



## An Integrated Approach of Patient Care Process for Suspected Stroke Results in Decreasing Door to Computed Tomography (CT) Times

*A Collaborative Initiative between Needham EMS and Beth Israel Deaconess Hospital - Needham*

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### 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 Coverdell 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.

### Pre-Trial Patient Care Process

#### Pre – Hospital:

EMS calls to alert of incoming patient with stroke like symptoms  
(Boston Stroke Scale use was inconsistent)  
1 IV established  
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<sup>nd</sup> IV established  
Labs drawn and sent, EKG  
Patient to CT  
Return from CT  
Neuro-telemedicine consult initiated  
Neurology consult / Decision to give TPA

Time: 58 – 220 min

### Trial Patient Care Process

#### 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, marble top)  
Hospital notifies Radiology to clear CT

#### Arrival Ambulance Bay:

EMS Report  
Emergency Registration created  
Point of Care INR upon arrival (finger stick - CoaguChek)  
Cursory ED MD Evaluation  
Direct Transport by EMS to CT  
Neuro-telemedicine consult initiated

#### Post Hospital Arrival Care:

Full ED MD evaluation after return from CT  
EKG  
IV established (if not already complete)  
Neurology consult / Decision to give TPA

Time: 51 min – 83 min

### 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=0.64; 95% CI -7.52 to 12.11) with 65.2% and 56.5% being female (P=0.76 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. The Door to CT time in the PRE and POST group was 47.9 +/- 29.1 vs. 8.4 +/- 4.9 minutes respectively (P<0.0001; 95% CI 27.0 to 51.8). Among patients who had INR testing (n=31) the time to result was 78.8 +/- 12.7 minutes in the PRE group and 20.2 +/- 24.6 minutes in the post group (P<0.0001, 95% CI 34.3 to 83.0).

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

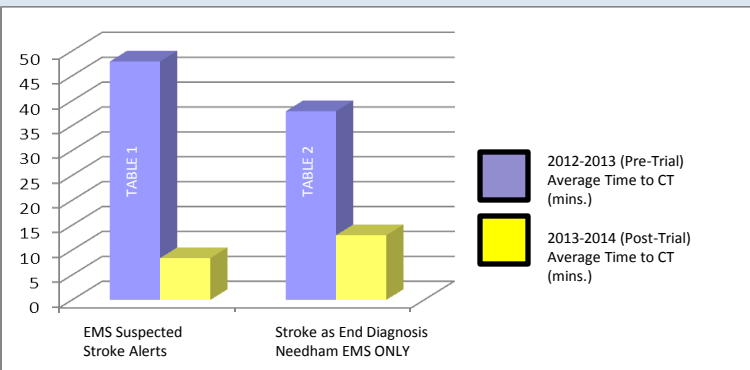
Needham EMS Stroke Alerts	Total Runs	Average Time to CT	Improvement Rate
2012-2013	23	47.9	
2013-2014	23	8.4	
			82.5%

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

End DX Stroke	Total Runs	Average Time to CT	Improvement Rate
2012-2013	10	37.9	
2013-2014	12	13	
			65.7%

### 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. Sample size was small due to use of a single EMS system. Assessment of continued decreasing Door to CT times will continue as the collaborative initiative expands to all EMS service providers



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