

Effect of arrival during shift change on process, treatment, and outcome in acute ischemic stroke

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Background

- ▶ 1996: IV tPA approved for use within 3 hrs
- ▶ 2008: IV tPA window extended to 4.5 hrs
- ▶ Earliest possible treatment is critical to functional outcome
- ▶ Use remains low (delayed presentation)
- ▶ In previous reports, door to needle times shown to be slower for patients arriving earlier
- ▶ In-hospital mortality higher on weekend for both non-neurological conditions and stroke in early studies
- ▶ Less data on how day/night and time of year impacts outcome
- ▶ No data on how nursing shift changes affect tPA use and patient outcomes

Goals

- ▶ To determine whether arrival with acute ischemic stroke (AIS) during specific "transition" times in ED such as shift change affects stroke management and patient outcomes
- ▶ Determine if the night/day, weekend, and time of year effect also takes place at Hartford Hospital

Methods

- ▶ Retrospective, single-center database review
- ▶ Time period: Jan 2005 - Nov 2010
- ▶ **Included:** all patients with AIS who presented <8 hours from symptom onset
- ▶ **Excluded:** direct admissions, transfers, inpatients, key data unknown (arrival time, time of symptom onset, NIHSS)
- ▶ **Parameters collected**
- ▶ Age, Gender, Medications, Pre-stroke MBI, Last seen well time, Admission NIHSS, Time and date of ED arrival
- ▶ **Independent variables**
- ▶ Shift change
- ▶ Night
- ▶ Weekend
- ▶ July through Sept
- ▶ **Process times**
- ▶ Page stroke team
- ▶ Head CT
- ▶ Start IV or IA tPA
- ▶ **Hospital outcome**
- ▶ IV and IA tPA treatment rate
- ▶ **Patient outcomes**
- ▶ Mortality
- ▶ Discharge disposition
- ▶ Change in NIHSS
- ▶ Gain in Modified Barthel Index at 3 and 12 months

Demographics

Characteristics	
Age, y, mean, (SD)	73.4 (14.6)
Sex, male, No. (%)	435 (47.4)
Barthel pre stroke, mean, (SD)	18.6 (3.2)
Admission NIHSS, mean, (SD)	8.7 (7.4)
Previous medications, No. (%)	
Aspirin	370 (40.3)
ACE inhibitor	238 (26)
Statin	360 (39.3)
Warfarin	140 (15.3)
Arrived During, No. (%)	
Shift change	159 (17.3)
Night	276 (30.1)
Weekend	241 (26.3)
July to September	258 (28.1)

Arrival during shift change

Process times, minutes, median, (IQR)	N	Outside shift change	N	Shift Change
Arrive to page stroke team	578	-1 (-5.3, 5)	132	-2 (-6, 3.8)
Arrive to perform head CT	678	27 (19, 41.3)	151	26 (20, 39)
Arrive to start IV tPA	231	63 (52, 83)	50	65 (48, 79.3)
Arrive to IA catheter insertion	60	158.5 (124.5, 208.8)	13	184 (124.5, 194.5)
Hospital outcomes, No. (%)				
Received IV tPA if eligible according to JCO	235	226 (96.2)	51	49 (96.1)
Received IA tPA if eligible	279	45 (16.1)	59	5 (8.5)
Patient outcomes				
Discharge disposition, No. (%)				
Expired	550	135 (24.5)	124	32 (25.8)
Discharged home	203	86 (42.4)	47	27 (57.4)
Functional Outcome				
NIHSS improved, No. (%)	242	166 (68.6)	41	30 (73.2)
NIHSS unchanged, No. (%)	242	58 (24)	41	8 (19.5)
NIHSS worse, No. (%)	242	18 (7.4)	41	3 (7.3)
Gain in Barthel at 3 months, mean, (SD)	239	2.6 (5.3)	51	3.9 (5.4)
Gain in Barthel at 12 months, mean, (SD)	158	3 (5.3)	33	3.5 (6.3)

