Evolution of the Ischemic Stroke Guidelines: We’ve Come a Long Way, Baby

DISCLOSURES

MARTHA POWER - NONE
LYNN HUNDLEY - MEDTRONIC SPEAKER BUREAU & ARBOR PHARMACEUTICALS SPEAKER BUREAU
KARI MOORE - NONE
KATHY MORRISON – NONE
### ISCHEMIC GUIDELINES

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<tbody>
<tr>
<td>Pages/References</td>
<td>13/179</td>
<td>11/54</td>
<td>19/402</td>
<td>37/378</td>
<td>50/1,006</td>
<td>11/42</td>
<td>48/421</td>
</tr>
</tbody>
</table>

- **Stroke Centers**
- **Stroke Units**
- **Prehospital Section**
- **Stroke Triaged as High Level**
- **Education for Comm, EMS, Health Care Professionals**
- **Switch from “Suddens” to FAST**
- **NIHSS Use**
- **Nurses as Guideline Authors**
- **Thrombolysis**
- **Mechanical Thrombectomy**

*Thrombolytic Guidelines  **Endovascular Updates*

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**Table 1. Levels of Evidence and Grading of Recommendations for Treatment of Patients With Acute Ischemic Stroke**

<table>
<thead>
<tr>
<th>Level of Evidence</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level I</td>
<td>Data from randomized trials with low false-positive (alpha) and low false-negative (beta) errors</td>
</tr>
<tr>
<td>Level II</td>
<td>Data from randomized trials with high false-positive (alpha) or high false-negative (beta) errors</td>
</tr>
<tr>
<td>Level III</td>
<td>Data from nonrandomized concurrent cohort studies</td>
</tr>
<tr>
<td>Level IV</td>
<td>Data from nonrandomized cohort studies using historical controls</td>
</tr>
<tr>
<td>Level V</td>
<td>Data from anecdotal case series</td>
</tr>
</tbody>
</table>

**Strength of Recommendation**

- Grade A: Supported by Level I evidence
- Grade B: Supported by Level II evidence
- Grade C: Supported by Levels III, IV, or V evidence

*Descriptions of evidence and recommendations are adapted from Cock et al.*
TO OUR CURRENT 2018 ACUTE ISCHEMIC STROKE GUIDELINE
SO MANY COLLABORATORS TO CREATE THIS METHODOLOGY SO OUR GUIDELINES ARE EVIDENCED BASED AND NON-BIAS.

ONE GOAL IS TO BE MORE USER FRIENDLY.

- Word limits
- Page limits
- Using more graphs/pictograms, algorithms, or figures
- Reference limit suggestions

THE DEVELOPMENT PROCESS CAN TAKE OVER A YEAR.
Martha, you might also mention the numerous peer reviewers we have for our GLs. On the ACC/AHA Joint GL side we might have up to 40 peer reviewers.

Anne Leonard, 3/6/2019
Admission to the Hospital

Because of the nature of the neurological problems and the propensity for complications, most patients with acute ischemic stroke should be admitted to a hospital. A recent meta-analysis demonstrates that outcome can be improved if a patient is admitted to a facility that specializes in the care of stroke (Level of Evidence I). Because most community hospitals do not have specialized stroke care units, physicians should consider transferring patients to institutions that have such facilities.

3. Early admission of most patients to a unit that has a specialized interest in the treatment of stroke is strongly recommended (Level of Evidence I, Grade A Recommendation). A team of physicians, nurses, and technicians that is devoted to the early care of patients with stroke should be assembled. Rapid transfer of a patient to a hospital that has a specialized stroke care unit is strongly recommended.

PREHOSPITAL 2007

“Even with immediate recognition of stroke onset by family members and the availability of sophisticated stroke centers, a lack of responsiveness and aggressive action on the part of dispatchers or EMS responders can become the weak link that will compromise the time-dependent chances for reversing or ameliorating an acute stroke in evolution.” NINDS, 1996

“Both BLS and ALS providers have been well-trained to rapidly transport patients with major injuries directly to trauma centers (6). However, stroke patients have not yet received the same priority and attention, either clinically or educationally.” NINDS, 1996

Do stroke units save lives?

