Focus on Quality

heart.org/quality

GET WITH THE GUIDELINES
STROKE
GET WITH THE GUIDELINES
HEART FAILURE
GET WITH THE GUIDELINES
RESUSCITATION
GET WITH THE GUIDELINES
AFIB
ACTION Registry-GWTC™
The Guideline Advantage
MISSION: LIFELINE
HOSPITAL Accreditation & Certification
TARGET: STROKE
TARGET: HF

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Stroke Essentials: EMS and Stroke
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Overview of Stroke
Overview

• Stroke Background
• Who we are
• EMS and stroke
• What we need to know
• Acute Treatment Options
• Hospital care
• Future directions in EMS
Case: CC

33 y/o man

- Presented 1 hour after sudden onset slurred speech, left sided weakness, neglect, hemisensory loss
- EMS contacted, patient presented to ED with field notification
- NIHSS 16
- Received IV tPA w/in 30 minutes of presentation to ED
- No improvement in examination
- Right MCA thrombus on imaging
Background

• Stroke is the 3rd most common cause of death in the US and leading cause of adult disability (Gos, 2014)

• 87% of strokes are ischemic (Gos, 2014)

• IV tPA administered in only 1.8 – 2.1% of ischemic strokes (Kleindorfer, 2008)

• 1.9 million neurons lost per minute of untreated ischemic stroke (Saver, 2006)
  – **TIME IS BRAIN**

• 3.6 years lost (accelerated aging) per hour of untreated ischemic stroke (Saver, 2006)
Background

• 2005 Survey (Fang, 2005):
  – 93% of patients were able to recognize stroke-specific symptoms
  – 38% knew to call 9-1-1 when someone was having a stroke

• Patients who arrive at the emergency room within 3 hours have less disability at 3 months compared to those who received delayed care (Lancet, 2004)
Types of Stroke

- **Ischemic**
  - Lack of blood flow
  - Lacunar
  - Large vessel
    - Vascular Distribution
- Ischemic with hemorrhagic conversion
  - Vascular Distribution

- **Hemorrhagic**
  - Intracerebral
  - Intraventricular
  - Subarachnoid
Our Story
Plaza Medical Center

• Magnet Hospital
• Level I Designated / Certified Comprehensive Stroke Center
• Graduate Medical Education Program
• Texas Stroke Institute
• Large neuroscience service line
• Located in the heart of the hospital district in Ft Worth
Bedford Fire Department

EMS

- Located in the Mid Cities area
- EMS responds to over 4300 incidents per year

Requirements for paramedics:
- Successfully complete a 6-month field-training program
- Successfully pass comprehensive protocol and skills testing
- Required to attend monthly medical training classes taught by Tarrant County College.
- Receive additional certification including NIHSS, ACLS, and PHTLS
- Staffed M.I.C.U.’s with firefighter/paramedics
The First Step

• Meet with local EMS agencies
• Agree on common goals (i.e. field blood draws)
• Monitor the process
• Celebrate the successes
• Share the data
EMS & Hospital Collaboration

- Plaza’s EMS Quarterly Updates
  - D2N EMS Task Force
- Mid Cities Educational Updates
- Air Medical Quarterly Updates
- EMS Grand Rounds
- Zone 7 Regional Advisory Council EMS
- HCA Texas Stroke Institute
  - EMS Liaisons & Grand Rounds
- EMS Stroke Video for Community
Act Fast! Time is Brain

FAST Study Article in STROKE  April 2004

http://stroke.ahajournals.org/content/35/6/1355.full
EMS and Pre hospital Stroke Care
Stroke Essentials: EMS and Stroke

How do you view strokes? Are they all the same?

Is urgent or emergent care needed for strokes?
Is It “just a Stroke ?”

With greatly **improve treatments** Stroke patients can be saved and we can help protect their quality of life. We must step up our programs, educate EMS & Medical personnel. Strokes must be handle with the same emergence as STEMI & Trauma!
The Actions of EMS Impact the Outcomes of the Stroke Patient

- 911 to hospital goal is 30 minutes
- Identify s/s stroke
- Symptom onset and last known well
- Pre hospital Neuro assessment (rapid NIHSS)
- Pre hospital stroke activation
- BP management
- Field blood draws
- Two IVs
- EKG transmission
- Priority transport
EMS Treatment Goals

