



## Brief Report

## Differences in patient population and length of stay between freestanding and hospital-based emergency departments

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## ABSTRACT

**Background:** Freestanding emergency departments (FEDs) represent over 10% of emergency departments (EDs) in the United States. Little is known about differences in encounter characteristics. We compared ED length of stay (LOS) clinical demographics, method of arrival, acuity level, and patient disposition for encounters to FEDs vs. hospital-based EDs (HBEDs).

**Methods:** A multi-center retrospective analysis was performed. Study sites included 6 FEDs and 13 HBEDs from 10/1/2017 to 9/30/2018. Data was abstracted from ED records and discharge summary within the electronic health record. Descriptive statistics were reported with prevalence (95% Confidence Interval [CI]) for categorical variables and mean (standard deviation [SD]) for continuous variables. Multivariable linear regression assessed the relationship between ED facility (FEDs vs. HBEDs) and ED length of stay (LOS).

**Results:** 1,263,297 encounters were analyzed. Mean ED LOS was shorter at FEDs (146.62 min ( $\pm 97.04$ )) vs. HBED (249.70 min (+287.50)). Nine percent of FED encounters arrived via EMS vs. 21% at the HBEDs. FEDs saw 5.47% emergency severity index (ESI) level 2 vs. 13.76% at the HBEDs. Medicaid and Medicare patients were more prevalent in HBEDs (64.2%) than in FEDs (50.6%). FEDs admitted 13% of patients and HBEDs 27%. All results were significant ( $p < 0.001$ ). After adjusting for potential confounding variables, patients utilizing FEDs had 16.2% shorter ED LOS vs. HBEDs ( $\beta = -0.18$  [95% CI:  $-0.18$  to  $-0.17$ ]).

**Conclusion:** Overall ED LOS was significantly less for FED vs. HBED patients. Acuity level, insurance status, method of arrival, and patient disposition were significantly different at FEDs vs. HBEDs.

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## 1. Introduction

The number of freestanding emergency departments (FEDs), which are emergency departments that are not physically connected to a hospital, has increased over the past decade [1]. In fact more than half of FEDs in the United States (US) opened during this period [1]. As of June 2017, there were 566 FEDs across the United States representing about 13% of US ED's [1]. FEDs may be affiliated with a hospital system or independently owned and operated. Similar to hospital based emergency departments (HBED), FED's are typically open 24/7/365, offer imaging such as CT and Ultrasound, and have lab services on site, though with varying levels of capabilities and equipment [1,2]. FED's do not typically have consultants available on-site.

ED means of arrival is an important patient care factor. For example, stroke patients who arrived by ambulance were seen faster by a physician, more likely to have brain imaging, and more likely to be admitted to the intensive care unit [3]. Previous studies have demonstrated that patients may choose to go to a HBED for more serious injuries [4]. Using Emergency Severity Index (ESI) as a proxy for ED acuity, one study found that FED's saw fewer ESI level 1 and 2 patients and more ESI level 3 and 4 than HBEDs [5]. FEDs have also been associated with a shorter door to provider time and shorter length of stay (LOS) as compared to HBEDs [2,5]. Previous studies compared FEDs to national benchmark data. To date there have been no known studies that directly compare FEDs to HBEDs in the same metropolitan area and health system allowing for a more direct and meaningful comparison. In this study we sought to evaluate how in a large integrated regional health systems FED's differ from HBEDs in terms of LOS, patient population, means of arrival, acuity, insurance and disposition.

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## 2. Methods

### 2.1. Study design and setting

This was a multicenter retrospective analysis performed in a large integrated health system. The study sites included 6 FEDs and 13 HBEDs with over 1.2 million annual ED encounters. The HBEDs include a quaternary care academic medical center, a level 1 trauma center, and ten community hospitals, of which two were level 2 trauma centers. All FEDs are within 15 miles of a HBED. All EDs in this study receive ambulances. Current EMS protocols stipulate that ambulances can transport to the FEDs with the exception STEMI, stroke and trauma (based on state trauma triage criteria). With the exception of times sensitive conditions, which include STEMI, trauma or stroke, the patient remains the final arbiter when it comes to hospital destination. There are no formal protocols in place as to which facility EMS should transport patients to with the exception that all cardiac arrests are to be transported to the closest ED facility. The EDs are located in an area with an estimated population of over 3.6 million at the time of the 2010 census [6]. The Institutional Review Board approved this study.

