

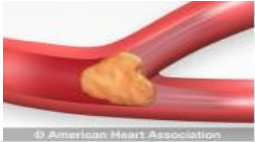
# STROKE TRAINING FOR EMS PROFESSIONALS



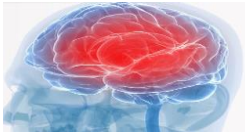
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# COURSE OBJECTIVES



About Stroke



Stroke Policy Recommendations



Stroke Protocols and Stroke Hospital Care



Stroke Assessment Tools



Pre-Notification



Stroke Treatment

# ABOUT STROKE

# STROKE FACTS

- A stroke is a medical emergency! Stroke occurs when blood flow is either cut off or is reduced, depriving the brain of blood and oxygen
- Approximately 795,000 strokes occur in the US each year
- Stroke is the fifth leading cause of death in the US
- Stroke is a leading cause of adult disability
- On average, every 40 seconds, someone in the United States has a stroke
- Over 4 million stroke survivors are in the US
- The indirect and direct cost of stroke: \$38.6 billion annually (2009)
- Crosses all ethnic, racial and socioeconomic groups



# DIFFERENT TYPES OF STROKE

## Ischemic Stroke

- Caused by a blockage in an artery stopping normal blood and oxygen flow to the brain
- 87% of strokes are ischemic
- There are two types of ischemic strokes:
  - **Embolism:** Blood clot or plaque fragment from elsewhere in the body gets lodged in the brain
  - **Thrombosis:** Blood clot formed in an artery that provides blood to the brain



Berry, Jarett D., et al. Heart Disease and Stroke Statistics --2013 Update: A Report from the American Heart Association. *Circulation*. 127, 2013.

[http://www.strokeassociation.org/STROKEORG/AboutStroke/TypesofStroke/IschemicClots/Ischemic-Stroke-Clots\\_UCM\\_310939\\_Article.jsp](http://www.strokeassociation.org/STROKEORG/AboutStroke/TypesofStroke/IschemicClots/Ischemic-Stroke-Clots_UCM_310939_Article.jsp)

# DIFFERENT TYPES OF STROKE

## Hemorrhagic Stroke

- About 13% of strokes are caused by a hemorrhage
  - Caused by a breakage in a blood vessel within the brain
- Can be the result of trauma or a ruptured aneurysm
- There are two types of hemorrhagic stroke:
  - Intraparenchymal (within the brain tissue, sometimes referred to as intracerebral) Hemorrhage: A blood vessel bursts leaking blood into the brain tissue
  - Subarachnoid Hemorrhage: Occurs when a blood vessel bursts near the surface of the brain and blood pours into the area outside of the brain, between the brain and the skull



Berry, Jarett D., et al. Heart Disease and Stroke Statistics --2013 Update: A Report from the American Heart Association. *Circulation*. 127, 2013.

[http://www.strokeassociation.org/STROKEORG/AboutStroke/TypesofStroke/HemorrhagicBleeds/Hemorrhagic-Strokes-Bleeds\\_UCM\\_310940\\_Article.jsp](http://www.strokeassociation.org/STROKEORG/AboutStroke/TypesofStroke/HemorrhagicBleeds/Hemorrhagic-Strokes-Bleeds_UCM_310940_Article.jsp)

# DIFFERENT TYPES OF STROKE

## Transient Ischemic Attack (TIA)

- A TIA or **Transient Ischemic Attack** produces stroke-like symptoms
- TIA is caused by a clot; but unlike a stroke, the blockage is temporary and usually causes no permanent damage to the brain
- Approximately 15% of all strokes occur after a TIA. **TIA is a medical emergency!**



# STROKE RISK FACTORS

Controllable Risk Factors	Non-Controllable Risk Factors
High Blood Pressure	Age
High Cholesterol	Gender
Diabetes	Race
Tobacco Use	Family History
Alcohol Use	Previous Stroke or TIA
Physical Inactivity	
Obesity	
Heart Disease	
Atrial Fibrillation	



# COMMON STROKE SYMPTOMS

## Right Hemispheric Stroke

- Slurred speech - dysarthria
- Weakness or numbness of left face, arm or leg
- Left sided neglect
- Right gaze preference