• 911 to ED 30 minutes
• Access Patient using Rapid NIH score
• Alert Stroke Team
• Secure to two large bore IV’s
• Transmit 12 Lead EKG to ED
• Draw Blood for ED
• Control BP
EMS Responsibility

• Must Have Appropriate Training
• Must Have Appropriate Protocols
• Must Have Clear and Supportive Medical Direction
• Must have strong partnership with Hospitals
• Must have a Team Approach
Time is Critical

EMS Must Understand and Act

• Quick Assessment
• Patient History
• Transport to Appropriate Facility
• Every Minute is critical

\[
\text{Time} = \uparrow \quad \text{Brain Cells Loss} = \downarrow \quad \text{Life}
\]
What We Need to Know

• LKN vs. Time of Onset
  – Who saw it?
  – How did they know?
  – What is normal?
  – What were they doing?

• Home medications?
  – Blood thinners? Stroke risk factors?

• Recent or remote history of bleeding?
EMS Field Blood Draws

Improve Door To Needle time
Securing I.V. Access

Having Two Large Bore IV’s is very important prior to arrival at ED
Performing Stroke Assessment

EMS Should Perform a Good Stroke Assessment such as the Rapid NIH to relay to the ED
# EMS Rapid NIH Stroke Scoring Tool

## Rapid NIH Stroke Score

<table>
<thead>
<tr>
<th>NHSS Date</th>
<th>Initial NIHSS Time</th>
<th>Time Last Known Normal</th>
<th>Time Symptoms Recognized</th>
<th>Initial Score</th>
<th>Concurrent Hospital Score</th>
</tr>
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### Visual Fields
- Normal: 0
- Partial Hemianopia: 1
- Complete Hemianopia: 2

### Left Arm Motor
- No Drift: 0
- Mild Drift: 1
- Major Deficit: 3
- No Movement: 4

### Right Arm Motor
- No Drift: 0
- Mild Drift: 1
- Major Deficit: 3
- No Movement: 4

### Left Leg Motor
- No Drift: 0
- Mild Drift: 1
- Major Deficit: 3
- No Movement: 4

### Right Leg Motor
- No Drift: 0
- Mild Drift: 1
- Major Deficit: 3
- No Movement: 4

### Sensory
- Normal: 0
- Impaired: 1

### Language
- Normal: 0
- Mild Aphasia: 2
- Severe Aphasia: 3
- Complete Aphasia: 4

### LOC
- Oriented to Person, Place, and Time: 0
- Confused to Person, Place, or Time: 1
- Unable to answer ANY correct: 4

### Total Score (27 possible)

### Criteria for Transport to Comprehensive Stroke Center

- Onset greater than 3 hrs:  
- Surgery within last 14 days:  
- MI or previous Stroke within last 3 months:  
- Hemorrhage within last 21 days:  
- Age less than 18 years:  
- NIHSS Greater than 8:  
- PFI Assessment Failure:  
- Stroke Symptoms with Severe Headache:  

### PFI Assessment (Cerebellar Infarct)
- Finger-to-nose Test (Normal/missed):  
- Right Hand (Normal/missed):  
- Vertical Nystagmus (Positive/Negative):  

### Scoring Explanations for Modified NIHSS

- **Gaze**
  - 1 = Partial Gaze Palsy: Patient is unable to move one or both eyes completely to both directions.
  - 2 = Forced Deviation: The patient has conjugate deviation of the eyes to the right or left, even with reflex movements.
  - 3 = Minimal Movement: Patient is able to hold the outstretched limb for 10 seconds.
  - 4 = No movement: The patient is unable to move the limb. There is no effort against gravity.

- **Motor Function - Arms (Left and Right):** Done separately
  - 0 = No drift: The patient is able to hold the outstretched limb for 10 seconds.
  - 1 = Mild Drift: The patient is able to hold the outstretched limb for 10 seconds, but there is some fluttering or drift of the limb.
  - 2 = Minimal Movement: The patient is not able to bring the limb off the bed but there is some effort against gravity.
  - 3 = No movement: The patient is unable to move the limb. There is no effort against gravity.

- **Motor Function - Legs (Right and Left):** Done separately
  - 0 = No drift: The patient is able to hold the outstretched limb for 5 seconds.
  - 1 = Mild Drift: The patient is able to hold the outstretched limb for 5 seconds but there is instead a fluttering, or drift of the limb.
  - 2 = Minimal Movement: The patient is not able to bring the limb off the bed but there is effort against gravity.
  - 3 = No movement: The patient is unable to move the limb. There is no effort against gravity.