Our primary outcome was to compare LOS between FED's and HBED's.

### 2.2. Data collection

The health system utilizes a comprehensive integrated electronic health record (EPIC, Verona, WI) at all FEDs and HBEDs. A total of 1,272,170 records of patients visiting 19 EDs from 10/1/2017 to 9/30/2018 were extracted. Records missing ED length of stay (LOS) data were excluded in its entirety, with a resultant sample size of 1,263,297. If there were missing elements for a particular data point, those encounters were excluded from that calculation; hence the different sample sizes in the results.

As the outcome of interest of this study, ED LOS was measured in minutes as a continuous variable. Since the ED LOS variable was positively skewed (skewness = 8.221), it was log-transformed to better fit the assumptions of underlying regression analysis. The primary exposure of interest was the binary variable ED facility, which was either FED or HBED.

Potential confounding factors adjusted in assessing the association between the primary exposure variable and the outcome were: demographic factors (age, gender, race, marital status and insurance type); clinical factors (acuity level); means of arrival (EMS vs. non-EMS); volume of ED facility; and final status of patient (patient disposition).

## 3. Statistical analysis

Using SAS® 9.4 (SAS Institute Inc., Cary, NC, USA) descriptive statistics were reported with prevalence and 95% Confidence Interval (CI) for categorical variables. Mean with standard deviation (SD) was reported for continuous variables. Stratified descriptive analysis was conducted to examine ED LOS differences between FEDs and HBED with Chi-squared test. Continuous variables were compared using two-tailed Student's *t*-test. Since this is a study with a large sample size, there is higher likelihood of achieving significance, therefore we used 95% CI for descriptive analysis.

Multivariable linear regression analysis was conducted to assess the relationship between type of ED facility (FEDs vs. HBEDs) the patient encounter occurred and ED LOS while adjusting for potential confounding variables. Significance of the test was determined using  $\alpha = 0.05$  as a cutoff for linear regression analysis. Dummy variables were created for categorical variables.

## 4. Results

A total 1,263,297 ED visits were used for analysis. Table 1 demonstrates descriptive statistics of the overall sample with stratified analysis

by type of ED facility the patient encounter occurred. Approximately 83% of the patients in this analysis utilized a HBED whereas 17% utilized a FED. The overall mean age was 44.68 years ( $\pm 24.21$ ) and mean ED LOS 232.05 min ( $\pm 267.65$ ). Mean ED LOS was longer for patients visiting a HBED (249.70 min ( $\pm 287.50$ )) as compared to patients at FEDs (146.62 min ( $\pm 97.04$ )). Overall 60% of patients were listed as white, however in the FEDs 81% of patients were listed as white. Though most patients were identified as single, FEDs had a slightly higher proportion of patients who were married than HBEDs (37.01% vs. 28.14%).

Nine percent of encounters to a FED arrived via EMS as opposed to 21% at the HBEDs. Likewise, HBED received more than twice the proportion of ED patients with ESI level 2 (13.76%) than FEDs (5.47%). Medicaid and Medicare patients were more prevalent in HBEDs (64.2%) than in FEDs (50.6%). In this population, 13% were admitted from the FEDs and 27% were admitted from the HBEDs.

Table 2 stratified FED and HBED patients by their disposition ( $n = 322,152$ ). While age and gender were similar between the two groups for admitted and discharged patients, acuity levels, mode of arrival and LOS were different between FEDs and HBEDs. Among the discharged patients, private insured patients were of higher proportion in FEDs, whereas Medicaid patients were of higher proportion among HBEDs.

