





Epidemiology of Frequent Visits to the Emergency Department at a Tertiary Care Hospital in Saudi Arabia: Rate, Visitors' Characteristics, and Associated Factors

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Background: Emergency department overcrowding is becoming a challenge for the health-care management system globally and locally. This study aimed to estimate the frequency of ED visits, describe the patients' profile along with visit-related characteristics, and associated factors in a tertiary care hospital.

Methods: A retrospective cohort study was conducted at a tertiary care hospital. The study included patients age 14 years and above visiting the main emergency department in year 2013. Data were extracted from electronic medical records by a qualified data extraction team. Statistical analyses were performed, including the odds ratio and 95% confidence interval for the factors associated with highly frequent (≥ 14 visits) ED visits using logistic regression models.

Results: There were 150,727 visits to the emergency department within a year. The number of frequent visitors was 7696 (9.38%), with 42,226 visits (28.01% of total ED visits). Highly frequent visitors totaled 249 (0.30%), with 5173 visits (3.43% of total ED visits). The frequent visitors' average age was 42.55 (SD 20.14), and 48.99 (SD 21.33) for the highly frequent visitors' group. More than half of the emergency visitors were females. The most common complaints among the highly frequent visitors were Gastrointestinal (21.34%), followed by Respiratory (13.47%), Orthopedic (12.57%), and Cardiovascular (12.43%). Multivariate analysis indicated that age, history of diabetes, history of cardiac diseases, insurance status, and nationality were significant predictors of highly frequent visits to the hospital emergency.

Conclusion: Frequent and highly frequent visitors to emergency departments represent a significant proportion of adult patients presenting to ED. Their visits constitute almost one-third of total ED visits. Several factors associated with highly frequent ED visits have been identified. This study provides local empirical evidence to develop improvement policy and actions related to chronic issue of frequent and highly frequent visitation to hospital ED.

Keywords: emergency department, frequent visits, hospital, quality improvement, Saudi Arabia

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Introduction

The role of Emergency Department (ED) has changed over time from providing rooms for the resuscitation of severely ill or injured patients to becoming a complex healthcare service setting, using sophisticated technology to provide healthcare that was once given in hospital wards. It has been reported that the ED utilization is

higher than other healthcare settings. In the United States, for example, 11% of the outpatient services are provided in the ED and almost half of the hospital admissions go through the ED.

Several studies have reported dramatic increase in ED visits.^{1–3} This increased emergency department utilization accounted for about 25% of visits by less than 10% of the population.⁴ Studies have indicated that most frequent visitors are patients who consult primary health care physicians, have insurance, and use inpatient and outpatient health care services.^{5–7} A recent study in 2019, has reported that frequent users were 4–6% of the total ED users but have accounted for 14–47% of ED visits.⁸ Other studies have reported that the complaints and conditions of frequent ED visitors are not manageable in outpatient and primary care settings.^{9–11}

While there is no consensus in literature on the definition of high frequent visits to ED, the most common standard set for frequent ED visiting is four or more visits per year.^{4,12,13} Studies have shown that visiting frequency is highest at 1–3 visits per year but falls from four visits per year and above.^{4,12,13} The frequency range suggests a visiting pattern that is not coincidental but rather systematic. This has been shown by statistical models comparing multiple cutoffs to determine the diversion between what is expected to happen by chance and what has been observed in reality.¹² Other studies have attempted to divide frequent visits into subgroups that share typical patient or visit characteristics. For example, a frequent ED visitor with 4–17 visits was found to have higher mortality, more admissions; and is unlikely to leave without being seen. ED visitors of more than 17 or 20 visits are less sick, unlikely to be admitted, and frequently leave ED without being seen.^{14,15} The high frequent visit rates used to be defined as ED visitors with 10, 12, 17, and 20 times per year.^{16–20}

In the Middle East context, including the Arabian Gulf States, the reported literature on emergency department frequent visitors and their characteristics, along with the determinant factors, are scarce. In Saudi Arabia, few studies have reported frequent visits to hospital emergency.^{1,7}

Local empirical evidence can inform healthcare policy-makers, health planners, hospital administrators, and ED heads on implementing improvement initiatives, optimizing utilization of hospital emergency services, and securing high quality and safety for urgent emergency patients. This study aimed primarily to estimate the magnitude of frequent visitors to a hospital emergency department,

describe the characteristics of patients and their visits, and identify the associated factors with highly frequent visitation.

Methods

Study Setting and Design

This is a retrospective cohort study based on the data extracted from an electronic database at a tertiary care hospital, Riyadh, Saudi Arabia. The emergency department at King Abdulaziz Medical City (KAMC) accommodates 150 beds and manages both pediatric and adult patients, with about 150,000–160,000 visits per year. KAMC is an academic tertiary center, with a capacity of 1500 beds.

Study Population

Study participants were adult patients visiting the main emergency department over a one-year period in 2013. An adult patient was defined as greater than or equal to 14 years of age. The 14 years of age cut-off was selected based on local practice in most hospitals. Adults presenting to ED within 24 hours with a chief complaint were included.

