Temporal Analysis of Workflow Trends in Emergent Stroke Evaluation

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No Disclosures

Background: UW Emergent Stroke Evaluation

- Certified Comprehensive Stroke Center
- ‘Stroke Codes’ can be initiated by any provider
- Paged out to a defined list of providers
  - Neurologists
  - Neuroendovascular service
  - Neuroradiology reading room
- Each initiated stroke evaluation includes:
  - Patient location
  - Initiating healthcare provider
  - Patient identifier (name and/or MRN)
- Data collated by the paging service, but not routinely evaluated for workflow analysis beyond JHACO’s ”Joint Commission Stroke” measures

Purpose

Harness novel paging data to analyze temporal trends in emergent stroke evaluation and identify potential workflow factors that may affect emergent stroke evaluation in the emergency department setting.

Methods

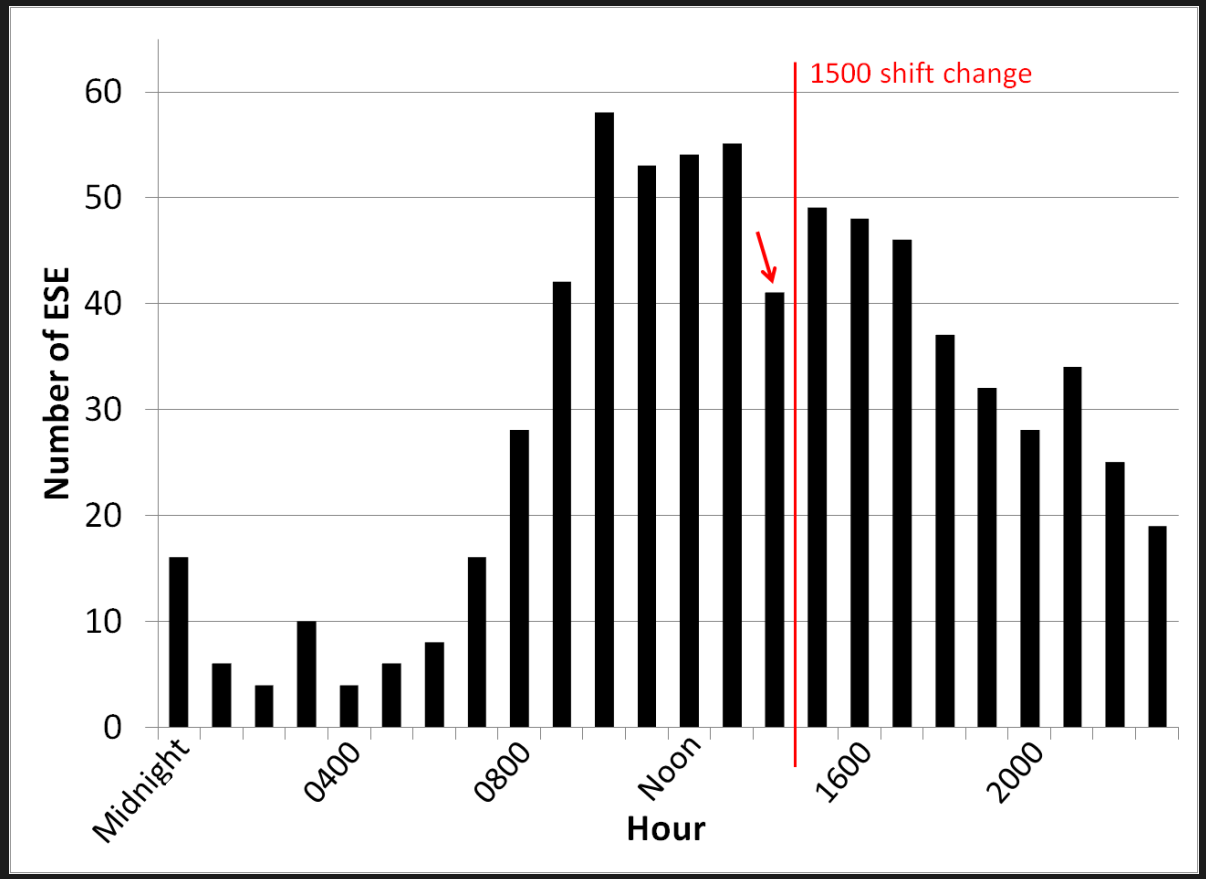
- Contiguous emergent stroke evaluation (ESE) paging data (1/1/2015-10/31/2016) identified 719 sentinel ESE with neuroimaging from the emergency department.
- Frequency data were tabulated and odds ratios (OR) were calculated, with the hour of fewest ESEs serving as baseline.
- Frequency data were also graphed and analyzed in order to identify meaningful unexpected variations.