Langhorne, Peter; Williams, Brian O; Gilchrist, William; Howie, Kate

The Lancet: Aug 14, 1993; 342, 8668; ProQuest

pg. 395

- Analysis of 10 randomized controlled trials conducted between 1962 and 1993
  - 1,586 stroke patients, 766 to a stroke unit, 820 to general ward
  - 4 months post stroke, 28% lower mortality in the stroke unit group

Two main questions spring to mind. First, what component of stroke unit management is responsible for the improved mortality and, second, have the lives saved merely led to existence in a physical state that most of us would regard as unacceptable?
Dispatchers should make stroke a priority dispatch.

Prehospital stroke assessment tools:
- Los Angeles Prehospital Stroke Screen
- Cincinnati Prehospital Stroke Scale

Stroke triaged by EMS same level as MI or trauma.

Educational programs for EMS recommended.

Pre-arrival notification.

Patients should be transported rapidly to closest institution that provides stroke care.

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**Table 3. Guidelines for EMS Management of Patients With Suspected Stroke**

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage ABCs</td>
<td>Dextrose-containing fluids in nonhypoglycemic patients</td>
</tr>
<tr>
<td>Cardiac monitoring</td>
<td>Hypotension/excessive blood pressure reduction</td>
</tr>
<tr>
<td>Intravenous access</td>
<td>Excessive intravenous fluids</td>
</tr>
<tr>
<td>Oxygen (as required O₂ saturation &lt;92%)</td>
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<tr>
<td>Assess for hypoglycemia</td>
<td></td>
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<tr>
<td>Nil per os (NPO)</td>
<td></td>
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<tr>
<td>Alert receiving ED</td>
<td></td>
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<tr>
<td>Rapid transport to closest appropriate facility capable of treating acute stroke</td>
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"When the receiving medical staff do not display a sense of urgency regarding stroke patients, EMS personnel are less apt to be as reactive as perhaps they should be in their routines." NINDS 1996

**Table 5. ED-Based Care**

<table>
<thead>
<tr>
<th>Action</th>
<th>Time</th>
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<tbody>
<tr>
<td>Door to physician</td>
<td>≤10 minutes</td>
</tr>
<tr>
<td>Door to stroke team</td>
<td>≤15 minutes</td>
</tr>
<tr>
<td>Door to CT initiation</td>
<td>≤25 minutes</td>
</tr>
<tr>
<td>Door to CT interpretation</td>
<td>≤45 minutes</td>
</tr>
<tr>
<td>Door to drug (≥80% compliance)</td>
<td>≤60 minutes</td>
</tr>
<tr>
<td>Door to stroke unit admission</td>
<td>≤3 hours</td>
</tr>
</tbody>
</table>

CT indicates computed tomography; and ED, emergency department.

Source: Bock.96
2013 “SUDDENS” F.A.S.T.

The F.A.S.T. was developed in the UK in 1998 by a group of stroke physicians, ambulance personnel, and an emergency department physician and was designed to be an integral part of a training package for ambulance staff.

2013 & 2018 NURSES AS GUIDELINES AUTHORS

First nurse on the Ischemic Stroke Guidelines
Debbie Summers

Lead author on the 2009 Comprehensive Overview of Nursing and Interdisciplinary Care of the Acute Ischemic Stroke Patient

2013 – appointed nursing areas – dysphagia, VTE, mobility, nutrition, skin care
  • Had physician counterpart to review her work for accuracy

2018 – assigned various areas, not specifically nursing areas
  • Was co-author with a physician; they reviewed each other’s work
  • Started in Sept 2016 → full day meeting in Dallas
  • Conference calls every Thursday 4-6pm til release of guidelines in 2018
2009 COMPREHENSIVE OVERVIEW OF NURSING AND INTERDISCIPLINARY CARE OF THE ACUTE ISCHEMIC STROKE PATIENT RECOMMENDATIONS

- Patient’s head should be positioned in neutral alignment, and HOB should be elevated 25-30 degrees
- ED patients should be kept NPO until ability to swallow is assessed
- IV access – 2 sites if patient is IV tPA candidate
- Temperature > 99.6 F should be managed aggressively
- Early bowel and bladder care should be instituted
- Fall precautions should be initiated
- Frequent turning for bedridden patients
- Use of Braden Scale is recommended
- Range of motion exercises should start early
- Swallow screen should be done, preferably by SLP
  - Nurses should be familiar with the process and perform a screen if SLP cannot do so within 24 hours

