Acute Stroke Teams

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Scott and White Healthcare
Goals/Objectives

- Brief review of IV thrombolysis in Acute Ischemic Stroke (AIS)
- Stroke Center Approach to AIS
- Implementation of Acute Stroke Teams
- Troubleshooting areas of need
795,000 people with stroke annually
3rd leading cause of death
Leading cause of long term disability
$140,000 direct/indirect cost/stroke
$74 Billion dollars/yr
NINDS Trial

• 2 Part NINDS sponsored trial
  • Randomized Double Blind Placebo Controlled Trial
  • IV t-PA (0.9mg/kg) vs Placebo given within 3hrs
  • Time of onset to treatment
    • 0-90 min
    • 91-180 min
    • 0-180 min

NEJM Dec 1995
NINDS Trial

• Part 1 (291 patients)
  • t-PA provided early improvement at 24 hrs
  • Complete resolution of symptoms or
    Improvement in NIHSS of ≥4 points

• Part 2 (333 patients)
  • Continual benefit of t-PA at 3 months
  • Minimal to No Disability
  • NIHSS 0-1, mRS 0-1, BI 95-100, GOS 1

NEJM Dec 1995
## Table 3. Scores on the NIHSS 24 Hours after the Onset of Stroke

<table>
<thead>
<tr>
<th>Time to Treatment after Stroke Onset</th>
<th>t-PA</th>
<th>Placebo</th>
<th>Relative Risk (95% CI)</th>
<th>P Value</th>
<th>NIHSS Score</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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<tr>
<td>min</td>
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<td></td>
</tr>
<tr>
<td>Part 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–90</td>
<td>71</td>
<td>36 (51)</td>
<td>68</td>
<td>31 (46)</td>
<td>1.1 (0.8–1.6)</td>
</tr>
<tr>
<td>91–180</td>
<td>73</td>
<td>31 (42)</td>
<td>79</td>
<td>26 (33)</td>
<td>1.3 (0.9–1.9)</td>
</tr>
<tr>
<td>0–180</td>
<td>144</td>
<td>67 (47)</td>
<td>147</td>
<td>57 (39)</td>
<td>1.2 (0.9–1.6)</td>
</tr>
<tr>
<td>Part 2</td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>0–90</td>
<td>85</td>
<td>51 (59)</td>
<td>77</td>
<td>30 (39)</td>
<td>1.5 (1.1–2.1)</td>
</tr>
<tr>
<td>91–180</td>
<td>82</td>
<td>29 (35)</td>
<td>88</td>
<td>35 (40)</td>
<td>0.9 (0.6–1.3)</td>
</tr>
<tr>
<td>0–180</td>
<td>166</td>
<td>80 (48)</td>
<td>163</td>
<td>63 (39)</td>
<td>1.2 (0.9–1.5)</td>
</tr>
<tr>
<td>Combined results</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>0–90</td>
<td>157</td>
<td>87 (55)</td>
<td>145</td>
<td>61 (42)</td>
<td>1.3 (1.0–1.7)</td>
</tr>
<tr>
<td>91–180</td>
<td>155</td>
<td>60 (39)</td>
<td>167</td>
<td>61 (37)</td>
<td>1.1 (0.8–1.4)</td>
</tr>
<tr>
<td>0–180</td>
<td>312</td>
<td>147 (47)</td>
<td>312</td>
<td>122 (39)</td>
<td>1.2 (1.0–1.4)</td>
</tr>
</tbody>
</table>

*Improvement was defined as a 4-point improvement in the NIHSS score from base-line values or complete resolution of the neurologic deficit.

†CI denotes confidence interval.

‖The Mantel-Haenszel test was used with stratification according to clinical center and, for analyses of 0-to-180-minute groups, the time to treatment after the onset of stroke (0 to 90 minutes or 91 to 180 minutes).

$Interquartile range.

$P > 0.18 by analysis of covariance.

$P < 0.02 by analysis of covariance.
Improvement At 24 hours

Haley et al 1997
Ann Emerg Med
NINDS Trial Results

Safety

• No difference in mortality

• Symptomatic ICH
  6.4% t-PA vs 0.6% placebo

• 61% mortality in patients with sICH

• Higher NIHSS, Cerebral Edema on baseline CT

• Angioedema 1-2%

NEJM Dec 1995
Pooled Analysis of ATLANTIS, ECASS Trials, NINDS, EPITHET

LANCET 2010
Pooled Analysis of ATLANTIS, ECASS Trials, NINDS, EPITHET

A Modified Rankin score 0–1

- Odds ratio estimated by model
- 95% CI for estimated odds ratio

OTT (min)

Odds ratio and 95% CI

60 90 120 150 180 210 240 270 300 330 360

5 4 3 2 1 0

LANCET 2010
Statistics

• US FDA approved IV t-PA 1996
• Following 2 part NINDS trial
• ASA Guidelines out to 4.5hrs
• Despite FDA approval/ ASA Guidelines
• Only 1-3% of patients are treated
Brain Attack Coalition