Results

Hour	ESE (N)	% Total	Odds Ratio*	OR 95% CI
Midnight – 0100	16	2.2%	4.0	1.3 – 12.0
0100 – 0200	6	0.8%	1.5	0.4 – 5.3
0200 – 0300	4	0.6%	1.0	0.2 – 4.0
0300 – 0400	10	1.4%	2.5	0.8 – 8.0
0400 – 0500	4	0.6%	1.0	0.2 – 4.0
0500 – 0600	6	0.9%	1.5	0.4 – 5.3
0600 – 0700	8	1.1%	2.0	0.6 – 6.7
0700 – 0800	16	2.2%	4.0	1.3 – 12.0
0800 – 0900	28	3.9%	7.0	2.4 – 20.1
0900 – 1000	42	5.8%	10.5	3.7 – 29.4
1000 – 1100	58	8.1%	14.5	5.2 – 40.2
1100 – Noon	53	7.4%	13.3	4.8 – 36.8
Noon – 1300	54	7.5%	13.5	4.9 – 37.5
1300 – 1400	55	7.7%	13.8	5.0 – 38.2
1400 – 1500	41	5.7%	10.3	3.7 – 28.8
1500 – 1600	49	6.8%	12.3	4.4 – 34.1
1600 – 1700	48	6.7%	12.0	4.3 – 33.5
1700 – 1800	46	6.4%	11.5	4.1 – 32.1
1800 – 1900	37	5.2%	9.3	3.3 – 26.1
1900 – 2000	32	4.5%	8.0	2.8 – 22.7
2000 – 2100	28	3.9%	7.0	2.4 – 20.1
2100 – 2200	34	4.7%	8.5	3.0 – 24.1
2200 – 2300	25	3.5%	6.3	2.2 – 18.1
2300 - Midnight	19	2.6%	4.8	1.6 – 14.0
Total ESE	719	---	---	---