Table 3 demonstrates multivariable linear regression analysis. Overall, after adjusting for potential confounding variables, on average, patients utilizing FEDs had 16.2% shorter ED LOS compared to those in HBEDs ( $\beta = -0.18$  [95% CI:  $-0.18$  to  $-0.17$ ]). This analysis was able to explain 30.98% variability in the outcome [R square: 0.3098].

For admitted patients, after adjusting for potential confounding variables, on average, patients who had their ED encounter at a FED had 21% longer ED LOS compared those patients whose ED counter was at HBEDs ( $\beta = 0.19$  [95% CI: 0.18 to 0.20]) Here, the multivariable linear regression demonstrated a low 6.99% of variability in the outcome [R square: 0.0699], suggesting that there may be other factors, which affect the ED LOS of admitted patients. Similarly, for discharged patients, on average, patients in FED had a 17% shorter ED LOS when compared with those in HBED with 27.43% variability. [R square: 0.2743].

Age group specified analysis was conducted to assess the difference in strength of association between type of ED facility encountered by patient and their ED LOS (not shown in table). There was no difference in ED LOS pattern from overall results presented above, except for admitted children (<18 years of age) which showed 25% shorter ED LOS among FEDs when compared to HBEDs.

## 5. Discussion

This paper adds to the growing body of literature examining the utilization of FEDs. There is limited literature describing the demographics of FED patients and their encounters. Our work is unique in that we directly compare FED patients to HBED within a region and single health system. Interestingly, even in a single system, the population of patients that presented to FEDs was significantly different from patients who presented to HBEDs with only age and gender being similar. It is unclear if the demographic variance is a function of the FED and its utilizers as opposed to differences in the makeup of the communities surrounding the FEDs. Only one of the FEDs was located in an urban area. The remaining FEDs were suburban/rural. Further research is needed to clarify this question. Critics of FEDs argue that they serve as glorified urgent care centers [7]. Our data show that FEDs handle comparable acuity levels in different proportions. While both HBEDs and FEDs see few high acuity patients (ESI level 1 and 2), the HBEDs see a greater proportion of these patients. However, FEDs admitted approximately 14% fewer patients. Perhaps, while the FEDs also see high acuity patients, they see a greater proportion of ESI level 3 and 4 patients, which explains the lower overall admission rate. Both facilities saw very few ESI level 5 patients. FEDs see less high acuity patients than the HBEDs and it is unclear whether this had to do with EMS preference to

**Table 1**  
Socio-demographic characteristics (prevalence) of patients visiting Cleveland Clinic Foundation (CCF) Emergency Department (ED) stratified by type of facility visited (FED versus HBED).

