage is to complete an evaluation and begin fibrinolytic treatment within 60 minutes of patient's arrival in the ED

Thrombolytic Therapy

- IV thrombolytic therapy is recommended in the setting of acute ischemic stroke

FDA Advise-ERR
Avoid Using The Error-Prone Abbreviation, TPA

- ISMP Patient Safety recommendation to abolish the use of abbreviated drug nicknames and only utilize generic drug names in order to avoid detrimental drug mix-ups
  - ***Avera McKennan has removed "tPA" from all order sets, replaced with "alteplase"***

Goal of Acute Ischemic Stroke Care

- Avera eEMERGENCY services can be of SIGNIFICANT assistance in the triage, evaluation & treatment of potential stroke patients

Alteplase Administration – 3 hrs

- Alteplase 0.9 mg/kg (MAXIMUM dose 90 mg) is recommended for selected patients who may be treated within 3 hours of onset of ischemic stroke
  - FDA indicated

Alteplase Criteria – 3 hours

Inclusion Criteria

- Diagnosis of ischemic stroke causing measurable neurological deficit
  - NO minimum NIH SS value
- Onset of symptoms < 3 hours before initiation of treatment
- Age ≥ 18 years
- Blood glucose > 50 mg/dL

Exclusion Criteria

- Sx. consistent with ICH / SAH
- Active internal bleeding
- Intracranial or intraspinal surgery within past 3 months OR serious head trauma within past 3 months
- Arterial puncture @ noncompressible site in past 7 days
- Intracranial neoplasm, AVM, aneurysm or other intracranial condition that may increase the risk of intracranial bleed
- Acute bleeding diathesis*
- Current, severe HTN (despite tx.)

*

*The 2016 AHA/ASA guidelines also advise against treatment with IV alteplase in patients:

- With platelet count < 100,000/mm^3
- Who have a history of warfarin use **and** an INR > 1.7
- Who have received a treatment dose of low-molecular-weight heparin within previous 24 hours
- Who are taking direct thrombin inhibitors or direct factor Xa inhibitors, unless laboratory tests are normal **or** the patient has not received a dose of these agents for > 48 hours

Alteplase Administration – 4.5 hours

- Alteplase 0.9 mg/kg (MAXIMUM dose 90 mg) is recommended for administration to eligible patients who can be treated in the time period of 3 to 4.5 hours after stroke onset
  - Off-label

Alteplase Criteria – 3 to 4.5 hours

Inclusion Criteria

- Diagnosis of acute ischemic stroke causing measurable neurologic deficit
  - NO minimum NIH SS score
- Onset of symptoms within 3 to 4.5 hours prior to initiation of treatment
- Age ≥ 18 years
- Blood glucose > 50 mg/dL

Exclusion Criteria

- Age > 80 years
- Severe Stroke
  - NIH SS > 25
- Patient taking oral anticoagulant, regardless of INR
- History of BOTH diabetes and prior ischemic stroke
- Imaging evidence of ischemic injury involving > 1/3 of MCA (middle cerebral artery) territory

IV Thrombolysis Contraindication Checklist for Patients within 3 hours of Symptom Onset

	Contraindication
	Current Intracranial Hemorrhage
	Subarachnoid Hemorrhage
	Active Internal Bleeding
	Recent (within 3 months) intracranial or intraspinal surgery
	Recent (within 3 months) serious head trauma
	Presence of intracranial conditions that may increase the risk of bleeding
	Current severe uncontrolled hypertension (uncontrolled despite active measures to lower BP below 185/110 mmHg)
	Known bleeding diathesis: The 2016 AHA/ASA guidelines also advise against treatment with IV alteplase in patients: • With platelet count < 100,000/mm³ • Who have a history of warfarin use and an INR > 1.7 • Who have received a treatment dose of low-molecular-weight heparin within previous 24 hours • Who are taking direct thrombin inhibitors or direct factor Xa inhibitors, unless laboratory tests are normal or the patient has not received a dose of these agents for > 48 hours

*If any checkmarks are present patient is not a candidate for IV thrombolysis. Patient may still be eligible for endovascular screening.

Patient's current medication history

	Contraindication
	Is the patient actively taking any anticoagulant medications (such as Coumadin/warfarin, Pradaxa/dabigatran, Eliquis/apixaban, Lovenox/enoxaparin, etc.)
	Is the patient's INR > 1.7

*If "checkmarks are present for BOTH questions patient is not a candidate for IV thrombolysis. Patient may still be eligible for endovascular screening.

