Emergency Medical Services Hospital Prenotification and Stroke Time Targets

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Background

The New York State Department of Health (NYSDOH) established stroke designated centers (SDCs) in 2004 to improve the quality of care and outcomes for patients who experience a stroke in NYS. The SDCs annually submit aggregate data to the NYSDOH for time targets (shown below) and quality measures.

Emergency Medical Services (EMS) initiative measures, such as prenotification for suspected stroke, were added to the required quality metrics in 2015. Studies have shown an association between EMS prenotification and reduced time to treatment.

Study Goal

The purpose of this study is twofold: (1) to investigate EMS prenotification by demographic subgroup; and (2) to determine if there is an association between prenotification and achievement of NYS time targets.

Study Design

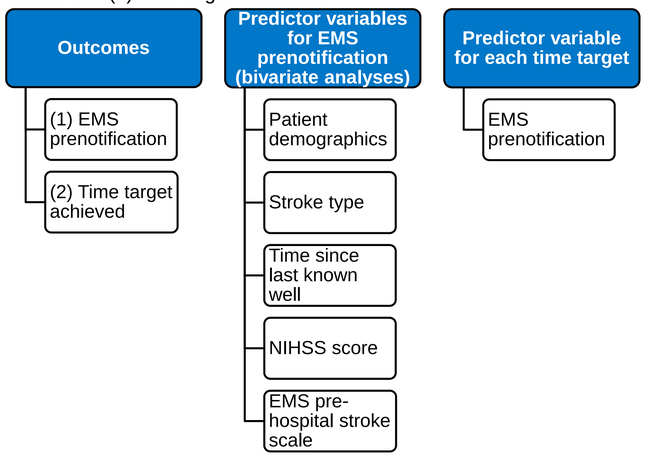
Patient level records from 63 NYS stroke centers participating in the Paul Coverdell National Acute Stroke Program with arrival dates between January 1, 2015 and December 31, 2016 are included in the analysis. Out of 62,270 extracted records, 1,905 (3.1%) are removed from the analysis due to elective carotid intervention or data integrity issues such as missing or invalid data. The final study cohort includes 60,365 records.

Data Source

The data source for the study is Get With the Guidelines (GWTG) - Stroke. NYSDOH has data use agreements in place with the 63 Coverdell participating stroke centers.

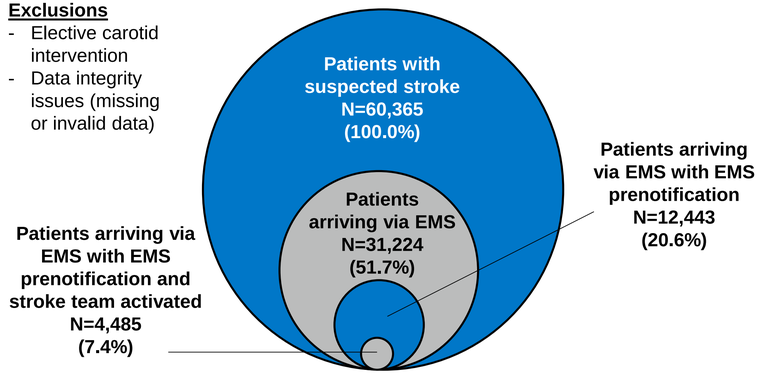
Methods

Descriptive summaries are prepared to investigate the number of patients arriving by EMS with EMS prenotification. Logistic regression is performed to determine if there is association for the outcomes of interest. The outcomes of interest are (1) EMS prenotification and (2) time target achieved.



Results

Exclusions
- Elective carotid intervention
- Data integrity issues (missing or invalid data)



Outcomes (Modeling EMS Prenotification)	Odds Ratio (95% CI)
Race (Reference: White)	
Hispanic	0.59 (0.54, 0.65)*
Asian	0.63 (0.55, 0.71)*
Black	0.61 (0.58, 0.65)*
Gender (Reference: Male)	
Female	1.06 (1.01, 1.11)*
Age (Reference: 18 – 44 Years Old)	
45 - 54 Years Old	1.05 (0.91, 1.21)
55 - 64 Years Old	1.07 (0.94, 1.22)
65 - 74 Years Old	1.15 (1.01, 1.30)*
75 - 84 Years Old	1.10 (0.97, 1.25)
85 Years Old and Older	1.15 (1.02, 1.30)*
Stroke Type (Reference: Ischemic Stroke)	
Transient Ischemic Attack	0.94 (0.88, 0.99)*
Subarachnoid Hemorrhage	0.69 (0.59, 0.81)*
Intracerebral Hemorrhage	1.11 (1.03, 1.20)*
Stroke Not Otherwise Specified	0.62 (0.43, 0.90)*
Time Since Last Known Well (Reference: 0 - 3 Hours)	
3 - 4.5 Hours	0.69 (0.63, 0.77)*
4.5 - 6 Hours	0.76 (0.67, 0.86)*
Greater than 6 Hours	0.60 (0.56, 0.64)*
NIHSS Category (Reference: Minor Stroke (1 - 4))	
No Stroke Symptoms	0.82 (0.77, 0.88)*
Moderate Stroke (5 - 15)	1.63 (1.53, 1.73)*
Moderate to Severe Stroke (16 - 20)	2.18 (1.97, 2.41)*
Severe Stroke (21 - 42)	2.19 (2.00, 2.39)*
EMS Pre-Hospital Stroke Scale (Reference: No)	
Yes	5.67 (5.19, 6.20)*

Outcomes (Modeling Time Target Met)	Odds Ratio (95% CI) Reference: No Pre-Notification
Door to MD Assessment	3.73 (3.53, 3.95)*
Door to Stroke Team	4.36 (4.10, 4.63)*
Door to Brain Imaging Completed	4.65 (4.42, 4.88)*
Door to Brain Imaging Report/Read	3.99 (3.78, 4.21)*
Time to IV Thrombolytic Therapy	1.50 (1.29, 1.75)*

Statistically Significant

Discussion

Key Findings
- The percentage of patients arriving via EMS is 51.7%; 39.9% of these (51.7%) have documented evidence of EMS prenotification.
- Once pre-notified, the stroke team was activated at the stroke center 36.0% of the time (4,485 out of 12,443).
- The odds of prenotification for suspected stroke cases are higher for people who are white, females, older age groups, people who arrive within 0 – 3 hours of last known well, people who have more severe strokes, and people who have an EMS pre-hospital stroke scale administered.
- The odds of meeting door to MD assessment, door to stroke team, door to brain imaging completed, door to brain imaging read, and time to IV thrombolytic therapy time targets are higher for those patients arriving via EMS with prenotification.

Limitations
- Additional analyses are needed to determine if the low prenotification percentage is real (EMS not pre-notifying) or a product of poor data quality/reporting such as missing emergency department documentation or the data not being captured in GWTG.

Conclusion

The study shows EMS prenotification is associated with increased odds of all NYS time targets being met; however, only 39.9% of records for patients arriving via EMS have documented prenotification. This is an area where NYS SDCs can improve by collaborating with EMS and enhancing data quality.

Acknowledgements & Author Affiliations

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