Frequent ED Visitor

A frequent ED visitor refers to a patient who visits the ED four times or more within a year. This definition is considered the most commonly reported description in the literature.^{4,12,13} The ED visit frequency was measured by a single patient visit during the study period from 1 January to 31 December 2013. The total number of ED visits for each patient was counted for 2013. This threshold, although defined as a homogeneous group of occasional visitors to the emergency department, has failed to describe the heterogeneous group of ED frequent visitors. Therefore, we have divided frequent visitors into three groups (less frequent, frequent and highly frequent users) using a data driven approach (see statistical analysis section).

Data Collection

The data were obtained from the electronic medical records for all the ED visits from 1 January to 31 December 2013, and recorded in an Excel sheet. The collected variables included patients' demographic and clinical characteristics (age, sex, nationality, payment method, medical history, whether a hospital employee or

not, and co-morbidities), ED visitation data, ie how many times the patient had visited the ED; time of visit; mode of arrival (private car or ambulance), triage and acuity level, length of stay in ED, and the outcome of the visit (admission/discharge home). The eight-hour shift schedule was divided into morning, evening, and night. The insurance status was described as either eligible or ineligible for treatment in tertiary care. The length of ED stay was calculated as the time from ED presentation to the time the electronic health system shown either an order of discharge or admission. It is worth noting that the length of stay does not denote the physical presence in the emergency department. In addition, the history of chronic medical conditions was recorded as a dichotomous (yes/no) variable. Patient acuity was determined by the Canadian Triage and Acuity Scale (CTAS).²¹

The study was approved by King Abdullah International Medical Research Center, Institutional Review Board (IRB) (RC12/156). Data confidentiality was preserved, and no personal identifiers were captured. The study was conducted in accordance with the Declaration of Helsinki. The patient informed consent was not required, since the collected data was deidentified.

Statistical Analysis

The patient and visit characteristics were reported as frequency and percentages. For the comparison of the categorical variables with respect to ED visit frequency categories, Chi-square and Fisher exact tests were employed. The mean and standard deviation were reported for continuous variables, and the differences among frequent visit groups were evaluated using Kruskal–Wallis test. To determine the breakpoints used to define the frequent and highly frequent ED users, a breakpoint strategy, proposed by Doupe et al was implemented.¹⁴ Briefly, patient characteristics (as percentages) were plotted against the frequency of ED use, and the breakpoints were determined by the deviations observed in the trend. To identify the determinants of frequent ED users, we used univariate and multivariate logistic regression analyses to examine the association between various patient characteristics and frequent ED users. Two separate logistic regression analyses were performed to compare high-frequency users with frequent users, and high-frequency users with less frequent users. Both unadjusted odds ratios (OR), as well as adjusted odds ratios (AOR) along with their 95%

confidence intervals (95% CI) obtained from logistic regression analyses for all the covariates, have been reported. It should be noted that the admission status variable was excluded from logistic regression models due to data unreliability and the unlikelihood of the variable being a predictor of frequent or highly frequent ED use. The discriminatory power and calibration of the multivariate models were evaluated using concordance (C) statistic and Hosmer and Lemeshow (HL) goodness of fit test respectively. All the analyses were performed using SAS software, version 9.4.

Results

Breakpoints of Total ED Adult Patients Visits by Sex, Age, and Co-Morbidities

Based on selected patient characteristics, including female patients, patients aged 65 years or more, patients with a history of cardiac disease, hypertension, diabetes, and employment in the hospital, the breakpoints for frequent and highly frequent ED visitors were determined. The breakpoint for frequent ED visits by female patients was determined to be four or more visits based on the deviation in trend observed in the majority of patient characteristics (see Figure 1). For example, the percentage of hospital employees making four visits declined in contrast to higher percentages observed up to three visits. Conversely, a higher rate of patients aged 65 or more visited the ED four times. A similar deviation in trend was detected in patients with a history of diabetes, and a proportion of female patients. Following a similar strategy, the breakpoint for high-frequency visits was determined to be 14, owing to a drastic decline in the percentage of patients with a history of cardiac disease, hypertension, or diabetes, and patients aged 65 years or more. In addition, a substantially higher proportion of hospital employees visited the ED 14 times. Patients were classified into three groups of ED users based on visit frequency, including less frequent users (1–3 visits), frequent users (4–13 visits), and highly frequent users (14 or more visits).

Rate of ED Visitation and Cohort Characteristics

A total of 82,046 patients made 150,727 visits during the year 2013 (see Figure 2). Most patients visited the emergency department only once, 51,595 (63%), which accounted for 34% of patients' total visits during the study period. The