<table>
<thead>
<tr>
<th>Tables</th>
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<tbody>
<tr>
<td>o Recommendations for secondary stroke prevention</td>
</tr>
<tr>
<td>o Stroke educational programs by AHA/ASA, NINDS, and NSA</td>
</tr>
<tr>
<td>o Effective nursing strategies for successful discharge planning</td>
</tr>
<tr>
<td>o Roles for nursing in Joint Commission PSC certification</td>
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### THROMBOLYTIC & THROMBECTOMY RECOMMENDATIONS

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<tbody>
<tr>
<td>Schedule for vs/neuro checks</td>
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<tr>
<td>60 Minute DTN Goal</td>
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<td>45 Min DTN Goal</td>
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<td>Exclusion/Inclusion Criteria</td>
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<td>Treat mild/rapidly improving</td>
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<td>X</td>
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<tr>
<td>Don’t Wait for PTT/PT/INR</td>
<td>X</td>
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<tr>
<td>Only Need BS prior to Treat</td>
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<td>X</td>
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<tr>
<td>CTA/MRA for candidacy</td>
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<tr>
<td>Stent Retriever over MERCI</td>
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<tr>
<td>20 Min Door-to CT in 50% of pts</td>
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<td>Thrombectomy 6-24 hrs</td>
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<td>X</td>
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<tr>
<td>CTA w/o Creat in Suspected LVO</td>
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* Thrombolytic Guidelines  ** Endovascular Updates

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### 2013 ISC - THROMBECTOMY STUDY RESULTS

3 Randomized Controlled Trials (RCT) were carried out between 2004-2012

**SYNTHESIS** – Intra-arterial Versus Systemic Thrombolysis for Acute Ischemic Stroke
- IV tPA vs Endovascular (IA tPA, clot disruption or retrieval)
  - 86% clot disruption, 14% clot retrieval
  - No difference in outcomes

**MR RESCUE** – MR and Recanalization of Stroke Clots Using Embolectomy
- Large-artery occlusion and anterior circulation ischemic stroke within 8 hrs who are ineligible for IV tPA or had persistent occlusion after IV tPA
- Standard medical care vs endovascular therapy (MERCI or Penumbra)
- No difference in outcomes

**IMS III** – Interventional Management of Stroke Trial III
- Major ischemic strokes (NIHSS ≥ 10) who got IV tPA vs IV tPA plus endovascular
  - 98.5% clot disruption, 1.5% clot retrieval
  - Stopped early for futility; no difference in outcomes
2015 UPDATE REGARDING ENDOVASCULAR TREATMENT

5 Randomized Controlled Trials (RCT) were published between December 2014 and April 2015

MR CLEAN – Multicenter Randomized Clinical Trial of Endovascular Treatment for Acute Ischemic Stroke in the Netherlands
- Standard Management with IAT (Intra-Arterial Thrombectomy) vs without IAT
- 33% good outcome (mRS 0-2) with IAT; 19% without IAT

EXTEND IA— Extending the Time for Thrombolysis in Emergency Neurological Deficits – Intra-Arterial
- IV tPA alone vs IV tpA with IAT (stent retriever)
- 71% good outcome with IAT; 40% with tPA alone

ESCAPE – Endovascular Treatment for Small Core and Anterior Circulation Proximal Occlusion with Emphasis on Minimizing CT to Recanalization Times
- Standard Therapy with IAT vs without IAT
- 53% good outcome with IAT; 29% without IAT
- Terminated early after MR CLEAN results

RESCAT – Randomized Trial of Revascularization With the Solitaire FR Device in the Treatment of Acute Stroke Due to Anterior Circulation Large Vessel Occlusion
- Standard Management with IAT vs without IAT
- 44% good outcome with IAT; 28% with tPA alone
- Terminated early after MR CLEAN results

SWIFT PRIME – Solitaire With the Intention for Thrombectomy Treatment
- IV tPA alone vs IV tpA with IAT (stent retriever)
- 60% good outcome with IAT; 36% with tPA alone
- Terminated early after MR CLEAN results

2015 New Recommendations

- Stent Retrievers are indicated in preference to MERCI device
  - other devices might be reasonable in some circumstances