## Left Hemispheric Stroke

- Speech problems – what is being said or inability to get words out
- Problems with comprehension
- Weakness or numbness of right face, arm, or leg
- Left gaze preference

## Brainstem Stroke Symptoms

- Nausea, vomiting or vertigo
- Speech problems
- Swallowing problems
- Abnormal eye movements
- Decreased consciousness
- Crossed findings

## Intracerebral Hemorrhage

### Intraparenchymal Hemorrhage

- Nausea and Vomiting
- Headache
- One Sided Weakness
- Decreased Consciousness

### Subarachnoid Hemorrhage

- Worst Headache of Life
- Intolerance to Light
- Neck Stiffness or Pain

# COMMON STROKE MIMICS

## STROKE MIMICS

Alcohol Intoxication

Cerebral Infections

Drug Overdose/Toxicity

Epidural Hematoma

Hypoglycemia

Metabolic Disorders

Migraines

Neuropathies (Bell's Palsy)

Seizure and post seizure, Todd's Paralysis

Brain Tumors

Hypertensive Encephalopathy

# STROKE POLICY RECOMMENDATIONS

# EMS POLICY RECOMMENDATIONS

- Support ABCs: airway, breathing, circulation – give oxygen if needed
- Perform prehospital stroke assessment
- Establish time when patient was last normal
- Rapid transport to the nearest Primary Stroke Center, Comprehensive Stroke Center or GWTG-Stroke Hospital
  - EMS can bypass hospital without stroke resources if the stroke center is within reasonable transport range
- Alert receiving hospital as soon as possible of potential stroke patient “CODE STROKE”
- Check glucose level if possible



# STROKE PROTOCOLS AND STROKE HOSPITAL CARE

# STROKE CARE

**The goal of stroke care is to minimize brain injury and maximize the patient's recovery**

The **Stroke Chain of Survival** links actions to be taken by patients, family members, and healthcare providers to maximize stroke recovery. The links include:

- Family member, friend or bystander recognizes stroke warning signs and rapidly calls 9-1-1
- EMS rapidly arrives at scene and performs stroke assessment
- EMS rapidly notifies receiving hospital that patient will be arriving and EMS transports patient to the receiving hospital
- Hospital rapidly diagnoses and treats patient



# HOSPITAL LEVELS OF CARE



## Primary Stroke Center (PSC)

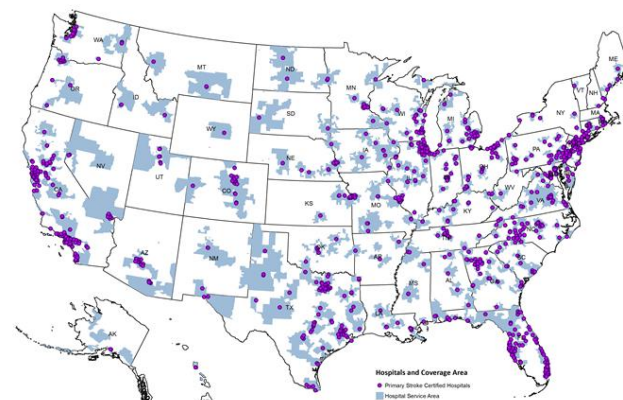
- Stabilize and provide emergency care for patients with acute stroke
- Either admit or transfer to a CSC
- Over 1,000 PSCs to date

## Comprehensive Stroke Center (CSC)

- Have the capability to support all needed levels of care to stroke patients, including
  - Special interventions
  - Highly technical procedures
- 74 certified CSCs to date (began 9/2012)

### Primary Stroke Centers

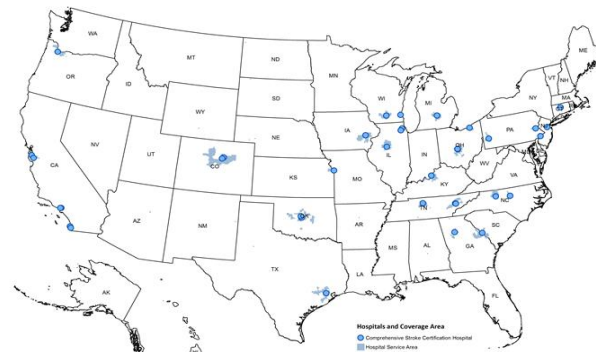
(Count: 1006 hospitals; 59.7% population coverage as of 5/19/2013)



