

INTRODUCTION

The EMS Stroke Quality Improvement Collaborative (EMS-QI) is a pilot program focused on improving prehospital clinical stroke care in Massachusetts, funded in part by the Centers for Disease Control and Prevention Paul Coverdell National Acute Stroke Registry Grant # 5U58DP000863-05.

Currently in the pilot phase, fourteen participating Emergency Medical Services (EMS) agencies submit and review their prehospital data, evaluating it against four clinical performance measures.

This dataset, when linked with the Paul Coverdell National Acute Stroke Registry (PCNASR), allows for unique analysis across the stroke systems of care continuum.

OBJECTIVE

We sought to assess the impact of prehospital care on hospital process and outcome measures among stroke patients.

METHODS

2008-2011 Massachusetts PCNASR data (30,402 cases) was analyzed with patients assigned to one of two categories: 'transported to the ED via EMS' or 'transported via other means'. Descriptive statistics were used to compare demographic characteristics between the two transport groups. IV t-PA eligible patients in each of the two groups were then compared in regards to process (meeting time targets) and outcome (receiving thrombolytic therapy) measures.

To facilitate further analysis, 862 EMS-QI cases from 2009-2011 were matched to PCNASR cases using patient age, gender, date/time of arrival, and receiving hospital. Of the 255 matched patients, 68 were IV t-PA eligible. Prehospital and ED time targets were analyzed in association with the administration of IV t-PA. Analyses and tests of significance included descriptive frequencies, correlations, linear regression, and signed rank tests.

RESULTS

There were few demographic variations in patients arriving via EMS versus those arriving by other means, with the exception of stroke severity. Patients arriving via EMS had significantly higher median NIHSS scores ($p < .0001$) (Table 1). Patients arriving via EMS had significantly shorter door-to-CT and door-to-needle times and a significantly greater likelihood of meeting door-to-CT and door-to-needle benchmarks than those arriving via other means. Those arriving via EMS were also significantly more likely to receive IV t-PA (Table 2). Upon linking PCNASR to EMS-QI data, the calculated positive predictive value for prehospital stroke identification was 30%. Of the 255 matched patients (Table 3), 27% were eligible for IV t-PA ($n=68$) and of those, almost half (49%) received the treatment. Shorter median EMS on-scene times were significantly associated with IV t-PA treatment.

Table 1. Demographic Characteristics of Coverdell Patients by Transport Type

	Transported via EMS (n=18,340)		Transported via other means (n=12,062)	
	n	Percent	n	Percent
Sex				
Male	8,033	44	6,145	51
Female	10,282	56	5,900	49
Race/Ethnicity				
White	15,952	90	10,232	88
Black	976	6	736	6
Hispanic	644	4	553	5
Stroke Type				
Ischemic	12,781	70	7,770	65
TIA	3,856	21	3,370	38
Hemorrhagic	1,327	7	683	6
Median Age	79		70	
Median NIHSS	7		2	

Table 2. Association of Measures with Transport Type Among IV t-PA Eligible Patients

Time Targets (median minutes)	Transported via EMS (n=4,698)	Transported via other means (n=2,741)	P Value
Last Known Well-to-Door	0:52	0:42	<.0001
Door-to-CT	0:52	0:84	<.0001
Door-to-Needle	0:75	0:85	<.002
% Meeting Time Targets			
Door-to-CT <25 minutes	22%	7%	<.0001
Door-to-Needle <60 minutes	7%	1%	<.0001
% Receiving IV t-PA	22%	5%	<.0001

Table 3. Association Between Prehospital Care and IV t-PA Administration among Eligible Patients in EMS-QI

Time Targets (median minutes)	Received IV t-PA (n=33)	Did not Receive IV t-PA (n=35)	P Value
On-Scene Time	13	15	0.03
Total ED Transport Time	6	6	0.72
Total Call Time	25	28	0.42
Door-to-CT	0:19	0:24	0.44
Door-to-Needle	0:58	---	---
% Meeting Time Targets			
On-Scene Time <15 minutes	70%	55%	0.19
Door-to-CT <25 minutes	76%	29%	<.0001
Door-to-Needle <60 minutes	25%	---	---
% Receiving IV t-PA	49%	---	---

CONCLUSIONS

EMS plays a vital role in the continuum of stroke care. The utilization of EMS by stroke patients is significantly associated with increased administration of life-saving stroke treatments and faster in-hospital treatment. Results from the EMS Stroke Quality Improvement Collaborative show the benefits of improving the quality of prehospital clinical care, communication, and data collection on stroke patient outcomes. Future public health efforts should continue to focus on improving the quality and utilization of prehospital care.

CONTACT INFORMATION

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