IV Thrombolysis Contraindication Checklist for Patients in 3 – 4.5 hours of Symptom Onset

	Contraindication
	Age > 80 years
	Use of oral anticoagulant medication, regardless of current INR value
	Baseline NIH stroke scale ≥ 25
	Imaging evidence of ischemic injury involving > 1/3 of MCA (middle cerebral artery) territory

*If any checkmarks are present patient is not a candidate for IV thrombolysis. Patient may still be eligible for endovascular screening.

Alteplase Administration

- **Dose = 0.9 mg/kg**
  - 10% of that dose to be administered over ONE MINUTE
  - Remaining dose to be infused over one hour
  - Dose should NEVER exceed 90mg

- Blood pressure must **FIRST** be safety lowered to **< 185/110** mmHg prior to administration of IV alteplase
  - May utilize Labetalol IVP or Nicardipine IV gtt
  - Other agents such as hydralazine, enalaprilat, etc. may be considered

- Once IV alteplase has been initiated blood pressure must be **MAINTAINED <180/105** mmHg for at least the next 24 hours

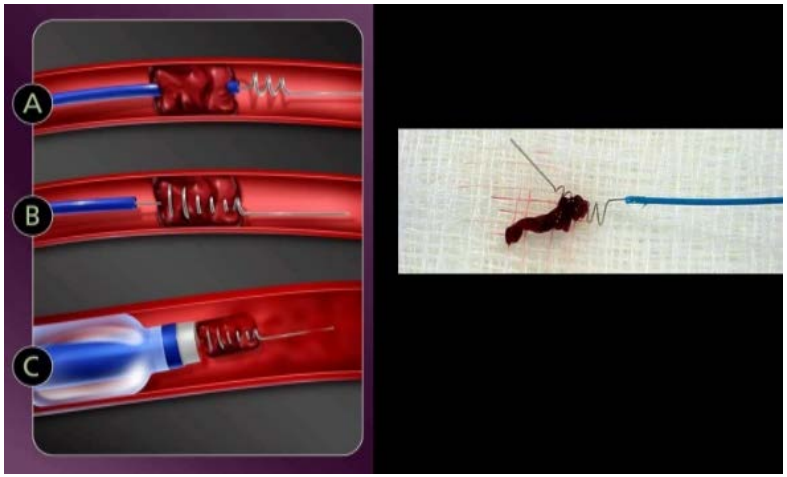
Ongoing Assessment

- For patients thrombolyzed with alteplase Neuro Checks, Vital Signs & Orolingual Angioedema assessments should be completed at minimum:
  - Q 15 minutes x 8 assessments
  - Q 30 minutes x 12 assessments
  - Q 1 hour for at least 24 hours after alteplase administration

Additional Treatment Option

Endovascular Intervention

- Standard treatment option for specific patients
- Patients should FIRST be treated with IV alteplase if they are eligible for IV thrombolysis
- CT Angiogram or other perfusion-based imaging is utilized to determine eligibility for endovascular intervention (up to 6-24 hours after symptom onset)
- Avera Medical Group Neurology can help to determine eligiblity for both IV thromoblysis and Neuroendovascular intervention



https://www.youtube.com/watch?v=cWh1ovlJg24

https://www.youtube.com/watch?v=SHDDD8Vs8fE

Immediate Supportive Care

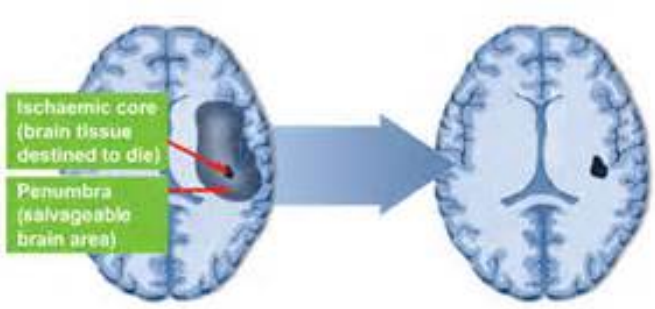
- **Cardiac monitoring should be initiated** to assess for dysrhythmia
  - Cardiac arrhythmias that may be reducing Cardiac Output should be corrected
- Blood pressure management
  - Thrombolyzed patients: maintain BP < 180/105 for at least 24 hrs
  - Non-thrombolyzed patients: in patients with 'markedly elevated' blood pressure a reasonable goal is to lower BP by 15% during the first 24 hours after onset of stroke
    - Consensus exists that meds should be withheld unless SBP is >220 mmHg or DBP is > 120 mmHg
- Airway and ventilatory support are recommended for patients with decreased LOC or compromised airway status
- Supplemental O_2 should be provided to **maintain oxygen saturation >94%**