Data as of 5/19/13. Hospital Service Area based on 2005 Dartmouth Atlas. Population estimates: ESRI 2011

### Comprehensive Stroke Certification

(Count: 36 hospitals; 8.9% population coverage as of 5/19/2013)



Data as of 5/19/13. Hospital Service Area based on 2005 Dartmouth Atlas. Population estimates: ESRI 2011

# STROKE ASSESSMENT TOOLS

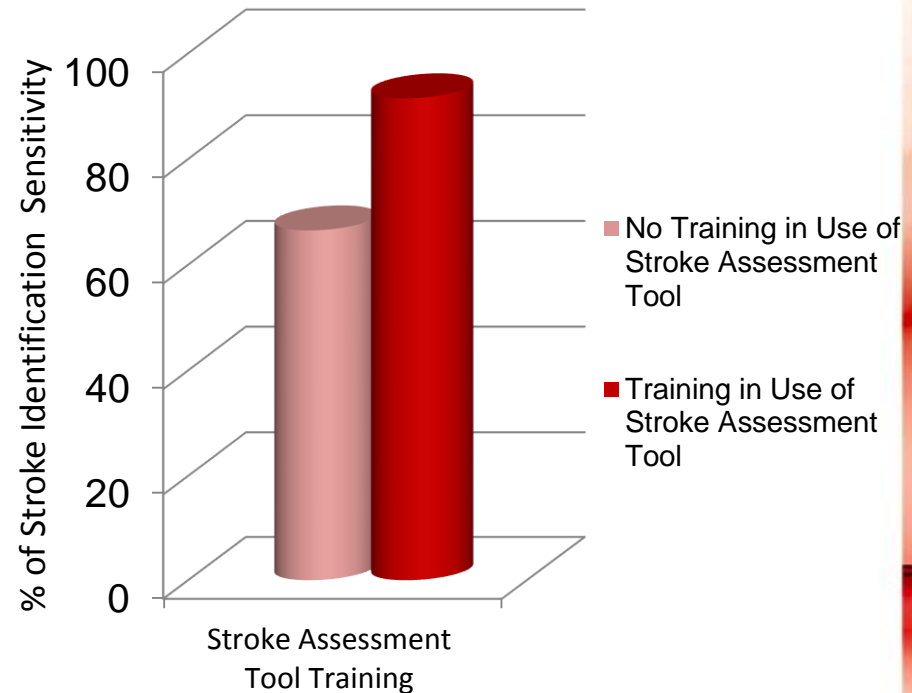


# STROKE ASSESSMENT TOOLS



- Stroke assessment tools help EMS identify a stroke quickly and transport the individual to the appropriate center
- Pre-hospital stroke assessment training raises the accuracy of stroke identification
- Paramedics demonstrated a sensitivity of 61-66% without stroke assessment training and **86-97%** with training

EMS Stroke Identification\*



# FIELD ASSESSMENT OF STROKE

There are multiple tools you can use to assess a stroke. Currently there are no standards set out by the AHA/ASA for the use of one tool over another. Cincinnati Prehospital Stroke Scale is most widely used.

## Cincinnati Prehospital Stroke Scale

### Facial Droop

Normal: Left and Right side of face move equally

Abnormal: One side of face does not move at all

### Arm Drift

Normal: Both left and right arm move together or not at all

Abnormal: One arm does not move equally with the other

### Speech

Normal: Patient uses correct words with no slurring

Abnormal: Patient has slurred speech, uses inappropriate words or cannot speak

# FIELD ASSESSMENT OF STROKE

## Los Angeles Prehospital Stroke Screen

Screening Criteria	Yes	No
1. Age over 45 years		
2. No prior history of seizure disorder		
3. New onset of neurological symptoms in just 24 hours		
4. Patient was ambulatory at baseline (prior to event)		
5. Blood glucose between 60 and 400		

