Feasibility of Intravenous Thrombolytic Therapy for Suspected Acute Ischemic Stroke on the Mobile Stroke Treatment Unit

Seby John, MD
Fellow, ESNR
Disclosures

- None
Every year, more than 795,000 people in the United States have a stroke

4th leading cause of death- killing almost 130,000 Americans each year

Leading cause of disability

Stroke costs the United States an estimated $36.5 billion each year

5,600 strokes and 730 deaths each year in Cuyahoga County

Kochanek Nat Vital Stat Rep. 2011;60(3)
Go Circulation. 2014;128
Background

- About 87% of all strokes are ischemic strokes

- Treatment for acute ischemic stroke (AIS) is **time-dependent**

- IV tPA use remains dramatically low. Less than 15-40% of patients with AIS arrive at the hospital early enough to receive thrombolytic therapy

- Used in ~2-5% of all stroke patients in a community setting

- Among patients who receive IV tPA < 26.6% receive IV tPA within the recommended time window of **60 minutes** of arrival

Go *Circulation*. 2014;128.
Fonarow *Circulation* 2011;123.7,750-758.
Rationale

Innovate the care delivery model

- Reduce patient’s long-term neurological deficits
- Increase stroke market share
- Reduce cost of care
Stroke Treatment Decisions Hinge on the CT Scan

BP control
IV tPA (clot buster)
Transport to Stroke Center

BP control
Warfarin reversal
Mannitol
Anti-epileptic medications
Transport to Neurosurgical Center
Mobile Stroke Treatment Unit

- Don’t wait for the stroke patient at the ER
- Bring the CT and stroke expertise to the patient
- Initiate treatment at the scene
- Cut time-to-treatment decisions
- Decrease double transfers

How this works

- Stroke patient calls 911 – activates Emergency Medical System
- Local ambulance dispatched simultaneously with MSTU
- Local ambulance arrives first – usual assessment, IV, O₂, draws blood samples
- MSTU arrives – mutual care/hand off of care
- Point of Care Testing for CBC, INR, PTT, creatinine, glucose
- CT head performed -> transmitted for neuroradiologist and neurologist review
- Telestroke System -> vascular neurologist “virtually” with the patient and team
- Confirm diagnosis?
- Initiate IV tPA
- Triage to appropriate hospital (level of care) in stroke system
# Results

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Year to Date</strong></td>
<td><strong>(October 31\textsuperscript{st} 2014)</strong></td>
</tr>
<tr>
<td>Dispatches</td>
<td>313</td>
</tr>
<tr>
<td>Transports</td>
<td>99</td>
</tr>
<tr>
<td>CC Admissions</td>
<td>63</td>
</tr>
<tr>
<td>IV tPA treatment</td>
<td>16 (16%)</td>
</tr>
<tr>
<td>Endovascular treatment</td>
<td>3</td>
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</tbody>
</table>
Results

- 83/99 (84%) patients did not receive IV tPA

<table>
<thead>
<tr>
<th>Reason</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outside time window</td>
<td>44</td>
</tr>
<tr>
<td>Minor or rapidly resolving deficits</td>
<td>13</td>
</tr>
<tr>
<td>Symptoms not felt to be due to AIS</td>
<td>11</td>
</tr>
<tr>
<td>ICH</td>
<td>5</td>
</tr>
<tr>
<td>Anticoagulation</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
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<tr>
<td>TOTAL 81/83</td>
<td></td>
</tr>
</tbody>
</table>

- 2 patients were eligible for IV tPA but did not receive it in the MSTU due to inability to obtain IV access

- 16/18 (89%) of patients who were eligible for IV tPA were successfully treated
911 Call to Scene

National Target Time of 911 call to ED Arrival

July: 12  
Aug: 11  
Sep: 12  
Oct: 12  

Cleveland Clinic
Door to Drug Administration

National Target
ED Arrival to Drug

Door to Drug

July: 48
Aug: 41
Sep: 19
Oct: 28
911 Alarm to Drug Administration

Data as of 9/18/2014

National Target for Drug Administration

- July: 60
- Aug: 52
- Sep: 32
- Oct: 40

Legend:
- Dark blue: Door to drug
- Light blue: 911 to scene

Cleveland Clinic
Conclusion

- The MSTU model of care has great potential to markedly increase IV tPA utilization rates, and decrease time to treatment
Future directions

- Training dispatch to minimize MSTU call-offs
- Increasing geographical coverage
- MSTU centralized relocation
Acknowledgements

- Muhammad Shazam Hussain, MD
- Gabor Toth, MD
- Stacey Winners
- Cleveland Pre-Hospital Acute Stroke Treatment (PHAST) Study Group
Every life deserves world class care.
## Pre-hospital treatments

<table>
<thead>
<tr>
<th></th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>October</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dispatch to Scene Arrival</td>
<td>13 mins</td>
<td>11</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>MSTU Door to Doctor</td>
<td>12</td>
<td>13</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>MSTU Door to CT complete</td>
<td>22</td>
<td>19</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>MSTU Door to CT Read</td>
<td>32</td>
<td>27</td>
<td>24</td>
<td>22</td>
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<tr>
<td>MSTU Door to Lab Results</td>
<td>15</td>
<td>10</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>MSTU Door to Drug</td>
<td>48</td>
<td>41</td>
<td>19</td>
<td>28</td>
</tr>
<tr>
<td>Total Time on Scene</td>
<td>52</td>
<td>46</td>
<td>39</td>
<td>40</td>
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</table>

Data as of 10/31/2014
# Results

<table>
<thead>
<tr>
<th></th>
<th>TOTAL (99)</th>
<th>IV tPA (16)</th>
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</thead>
<tbody>
<tr>
<td>Age</td>
<td>63 ± 17</td>
<td>62 ± 18</td>
</tr>
<tr>
<td>Sex (F)</td>
<td>57 (58%)</td>
<td>9 (56%)</td>
</tr>
<tr>
<td>Initial NIHSS</td>
<td>8 ± 6</td>
<td>10 ± 6</td>
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