Emergency Department Use Among Student-Run Free Clinic Patients: a Cross-sectional Study

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INTRODUCTION

Student-run free clinics (SRFCs) deliver care to patients frequently neglected by the health system.^{1–3} Though SRFC use is associated with decreased ED utilization,^{2, 3} the drivers of ED use in SRFC patients are poorly described. This study aims to improve our understanding of why SRFC patients visit the ED and generate hypotheses to guide future interventions. This study describes the frequency and potential preventability of ED visits for a population of SRFC patients and assesses risk factors for ED utilization.

METHODS

We performed a cross-sectional study of Shade Tree Clinic (STC) patients, a SRFC associated with Vanderbilt University Medical Center (VUMC), that provides free comprehensive primary and specialty — including mental health — care to uninsured patients in Middle Tennessee. We included 254 patients with two or more scheduled or one or more completed primary care visits at STC between July 15, 2018, and July 15, 2019.

We extracted demographic information and all STC visit information during the study period from the electronic medical record. We used 2017 American Community Survey Census Tract estimates for population-level information from geocoded patient addresses.⁴ We conducted a guided chart review for VUMC ED encounters during the study period. We characterized primary ED discharge diagnoses as “preventable” using the 2001 Agency for Healthcare Research and Quality (AHRQ) definition.⁵

Our primary predictors included presence of a mental health disorder, Charlson Comorbidity Index, number of previous year VUMC ED visits, and percent of missed primary care visits. Our outcome was at least one VUMC ED visit during the study period. After describing the data, we quantified the relationship between our a priori identified predictors and outcome using multivariable logistic regression to identify independent risk factors for ED utilization, accounting for effect modification by mental health diagnosis. Statistical analyses were conducted in *R*, version 3.5.1.⁶ The VUMC Institutional Review Board deemed this study exempt.

RESULTS

Among the 254 included patients, 59 (23.2%) visited the VUMC ED — a total of 87 VUMC ED visits during the study period (Table 1). There were differences in mental health diagnosis prevalence (49.2% vs 28.2%), Charlson Comorbidity Index (median 2 vs 1), and history of VUMC ED visits (40.7% vs 10.8%) among STC patients who did and did not visit the VUMC ED. Both groups had a similar median percentage of missed appointments (27.3 vs 28.6). Of the 14 (16.1%) STC patients who visited the ED for preventable conditions, six (42.9%) had diabetes-related complications.

In multivariable analysis, the presence of a mental health disorder increased the odds of a VUMC ED visit 2.46 times (95% confidence interval (CI) 1.35, 4.48). Figure 1 presents stratified adjusted odds ratios (aOR) and 95% confidence intervals (CI) by mental health diagnosis. Charlson Comorbidity Index was associated with increased odds of VUMC ED visits in patients without a mental health diagnosis (aOR 1.28, 95% CI 1.03, 1.61), but not in patients with a mental health diagnosis (aOR 0.99, 95% CI 0.75, 1.31). A history of VUMC ED visits was associated with increased odds of VUMC ED visits with (aOR 3.75, 95% CI 1.72, 8.16) and without (aOR 2.33, 95% CI 1.13, 4.79) a mental health diagnosis.

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Table 1 Characteristics of Shade Tree Patients by VUMC ED Visit During the Study Period

	No ED visit (n = 195)	ED visit (n = 59)
	Frequency/ median (percentage/IQR)	Frequency/ median (percentage/IQR)
Age	49 (39, 59.5)	47 (38.5, 58.5)
Sex		
Female	109 (55.9)	39 (66.1)
Male	86 (44.1)	20 (33.9)
Primary language		
Spanish	100 (51.3)	32 (54.2)
English	87 (44.6)	25 (42.4)
Other	8 (4.1)	2 (3.4)
Race		
White	84 (43.1)	29 (49.2)
Black	28 (14.4)	13 (22)
Other	83 (42.6)	17 (28.8)
Ethnicity		
Hispanic	102 (52.3)	33 (55.9)
Non-Hispanic	80 (41)	26 (44.1)
Other	13 (6.7)	0 (0)
Median household income by Census Tract (in thousands of dollars)	45.1 (35.7, 56.3)	43.4 (35.7, 57.8)
Median percent of families in Census Tract living below the federal poverty limit	13.9 (7, 21)	17.1 (7, 24.4)
Median percent of employed adults	69.1 (64.9, 76.2)	68.4 (64.9, 73.8)
Mental health diagnosis*	55 (28.2)	29 (49.2)
Charlson Comorbidity Index	1 (0, 2)	2 (0.5, 4)
≥ 1 ED visit in the year before the study year	21 (10.8)	24 (40.7)
Missed STC PC visits	2 (1, 3)	3 (1, 4)
Percent of missed PC visits	28.6 (10, 50)	27.3 (17.4, 50)
Total VUMC ED visits in the study year	0	87
AHRQ preventable (n = 87) [†]		14 (16.1)
Diabetes complication (n = 14)	0	6 (42.9)

VUMC Vanderbilt University Medical Center; ED Emergency Department; STC Shade Tree Clinic; PC primary care; IQR interquartile range
 *Mental health diagnoses include mood disorders, anxiety disorders, psychotic disorders, and substance use disorders from the patient's problem list at the end of the study period

[†]Diabetes short-term complication, diabetes long-term complication, uncontrolled diabetes, and lower-extremity amputation among patients with diabetes

DISCUSSION

In a cross-sectional study of 254 SRFC primary care patients, of 87 total ED visits, 14 (16.1%) were ambulatory care sensitive, and 6 of these were secondary to diabetes complications. Patients who visited the ED were more likely to have a mental health disorder. Our study highlights opportunities at SRFCs to improve education, interventions, and outcomes among patients with diabetes and/or mental health disorders to address potentially preventable ED visits.

Though our cross-sectional and exploratory analysis cannot be interpreted as causal or imply temporality, these limitations are balanced by the completeness of our data and the unique characteristics of the study cohort. We believe that our data may help other SFRCs plan interventions to reduce preventable ED visits.

This study provides new insights that will provide SFRC administrators with information to tailor future quality improvement projects to reduce avoidable ED utilization. These data suggest interventions focused on patients with diabetes and patients with mental health conditions could help to reduce ED utilization in our population. Additional studies should follow patients longitudinally and/or assess how specific interventions impact ED utilization among SRFC patients.

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Data Sharing Statement: The datasets analyzed during the current study are available from the corresponding author on reasonable request.

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Figure 1 Association between a priori identified covariates and VUMC ED visits in study period stratified by mental health diagnosis. This forest plot shows the adjusted odds ratios and 95% confidence intervals from a logistic regression model for a VUMC (Vanderbilt University Medical Center) ED (Emergency Department) visit during the study year, stratified by the presence or absence of a mental health disorder—including mood, anxiety, psychotic, and substance use disorders. “Charlson Comorbidity Index” refers to a score that quantifies medical comorbidities, “History of VUMC ED Visits” refers to the number of VUMC ED visits in the 12 months before the study year, and “Missed Primary Care Visits” refers to percent of missed Shade Tree Clinic primary care visits (for each 10%) during the study year.

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Compliance with Ethical Standards:

The Vanderbilt University Medical Center Institutional Review Board reviewed the study and deemed it exempt.

Conflict of Interest: The authors declare that they do not have a conflict of interest.

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