Analyzing Unspecified Chest Pain Diagnoses and the Impact of Physician Staffing at the PVAHCS ED

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Introduction

Emergency department overcrowding is a reality that exists within the healthcare system. To standardize monitoring performance, the VHA Directive establishes ED performance metric goals (targets) and minimum standards (thresholds) on a fiscal year basis. In line with these pre-determined metrics, the outcomes examined within this study include the number of patients diagnosed with unspecified chest pain and the respective Door to Doc, Admission Decision, Admission Delay, ED LOS, and Inpatient LOS times. The reasoning behind specifically examining patients with unspecified chest pain was because it was one of the top 10 diagnoses made at the PVAHCS ED for the year of 2016 and is an acuity level only assigned to physician providers. The reason for this study is to determine the impact increased physician staffing has on the flow of the Phoenix VA ED with regard to the described outcome measures. Therefore, examining if unspecified chest pain patients solely seen by physicians have improved flow within the ED.

Methods

Study Design: EDIS data from EMMT from 04/16-12/16 and provider reports for 09/12/16 – 09/30/2016.
Subjects: Patients were de-identified and each interaction was independent.. Inclusion criteria: patient diagnosis and admission to the hospital. Exclusion criteria: Admission Delay measurements exceeding >60,000.
Analytic Methods: Outcomes were assessed using means, standard deviations for continuous variables and frequencies, proportions for categorical variables. Linear Regression was implemented to ascertain any trends in the outcomes from April-September. Chi-Squared analysis was used to ascertain trends in the number of physicians on service. Finally, the Kruskal-Wallis Test was used to assess differences in the outcome measurements between categories of the number of physicians on service.

Results

156 patients were admitted for unspecified chest pain. There were no significant trends in the Door to Doc (p = 0.63) and Admission Decision times (p = 0.80). The Admission Delay increased (p=0.01). The Admission Delay time was the shortest in April at an average of 132.6 ± 117.8 minutes. The Admission Delay time was the longest in September at an average of 75.8 ± 55.8 minutes. (Table 1). The increase in ED LOS trended towards statistical significance (p = 0.053).
Physician FTE varied from 12 to 15. In Table 2, there was no significant difference in the Door to Doc (p = 0.53), Admission Decision (p = 0.81), Admission Delay (p = 0.53), Inpatient LOS (p = 0.30) and ED LOS time (p = 0.52).
The physician shift schedule for September 12th through September 30th 2016, led to the creation of Table 3. There was no statistical significance determine between the Door to Doc (p = 0.11), Admission Decision (p = 0.13), Admission Delay (p = 0.11), and ED LOS time (p = 0.43). (Table 3).

Variables (Number of Patients)	Overall N=156	April N=31	May N=27	June N=25	July N=17	August N=28	September N=28	P-value
Number of Doctors: n, (ratio physicians/patients admitted)	25 (16.0)	15 (9.6)	14 (8.9)	12 (7.6)	12 (7.6)	14 (8.9)	12 (7.6)	N/A
Door to Physician in minutes: mean, (%)	31.8 (41.8)	29.8 (45.4)	32.1 (39.0)	29.8 (57.7)	33.0 (34.7)	29.9 (24.8)	36.7 (44.3)	0.63
Admission Decision in minutes: mean, (SD)	219.8 (97.2)	225.4 (108.4)	212.8 (83.8)	228.0 (102.1)	187.6 (55.4)	213.4 (100.4)	238.8 (109.9)	0.80
Admission Delay in minutes: mean, (SD)	96.2 (79.3)	75.8 (55.8)	93.7 (64.4)	77.7 (60.9)	102.5 (81.7)	97.7 (73.1)	132.6 (117.8)	0.010
ED Length of Stay in hours: mean, (SD)	5.2 (2.0)	5.0 (1.9)	5.0 (1.5)	5.0 (1.8)	4.8 (1.6)	5.2 (2.1)	6.2 (2.7)	0.053
Inpatient Length of Stay in hours: mean, (SD)	57.8 (99.9)	81.9 (188.4)	56.0 (43.9)	58.2 (65.6)	31.7 (17.7)	37.5 (22.8)	68.4 (99.7)	0.34

P-values calculated using Chi2 for categorical variables and simple linear regression for continuous variables.
Table 1 Trends in Outcome Measures for Unspecified Chest Pain Diagnoses from April 2016 to September 2016.

