STROKE TRAINING
FOR EMS PROFESSIONALS
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

http://www.strokeassociation.org/STROKEORG/AboutStroke/TypesofStroke/IschemicClots/Ischemic- strokes-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

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

<table>
<thead>
<tr>
<th>Controllable Risk Factors</th>
<th>Non-Controllable Risk Factors</th>
</tr>
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<tbody>
<tr>
<td>High Blood Pressure</td>
<td>Age</td>
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<tr>
<td>High Cholesterol</td>
<td>Gender</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Race</td>
</tr>
<tr>
<td>Tobacco Use</td>
<td>Family History</td>
</tr>
<tr>
<td>Alcohol Use</td>
<td>Previous Stroke or TIA</td>
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<tr>
<td>Physical Inactivity</td>
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<tr>
<td>Obesity</td>
<td></td>
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<tr>
<td>Heart Disease</td>
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<tr>
<td>Atrial Fibrillation</td>
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</table>

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

<table>
<thead>
<tr>
<th>STROKE MIMICS</th>
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</thead>
<tbody>
<tr>
<td>Alcohol Intoxication</td>
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<tr>
<td>Cerebral Infections</td>
</tr>
<tr>
<td>Drug Overdose/Toxicity</td>
</tr>
<tr>
<td>Epidural Hematoma</td>
</tr>
<tr>
<td>Hypoglycemia</td>
</tr>
<tr>
<td>Metabolic Disorders</td>
</tr>
<tr>
<td>Migraines</td>
</tr>
<tr>
<td>Neuropathies (Bell’s Palsy)</td>
</tr>
<tr>
<td>Seizure and post seizure, Todd’s Paralysis</td>
</tr>
<tr>
<td>Brain Tumors</td>
</tr>
<tr>
<td>Hypertensive Encephalopathy</td>
</tr>
</tbody>
</table>

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
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

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)

http://www.qualitycheck.org/StrokeCertificationList.aspx
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

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.

<table>
<thead>
<tr>
<th>Cincinnati Prehospital Stroke Scale</th>
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</thead>
<tbody>
<tr>
<td><strong>Facial Droop</strong></td>
</tr>
<tr>
<td>Normal: Left and Right side of face move equally</td>
</tr>
<tr>
<td>Abnormal: One side of face does not move at all</td>
</tr>
<tr>
<td><strong>Arm Drift</strong></td>
</tr>
<tr>
<td>Normal: Both left and right arm move together or not at all</td>
</tr>
<tr>
<td>Abnormal: One arm does not move equally with the other</td>
</tr>
<tr>
<td><strong>Speech</strong></td>
</tr>
<tr>
<td>Normal: Patient uses correct words with no slurring</td>
</tr>
<tr>
<td>Abnormal: Patient has slurred speech, uses inappropriate words or cannot speak</td>
</tr>
</tbody>
</table>

# FIELD ASSESSMENT OF STROKE

## Los Angeles Prehospital Stroke Screen

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

**Exam: Look for obvious**

<table>
<thead>
<tr>
<th>Normal</th>
<th>Right</th>
<th>Left</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facial smile/grimace</td>
<td></td>
<td>____Droop</td>
</tr>
<tr>
<td>Grip</td>
<td></td>
<td>____Weak grip</td>
</tr>
<tr>
<td></td>
<td></td>
<td>____No grip</td>
</tr>
<tr>
<td>Arm Weakness</td>
<td></td>
<td>____Drifts down</td>
</tr>
<tr>
<td></td>
<td></td>
<td>____Falls rapidly</td>
</tr>
</tbody>
</table>

FIELD ASSESSMENT OF STROKE

Miami Emergency Neurological Deficit Scale

<table>
<thead>
<tr>
<th>MENDS : Pre Hospital Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mental Status</strong></td>
</tr>
<tr>
<td>Level of Consciousness (AVPU)</td>
</tr>
<tr>
<td>Speech: “You can’t teach an old dog new tricks”</td>
</tr>
<tr>
<td>Questions: (Age, Month)</td>
</tr>
<tr>
<td>Commands: (Close/open eyes)</td>
</tr>
<tr>
<td><strong>Cranial Nerves</strong></td>
</tr>
<tr>
<td>Facial Droop: Show teeth or smile</td>
</tr>
<tr>
<td>Visual Fields: Four Quadrants</td>
</tr>
<tr>
<td>Horizontal Gaze: Side to side</td>
</tr>
<tr>
<td><strong>Limbs</strong></td>
</tr>
<tr>
<td>Motor: Arm Drift (close eyes hold out arms)</td>
</tr>
<tr>
<td>Leg Drift (Open eyes lift each leg separately)</td>
</tr>
<tr>
<td>Sensory: Arm, Leg (close eyes and touch, pinch)</td>
</tr>
<tr>
<td>Coordination: Arm, Leg (finger-nose, heel-shin)</td>
</tr>
</tbody>
</table>
**CONSUMER ASSESSMENT OF STROKE**

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

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

**Speech 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?

**Time 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.

http://www.strokeassociation.org/STROKEORG/WarningSigns/Warning-Signs_UCM_308528_SubHomePage.jsp
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. |


[http://circoutcomes.ahajournals.org/content/5/4/514.abstract?sid=c69e97af-b8b943dc8-8c4b-030c](http://circoutcomes.ahajournals.org/content/5/4/514.abstract?sid=c69e97af-b8b943dc8-8c4b-030c)
STROKE TREATMENT OPTIONS
STROKE TREATMENT PROTOCOLS

Patient Arrives at Comprehensive Stroke Center ER

- Symptom onset ≤ 3 hrs (4.5 hours)
  - TPA Eligible YES
  - Start IV TPA
  - CTP/CTA/MRP/MRA

- Symptom onset > 3 hrs (4.5 hours)
  - TPA Eligible No
  - Consider Other Interventional Treatments
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
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)

THANK YOU