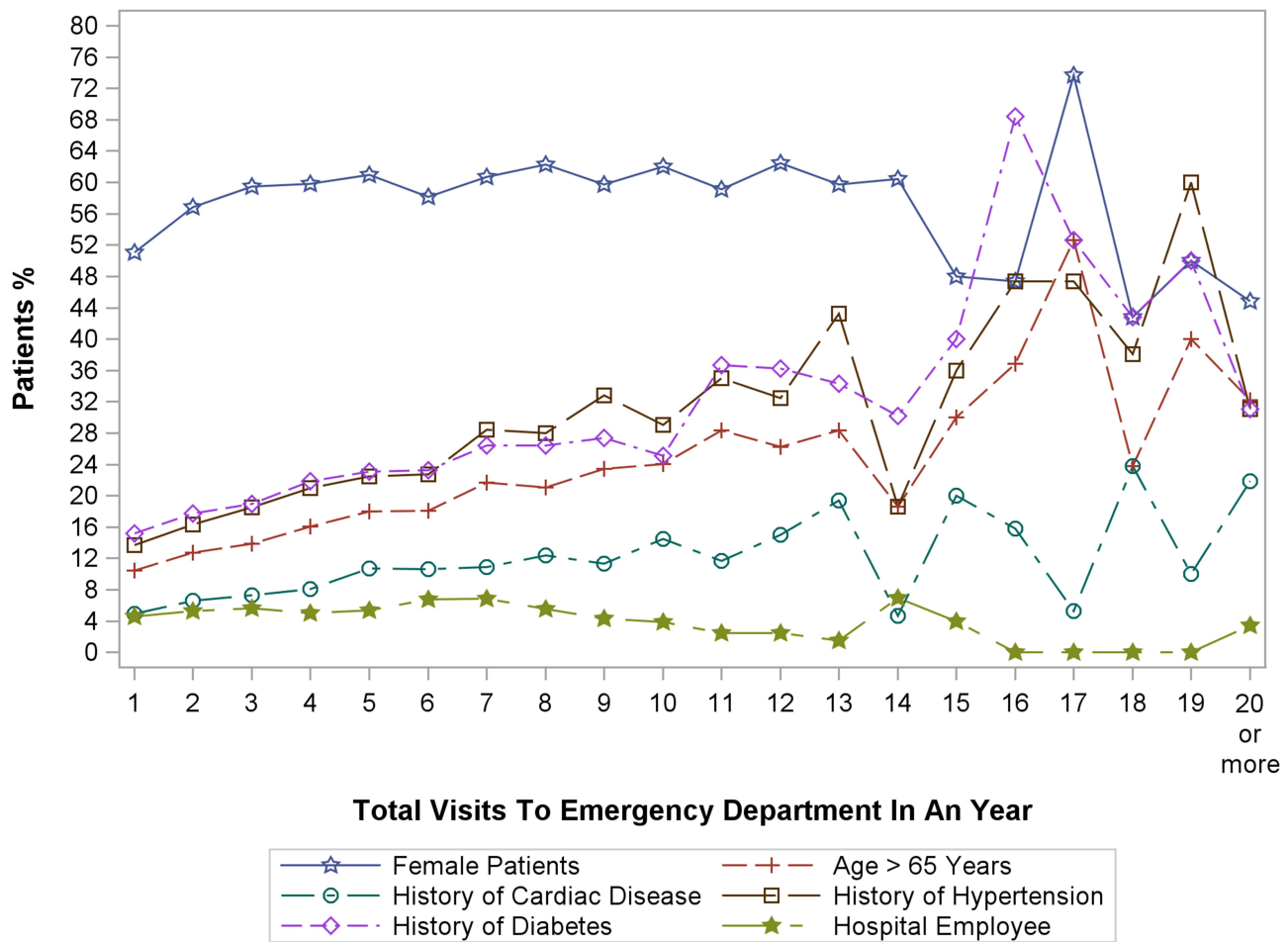


Figure 1 Breakpoints of total ED adult patients' visits by sex, age, and co-morbidities.

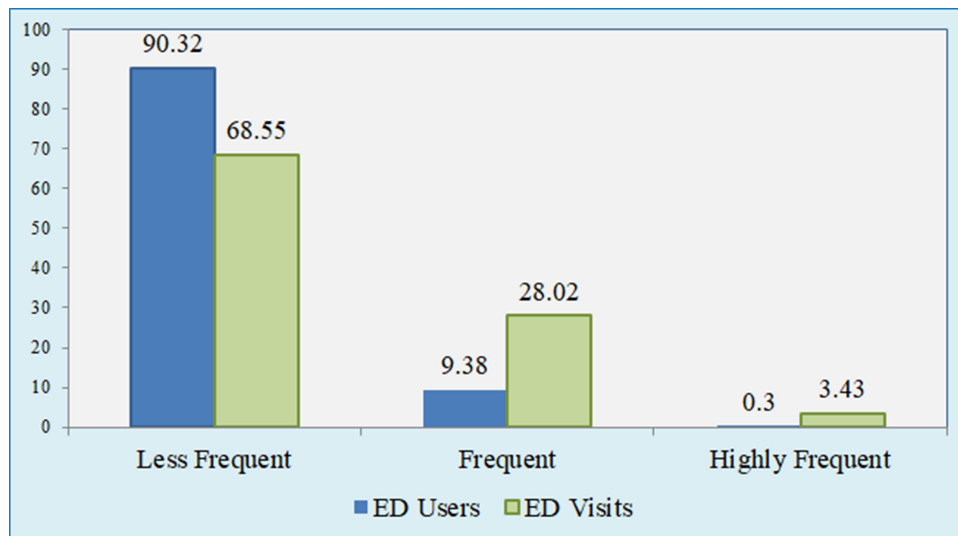


Figure 2 Distribution of total emergency department (ED) users and visits; the total number of ED users n=82,028, the total number of ED visits n=150,727.