*p<.05, **p<.01, ***p<.001

Weekend arrival

Process times, minutes, median, (IQR)	N	Weekday	N	Weekend
Arrive to page stroke team	526	-1 (-5.25, 4)	184	-2 (-6, 6)
Arrive to perform head CT	609	26 (20, 39)	220	28 (20, 44.8)
Arrive to start IV tPA	206	63 (51, 80.5)	75	66 (53, 84)
Arrive to IA catheter insertion	55	155 (119, 198)	18	176.5 (155.8, 242)
Hospital outcomes, No. (%)				
Received IV tPA if eligible according to JCO	209	200 (95.7)	77	75 (97.4)
Received IA tPA if eligible	250	37 (14.8)	88	13 (14.8)
Patient outcomes				
Discharge disposition, No. (%)				
Expired	497	128 (25.8)	177	39 (22)
Discharged home	169	79 (46.7)	81	34 (42)
Functional Outcome				
NIHSS improved, No. (%)	205	143 (69.8)	78	53 (67.9)
NIHSS unchanged, No. (%)	205	46 (22.4)	78	20 (25.6)
NIHSS worse, No. (%)	205	16 (7.8)	78	5 (6.4)
Gain in Barthel at 3 months, mean, (SD)	205	2.9 (5.6)	85	2.7 (4.5)
Gain in Barthel at 12 months, mean, (SD)	135	3.1 (5.5)	56	3.1 (5.4)

*p<.05, **p<.01, ***p<.001



Arrival at night

Process times, minutes, median, (IQR)	N	Day	N	Night
Arrive to page stroke team	517	-1 (-5, 5)	193	-3 (-7, 4)*
Arrive to perform head CT	594	26 (20, 39.3)	235	28 (19, 45)
Arrive to start IV tPA	212	61.5 (50.3, 80.8)	69	69 (56, 85)
Arrive to IA catheter insertion	48	147 (115.3, 176.8)	25	214.3 (176, 211.5)***
Hospital outcomes, No. (%)				
Received IV tPA if eligible according to JCO	214	207 (96.7)	72	68 (94.4)
Received IA tPA if eligible	236	36 (15.3)	102	14 (13.7)
Patient outcomes				
Discharge disposition, No. (%)				
Expired	465	105 (22.6)	209	62 (29.7)*
Discharged home	183	82 (44.8)	67	31 (46.6)
Functional Outcome				
NIHSS improved, No. (%)	201	137 (68.2)	82	59 (72)
NIHSS unchanged, No. (%)	201	49 (24.4)	82	17 (20.7)
NIHSS worse, No. (%)	201	15 (7.5)	82	6 (7.3)
Gain in Barthel at 3 months, mean, (SD)	205	3.3 (4.9)	85	1.9 (6)*
Gain in Barthel at 12 months, mean, (SD)	143	3.1 (5.8)	48	3.0 (4.3)