- Careful selection of patients with large artery occlusion and initiation within 6 hours is reasonable

- Endovascular therapy with stent retrievers may be reasonable for some patients < 18 yrs

- Observing patients after IV tPA prior to Endovascular therapy is not recommended

- Technical goal should be TICI grade 2b/3

- Conscious sedation when possible in preference to general anesthesia

- If endovascular therapy is considered, non-invasive vascular imaging should be done, but not before initiation of IV tPA
Key Recommendations

• Evaluate up to 4.5 hours
• Utilize telestroke conferencing when neurologist not on-site
• Faster door-to-needle times for IV Alteplase
  • 60 min in 50% of pts
  • Ideally, aim for 45 min
• Increased timeframe for thrombectomy from 6 hours to 24 hours

New Recommendations

• Develop regional systems of care to:
  • Provide IV alteplase
  • Perform endovascular treatments with comprehensive periprocedural care
  • Facilitate rapid transport to advanced centers
  • Participate in stroke data repository
• Door to CT < 20 min in 50% of cases eligible for IV alteplase or mechanical thrombectomy
• Noninvasive imaging of cervical vessels within 24 hours to eval for carotid intervention
  • Revascularization procedure 48h – 7 days
• Early Decompressive Hemicraniectomy age $\leq$ 60

For AIS Patients Only

Recommendation

Have Comorbid conditions requiring blood pressure reduction

Early hypertension treatment to lower blood pressure by 15% is probably safe

Did not receive IV alteplase or endovascular treatment

If BP is < 220/120 mm Hg, treatment of HTN within the first 48 to 72 hours after AIS is of no benefit
If BP is 220/120 mm Hg or higher, the benefit of lowering BP is unknown, but lowering by 15% in the first 48 to 72 hours after AIS is reasonable

Do not have a comorbid condition that requires acute antihypertensive treatment

Receive IV Alteplase

BP should be maintained below 180/105 mm Hg and for 24 hours after administration

Are undergoing mechanical thrombectomy

It is reasonable to maintain BP below 180/105 mm Hg during and for 24 hours after the procedure

For AIS Patients Who Were treated with IV alteplase

Aspirin is generally withheld for 24 hours

Were treated with IV alteplase and have concomitant conditions

Earlier aspirin treatment might be considered if:
  • It is known to provide substantial benefit in the absence of IV alteplase, or
  • Withholding such treatment is known to cause substantial risk

Have mild stroke symptoms and were not treated with IV alteplase

Dual antiplatelet therapy with aspirin and clopidogrel started within 24 hours and continued for 21 days may prevent secondary stroke
STANDARDIZATION OF MULTIDISCIPLINARY CARE REQUIRING ADDITIONAL RESEARCH

1. Vital Sign Frequency in non alteplase and EVT patients
2. Frequency of NIHSS
3. Assessment of glucose – Guidelines recommend “monitoring closely”
4. Early Mobilization
5. Dysphagia Screening tool
6. Timing of Depression Screening

2018 GUIDELINES ALTEPLASE INCLUSION/EXCLUSION CRITERIA

- Provide additional recommendations regarding administration for specific comorbidities:
  - ESRD
  - Clarification LMWH for prophylaxis vs. full anticoagulation treatment
  - Cortical Microbleeds, Sickle Cell Disease, Infective Endocarditis, Aortic Arch Dissection
  - Intracranial/Extracranial arterial Dissections, vascular malformations, and Unruptured Aneurysms
  - Acute MI – STEMI vs. Non STEMI
- Up for Debate-conflicting statements based on evidence
  - Absolute vs. relative exclusion criteria in the 3-4.5 hour window
- Potential New Thrombolytic Agent for AIS treatment
  - Utilization of IV tenecteplase for acute thrombolytic therapy instead of alteplase
2018

Correction to: 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

Section 1.3 EMS Systems Recommendation 4
Section 1.4 Hospital Stroke Capabilities Recommendation 1
Section 1.6 Telemedicine Recommendation 3
Section 2.2 Brain Imaging Recommendation 11
Section 3.2 Blood Pressure Recommendation 3
Section 4.3 Blood Pressure Recommendation 2
Section 4.6 Dysphagia Recommendation 1
Section 6.0 All subsections (11)

Summary

We’ve come a long way, baby

... and we’ve got a long way to go