majority had less frequent ED visits, 74,101 (90.3%); 7696 (9.9%) had frequent ED visits; only 249 (0.3%) had highly frequent visits. The average age was significantly different

across the groups, with higher age in the highly frequent visit group ($p < 0.0001$). Participants were predominantly females 44,058 (53.7%), Saudi nationals 76,051 (92.7%), aged 25–44

Table 1 Emergency Department Patients' Characteristics by Visits Frequency Types

Characteristics	Less Frequent ED Visitors (1–3 Visits)	Frequent ED Visitors (4– 13 Visits)	Highly Frequent ED Visitors (≥14 Visits)	P-value
	n=74,101 (90.32%)	n=7696 (9.38%)	n=249 (0.30%)	
Age in years (mean± SD)	38.6 ± 17.9	42.03 ± 19.95	49.98 ± 21.53	<0.0001*
Gender n(%)				<0.0001
Male	34,796(46.96)	3069(39.8)	123(50.6)	
Female	39,305(53.04)	4627(60.12)	126(49.4)	
Age in groups n(%)				<0.0001
14–24 years	17,722(23.92)	1525(19.82)	25(10.04)	
25–44 years	32,871(44.36)	3248(42.2)	90(36.14)	
45–64 years	15,157(20.45)	1517(19.71)	57(22.89)	
65 years or more	8351(11.27)	1406(18.27)	77(30.92)	
Nationality n(%)				<0.0001
Saudi	68,452(92.38)	7357(95.6)	242(97.19)	
Non-Saudi	5649(7.62)	339(4.4)	7(2.81)	
History of cardiac disease (yes) n(%)	4083(5.51)	764(9.93)	41(16.47)	<0.0001
History of hypertension (yes) n(%)	10,917(14.73)	1813(23.56)	85(34.14)	<0.0001
History of diabetes (yes) n(%)	11,910(16.07)	1819(23.64)	97(38.96)	<0.0001
Insurance status n(%)				<0.0001
Insured fully	58,418(78.84)	6881(89.41)	210(84.34)	
Partial insurance	15,683(21.16)	815(10.59)	39(15.66)	
Military status n(%)				0.027
Soldier	15,294(20.64)	1549(20.13)	67(26.91)	
Not a soldier	58,807(79.39)	6147(79.87)	182(73.09)	
Hospital employee (yes) n(%)	3597(4.85)	411(5.34)	8(3.21)	0.079
Number of admissions n(%)				<0.0001
Not admitted	58,715(79.24)	4154(53.98)	96(38.55)	
Once	13,432(18.13)	1910(24.82)	41(16.47)	
2 or more times	1954(2.64)	1632(21.21)	112(44.98)	

Note: *P-value is based on Kruskal–Wallis test, whereas rest of the p-values are based on Chi-square test.

Abbreviations: SD, standard deviation; n (%), number of subjects (percentage).

years 36,209 (44%), and insured fully 65,509 (79.8%). The history of cardiac disease, hypertension, and diabetes was significantly different between groups with more than expected patients in the highly frequent visit category ($p < 0.0001$). The bulk of patients in the highly frequent visit group (45%) got admitted to the ward more than once, unlike most frequent (54%) and less frequent (79%) visitors who were not admitted (Table 1).

Emergency Department Visit Characteristics

Table 2 reports the characteristics of visits made by visit group. It is worth noting that 9.4% of frequent users contributed to 28% of the visits, and a small proportion of highly frequent visitors (0.3%) clocked (3.4%) of the total visits. Most ED visitors had less urgent and non-urgent cases. However, the proportion of urgent cases

