Best Practice for Acute Ischemic Stroke

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Intermountain Stroke Conference
October 28, 2016
Disclosures

None
Objectives

Define Stroke and TIA, discuss the ABCD² and Stroke Risk

Discuss acute ischemic stroke impact, statistics, assessment and treatment options

Understand Utah’s “Stroke System of Care” and the role it plays in providing best practice

Discuss providing best practice care based on national guidelines and core measures for stroke
Acute Stroke

Time is Brain

- From onset to completion, the average stroke is 10 hours, with a variation of 6 to 18 hours.
- For every 12 minutes that treatment is delayed, a pea-sized piece of brain dies.
- Brain tissue the size of 1 1/2 ping-pong balls is irretrievably lost if a typical stroke runs its course without treatment.
Impact of Stroke

Stroke is the leading cause of serious long-term disability and the fifth leading cause of death in the United States, accounting for 1 in every 18 deaths.

On average, every 40 seconds, someone in the United States has a stroke and every 4 minutes someone dies of a stroke.

Each year, approximately 795,000 people have a stroke in the United States. Approximately 610,000 of these are first attacks and 185,000 are recurrent attacks.

87% are considered to be ischemic, resulting from a clot in the cerebral vasculature that obstructs the flow of oxygen and nutrients to the brain. The other 13% are hemorrhagic.

The estimated direct and indirect cost of stroke in 2010 is $73.7 billion.
Acute Stroke

The 8 D’s of Stroke Treatment

- Detection of the signs and symptoms of stroke
- Dispatch of EMS by telephoning 911 or the emergency response number)
- Delivery with advanced prehospital notification to a hospital capable of providing acute stroke care
- Door of the ED, including arrival and urgent triage in the ED
Acute Stroke

The 8 D’s of Stroke Treatment

- **Data**, including computed tomography (CT) scan and interpretation of the scan
- **Decision** regarding treatment, including fibrinolytics
- **Drug** administration (as appropriate) and post-administration monitoring
- **Disposition** with rapid admission to stroke unit, critical care unit
Stroke is a Brain Attack

A stroke is a medical emergency. A stroke is a “brain attack.”

A stroke is a sudden neurological deficit caused by interruption of blood flow to the brain.

A stroke may be caused by thrombosis, embolism, or hemorrhage.
Transient Ischemic Attack (TIA)

The classic definition of a TIA is an event (sometimes called a mini-stroke) or stroke symptoms that always last less than 24 hours before disappearing.

It is estimated that one third of episodes characterized as a TIA using this classic definition would be considered infarctions on the basis of diffusion-weighted magnetic resonance imaging findings.

Leading to the proposal of a new definition of TIA:

- Brief episode of neurologic dysfunction caused by focal brain or retinal ischemia
- Clinical symptoms typically lasting less than 1 hour
- No evidence of cerebral infarction (using advanced neuroimaging techniques)
- Urgent brain imaging is recommended

While it is generally assumed that TIAs do not cause permanent brain damage, they are a serious warning sign of stroke and should not be ignored.
Stroke Following a TIA

More than one-third of all people who have experienced a TIA will go on to have an actual stroke. In fact:

- 5% will have a stroke within two days of their TIA
- 10% will have a stroke within 90 days of their TIA
- 14% will have a stroke within one year of their TIA

Of those who have had a TIA before their stroke:

- 17% had a TIA on the day of their stroke
- 43% had a TIA during the 7 days prior to their stroke

The ABCD² Score is used to predict a patient’s risk of stroke following a TIA. Studies have found that as the ABCD² Score goes up, so does the risk of subsequent stroke. Not only in the long-term, but in the short-term as well.
**ABCD² Score**

<table>
<thead>
<tr>
<th>Category</th>
<th>Criteria</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A- Age</td>
<td>≥ 60 years</td>
<td>1 point</td>
</tr>
<tr>
<td>B- Blood Pressure</td>
<td>SBP &gt; 140 mm Hg or DBP ≥ 90 mm Hg</td>
<td>1 point</td>
</tr>
<tr>
<td>C- Clinical feature</td>
<td>Unilateral weakness</td>
<td>2 points</td>
</tr>
<tr>
<td></td>
<td>Speech disturbance without weakness</td>
<td>1 point</td>
</tr>
<tr>
<td>D- Duration of symptoms</td>
<td>≥ 60 minutes</td>
<td>2 points</td>
</tr>
<tr>
<td></td>
<td>10-59 minutes</td>
<td>1 point</td>
</tr>
<tr>
<td>D- Diabetes</td>
<td>Diabetes</td>
<td>1 point</td>
</tr>
</tbody>
</table>
ABCD² Score

A patient who has completely resolved and has a score of 4 or less can be discharged from the ED and worked up in an urgent rapid access TIA clinic within 24 hours.