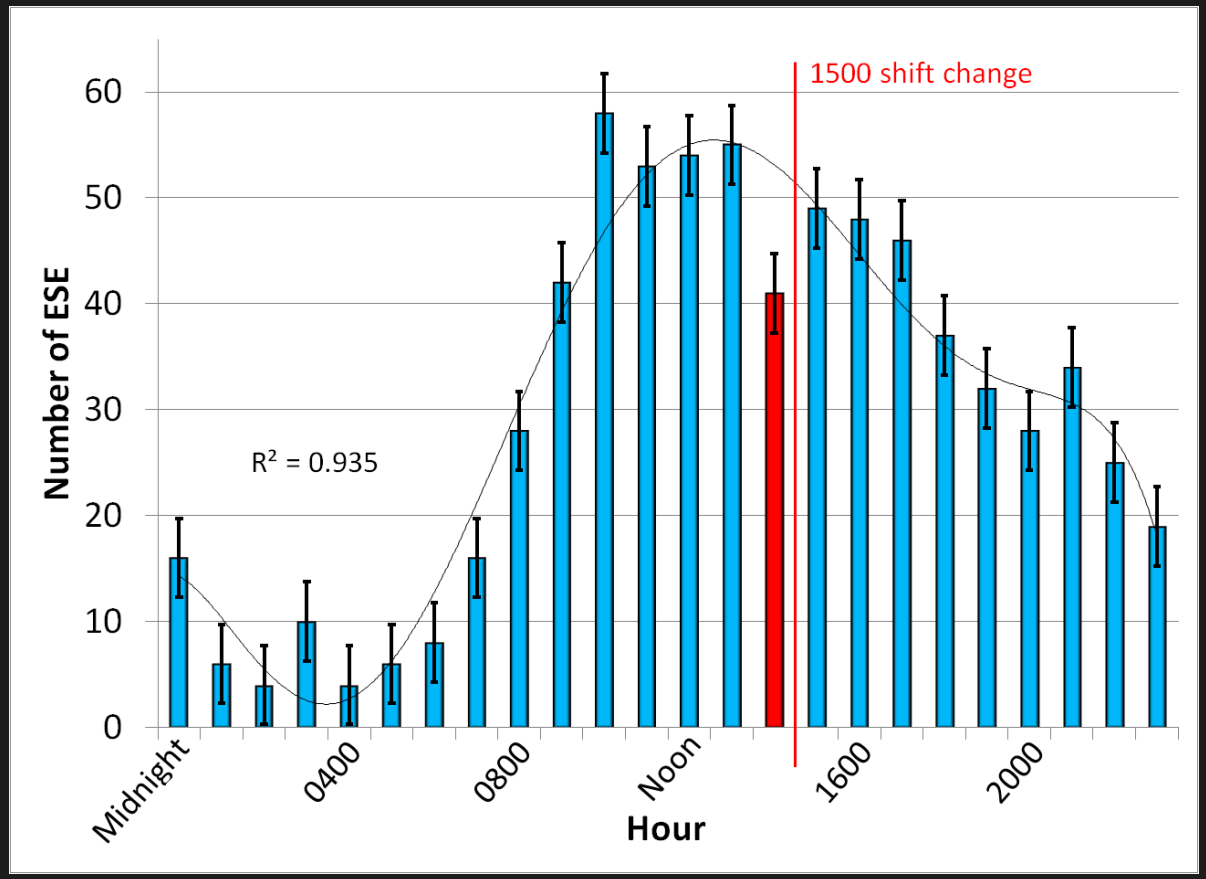
- We observed a relative decrease in frequency overnight with only 5% of ESE's occurring between 0100 and 0700.
- The absolute nadir occurred during the 0200 hour and again during the 0400 hour.
- Peak volume occurred during the 1000 hour, accounting for 8.1% of all ESE's with an odds ratio of 14.5 relative to the nadir.
- 50% of all ESE's occurred during the 7 hour interval between 1000 and 1700.

Results



- Paging frequency data as a function of time of day
- An unexpected drop in ESE volume appears to occur during the 1400 hour.
- This drop occurs during the hour before a major ED nursing shift change.
- Analysis was performed to assess for the significance of this finding.

Results



- This figure shows frequency data with standard error bars (SE = ±3.7 ESE).
- A complex polynomial best fit curve yields an expected value of 54.6 ESE during the 1400 hour (observed ESE N = 41).
- Assuming Poisson distribution, the chance of observing 41 or fewer ESE when 54.6 are expected is 0.034, or 3.4%, suggestive of statistical significance.

Discussion: Take Home Points

- Temporal analysis of institution-specific emergent stroke evaluation initiation can uncover potential workflow factors affecting stroke evaluation
- Workflow factors, such as major shift changes, may affect timeliness of emergent stroke evaluation
- The temporal distribution of stroke evaluation at our institution is consistent with previously published data on the temporal onset of stroke[1-3]

References

1. Ricci S et al. Diurnal and seasonal variations in the occurrence of stroke: a community-based study. Neuroepidemiology 1992;11(2)59-64

2. Kelly-Hayes M et al. Temporal Patterns of Stroke Onset – The Framingham Study. Stroke. 1995;26:1343-1347

3. Wroe S et al. Diurnal variation in incidence of stroke: Oxfordshire community stroke project. British Journal of Medicine 1992;304:155-157