Table 2 Emergency Department Visit Characteristics by Visits Frequency Types

Characteristics	Less Frequent ED Visitors (1–3 Visits)	Frequent ED Visitors (4–13 Visits)	Highly Frequent ED Visitors (≥14 Visits)	P-value
	n=103,328(68.55%)	n=42,226(28.01%)	n=5173 (3.43%)	
Duration of stay in ER (Mean ± SD)	4.01±8.16	4.39±5.98	4.96±5.86	<0.0001*
Acuity level				<0.0001
Emergent (Levels 1–2)	3648(3.53)	1586(3.76)	196(3.79)	
Urgent (Level 3)	29,033(28.1)	14,715(34.85)	2051(39.65)	
Less Urgent (Level 4)	47,944(46.4)	19,087(45.2)	2361(45.64)	
Non-urgent (Level 5)	20,165(19.52)	6409(15.18)	521(10.07)	
Unknown	2538(2.46)	429(1.02)	44(0.85)	
Presenting complaints n(%)				<0.0001
Gastrointestinal	19,743(19.11)	9204(21.8)	1104(21.34)	
Orthopedic	16,378(15.85)	5327(12.62)	650(12.57)	
Obstetrics & Gynecology	10,244(9.91)	4782(11.32)	243(4.7)	
Cardiovascular	9157(8.86)	3591(8.5)	643(12.43)	
Neurologic	8599(8.32)	3541(8.39)	507(9.8)	
ENT	7659(7.41)	2552(6.04)	233(4.5)	
Respiratory	7783(7.53)	4339(10.28)	697(13.47)	
General and minor complaints	8174(7.91)	3958(9.37)	519(10.03)	
Genitourinary	4892(4.73)	2274(5.39)	320(6.19)	
Skin	3559(3.44)	1036(2.45)	129(2.49)	
Unknown	2768(2.68)	485(1.15)	33(0.64)	
Ophthalmology	2004(1.94)	625(1.48)	39(0.75)	
Mental health	377(0.36)	139(0.33)	30(0.58)	
Environmental health and Substance misuse	95(0.09)	13(0.03)	2(0.04)	
Radiology requests n(%)				<0.0001
No imaging required	96,450(3.34)	38,618(91.46)	4759(92)	
Imaging required	6878(6.66)	3608(8.54)	414(8)	
Medication requested n(%)				<0.0001
No prescription required	91,276(88.34)	36,789(87.12)	4606(89.04)	
Prescription given	12,052(11.66)	5437(12.88)	567(10.96)	
Emergency visit time n(%)				<0.0001
Morning shift	40,706(39.39)	15,855(37.55)	2030(39.24)	
Evening shift	41,600(40.26)	16,879(39.97)	2062(39.86)	
Night shift	21,022(20.34)	9492(22.48)	1081(20.9)	
Day of the week n(%)				0.086
Sunday	15,639(15.14)	6286(14.89)	727(14.05)	
Monday	14,777(14.3)	6110(14.47)	732(14.15)	
Tuesday	15,083(14.6)	6058(14.35)	746(14.42)	
Wednesday	14,019(13.57)	5715(13.52)	738(14.27)	
Thursday	13,966(13.52)	5758(13.64)	762(14.73)	
Friday	14,109(13.65)	5910(14)	671(12.97)	
Saturday	15,735(15.23)	6389(15.13)	797(15.41)	

(Continued)

Table 2 (Continued).

Characteristics	Less Frequent ED Visitors (1–3 Visits)	Frequent ED Visitors (4–13 Visits)	Highly Frequent ED Visitors (≥14 Visits)	P-value
	n=103,328(68.55%)	n=42,226(28.01%)	n=5173 (3.43%)	
Duration of stay in emergency department n(%)				<0.0001
1 hr. or less	24,413(23.63)	7227(17.12)	685(13.24)	
1.0–2.0 hrs.	21,643(20.95)	7943(18.81)	879(16.99)	
2.0–3.5 hrs.	22,106(21.39)	8906(21.09)	1049(20.28)	
3.5–6.0 hrs.	17,964(17.39)	8655(20.5)	1128(21.81)	
6.0–10.0 hrs.	10,596(10.25)	6082(14.4)	896(17.32)	
More than 10 hrs.	6603(6.39)	3411(8.08)	536(10.36)	
Unknown [†]	3	2	0	

Notes: *P-value is based on Kruskal–Wallis test, whereas rest of the p-values are based on Chi-square test; n(%)=number of visitors(percentage); [†]unknown visits (n=5) were excluded from the analysis.

was higher among frequent 14,715 (34.9%) and highly frequent 2051 (39.7%) visitors compared to less frequent visitors 29,033 (28.1%). The predominant complaints from less frequent users were gastrointestinal, orthopedic, obstetrics and gynecology, and cardiovascular. Among frequent users, the chief complaints were similar to those of less frequent users, but the fourth major complaint was of respiratory origin. Highly frequent ED users presented with gastrointestinal (21.3%), respiratory (13.5%), orthopedic (12.6%), and cardiovascular (12.4%) complaints. The median duration of stay in the emergency department before the patient was either admitted or discharged was significantly higher among frequent visitors and the highest among highly frequent visitors ($p<0.0001$). The ED visitation was not statistically different throughout the days of the week ($p=0.086$).

Patient Factors Associated with Highly Frequent Visits

Table 3 shows the OR and AOR with corresponding 95% CI for the association between highly frequent ED visitors and various patient characteristics using frequent visitors as a comparison group. The logistic regression models were based on 249 highly frequent ED visitors and 7696 frequent ED visitors. Notably, an increased risk of highly frequent ED use was observed among older age groups (with reference to the 14–24 years group) ($p<0.05$). In addition, a 1.5-fold and 1.6-fold increased risk of highly frequent ED use was observed among partially insured patients and patients with a history of diabetes, respectively ($p<0.05$). The multivariate model

was well-calibrated (HL test $p=0.7305$) and exhibited reasonable discriminatory power (C-statistic = 0.6). The OR and AOR and their 95% CI for the association between highly frequent ED use and various patient characteristics using less frequent ED users as a comparison group were obtained through 249 highly frequent ED users and 74,101 less frequent ED users (Table 4). A minimum of 1.5-fold increased risk of highly frequent ED use was observed among various age groups (with reference to the 14–24 years group), patients with a history of cardiac disease, and patients with a history of diabetes ($p<0.05$). Further, non-Saudi nationals were less prone to highly frequent ED use than Saudi nationals ($p<0.05$). This multivariate model was well-calibrated (HL test $p=0.622$) and exhibited good discriminatory power (C-statistic = 0.7).