Variables	Overall (n = 1,263,297)	Type of ED facility		p value
		FEDs (n = 216,265) 17.12 [17.05–17.18]	HBED (n = 1,047,032) 82.88 [82.81–82.95]	
Age, in years (n = 1,263,294) (Mean, $\pm$ SD)	44.68 ( $\pm$ 24.21)	43.54 ( $\pm$ 22.91)	44.91 ( $\pm$ 24.46)	<0.001
Length of stay in ED facility (n = 1,263,297) (Mean, $\pm$ SD), in minutes	232.05 ( $\pm$ 267.65)	146.62 ( $\pm$ 97.04)	249.70 ( $\pm$ 287.50)	<0.001
Race (n = 1,204,942), prevalence [95% CI]				<0.001
Whites	60.43 [60.34–60.51]	81.36 [81.19–81.53]	56.01 [55.91–56.11]	
Blacks	34.33 [34.24–34.41]	14.48 [14.33–14.63]	38.51 [38.42–38.61]	
Asians	0.79 [0.77–0.81]	0.93 [0.89–0.97]	0.76 [0.75–0.78]	
Multiracial	4.28 [4.25–4.32]	3.06 [2.99–3.14]	4.54 [4.50–4.58]	
Others	0.17 [0.16–0.17]	0.17 [0.15–0.18]	0.17 [0.16–0.17]	
Gender (n = 1,263,284), prevalence [95% CI]				<0.001
Female	56.19 [56.11–56.28]	57.22 [57.02–57.43]	55.98 [55.89–56.08]	
Male	43.80 [43.72–43.89]	42.77 [42.57–42.98]	44.02 [43.92–44.11]	
Age Group, in years (n = 452,958), prevalence [95% CI]				<0.001
18 years and under	13.79 [13.73–13.85]	12.92 [12.78–13.06]	13.97 [13.91–14.04]	
18–35	25.32 [25.24–25.39]	27.66 [27.47–27.85]	24.83 [24.75–24.91]	
36–55	25.03 [24.95–25.11]	27.24 [27.05–27.42]	24.57 [24.49–24.66]	
56 or above	35.85 [35.77–35.94]	32.18 [31.98–32.38]	36.61 [36.52–36.71]	
Marital status (n = 1,247,777), prevalence [95% CI]				<0.001
Single	55.86 [55.77–55.95]	49.47 [49.26–49.68]	57.19 [57.09–57.28]	
Married	29.66 [29.58–29.74]	37.01 [36.80–37.21]	28.14 [28.05–28.23]	
Divorced	7.95 [7.90–8.00]	7.89 [7.78–8.01]	7.96 [7.91–8.02]	
Widowed	6.46 [6.41–6.50]	7.89 [7.78–8.01]	7.96 [7.91–8.02]	
Other	0.1 [0.06–0.07]	0.08 [0.06–0.09]	0.06 [0.05–0.06]	
Means of Arrival to ED facility (n = 1,262,996), prevalence [95% CI]				<0.001
EMS	19.03 [18.96–19.09]	8.91 [8.79–9.04]	21.12 [21.04–21.19]	
Non-EMS	80.97 [80.90–81.04]	91.08 [90.96–91.20]	78.88 [78.80–78.96]	
Acuity Level (n = 1,248,653), prevalence [95% CI]				<0.001
ESI-1	0.59 [0.58–0.61]	0.19 [0.18–0.21]	0.68 [0.66–0.69]	
ESI-2	12.33 [12.28–12.39]	5.47 [5.37–5.56]	13.76 [13.69–13.82]	
ESI-3	59.28 [59.20–59.37]	58.96 [58.75–59.17]	59.35 [59.26–59.45]	
ESI-4	25.89 [25.82–25.97]	34.14 [33.94–34.34]	24.19 [24.11–24.27]	
ESI-5	1.88 [1.86–1.91]	1.24 [1.19–1.28]	1.69 [1.99–2.05]	
Insurance Type (n = 1,252,631), prevalence [95% CI]				<0.001
Medicaid	33.35 [33.27–33.44]	26.56 [26.37–26.74]	34.76 [34.67–34.85]	
Medicare	28.51 [28.43–28.59]	24.04 [23.85–24.22]	29.44 [29.35–29.52]	
Private	31.30 [31.2–31.38]	42.93 [42.72–43.14]	28.89 [28.80–28.98]	
Self-Pay	6.83 [6.79–6.88]	6.47 [6.37–6.58]	6.91 [6.86–6.96]	
Patient disposition (n = 1,259,076), prevalence [95% CI]				<0.001
Admitted to hospital	24.76 [24.69–24.84]	12.81 [12.67–12.95]	27.24 [27.15–27.32]	
LAMA/Eloped	1.53 [1.51–1.56]	1.12 [1.08–1.17]	1.62 [1.59–1.64]	
LWBS	0.75 [0.73–0.76]	0.49 [0.46–0.52]	0.80 [0.79–0.82]	
Discharged	72.95 [72.87–73.03]	85.58 [85.43–85.72]	70.34 [70.25–70.43]	

Note: SD: Standard Deviation; HBED: Hospital-Based Emergency Department; FED: Free standing Emergency Department; ED: Emergency Department LAMA: Left against Medical Advice; LWBS: Left without being seen; EMS: Emergency Medical Service.

transport critical patients to HBEDs, patient self-selection, or lower acuity of the adjacent suburban or rural areas. Patient self-selection may be multi-factorial [4]. There could also be a lack of public awareness in regard to FED capabilities. Furthermore, there may be concerns that if admission were required, patients would have to arrange or pay for transport.