Exam: Look for obvious

	Normal	Right	Left
Facial smile/grimace	_____	_____ Droop	_____ Droop
Grip	_____	____ Weak grip ____ No grip	____ Weak grip ____ No grip
Arm Weakness	_____	____ Drifts down ____ Falls rapidly	____ Drifts down ____ Falls rapidly

Table adapted from Kidwell C.S., Starkman S., Eckstein M., Weems K., Saver J.L., "Identifying stroke in the field. Prospective validation of the Los Angeles prehospital stroke screen (LAPSS)." Stroke 2000 Jan;31(1):71-6.

# FIELD ASSESSMENT OF STROKE

## Miami Emergency Neurological Deficit Scale

### MENDS : Pre Hospital Examination

#### Mental Status

Level of Consciousness (AVPU)

Speech: "You can't teach an old dog new tricks"

Questions: (Age, Month)

Commands: (Close/open eyes)

#### Cranial Nerves

Facial Droop: Show teeth or smile

Visual Fields: Four Quadrants

Horizontal Gaze: Side to side

#### Limbs

Motor: Arm Drift (close eyes hold out arms)

Leg Drift (Open eyes lift each leg separately)

Sensory: Arm, Leg (close eyes and touch, pinch)

Coordination: Arm, Leg ( finger-nose, heel-shin)

# CONSUMER ASSESSMENT OF STROKE



**F**ace Drooping - Ask the person to smile. Does one side of the face droop or is it numb?

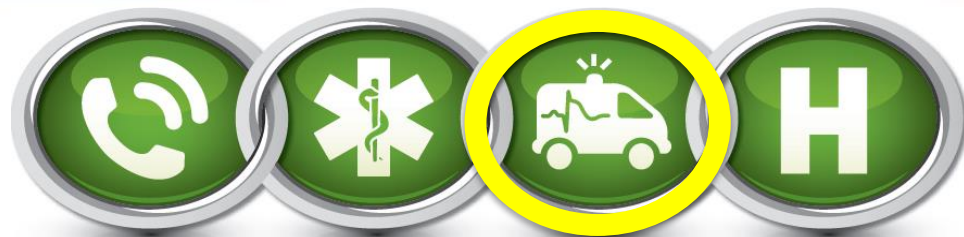
**A**rm Weakness - Ask the person to raise both arms. Is one arm weak or numb? Does one arm drift downward?

**S**peech Difficulty - Ask the person to repeat a simple sentence, like "the sky is blue." Is the sentence repeated correctly? Are they unable to speak, or are they hard to understand?

**T**ime to call 9-1-1 - If the person shows any of these symptoms, even if the symptoms go away, call 9-1-1 and get them to the hospital immediately.

# PRE-NOTIFICATION

# PRE-NOTIFICATION SYSTEMS



- EMS professionals can notify hospital staff that a stroke patient is being sent to the hospital prior to them arriving at the hospital
- Pre-notification systems help improve rapid triage, evaluation, and treatment of patients with acute ischemic stroke
- The sooner the patient gets to medical treatment, the greater potential for a better outcome

## EMS Pre-Notification Systems

The study cited below by Lin, et al. observed shorter symptom onset to hospital arrival when a pre-notification system was used

There was an increase in the amount of patients with door-to-imaging times within 25 min

When a pre-notification system was used there were lower onset to door times observed (113 min vs. 150 min)

Overall, pre-notification resulted in more rapid triage, evaluation, and treatment of patients with acute ischemic stroke