Discussion

Emergency department overcrowding is becoming a challenge for the healthcare management system globally²² and locally.¹ In Saudi Arabia, studies about ED visits mainly focus on a specific study population, ie drug-related problems,²³ triage system issues,²⁴ non-urgent visits,²⁵ duration of revisit,²⁶ or a specific group of patients, ie post bariatric surgery²⁷ and sickle-cell disease.²⁸ To our knowledge, the current study is among the few targeting all the adult patients frequenting the emergency department in tertiary care in Saudi Arabia.

During the study period, the rate of frequent visitors is evidently trending. It has been found that the most common definition of frequent visitation was four and more

Table 3 Comparison of Patient's Characteristics Between Frequent and Highly Frequent Visitors in Emergency Department

Characteristics	Frequent Visitors (4–13 Visits) n=7696 (9.38%)	Highly Frequent Visitors (≥14 Visits) n=249 (0.30%)	Univariate		Multivariate	
			OR	95% CI	AOR	95% CI
Gender						
Male	3069(39.9)	123(50.6)	Ref		Ref	
Female	4627(60.1)	126(49.4)	0.68	(0.53–0.88)	0.81	(0.57–1.14)
Age group						
14–24 years	1525(19.82)	25(10.04)	Ref		Ref	
25–44 years	3248(42.2)	90(36.14)	1.69	(1.08–2.64)	1.7	(1.06–2.72)
45–64 years	1517(19.71)	57(22.89)	2.29	(1.43–3.69)	1.96	(1.16–3.31)
65 years or more	1406(18.27)	77(20.92)	3.34	(2.12–5.28)	2.61	(1.52–4.46)
Nationality						
Saudi	7357(95.6)	242(97.19)	Ref		Ref	
Non-Saudi	339(4.4)	7(2.81)	0.63	(0.29–1.34)	0.68	(0.30–1.57)
History of cardiac disease						
Yes	764(9.93)	41(16.47)	1.79	(1.27–2.52)	1.08	(0.74–1.59)
No	6932(90.07)	208(83.53)	Ref		Ref	
History of hypertension						
Yes	1813(23.65)	85(34.14)	1.68	(1.29–2.20)	0.83	(0.57–1.22)
No	5883(76.44)	164(65.86)	Ref		Ref	
History of diabetes						
Yes	1819(23.64)	97(38.96)	2.06	(1.59–2.67)	1.6	(1.12–2.29)
No	5877(76.36)	152(61.04)	Ref		Ref	
Insurance status						
Insured fully	6881(89.41)	210(84.34)	Ref		Ref	
Partial insurance	815(10.59)	39(15.66)	1.57	(1.11–2.22)	1.52	(1.05–2.26)
Military status						
Soldier	1549(20.13)	67(26.91)	1.46	(1.10–1.94)	1.26	(0.83–1.90)
Not a soldier	6147(79.87)	182(73.09)	Ref		Ref	
Hospital employee						
Yes	411(5.34)	8(3.21)	0.59	(0.29–1.20)	0.85	(0.38–1.91)
No	7285(94.66)	241(96.79)	Ref		Ref	
Number of admissions						
Not admitted	4154(53.98)	96(38.55)	Ref		–	–
Once	1910(24.82)	41(16.47)	0.93	(0.64–1.33)	–	–
2 or more times	1632(21.21)	112(44.98)	2.97	(2.25–3.93)	–	–

Note: Bold AOR measures indicate statistically significant values at 0.05 significance level.

Abbreviations: n, number of patients; OR, odds ratio; AOR, adjusted odds ratio; 95% CI, 95% confidence interval; Ref, reference category.

visits per year. A small proportion of patients that made frequent and highly frequent visits accounted for 31.4% of the total ED visits. This percentage is higher than what has been reported in the literature, (8%) in 2006,⁴ (28%) in 2013.¹³ The large proportion of visits should prompt administrators and policymakers to examine the

characteristics of the disproportionately fewer patients and develop interventions that reduce their visit numbers.^{4,11} Moreover, almost half of the patients presented with less urgent conditions, a consistent finding across visit frequency groups. This finding is consistent with what was reported in the literature.^{5,6,15,29}

Table 4 Comparison of Patient's Characteristics Between Less Frequent and Highly Frequent Visitors in Emergency Department