FEDs serve a vital purpose in the community by providing care that is close to home. In our system, facilities are designed in a hub and spoke model to bring care into communities where hospitals are a distance away and may have longer wait times. While EMS traffic in general is less at the FEDs compared to HBEDs, there are still a significant number of patients that arrive via EMS at the FEDs. This allows EMS faster turnaround times which permits them to remain in their catchment areas and have more availability [8]. An extended round trip can add strain to a local service that is struggling with limited ambulance availability. The occasional multi-system trauma, cardiac arrest, and respiratory arrest patient could significantly impact patient flow at the FEDs, as these facilities are often single physician coverage.

Treated and released patients at the FEDs had a shorter LOS compared to HBEDs. It is possible that the shorter LOS is related to the lack of shared resources i.e. CT or lab with a hospital, or lower overall ED census at a given time, or whether there were other operational efficiencies

that have not yet been quantified. Further research is needed in this area. We found that adult admitted patients at the FEDs had a longer ED LOS than those patients seen at HBEDs. This was likely due to admitted patients being transported via ambulance to the hospital for their admission. Admitted pediatric patients at the FEDs had a shorter ED LOS compared to HBEDs. Further study to determine the difference between LOS for admitted adult and pediatric encounters is warranted.

Some critics have argued that FEDs exist to siphon insured patients away from hospitals leaving them with a disproportionate share of Medicaid or uninsured patients [9]. Our FEDs participate in Medicaid, Medicare and are subject to EMTALA, and over half of patients seen are Medicaid, Medicare and self-pay patients. In our system FEDs provide a venue close to home that provides timely high quality care by board certified emergency physicians.

Increased LOS has been linked to negative outcomes such as reduced patient satisfaction, higher elopement rate, and well as poor outcomes in seriously ill patients [8,10]. Hospital systems experiencing overcrowding in their EDs may want to consider opening FEDs as they can efficiently see patients and prior studies cite improved patient satisfaction, reduced wait times, and improved access to care as factors linked to the operation of a FED [2,5,11]. Hospital systems can consider opening FEDs as a means to improve access to otherwise under-served populations.

**Table 2**

Socio demographic characteristics (prevalence) of admitted and discharged patients visiting Cleveland Clinic Foundation (CCF) Emergency Department (ED) stratified by type of facility visited (FED versus HBED).