Variables		# of Docs					P-value[1]
	Overall	4	5	6	7	8	
Door to Doc in minutes: (median, IQR)	26 (10, 59)	16 (6, 6, 31)	56 (16, 126)	12.5 (9, 17)	23 (10, 59)	45.5 (25, 61.5)	0.11
Admission Decision in minutes: (median, IQR)	181 (145, 295)	166 (95, 179)	295 (223, 339)	182 (131, 273)	176 (176, 176)*	181 (181, 181)*	0.13
Admission Delay in minutes: (median, IQR)	101 (67, 166)	160 (133, 266)	94 (56, 122)	66.5 (33, 108)	430 (430, 430)*	69 (69, 69) *	0.11
ED Length of Stay in hours: (median, IQR)	4 (3, 5)	4 (3, 6)	4 (4, 8)	4.5 (4, 5)	3 (1, 5)	4.5 (4, 5)	0.48
In Patient Length of Stay in hours: (median, IQR)	36.5 (25, 46)	25 (20, 28)	61.5 (45, 185)	43 (35.5, 69.5)	15 (15, 15) *	20 (20, 20) *	0.009
Whether Patient was Admitted							0.093
Yes	31 (62.0)	5 (45.5)	11 (61.1)	2 (33.3)	10 (90.9)	3 (75.0)	
No	19 (38.0)	6 (54.6)	7 (38.9)	4 (66.7)	1 (9.1)	1 (25.0)	

[1]P-Values calculated using Kruskal-Wallis for continuous variables and Fisher's Exact for categorical variables. * Denotes a Sample Size of 1 patient.
Table 3 Unspecified Chest Pain Outcome Variables in Comparison to Number of Physicians for September 12th-30th 2016.

Figure 2 Mean Outcome Variables for all Patient Diagnoses presenting to the PVAHCS ED.

Variables	12 Physicians	14 Physicians	15 Physicians	P-Value
Door to Physician in minutes: mean, (%)	33.3 (47.1)	31.0 (32.3)	29.8 (45.4)	0.53
Admission Decision in minutes: mean, (SD)	222.5 (97.4)	213.1 (91.8)	225.4 (108.4)	0.81
Admission Delay in minutes: mean, (SD)	105.7 (94.1)	95.7 (68.4)	75.8 (55.7)	0.53
ED Length of Stay in hours: mean, (SD)	5.4 (2.3)	5.1 (1.8)	5.0 (1.9)	0.52
Inpatient Length of Stay in hours: mean, (SD)	55.9 (5.3)	46.6 (35.7)	81.9 (188.4)	0.30

P-values calculated using Kruskal-Wallis
Table 2 Unspecified Chest Pain Variables for April 2016 - September 2016 Compared to Number of Physicians.

The maximum number of patients seen in December at 3,380 and the minimum in June at 3,083, with an average of 3,170 per month. The overall trend for ED LOS appears to decrease overall, outside of the month of May and September at an average of 176 minutes.

Discussion and Conclusions

Overall, PVAHCS ED flow in terms of Door to Doc, Admission Decision, Admission Delay, and ED LOS times from April 2016 through September 2016 in patient encounters with unspecified chest pain were found to be statistically insignificant when compared to the respective month as well as increased physician staffing. By this predictive model, it was recognized that despite ED staffing implementations to increase physician staffing and obtaining midlevel providers, it did not decrease the ED LOS.
These results highlight that throughput through the PVAHCS ED is not a product of understaffing, but possibly rather related to other confounding variables, such as, but not limited to, inadequate recognition of clinical conditions, lack of ancillary labs, imaging in a timely manner, availability of hospital beds, and inefficient inner and inter- handoffs.

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