Patient’s who have completely resolved, but score a 5 or higher should be admitted due to much higher risk of stroke in the next 48 hours.
Acute Stroke

Critical in-hospital time goals established by the NINDS for assessment and management of patients with suspected stroke:

- Door to Physician – 10 minutes
- Door to CT Complete – 25 minutes
- Door to CT Read – 45 minutes
- Door to TPA – 60 minutes
What is the NIHSS

The NIH Stroke Scale (NIHSS) was originally designed as a research tool to measure stroke severity. Over time, it has developed into the gold standard for stroke assessment and measurement. It is used for both initial assessments of stroke severity and monitoring changes in the patient’s condition.

The American Heart Association’s Get With the Guidelines-Stroke collects data on indicators of quality stroke care, including whether the initial NIHSS was done on each stroke patient.

The NIHSS gives a numerical value to stroke severity, allows caregivers to compare scores over time, and gives a common language to the stroke community.

Online training to use the NIHSS is time consuming and nurses who use it infrequently find it difficult to use due to the neurologic terminology embedded in the scale.

Sandy Dancer and her colleagues at Providence Portland Medical Center modified the NIHSS by replacing the neurologic terminology for each component of the original scale with plain English. No components were deleted or changed; the language was merely simplified. Testing showed the modified tool to be reliable (0.96) and valid (0.977) when compared with the NIHSS.
Large Vessel Distribution Predicted by NIH Stroke Scale (NIHSS)

- NIHSS 5 - 9: 36% Large Vessel
- NIHSS 10 - 14: 44% Large Vessel
- NIHSS ≥12: 91% Central Large Vessel
- NIHSS 15+: 100% Large Vessel

Treatment Options

Thrombolytic Therapy

- The National Institute of Neurological Disorders and Stroke (NINDS) Studies
  - Part I – clinical outcomes 24 hours post TPA
  - Part II – clinical outcomes 3 months post TPA
- For carefully screened, eligible patients with acute ischemic stroke, thrombolytic therapy has been shown to be highly beneficial
Treatment Options

*IV Alteplase (t-PA)*
- Recombinant Tissue Plasminogen Activator (rtPA)
- Approved by U.S. FDA in 1996
- Only thrombolytic drug approved for ischemic stroke
- Restores blood flow to the brain
- Only 3-4% of all ischemic stroke patients
- Inclusion/Exclusion criteria
Treatment Options

Beyond 3 Hours

- ECASS-3 Study/European Cooperative Acute Stroke Study-3 (2008)
- IV TPA may be considered up to 4.5 hours in selected patients who present after 3 hours from time last known well AND are:
  - < 80 yrs old
  - Not on any anticoagulants
  - NIHSS ≤ 25
  - No history of diabetes or stroke
- Consultation with Neurologist recommended
Treatment Options

*IA Alteplase (t-PA)*

- Extends intervention time window to 6 hours
- Higher concentrations directly into thrombus
- Large thrombus in middle cerebral artery (MCA)
- Life-threatening vertebrobasilar stroke in the posterior circulation
- Contraindication to IV Alteplase (t-PA)
- Can be used in conjunction with IV tPA and/or with mechanical thrombectomy devices
Treatment Options

**MERCI Device**

- Mechanical Embolus Removal in Cerebral Embolism
- First retrieval device approved for clot retraction
- Vessels opened with a device that removes, or ‘grabs’, the thrombus from an intracranial artery
Treatment Options

Penumbra System

- Second retrieval device approved to remove blood clots
- Designed to revascularize large vessel occlusions
- Continuous aspiration to ‘suck’ the thrombus from an intracranial artery
Treatment Options