- 2000 BAC, JAMA
- Recommendations for the Establishment of PSC

- Stroke Teams
  - Written Protocols
  - EMS integration
  - ED education
  - Stroke Unit
  - NSRGRY services
  - Institutional Support
  - Laboratory
  - Imaging Services
  - Quality Improvement
  - Educational Programs
BAC Recommendations Related to tPA Rates

- **Stroke Teams**
  - Written Protocols
  - EMS integration
  - ED education
  - Stroke Unit
  - NSRGRY services
  - Institutional Support
  - Laboratory
  - Imaging Services
  - Quality Improvement
  - Educational Programs

**End of List**
BAC Elements tPA Rates

Light Gray: Mortality
Dark Gray: tPA Use

Douglas Neurology 2005
Non-Academic Stroke Team

- MD suburban Hospital
- Historical tPA use 1.5%
- 24/7 acute stroke team

% tPA Administration

Lattimore Stroke 2003
GWTG- Stroke Improvements in tPA Administration for Eligible Patients
GWTG- Stroke tPA Treatment Times
Door to Needle % <60 minutes

% DTN <60min

2005  | 2006  | 2007  | 2008  | 2009

Schwamm Stroke 2010
Regional tPA rates with Stroke Center Designation

- 32 Hospitals in Queens/Brooklyn region
- 5 baseline Stroke Centers
- 20 Stroke Centers after intervention
- Integrated EMS Transport
- Evaluate:
  - tPA rates
  - Door to Needle
  - Admission to Stroke unit
Regional tPA rates with Stroke Center Designation

Regional Stroke unit admission: 15.6%-38.6% post designation

Gropen Neurology 2006
Components of a Stroke Alert

- Patient Presentation
  - EMS encode +/- Stroke Alert
  - Ambulatory
- Door to MD- <10min Stroke Alert
- Door to Neurological Evaluation- <15min
- Door to CT- 25min
- Door to CT results- 45min
- Door to Lab results- 45min
- Door to Needle- <60min
- Stroke Alert Notifies Radiology, Laboratory, Bed Supervisor, Stroke Leader
“Stroke Team”

- Stroke Leader - MD with cerebrovascular expertise
- Nurse - Neurological Training
- ED Physician

Misdiagnosis of Primary Care/Emergency Medicine as high as 30% compared with stroke team

Harbison Stroke 2003
Stroke Mimics

- Hypoglycemia
- Seizure
- Migraine
- Hypertensive Encephalopathy
- Reactivation of old stroke
- Mass lesion
- Intracerebral Hemorrhage
- SAH
- Peripheral vestibulopathy
- Conversion reaction
Still Why Are So Few Treated?

- Access To Care
- Time Dependent Treatment
- Exclusionary Criteria
- Perception and Concerns Regarding t-PA
Access to Care

Schwamm Stroke 2010
# Bridging the Gap - Telemedicine

<table>
<thead>
<tr>
<th>NIHSS Item</th>
<th>Handschu Telemed vs. Bedside (0-36 hrs)</th>
<th>Handschu Telemed vs. Bedside (0-6 hrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOC</td>
<td>0.99</td>
<td>0.97</td>
</tr>
<tr>
<td>LOC Q</td>
<td>0.90</td>
<td>0.88</td>
</tr>
<tr>
<td>LOC C</td>
<td>0.93</td>
<td>0.89</td>
</tr>
<tr>
<td>Gaze</td>
<td>0.95</td>
<td>0.88</td>
</tr>
<tr>
<td>Visual Fields</td>
<td>0.89</td>
<td>0.83</td>
</tr>
<tr>
<td>Facial Palsy</td>
<td>0.85</td>
<td>0.62</td>
</tr>
<tr>
<td>Motor Arm</td>
<td>0.90</td>
<td>0.74</td>
</tr>
<tr>
<td>Motor Leg</td>
<td>0.92</td>
<td>0.72</td>
</tr>
<tr>
<td>Ataxia</td>
<td>0.95</td>
<td>0.94</td>
</tr>
<tr>
<td>Sensory</td>
<td>0.91</td>
<td>0.83</td>
</tr>
<tr>
<td>Language</td>
<td>0.98</td>
<td>0.97</td>
</tr>
<tr>
<td>Dysarthria</td>
<td>0.92</td>
<td>0.93</td>
</tr>
<tr>
<td>Neglect</td>
<td>0.96</td>
<td>1.00</td>
</tr>
</tbody>
</table>

Green = excellent agreement  Yellow = moderate agreement  Red = poor agreement

Schwamm Stroke 2009
ASA Recommendations on Telemedicine

**Class I Recommendation**

1. It is recommended that a stroke specialist using HQ-VTC provide a medical opinion in favor of or against the use of intravenous tPA in patients with suspected acute ischemic stroke when on-site stroke expertise is not immediately available (*Class I, Level of Evidence B*).

**Class II Recommendation**

1. Implementation of telestroke consultation in conjunction with stroke education and training for healthcare providers can be useful in increasing the use of intra-venous tPA at community hospitals without access to adequate onsite stroke expertise (*Class IIa, Level of Evidence B*).
Summary

+ IV tPA for acute ischemic stroke is efficacious

+ Strict time dependent treatment

+ Stroke centers and stroke teams improve treatment rates

+ Telemedicine will help bridge the gap in rural regions