Background:

- Current American Stroke Association Benchmarks for Acute Stroke advocate that Door to Computed Tomography time be less than or equal to 25 minutes and Door to Needle Time be less than or equal to 60 minutes.
- Our Door to Computed Tomography times, often less than 25 minutes, were noted to be slowly increasing over time. Regional collaboration with other MA Paul Covernell hospitals provided the framework for us to create a streamlined patient care protocol.
- We adapted an approach which is specific to our demographic area and uniform patient population. We partnered with our largest volume EMS System, Needham Fire, to develop and initiate trialed protocol.

Objectives:

Our goal was to develop and evaluate the impact of an integrated patient care pathway aimed at decreasing Door to Computed Tomography Times in suspected Acute Stroke Patients arriving within 3.5 hours of Last Known Well.

- Data outcomes from new patient pathway will aid in identifying other care areas causing delays in Door to Treatment windows, impacting future trials to improve outcomes.

Methods:

- This is a retrospective pre- and post- implementation study evaluating the influence of new stroke protocol to reduce Door to CT Times.
- The team consisted of Needham EMS, Beth Israel Deaconess Hospital - Needham Emergency Department, Radiology Department, Registration, Laboratory Department, and Stroke Committee members. A new Stroke Alert Form was jointly created for EMS and ED Systems to utilize in collecting pertinent patient information.
- The instituted multidisciplinary protocol included the following: (1) pre-hospital stroke alert activations; (2) pre-hospital lab draws; (3) ED evaluation of stroke patients in the triage ambulance bay; (4) Point of care INR testing (estimate of 2 minute when Point of Care device utilized); (5) EMS transport to CT after medical clearance by ED physician.
- The protocol was launched in May 2013. The pre-intervention (PRE) time period was May 1, 2012 through April 30, 2013 and the post-intervention (POST) enrollment period was from May 1, 2013 through April 30, 2014. Concurrently all Door to Treatment timeframes were reviewed to identify any areas of adverse impact to care and to target future improvements.

RESULTS:

Statistical Analysis using Unpaired T Test showed 46 pre-hospital stroke alert patients were identified (PRE, n=23; POST, n=23) over the two year time-period. Demographic variables in the PRE and POST groups respectively were age of 76.9 +/- 13.4 vs. 77.6 +/- 18.7 (P=0.84; 95% CI -7.52 to 12.11) with 65.2% and 65.4% being female (P=0.79 Fisher Exact Test). Over the entire study period 56.5% (n=26) had a final diagnosis of Acute Ischemic Stroke/TIA/ICH and 6.5% (n=3) received intravenous TPA (estimate 2 minute when Point of Care device utilized); (5) EMS transport to CT after medical clearance by ED physician.

Pre-Trial Patient Care Process

- EMS calls to alert of incoming patient with stroke like symptoms
- Boston Stroke Scale was used, if not complete
- Finger stick blood glucose

Post Hospital Arrival:

- Placed in the ED Treatment Room
- Vital signs
- Full report from EMS
- Patient registration completed
- ED MD at bedside completing a neurological evaluation
- CODE STROKE called
- Radiology called to clear CT
- 2 IVs established
- Labs drawn and sent, EKG
- Patient to CT
- Return from CT
- Neuro-telemedicine consult initiated
- Neurology consult / Decision to give TPA

Pre – Hospital:

- EMS pre-hospital Code Stroke Activation
- (Standard use of Boston pre-hospital stroke scale)
- 2 IVs established
- Finger stick blood glucose
- Pre-hospital lab collection (red top, blue top, purple top, marple top)
- Hospital notifies Radiology to clear CT

Trial Patient Care Process

- EMS pre-hospital Code Stroke Activation
- (Standard use of Boston pre-hospital stroke scale)
- 2 IVs established
- Finger stick blood glucose
- Pre-hospital lab collection (red top, blue top, purple top, marple top)
- Hospital notifies Radiology to clear CT

- Time: 58 – 220 min

Table 1. Pre and Post Data: Needham Fire EMS Patients with Suspected Diagnosis of Stroke/Bleed with LKN w/in 3.5 hours

<table>
<thead>
<tr>
<th>Needham EMS Stroke Alerts</th>
<th>Total Runs</th>
<th>Average Time to CT</th>
<th>Improvement Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012-2013</td>
<td>23</td>
<td>47.9</td>
<td></td>
</tr>
<tr>
<td>2013-2014</td>
<td>23</td>
<td>8.4</td>
<td>82.5%</td>
</tr>
</tbody>
</table>

Table 2. Comparison Data: Needham Fire EMS Patients with End Diagnosis of Stroke/Bleed with LKN w/in 3.5 hours

<table>
<thead>
<tr>
<th>End DX Stroke</th>
<th>Total Runs</th>
<th>Average Time to CT</th>
<th>Improvement Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012-2013</td>
<td>10</td>
<td>37.9</td>
<td></td>
</tr>
<tr>
<td>2013-2014</td>
<td>12</td>
<td>13</td>
<td>65.7%</td>
</tr>
</tbody>
</table>

CONCLUSIONS:

The collaborative patient care initiative between EMS and ED demonstrated decreased door to computed tomography times. Point of care INR dramatically reduced result times. Assessment of continued decreasing Door to CT times will continue as the collaborative initiative expands to all EMS service providers.