Stentriever Devices

- Trevo
- Solitaire
- These are retrieval devices based on stent technology
- The device grabs and removes the thrombus from an intracranial artery, opening the vessel
Acute Stroke

*Pre-Alteplase (t-PA) Interventions and Management*

- Obtain time Last Seen Normal (LSN)
- Obtain patient weight
- Stat labs: ISTAT glucose and creatinine, BMP, CBC, PT/INR,
- Stat CT non-contrast; consider CTA and/or CTP
- ECG
Acute Stroke

Pre-Alteplase (t-PA) Interventions and Management

- Ensure 2 large bore (18 gauge) IVs are placed
- If Foley catheter is needed, try to place before Alteplase (t-PA) bolus given
- NPO
- Bedrest with HOB flat, as airway permits
- Continuous cardiac monitoring
Acute Stroke

Post-Alteplase (t-PA) Interventions and Management

- Vital signs every 15 minutes for 2 hours, every 30 minutes for 6 hours, every 1 hour for 16 hours
- Neuro checks every 15 minutes for 2 hours, every 30 minutes for 6 hours, every 1 hour for 16 hours, including assessing for angioedema and bleeding
- Maintain normoglycemia and normal body temperature (37.6 or under)
- Nursing Swallow Screen prior to any oral intake
- Telemetry
Acute Stroke

Post-Alteplase (t-PA) Interventions and Management

- Permissive hypertension
- Fasting lipid panel and A1c
- Echocardiogram (TTE or TEE)
- PT, OT and ST
- Antiplatelet by second midnight
- Statin
- Rehab consult
- Stroke Education
Utah Statewide Stroke System

- Stroke Receiving Facility or Acute Stroke Ready Hospital (SRF or ASRH)
- Primary Stroke Centers (PSC)
- Comprehensive Stroke Centers (CSC)
Joint Commission Certification

Gold Seal of Approval

PSCs
Utah Valley Regional Medical Center
McKay-Dee Hospital Center
Dixie Regional Medical Center
CSC
Intermountain Medical Center
State Stroke Certification

Stroke Receiving Facilities

[Logo]
Joint Commission and State Measures and Expectations
Joint Commission

Primary Stroke Center Certification Program

- Developed and launched in 2003 in collaboration with the American Heart Association/American Stroke Association (AHA/ASA)
- Incorporates recommendations from Brain Attack Coalition (BAC)
- The Certificate of Distinction for Primary Stroke Centers recognizes centers that make exceptional efforts to foster better outcomes for stroke care
- Programs applying for advanced certification must meet the requirements for Disease-Specific Care Certification, plus additional clinically specific requirements and expectations
- Certified primary stroke centers must collect and report on eight National Inpatient Hospital Quality Measures for stroke
- Ongoing data submission and certification activities
Joint Commission

Comprehensive Stroke Center Certification

• Recognizes hospitals that meet standards to treat the most complex stroke cases. Eligibility standards include all components of a Primary Stroke Center, plus:
  • Availability of advanced imaging techniques, including MRI/MRA, CTA, DSA and TCD
  • Availability of personnel trained in vascular neurology, neurosurgery and endovascular procedures
  • 24/7 availability of personnel, imaging, operating room and endovascular facilities
  • ICU/Neuroscience ICU facilities and capabilities
  • Experience and expertise treating patients with large ischemic strokes, intracerebral hemorrhage and subarachnoid hemorrhage (also volume dependent)
Joint Commission

Primary Stroke Center Certification

- Recognizes hospitals that meet standards to support better outcomes for stroke care. Eligibility standards include:
  - A dedicated stroke-focused program
  - Staffing by qualified medical professionals trained in stroke care
  - Individualized care to meet stroke patients’ needs
  - Patient involvement in their hospital care
  - Coordination of post-discharge patient self-care based on recommendations of the Brain Attack Coalition and guidelines published by the American Heart Association/American Stroke Association or equivalent guidelines
  - Streamlined flow of patient information while protecting patient rights, security and privacy
  - Collection of the hospital’s stroke-treatment performance data
  - Hospital team performance data
  - Use of data to assess and continually improve quality of care for stroke patients
Joint Commission or State Certification