Immediate Supportive Care

- Sources of hyperthermia should be identified and treated,
  - Antipyretic meds should be administered to lower temperature in hyperthermic patients (temp >38○C) with stroke (100.4○F)
- Hypovolemia should be corrected with IV NS
- Hypoglycemia (glucose < 60 mg/dL) should be treated with a goal to achieve normoglycemia
- Hyperglycemia should be treated to achieve blood glucose levels in the range of 140 to 180 mg/dL

Immediate Supportive Care

- Remember the zones of injury, salvage of the penumbra should be a primary goal
  - Perfusion
  - Oxygenation



Documentation and Communication

- Date & Time of **Last Known Well** should be clearly documented and communicated
- Date, time and score of **NIH Stroke Scale** should be clearly documented and communicated
- Date, time and dose of **alteplase administraiton** should be clearly documented and communicated
- Diagnostics (imaging and lab values), Vital Signs and Interventions should be clearly documented and communicated

Ongoing Assessment

- Patients suspected of having an acute stroke should have **ongoing**, **serial** assessments (physical assessment, detailed neurological assessment, vital signs) in order to follow trend of patient status

- Blood pressure should be monitored at least every 15 minutes

- Level of consciousness should be monitored closely

Avera McKennan Stroke Team Process

- Patient arrives via EMS or private vehicle + stroke symptoms identified via front desk → "Stroke Team" paged overhead
- Patient registered quickly in triage room, glucose assessed if not already obtained. ED provider performs quick triage assessment, patient then taken directly to CT
- Neuro nurse/Stroke Coordinator meets patient in ED to perform detailed neurological assessment, review IV thrombolytic eligibility
- ED nurse places patient on monitor, inserts IV and performs blood draw for laboratory work
- ED physician, ED nurse and neuro nurse huddle to share information and determine if patient is a candidate for IV thrombolysis or endovascular treatment, neurology is then contacted with patient specific information

Program Evaluation

- Review step-by-step process for when your facility first receives notification of incoming potential stroke patient
  - Consider:
    - Holding CT scanner
    - Visible stroke protocol, visible alteplase indications, checklists
    - Lab draw versus IV start during CT phase of evaluation
    - Storage & supplies to reconstitute alteplase
    - Immediate eED notification
    - Routine staff education with mock patient situations
- Review door-to-physician, door-to-CT, door-to-CT interpretation and door-to-drug times to assessment for any areas of inefficiency
- Review patient outcomes to assess for any opportunities to impact quality of care

Questions

Guidelines for the Early Management of Patients With Acute Ischemic Stroke : A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Edward C. Jauch, Jeffrey L. Saver, Harold P. Adams, Jr, Askiel Bruno, J.J. (Buddy) Connors, Bart M. Demaerschalk, Pooja Khatri, Paul W. McMullan, Jr, Adnan I. Qureshi, Kenneth Rosenfield, Phillip A. Scott, Debbie R. Summers, David Z. Wang, Max Wintermark and Howard Yonas

AHA/ASA Scientific Statement

Scientific Rationale for the Inclusion and Exclusion Criteria for Intravenous Alteplase in Acute Ischemic Stroke

A Statement for Healthcare Professionals From the American Heart Association/American Stroke Association

Emergency Neurological Life Support: Acute Ischemic Stroke

Hartmut Gross[1] · Noah Grose[2,3]

AHA/ASA Guideline

2015 American Heart Association/American Stroke Association Focused Update of the 2013 Guidelines for the Early Management of Patients With Acute Ischemic Stroke Regarding Endovascular Treatment

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Emergency Neurological Life Support: Subarachnoid Hemorrhage

Brian L. Edlow[1] · Owen Samuels[2]

AHA/ASA Guideline

Guidelines for the Management of Spontaneous Intracerebral Hemorrhage

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Emergency Neurological Life Support: Intracerebral Hemorrhage

J. Claude Hemphill III[1] · Arthur Lam[2]

References

- Hickey, J. & Livesay, S. (2016). The continuum of stroke care: An interprofessional approach to evidence-based care. Wolters Kluwer.

- Jauch, E., Saver, J., Adams, H., Bruno, A., Connors, J., Demaerschalk, B., . . . Yonas, H. (2013). Guidelines for the Early Management of Patients With Acute Ischemic Stroke: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke, 870-947.

- Livesay, S. (2014). Comprehensive review for stroke nursing. American Association of Neuroscience Nurses.

Stay Tuned.....

AHA/ASA Guideline

2018 Guidelines for the Early Management of Patients With Acute Ischemic Stroke

A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association

Reviewed for evidence-based integrity and endorsed by the American Association of Neurological Surgeons and Congress of Neurological Surgeons

Endorsed by the Society for Academic Emergency Medicine

Contact Information

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