Characteristics	Less Frequent Visitors (1–3 Visits) n=74,101 (90.32%)	Highly Frequent ED Visitors (≥14 Visits) n=249 (0.30%)	Univariate		Multivariate	
			OR	95% CI	AOR	95% CI
Gender						
Male	34,796(47.0)	123(50.6)	Ref		Ref	
Female	39,305(53.0)	126(49.4)	0.9	(0.71–1.16)	1.02	(0.73–1.44)
Age group						
14–24 years	17,722(23.92)	25(10.04)	Ref		Ref	
25–44 years	32,871(44.36)	90(36.14)	1.94	(1.25–3.02)	1.82	(1.14–2.89)
45–64 years	15,157(20.45)	57(22.89)	2.67	(1.67–4.27)	1.81	(1.07–3.05)
65 years or more	8351(11.27)	77(30.82)	6.54	(4.16–10.27)	3.35	(1.95–5.77)
Nationality						
Saudi	68,452(92.38)	242(97.19)	Ref		Ref	
Non-Saudi	5649(7.62)	7(2.81)	0.35	(0.17–0.74)	0.39	(0.17–0.91)
History of cardiac disease						
Yes	4083(5.51)	41(16.47)	3.38	(2.42–4.73)	1.52	(1.03–2.23)
No	70,018(94.49)	208(83.53)	Ref		Ref	
History of hypertension						
Yes	10,917(14.73)	85(34.14)	3.00	(2.31–3.90)	1.22	(0.83–1.87)
No	63,184(85.27)	164(65.86)	Ref		Ref	
History of diabetes						
Yes	11,910(16.07)	97(38.96)	3.33	(2.58–4.30)	1.82	(1.27–2.61)
No	62,191(83.93)	152(61.04)	Ref		Ref	
Insurance status						
Insured fully	58,418(78.84)	210(84.34)	Ref		Ref	
Partial insurance	15,683(21.16)	39(15.66)	0.69	(0.49–0.97)	0.81	(0.55–1.19)
Military status						
Soldier	15,294(20.64)	67(26.91)	1.42	(1.07–1.87)	1.25	(0.83–1.87)
Not a soldier	58,807(79.36)	182(73.09)	Ref		Ref	
Hospital employee						
Yes	3597(4.85)	8(3.21)	0.65	(0.32–1.32)	1.25	(0.56–2.78)
No	70,504(95.15)	241(96.79)	Ref		Ref	
Number of admissions						
Not admitted	58,715(79.24)	96(38.55)	Ref		–	–
Once	13,432(18.13)	41(16.47)	1.87	(1.30–2.69)	–	–
2 or more times	1954(2.64)	112(44.98)	35.06	(26.59–46.21)	–	–

Note: Bold AOR measures indicate statistically significant values at 0.05 significance level.

Abbreviations: n, number of patients; OR, odds ratio; AOR, adjusted odds ratio; 95% CI, 95% confidence interval; Ref, reference category.

The age distribution in the study reflects the population pyramid in Saudi Arabia, with majority of the population being young. The highest visiting age group ranged from 25 to 44 years (44% of patients). However, this finding contrasts with⁷ showing different age groups attending ED both in frequent and non-frequent visits. This discrepancy could be attributed to the nature of this study being a self-reporting survey and sampling of

population rather than the entire population attending hospital emergency.³⁰ In this study, the ED visits were detected more in the 25–44 years age group, in contrast with 45–64 years as reported by Hooker et al.³¹ Overall, previous studies have shown inconclusive conclusion due to age difference between frequent users and non-frequent users, as the current study also supports.^{5,20,30,32,33}

A small body of literature has indicated a slight difference in age, apportioning infrequent ED visits to the young groups.^{5,19,33} In the study by Liu et al,³² a very young (25 years old) age group was a characteristic of the less frequent visitor. In contrast, the peak age in frequent visiting was found to belong to the middle-aged 25–64 years.⁹ It has been reported that frequent visits to the hospital emergency might be due to the lack of primary care providers or the lack of insurance. However, some studies have challenged the hypothesis and reported that lack of insurance was also prevalent among frequent group.^{30,33,34} Vinton et al (2014) stated that countries with universal insurance support the idea that the lack of insurance is not considered a factor. Likewise, a study in the Veteran Health Administration network in the United States reported that insurance status was not a factor, as authors pointed out that despite the unlikelihood of insurance to be a factor, visit frequency patterns between patients were evident.²⁰ On the other hand, some studies have shown a difference in the insurance status between the less frequent and the frequent users of hospital emergency.^{4,5} The current study shows that female patients had more visits (53%), which supports local studies, (55%) females reported by Al-Otmy et al; (57%) by Zakaria et al, and international literature Hooker et al. Yet, a study has yielded equal numbers of ED visits by males and females.²⁴ In general, studies have reported different distribution of frequent visitation across gender; males dominance was reported in Singapore,⁹ in females³¹ or unrelated to gender.³⁵ It has been reported in the literature that when visiting frequency increases, the percentage of males increases.^{5,14,32} In contrast, findings in the Saudi context have shown that males were three times more likely to be in the frequent users' groups than females.⁷ Other studies reported no significant differences in gender between the frequent and none frequent ED visitors.^{15,30,34–37} The acuity level in this study mostly features less urgent cases, which accords with other studies.²⁵ The chronic diseases, reported in this study, are lower than that of Al-Otmy et al.²⁵ One of the possible explanations might be due to that all public hospitals in Saudi Arabia have to accept all patients visiting the ED, which encourage patients to bypass the primary care centers, ignoring nature of ED services that must be for life saving conditions. Previous literature has discussed different reasons for seeking ED visits. In the current study, the five most common reasons for visiting ED were gastrointestinal symptoms (36%), followed by orthopedic (27.2%),

gynecology (18.6%), cardiovascular (16.3%), and neurologic (15.4%). Similarly, a study has reported abdominal problems as the top most complaints (Hooker et al, 2019). Mental health and substance abuse were also identified as common reasons for ED visits.³¹

The study has shown that being a female is a significant predictor of highly frequent emergency visiting. While this finding is consistent with two previous studies,^{4,33} most studies have concluded that being a male can be a predictor of highly frequent emergency visits.^{5,14,17,19,32,36} Furthermore, one study³⁸ has revealed that not only the percentage of males increases with frequency but also their mortality rate.