Acute Stroke Ready Hospital or Stroke Receiving Facility

- Acute Stroke Ready Hospital certification was developed in collaboration with the American Heart Association/American Stroke Association. Acute Stroke Ready Hospital certification fulfills a community need within a stroke system of care.
- A relationship with local emergency management systems (EMS) that encourages training in field assessment tools and communication with the hospital prior to bringing a patient with a stroke to the emergency department.
- Stroke protocols along with an acute stroke team, in order to expedite the assessment and treatment of a patient presenting with acute stroke symptoms.
- The ability to perform diagnostic imaging and laboratory tests 24 hours a day, 7 days a week with results within 45 minutes of testing.
- Access to stroke expertise 24 hours a day, 7 days a week (in person or via telemedicine) and transfer agreements with facilities that provide primary or comprehensive stroke services.
- The ability to administer intravenous thrombolytics, if needed, prior to transferring the patient to a facility that provides primary or comprehensive stroke services.
PSC and CSC Stroke Quality Measures

- VTE Prophylaxis
- Discharged on Antithrombotic Therapy
- Anticoagulation Therapy for Atrial Fibrillation/Flutter
- Thrombolytic Therapy
- Antithrombotic Therapy By End of Hospital Day 2
- Discharged on Statin Medication
- Stroke Education
- Assessed for Rehab
Primary Stroke Center Measure: STK-1

**VTE Prophylaxis**

- All stroke patients (ischemic/hemorrhagic/TIA) should have VTE prophylaxis administered within 48 hours of admission
  - Examples: Lovenox, Subcutaneous Heparin, Sequential compression devices (SCDs)
  - Document contraindication or reason for not providing VTE prophylaxis
Primary Stroke Center Measure: STK-2

Discharged on Antithrombotic Therapy

- All stroke patients (ischemic/TIA) should be discharged home on antithrombotics
  - Examples: Aspirin, Plavix, Aggrenox
  - Document contraindication or reason for not prescribing antithrombotic therapy at discharge (hemorrhagic stroke, risk of bleeding)
Primary Stroke Center Measure: STK-3

Anticoagulation Therapy for Atrial Fibrillation/Flutter

- All stroke patients (ischemic/TIA) with a history of afib/flutter or new onset afib/flutter should be discharged on anticoagulants
  - Examples: Coumadin
  - Document contraindication or reason for not providing anticoagulation (risk of bleeding, falls risk)
Primary Stroke Center Measure: STK-4

*Thrombolytic Therapy*

- All acute ischemic stroke patients arriving within 2 hours of time last known well, and meet all eligibility criteria, should receive IV t-PA
- The FDA approved the use of intravenous recombinant tissue plasminogen activator (IV r-TPA or t-PA) in 1996 for the treatment of acute ischemic stroke when given within 3 hours of stroke symptom onset
- Document contraindication or reason for not providing thrombolytic therapy
Primary Stroke Center Measure: STK-5

Antithrombotic Therapy By Day 2

- All stroke patients (ischemic/TIA) should have antithrombotics administered by the end of hospital day 2
- Examples: Aspirin, Plavix, Aggrenox
- Document contraindication or reason for not providing antithrombotic therapy (hemorrhagic stroke, risk of bleeding)
Primary Stroke Center Measure: STK-6

Discharged on Statin Medication

- All stroke patients (ischemic/TIA) should have a lipid profile measurement performed within 48 hours of admission
- If the LDL is $\geq 70$ mg/dL, a lipid-lowering agent should be administered during the hospitalization and prescribed at discharge
  - Examples: Zocor, Lipitor, Crestor, Pravachol, Vytorin,
- Document contraindication or reason for not prescribing statin therapy at discharge
Primary Stroke Center Measure: STK-8

Stroke Education

- All stroke patients (ischemic/hemorrhagic/TIA) should receive stroke education materials during the hospital stay addressing ALL of the following:
  - Activation of emergency medical system
  - Need for follow-up after discharge
  - Medications prescribed at discharge
  - Risk factors for stroke
  - Warning signs and symptoms of stroke
- Reason for not providing stroke education should be documented in the patient chart (patient’s cognition impaired and no family available)
Primary Stroke Center Measure: STK-10