Variables	Patient disposition (N = 1,230,302)					
	Admitted (n = 311,797) 25.34 [25.27–25.42]			Discharged (n = 918,505) 74.66 [74.58–74.73]		
	FEDs 8.87 [8.77–8.97]	HBED 91.13 [91.03–91.23]	p value	FEDs 20.11 [20.03–20.19]	HBED 79.89 [79.81–79.97]	p value
Age (Mean, ±SD), in years	58.99 (±21.49)	60.20 (±21.58)	<0.001	41.15 (±22.23)	39.08 (±23.07)	<0.001
Length of stay in ED facility (Mean, ±SD), in minutes	288.30 (±127.90)	381.80 (±353.30)	<0.001	125.50 (±69.86)	194.50 (±195.60)	<0.001
Race, prevalence [95% CI]			<0.001			<0.001
Whites	86.28 [85.87–86.69]	68.13 [67.96–68.31]		80.64 [80.46–90.82]	51.39 [51.27–51.51]	
Blacks	10.71 [10.35–11.08]	28.26 [28.09–28.43]		15.00 [14.84–15.17]	42.35 [42.23–42.47]	
Asians	0.98 [0.86–1.09]	0.72 [0.69–0.75]		0.92 [0.87–0.96]	0.79 [0.77–0.81]	
Multiracial	1.89 [1.72–2.05]	2.74 [2.68–2.79]		3.26 [3.18–3.34]	5.29 [5.24–3.34]	
Others	0.14 [0.09–0.18]	0.15 [0.14–0.16]		0.17 [0.15–0.19]	0.17 [0.16–1.18]	
Gender, prevalence [95% CI]			<0.001			<0.001
Female	54.15 [53.46–54.63]	53.37 [53.19–53.56]		57.79 [57.57–58.02]	57.03 [56.92–57.14]	
Male	45.95 [45.36–46.54]	46.62 [46.44–46.81]		42.20 [41.97–42.43]	42.97 [42.85–43.08]	
Marital status, prevalence [95% CI]			<0.001			<0.001
Single	32.23 [31.67–32.78]	39.49 [39.31–39.67]		52.06 [51.83–52.28]	63.76 [63.65–63.87]	
Married	44.94 [44.36–45.54]	36.39 [36.21–36.56]		35.88 [35.66–25.12]	25.12 [25.02–25.22]	
Divorced	9.72 [9.37–10.07]	10.61 [10.50–10.73]		7.57 [7.44–7.69]	6.92 [6.86–6.98]	
Widowed	13.02 [12.62–13.58]	13.45 [13.32–13.58]		4.42 [4.33–4.51]	4.13 [4.08–4.17]	
Other	0.07 [0.04–0.10]	0.06 [0.05–0.07]		0.07 [0.06–0.09]	0.06 [0.05–0.06]	
Means of Arrival to ED facility, prevalence [95% CI]			<0.001			<0.001
EMS	26.39 [25.87–26.91]	40.97 [40.79–41.15]		6.12 [6.01–6.23]	13.43 [13.36–13.51]	
Non-EMS	73.61 [73.09–74.13]	59.03 [58.85–59.21]		93.88 [93.77–93.99]	86.56 [86.49–86.64]	
Acuity Level, prevalence [95% CI]			<0.001			<0.001
ESI-1	0.68 [0.58–0.78]	1.87 [1.82–1.92]		0.01 [0.005–0.01]	0.09 [0.08–0.09]	
ESI-2	23.56 [23.06–24.06]	32.99 [32.82–33.17]		2.64 [2.57–2.72]	6.38 [6.33–6.44]	
ESI-3	73.48 [72.96–74.01]	63.69 [63.52–63.88]		56.71 [56.48–56.94]	57.44 [57.32–57.55]	
ESI-4	2.22 [2.05–2.40]	1.40 [1.36–1.45]		39.22 [38.99–39.44]	33.30 [33.19–33.41]	
ESI-5	0.04 [0.02–0.07]	0.03 [0.02–0.03]		1.42 [1.36–1.47]	2.79 [2.75–2.83]	
Insurance Type, prevalence [95% CI]			<0.001			<0.001
Medicaid	15.67 [15.24–16.10]	20.14 [19.99–20.29]		28.10 [27.89–28.31]	40.15 [40.04–40.26]	
Medicare	49.26 [48.67–49.84]	53.98 [53.79–54.16]		20.14 [19.96–20.32]	20.04 [19.94–20.13]	
Private	31.96 [31.41–32.51]	22.73 [22.58–22.89]		44.83 [44.60–45.05]	31.54 [31.44–31.65]	
Self-Pay	3.11 [2.91–3.32]	3.14 [3.08–3.21]		6.93 [6.81–7.04]	8.27 [8.21–8.33]	

Note: SD: Standard Deviation; HBED: Hospital-Based Emergency Department; FED: Free standing Emergency Department; ED: Emergency Department LAMA: Left against Medical Advice; LWBS: Left without being seen.

**5.1. Limitations**

This study population from a single hospital system may not be generalizable to other areas. This study has limitations inherent to those of retrospective studies, such as missing or inaccurate data. Furthermore,

most of the FEDs were located in more suburban areas, which may have had a different population than the urban areas. Since EMS takes all STEMI, stroke and traumas requiring trauma team activation to the HBEDs, this may impact patient populations at these facilities. Also, local preferences of EMS to transport to a particular facility may also

**Table 3**

Multiple linear regression model: predictors of length of stay in Emergency department.