The most significantly associated health conditions with frequent and highly frequent visits were diabetes, cardiac diseases, and respiratory problems. This finding aligns with what has been reported in the literature by a Saudi community survey.³⁹ In this study, an increasing tendency was observed among frequent users to be diabetic, hypertensive, have a medical history, or cardiac disease, which also corroborates earlier findings in the literature.^{14,19,20,29,33} These findings postulate that frequent visitors to ED are medically vulnerable.

Frequent visitors had more admissions into the hospital over the study period. The status of having at least one-admission rate goes up over time. This aligns with earlier studies.^{5,7,11,30} On the other hand, several studies have revealed initial increase in the admission rates then drop-down rates as the visiting frequency exceeds 17 visits per year, which is not supported by the current study.^{15,17} This discrepancy might reflect the poor health conditions in our population or suggest that local medical practice has a low threshold to admit frequent visiting patients. We think this need to be investigated further in future studies.

As for the outcome of the visit being admitted or discharged, there was no difference between occasional and frequent visitors, which corresponds to previous findings,⁵ except for the highly frequent visitors who exhibit a drop in admission rates per visit. Seven categories of the patient's complaints present the most common complaints that constitute the majority of ED visits. This findings also concurs with many previous findings.^{5,6,15,34} Obstetrics and gynecology-related complaints are more prevalent in occasional visitors compared to highly frequent visitors. Categories of cardiovascular, neurologic, and respiratory showed an increasing percentage that correlates with the visiting frequency. The lack of standardization for presenting complaints categories raised an issue

when comparing our data to other studies. We used a standardized method by presenting an abbreviated list of complaints, developed by the Canadian Health Information.^{21,40,41} The tendency towards complaints aggravated by cardiovascular and respiratory problems compared to occasional visit complaints has also been demonstrated in the literature.¹⁵ The visiting time, day, or month has not proven to be a factor for frequent visiting. This finding has also been supported by earlier findings^{5,11,29,30,37} except for a study demonstrating an increased odds of frequent visiting for people attending at night shift.¹⁵

Strengths and Limitations

This study explores visit frequency and patient's characteristics in Saudi Arabia, with a large sample size. The study was conducted in a tertiary care hospital with high annual ED visits. Yet, several limitations need to be addressed. First, manual data extraction for medical diagnosis was challenging since the information was not available electronically. Second, the study data were collected from a single hospital. In other words, a multicenter study would have provided more insights. Moreover, the extracted data is limited to one year period. Third, we did not include data about the utilization of other health-care services like outpatient clinics, dialysis centers, and home healthcare. The utilization of services can unravel a patient's visiting pattern and whether related to dissatisfaction with other healthcare services or actual emergency conditions that cannot be managed in the outpatient setting.

Conclusion

Frequent visits place a significant burden on the hospital emergency department, accounting for more than one-third of the total ED visits. This mirrors the international data about emergency department frequent visiting. Factors significantly associated with highly frequent ED visits are age group, history of chronic disease, including diabetes and cardiac disease, Saudi nationality, and partial insurance coverage. The most frequent complaints among frequent visitors are related to gastrointestinal, cardiovascular, orthopedic, and respiratory systems. No significant difference was observed between less frequent, frequent, or highly frequent visitors with respect to acuity level and admission to the hospital. This study findings provide empirical evidence that could help in developing policy interventions as well as initiating quality improvement

projects addressing the issue of frequent ED visitors. From primary care perspective, sustaining effective coordination between EDs and family physicians and primary care providers consider among the proposed solutions for managing ED crowdedness and frequent users.¹³ Likewise, effective communication between care providers is a key component of a case-management approach,^{42–44} especially for chronic conditions. Further studies are also recommended, in particular a qualitative study, exploring the rationale and cultural factors behind ED frequent visitation.

Implications and Future Research

Methodological studies can help define the optimum number and threshold for visiting frequency in line with our culture, people, and health infrastructure. Different communities call for a different threshold for frequent visiting. The field of quantitative research could be enriched by qualitative studies addressing the characteristics of specific groups of patients like patient's COPD, asthma, heart failure, connective tissue disease, cancer, sickle-cell disease, among whom are frequent ED visitors. Unfortunately, qualitative studies garner little attention from medical researchers. Incentives must be introduced to foreground the role of qualitative research and integrate research capabilities with family medicine and emergency medicine.

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Disclosure

The authors report no conflicts of interest in this work.

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