Hospital Pre-notification of Stroke Patients by Emergency Medical Services Improves Stroke Time Targets

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Introduction

Aims:

1) **to compare stroke time targets among patients alerted as a Brain Attack by EMS in the pre-hospital setting compared to after ED triage**
2) **to compare IV tPA rates between stroke patients alerted as a Brain Attack pre-hospital versus after ED triage**

BACKGROUND

Pre-arrival notification to hospitals by emergency medical services of patients with suspected stroke is recommended to reduce delays in time-dependent therapies.[1,2] We hypothesized that hospital pre-notification would reduce stroke time targets recommended by the National Institute of Neurological Disorders and Stroke (NINDS).

METHODS

We used the Robert Wood Johnson University Hospital (RWJUH) Brain Attack Database, which includes demographic and clinical data on all emergency department (ED) patients alerted to the stroke team as a Brain Attack between January 1, 2009 and June 30, 2010. Outcome variables included the time from door to stroke team arrival, CT completion, CT interpretation, EKG, laboratory results, treatment decision, and intravenous (IV) rt-PA administration. The primary independent variable was Brain Attack activation before ED arrival (pre-hospital) versus on or after ED arrival (no pre-hospital). Analysis of covariance was used with patient predictors (age, sex, initial NIHSS) as covariates in addition to the one of interest (pre-notification vs. no pre-notification). Statistical significance was defined as a p-value ≤ 0.05.

Table 1. Patient Characteristics

	Pre-notification N=116	No Pre-notification N=115	*P*-value
Age (mean±SD)	69.5 ± 11.1	61.5 ± 17.1	0.0002
Female	61 (53%)	55 (47%)	0.469
Arrival			
EMS	115 (62%)	71 (38%)	<0.0001
Walk-in	1 (2%)	44 (98%)	
NIHSS (mean±SD)	11.1 ± 7.6	6.1 ± 6.9	<0.0001
IV tPA	32 (28%)	17 (15%)	0.024

Table 2. Stroke Time Targets

Variable	Time (minutes) mean±SD			*P*-value
	Pre-notification N=116	No Pre-notification N=115	Absolute Difference (95% CI)	
Stroke team arrival	-2.5 ± 7.6	16.1 ± 15.2	18.6 (15.5-21.8)	<0.0001
EKG	5.8 ± 5.2	14.3 ± 23.3	8.5 (4.1-13.0)	0.0002
CT completion	25.5 ± 11.4	38.4 ± 17.8	12.9 (9.0-16.8)	<0.0001
CT interpretation	38.2 ± 17.3	50.4 ± 20.2	12.2 (7.3-17.1)	<0.0001
Lab results	45.2 ± 16.4	54.1 ± 16.7	8.9 (4.5-13.2)	<0.0001
Decision	52.6 ± 31.4	47.2 ± 15.4	-5.4 (-21.7-10.9)	0.422
tPA administration	65.8 ± 26.9	62.0 ± 17.6	-3.8 (-18.4-10.8)	0.554

RESULTS

- **There were 231 patients (116 pre-notification, 115 no pre-notification) alerted as a Brain Attack from the RWJUH ED within the study period.**
- **Patients with pre-hospital notification were older, had more severe strokes, and were treated with IV rt-PA twice as often (Table 1).**
- **Pre-notification resulted in a significant reduction in all studied stroke time targets, except the door to treatment decision time and rt-PA administration (Table 2).**

CONCLUSIONS

1. **Pre-hospital notification of suspected stroke patients reduces time to:**
   - **Stroke team arrival**
   - **CT Scan Completion**
   - **CT scan interpretation**
2. **IV thrombolysis occurred twice as often in the pre-notification group**

REFERENCES

1. Adams HP et al. Guidelines for the early management of adults with ischemic stroke: a guideline from the American Heart Association/American Stroke Association Stroke Council, Clinical Cardiology Council, Cardiovascular Radiology and Intervention Council, and the Atherosclerotic Peripheral Vascular Disease and Quality of Care Outcomes in Research Interdisciplinary Working Groups: The American Academy of Neurology affirms the value of this guideline as an educational tool for neurologists. Circulation 2007;38: 1655.