Assessed for Rehab

- All stroke patients (ischemic/hemorrhagic/TIA) should be assessed for rehab services
- Goals of rehabilitation are to prevent complications, minimize impairments, and maximize function, and should be initiated as early as possible following stroke
- Approximately 2/3 of all stroke survivors require rehabilitation
- Reasons for not providing a rehab assessment should be documented in the patient chart (patient asymptomatic, no rehab needs)
Get With The Guidelines – Stroke

- A quality improvement program provided by the American Heart Association/American Stroke Association to help hospitals improve outcomes in stroke patients
- The Patient Management Tool™ (PMT), an online, interactive assessment and reporting system offers patient-specific guideline information and immediate access to clinical decision support
Get With The Guidelines – Stroke

- Using the PMT, hospitals can track their program performance and pinpoint areas for improvement
- Data entered into system on a continuous basis, including the 8 stroke core measures
- Achievement awards presented to facilities for compliance with achievement and quality measures for designated time periods
GWTG

Get With The Guidelines Achievement Awards

- Bronze
  - 90 days 85% achievement
- Silver
  - 12 months 85% achievement
- Gold
  - 24 months 85% achievement
GWTG

Get With The Guidelines Achievement Awards

- Silver Plus
  - 12 months 85% achievement AND 12 months 75% quality

- Gold Plus
  - 24 months 85% achievement AND 12 months 75% quality
Target Stroke Honor Roll

Starting in January 2015, hospitals have had the opportunity to be recognized with two new Target: Stroke Honor Roll levels. The existing and new Honor Roll levels will include:

- Target: Stroke Honor Roll: Time to thrombolytic therapy within 60 minutes in 50 percent or more of acute ischemic stroke patients treated with IV tPA (current criteria and same volume thresholds)
- Target: Stroke Honor Roll-Elite: Time to thrombolytic therapy within 60 minutes in 75 percent or more of acute ischemic stroke patients treated with IV tPA (current criteria and same volume thresholds)
- Target: Stroke Honor Roll-Elite Plus: Time to thrombolytic therapy within 60 minutes in 75 percent or more of acute ischemic stroke patients treated with IV tPA AND door-to-needle time within 45 minutes in 50 percent of acute ischemic stroke patients treated with IV tPA (current criteria and same volume thresholds)
Inpatient management and workup should include:

- Support perfusion
  - Permissive hypertensive
  - Fluids
  - HOB flat, possible trendelenberg
- Prevent UTI
- Prevent pressure ulcers
- GI prophylaxis
Additional Best Care Practices

Inpatient management and workup should include:

- Appropriate vessel imaging
- Nutrition support
- Management of comorbidities (diabetes, hypertension, hyperlipidemia, OSA, etc.)
- Screening for depression and management
- Rehabilitation
- Discharge planning
Appropriate Large Vessel Imaging
Nutrition
Obstructive Sleep Apnea

ALGORITHM: INPATIENT MANAGEMENT OF COMORBID OBSTRUCTIVE SLEEP APNEA (OSA)

- SYMPTOMS: Patient with diagnosed OSA
- Is patient's CPAP machine available?
  - Yes: Use CPAP until discharge
  - No: Switch to alternative CPAP until discharge

EVALUATE CPAP compliance and control
- Compliance based on time of use: Good compliance is used
  - 4 hours: 70% of the time
- Control based on pressure: Good control is AHI < 5

DETERMINE outpatient follow-up or discharge using OSA Matrix (a)

(a) Recommended outpatient treatments based on inpatient compliance and control evaluation:
- Poor control and poor compliance: Recommended PAP-NAP or split-night study
- Good control but poor compliance: Recommended PAP-NAP only
- Poor compliance but good control: Recommended a titration study
- Good control AND good compliance: Recommended follow-up visit with primary care provider

NOTE: If patient does not receive CPAP therapy in hospital, refer to sleep specialist.
See Management of Obstructive Sleep Apnea (OSA) for more information.
Depression
Rehabilitation (STIROP)
Discharge Planning
Conclusion

A stroke is a medical emergency. Time lost is brain lost. Recognition is key.

Stroke may be treated within 6 hours of symptom onset.

Understanding of our states “Stroke Systems of Care”.

Understanding of the use of evidence based best practice for stroke including:

- AHA/ASA Acute Ischemic Stroke Guidelines
- TJC Quality Measures
- Intermountain Healthcare Acute Ischemic Stroke CPMs
References


References