Variable	Overall ED patients (N = 1,263,297)			Admitted ED patients (N = 311,797)			Discharged ED patients (N = 918,505)		
	R-squared: 0.3098			R-squared: 0.0699			R-squared: 0.2743		
	Beta †	Exp Beta	95% CI	Beta †	Exp Beta	95% CI	Beta †	Exp Beta	95% CI
Intercept	4.272	71.675	4.267 to 4.277	6.023	412.889	6.009 to 6.037	4.244	69.694	4.239 to 4.250
Facility Type	-0.177	0.838	-0.181 to -0.172	0.191	1.211	0.181 to 0.201	-0.192	0.826	-0.196 to -0.187
Age (in years)	0.005	1.005	0.0048 to 0.0049	0.000	1.000	0.0001 to 0.0003	0.003	1.003	0.0032 to 0.0034
Gender	-0.048	0.953	-0.051 to -0.046	-0.024	0.976	-0.028 to -0.019	-0.070	0.933	-0.072 to -0.067
Race	-0.014	0.986	-0.016 to -0.012	0.003	1.003	-0.0009 to 0.006	-0.012	0.988	-0.014 to -0.011
Marital Status	-0.002	0.998	-0.004 to -0.0003	-0.014	0.987	-0.016 to -0.011	0.006	1.006	0.004 to 0.008
Acuity level	0.409	1.505	0.407 to 0.411	-0.027	0.973	-0.031 to -0.023	0.396	1.486	0.394 to 0.398
Means of arrival	0.059	1.061	0.056 to 0.063	-0.097	0.907	-0.102 to -0.092	0.091	1.095	0.087 to 0.095
Insurance type	0.025	1.026	0.024 to 0.027	0.008	1.008	0.004 to 0.011	0.026	1.026	0.024 to 0.027
ED volume in each ED facility	-0.015	0.985	-0.015 to -0.014	-0.045	0.956	-0.046 to -0.044	-0.010	0.990	-0.011 to -0.01

CI: Confidence Interval.

Multivariable linear regression model was adjusted for age group, gender, race, marital status, acuity level, insurance type, mode of arrival to ED and patient disposition. Dummy variables for categorical variables are listed below.

Gender: Female = 0 and male = 1.

Race: Whites = 0; Blacks = 1; Asians = 2 and Others = 3.

Marital Status: Single = 0; Married = 1; Divorced = 2 and Others = 3.

Insurance type: Medicaid = 0; Medicare = 1; Private = 2; Self-pay = 3 and VA/Trica = 4.

Acuity Level: ESI-5 = 0; ESI-4 = 1; ESI-3 = 2; ESI-2 = 3 and ESI-1 = 4.

Patient Deposition: Discharged = 0; Admitted to hospital = 1; AMA/Eloped = 2 and LWBS = 3.

contribute to the findings. Local EMS is aware of the FED capabilities and may preference transport to the FEDs for certain complaints or patients deemed lower acuity. The large sample size of our patient encounters creates higher likelihood of significant results.

In addition, our study was not able to explain the variability in ED LOS for admitted patients. Further research is needed to look at the various steps in ED throughput and differences in patient populations to ascertain what variables may explain this difference.

## 6. Conclusion

In this study we found that the average ED LOS for treated and released patients was significantly less at FEDs vs. HBEDs. The acuity levels, insurance status, method of arrival, ED patient volume and patient disposition of FED patients were different when compared to HBEDs. However FED's still cared for a broad spectrum of patients with varying acuity, including those who were critically ill and arrived by ambulance.

## Prior presentations

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None.

## Author contribution statement

ELS conceived and designed the study. ELS, BF, and MM contributed to data collection. SS provided statistical advice on study design and analyzed the data. ELS and SS drafted the manuscript, and all authors contributed substantially to its revision. ELS takes responsibility for the paper as a whole.

## Declaration of Competing Interest

None.

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