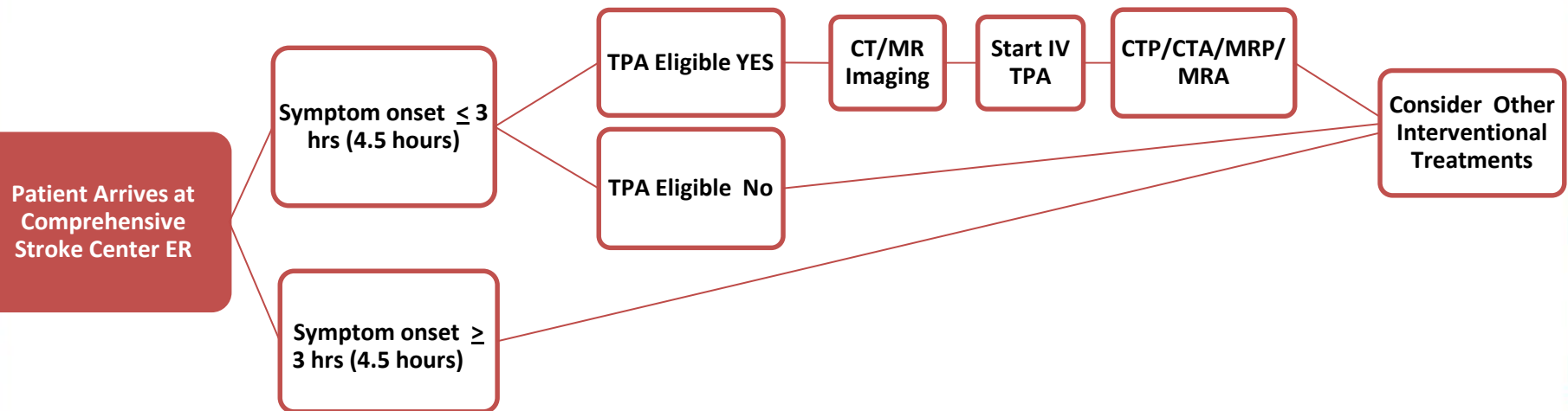
Lin, C. B., Peterson, et al. (2012). Emergency Medical Service Hospital Pre-Notification is Associated with Improved Evaluation and Treatment of Acute Ischemic Stroke. *Journal of the American Heart Association*, 1-9.

<http://circoutcomes.ahajournals.org/content/5/4/514.abstract?sid=c69e97af-b8b943dcb7c8-e56821ee6c86>

# STROKE TREATMENT OPTIONS



# STROKE TREATMENT PROTOCOLS



# STROKE TREATMENT OPTIONS

## Medical Management

- IV-tPA is the clot busting drug used with stroke patients
- Patients must be within the time window of 0-3 (or 3-4.5 hour window (in certain eligible patients) hours from symptom onset
- There are other contraindications associated with the use of the drug

## Intra-arterial Thrombolysis

- IA thrombolysis is a technique where the doctor uses a catheter (like a heart catheterization) to administer tPA directly into the blood clot blocking blood flow to part of the brain
- This treatment can be administered up to 6 hours after stroke symptoms onset
- Patients must meet strict criteria in order to receive this procedure

## Mechanical Thrombectomy

- This procedure uses a device to retrieve the clot
- The time window for mechanical thrombectomy is up to 8 hours from symptom onset
- If the patient fails IV-tPA or is ineligible for IV-tPA, they may be eligible for mechanical thrombectomy

# PUBLISHED RCT CURRENT TREATMENT OUTCOMES

## Thrombolytics

- Revascularization success with IV rt-PA
- Mortality rates
- Disability (Modified Rankin Scale measure of disability at 90 days after rt-PA)

## Mechanical Thrombectomy

- Revascularization success with endovascular/interventional procedures
- Mortality rates
- Disability (Modified Rankin Scale measure of disability at 90 days after an interventional procedure)

Tissue Plasminogen Activator for Acute Ischemic Stroke. *The New England Journal of Medicine*, 333:24, 1995.

Mendes, Dávalos A, Pereira V, Chapot R, Bonafé A, Andersson T, and Jan, Gralla. Retrospective Multicenter Study of Solitaire™ FR for Revascularization in the Treatment of Acute Ischemic Stroke. *Stroke*. 2012.

Pereira, Vitor M., et al. Prospective, Multicenter, Single-Arm Study of Mechanical Thrombectomy Using Solitaire Flow Restoration in Acute Ischemic Stroke. *Stroke*. 2013.

Saver, Jeffrey L., et al. Solitaire flow restoration device versus the Merci Retriever in patients with acute ischaemic stroke (SWIFT): a randomised, parallel-group, non-inferiority trial. *The Lancet*. 2012.

**THANK YOU**