- **Sensory**
  - 0 = Normal: No sensory loss to pin is detected.
  - 1 = Partial loss/Impaired: Mild to moderate diminution in perception to pin stimulation is recognized. This may involve more than one limb.

- **Best Language**
  - 1 = Mild to moderate aphasia: The patient has mild to moderate naming errors, word finding errors, paraphasias, or mild impairment in comprehension or expression.
  - 2 = Severe aphasia: The patient has severe aphasia with difficulty in reading as well as naming objects. Patient with either Broca or Wernicke aphasia is included here.

- **LOC**
  - 0 = Oriented to Person, Place and Time
  - 1 = Confused to Person, Place and Time
  - 2 = Unable to answer ANY correct

### Hospital NIHSS Time

- Hospital Intervention (Interventional)
- Obs Care
- IV+Ps

### EMS Rapid NIH Stroke Scoring Tool

- EMS Rapid NIH Stroke Scoring Tool
- NIH Stroke Scoring Tool
Call Code Stroke

Alert the Hospital Stroke Team Prior to Arrival
Speeds up the process
Patient Follow Up’s

• Meet with Hospital Staff on a Regular Bases
• Share Outcomes with EMS Personnel
• Maintain Good Morale
• Combine 911 to Needle (tPA)
• Training – Improve Process
• Work with Hospital to Improve Combined Times
EMS Must Educate

• Personnel
• Medical Director
• Hospital Partners
• Management
• Public – Citizens
• Local Government – Elected Officials
Acute Hospital Care

Designated by the state of Texas as a Level I Comprehensive Stroke Center
Acute Treatment Options

• 0 – 3 hour window
• 3 – 4.5 hour window
• Endovascular considerations
  – Based on:
    • Stroke severity
    • Age
    • Advanced imaging
Brain Attack Care

• Receives the EMS stroke field activation
• ED activates the Code Stroke pager system
• EMS goes straight to CT with the patient
• ED Physician, ED nurse and Code Stroke Team meets the patient and EMS in CT control room
• Report and hand off communication completed with EMS
Brain Attack Care

• NIHSS performed by ED physician
• Patient vital signs obtained
• CT performed
• Pre-registration completed by ED nurse
• TSI notified by ED physician
• TSI reviews scans & recommends course of care
Thrombolytic Indications

- Acute ischemic stroke symptoms causing measurable neurological deficit via NIH Stroke Scale
- Symptom onset within 4.5 hours
- CT head without intracranial hemorrhage or pathology other than acute ischemic stroke
- Age > 18 years
Brain Attack Care

• tPA mixed by ED RN at bedside
• Patient is further assessed
• Once tPA is initiated, then CTA or Brain Attack MR is completed
• Monitor patient for neurological deterioration
  - Headache / Nausea / Vomiting / Worsening stroke symptoms / Decreased LOC
• Monitor for angioedema
  - Tongue or mouth swelling / Respiratory distress / rash
Brain Attack Care

Manage Hypotension and Hypertension

- Post tPA parameters are sBP<180, dBP<105
- If Cardene is started the BP parameters are sBP 160-180, and dBP 80-100
- Keep the BP elevated to perfuse the penumbra for at least the first 24 hrs post tPA before considering a gradual decrease
Brain Attack Care

Monitor Blood Sugars

• The brain is the primary organ when it comes to glucose consumption; it loves glucose
• Too much glucose to an impaired brain leads to cerebral edema and slows the healing process
• Aim for control of 120-180
• Initiate a nutritional plan: diet vs tube feedings
ENDOVASCULAR SERVICES

Ischemic Stroke: IV t-PA, Ia t-PA, stenting, angioplasty, thrombectomy/embolectomy

- Penumbra
- Solitaire
- Trevo
- Merci
- IV / IA tPA

Hemorrhagic Stroke: coiling, clipping, stenting, embolization, vasospasm treatment

- Pipeline
- Onyx
- Coils
- Verapamil Injection
- PTA
- Treatments for Vasospasm
Case CC (cont’d):

- Taken for mechanical thrombectomy
- Recovered strength on left
- NIHSS 16
- → 4 next day
- Now (3 months)
  - NIHSS 0
  - Back at work
  - Brought wife and 3 young children to follow-up
References


• Saver JL. Time is Brain—Quantified. Stroke 2006;37:263-266.

EMS and Hospital Acute Stroke Care
Future goals, plans, and initiatives
To the moon and beyond!
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