*p<.05, **p<.01, ***p<.001

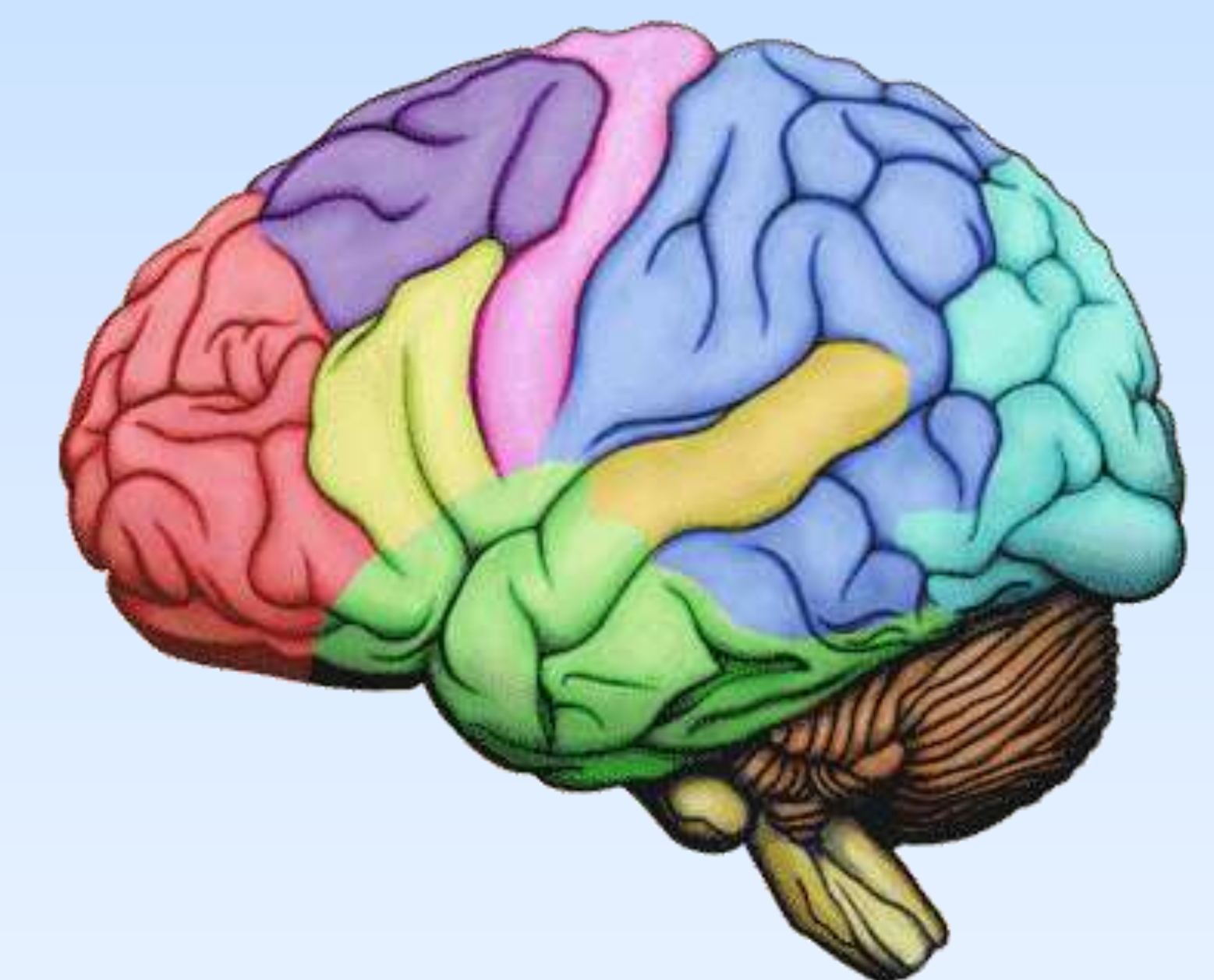
Arrival in July - Sept.

Process times, minutes, median, (IQR)	N	Oct - June	N	July-Sept
Arrive to page stroke team	516	-2 (-6, 5)	194	-1 (-6, 5)
Arrive to perform head CT	598	28 (20, 42)	231	26 (19, 40)
Arrive to start IV tPA	214	63.5 (52, 79.3)	67	63 (49, 93)
Arrive to IA catheter insertion	54	158 (124.8, 200.8)	19	161 (124, 243)
Hospital outcomes, No. (%)				
Received IV tPA if eligible according to JCO	219	209 (95.4)	67	66 (98.5)
Received IA tPA if eligible	250	38 (15.2)	88	12 (13.6)
Patient outcomes				
Discharge disposition, No. (%)				
Expired	488	132 (27)	186	35 (18.8)*
Discharged home	184	85 (46.2)	66	28 (42.4)
Functional Outcome				
NIHSS improved, No. (%)	198	134 (67.7)	85	62 (72.9)
NIHSS unchanged, No. (%)	198	49 (24.7)	85	17 (20)
NIHSS worse, No. (%)	198	15 (7.6)	85	6 (7.1)
Gain in Barthel at 3 months, mean, (SD)	210	3 (5.3)	80	2.3 (5.2)
Gain in Barthel at 12 months, mean, (SD)	139	3.4 (5.3)	52	2.4 (5.8)

*p<.05, **p<.01, ***p<.001

Conclusions

- ▶ Care for patients with AIS is not impacted by the additional responsibilities ED nurses have during transitions of care during shift change.
- ▶ Rates of IV thrombolysis are not reduced by off-hour arrivals specifically nights and weekends.
- ▶ While care is not delayed for those patients presenting early enough for IV thrombolysis, it is delayed for those who miss the 3 or 4.5 hour window and require IA thrombolysis during night-time hours
- ▶ Patients arriving at night had a higher mortality rate and worse clinical outcome at 3 months. Presentation during shift change, weekend, or during July through September had no negative impact on outcome.



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