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Original Research

Characteristics of High Utilizer Patients in the Emergency Department at a University Hospital in the Kingdom of Bahrain

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ABSTRACT

Background: Emergency departments (EDs) around the world are facing a crippling crisis of overcrowding, a complex problem caused by a variety of factors. One contributing factor is the overutilization of EDs by patients with frequent visits. Objective: This study aims at measuring the prevalence of this phenomenon and better understanding the characteristics of high utilizers.

Methods: A retrospective review was conducted in a tertiary care teaching hospital, for patients aged 14 years and above during the year 2022. The definition of a high utilizer is set as any patient that fits the inclusion criteria with four or more visits to the ED during 1 year.

Results: The prevalence of high utilizers in our ED is 3.9%, accounting for 12.1% of visits in 2022, where 135 was the highest number of visits made by one patient. Visits mostly consisted of level 3, Yellow (48.9%) and level 4, Green (42.8%) triage. The top three chief complaints were sore throat (16.8%), unwell adult (15.1%), and abdominal pain (12.8%). The total length of stay was 3.6 ± 3.2 h in the ED. Time of arrival was observed; 23.9% presented at night, 37.8% in the morning, and 38.8% in the evening.

Conclusions: The prevalence rate of high utilizers was found to be 3.9% in our study, falling within the range based on literature. Due to the parallel issues raised by many studies, the importance of developing convenient corrective strategies and conducting further national-based studies to get better insight of high utilizers is required.

Keywords: high utilizers; frequent utilizers; emergency departments; health care utilization; EMD; ED; frequent flyers

INTRODUCTION

Emergency departments (EDs) have established a pivotal role in any effective health care system, as such, any disruption in its flow can have repercussions on the entire health system. In recent decades, EDs around the world have been faced with a crippling crisis of overcrowding. Irrespective of health care payment systems, many countries reported increasing waiting time and prolonged boarding times without proper solutions.[1] The negative impact of overcrowding is widely acknowledged; it compromises patient safety, reduces satisfaction levels, worsens the quality of care, and in certain circumstances, even leads to higher mortality rates.[1–3] It is essential to fully understand the causes of overcrowding and objectively measure it to effectively address this issue.[2]

Among many other factors contributing to overcrowding, patients with recurrent visits to the ED, termed high utilizers or frequent flyers, might

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be a cause.[1–3] Although there is no agreement upon definition of high utilizers, the most common definition is having at least four ED visits per year.[4–7] Other than aggravating overcrowding, there are various aspects to how this phenomenon can negatively affect health systems and EDs.[8] For example, EDs are considered a high-cost and resource-intense environment and are not the optimum setting for nonurgent matters nor for the delivery of chronic continuous care.[9] Malebranche et al. reported that, with appropriate interventions addressing high utilizers, deductions in ED costs of 26–45% and inpatient costs of up to 67% have been achieved.[10] Furthermore, unnecessary frequent visits eventually lead to unnecessary admissions and increase overall costs, especially among fragile multimorbid groups, potentially harming patients by undergoing more radiological imaging over time, increasing their cumulative radiation doses and cancer risk.[6,11–13]

High utilizers have been studied in various populations and regions.[11,12,14,15] Among senior patients, although they constituted < 6% of all ED users, they accounted for up to 30% of the total visits.[16,17] Conversely, in the pediatric population, studies with varying definitions and age ranges found a wide incidence range for high utilizers, ranging from 0.3% to as high as 75%.[18,19] Specific subgroups such as prisoners and homeless patients have also been the subjects of investigation.[20,21] An Australian study found that the odds are higher if they were Arabic speakers compared with English speakers, in addition to various other studies suggesting predominance in certain races and ethnicities.[6,11,12,15]

To our knowledge, this study is the first investigating the characteristics of high utilizers at the ED in the Kingdom of Bahrain. We hypothesize that, with free government-funded health care in Bahrain, we might have a significant prevalence of high utilizers. Furthermore, this study aims to understand the characteristics of high utilizers of EDs, and guide future interventions to decrease their visits and eventually decrease costs and overcrowding.

METHODS

Ethical Approval

Ethical approval for this study was granted by the Institutional Review Board at King Hamad University Hospital (KHUH) (IRB#23-586).

Study Design

This study followed a nonanalytic retrospective study design where the primary objective is to provide a clear understanding of the high utilizer population rather than determining any quantitative relationships.[22]

Data Collection

Data was extracted from the electronic patient medical records at KHUH and reviewed by trained physicians from the ED. Medical chart review is a common method used in emergency medicine research.[23] Patients' demographics (age and gender) were collected. The number of visits was retrieved from the system including: the mode of arrival to the hospital, laboratory and radiological investigations, chief complaint, length of stay, and their disposition. Chief complaints from the system are coded using the Manchester Triage System (MTS).

The data included all patients with four or more visits to KHUH ED within the period January 1 to December 31, 2022. As patients diagnosed with an oncology condition are followed up with the

Bahrain Oncology Center, they are provided with emergency care in the same setting as nononcology patients. Thus, due to their high expected recurrent visits to the ED related to their condition, these patients were excluded. Additionally, in line with most health systems in Gulf Corporation Council countries, patients younger than 14 years of age are considered under the pediatrics population and were excluded from the study.[24] The exclusion criteria also included patients who left without being triaged and those who left without being seen after triage.

After investigation of the data, the visits that had missing input data were excluded to increase the validity of our data.[25] Furthermore, the data was further checked for any duplication from the system, accounting for 917 visits, and the initial entry into the system was refined. Duplication may have included a change in re-triage level, different chief complaints, or changes in the request for clinical investigations. Further analysis to check for the appropriate number of visits was done to ensure that all patients had four or more visits. The total number of patients that fit the inclusion criteria after data revision is 2,158, with 12,779 visits.

Patient demographics included gender, age, and the number of visits in one year, which aimed to assess the overall high utilizer characteristics in the ED. Patients that were deceased in the hospital were noted. The arrival mode was recorded for each patient and categorized into ambulance arrival or walk-in arrival. Walkin arrival included both walk-in and wheelchair arrival status.

Triage levels were recorded based on the MTS system: Red, Orange, Yellow, Green, Blue. Chief complaints were recorded based on the MTS, which included 53 categories. Clinical investigations such as laboratory requests and radiological requests made by the physicians are noted in the data. The duration of the visit was calculated through system-generated data. Patterns of high utilizers visits are explored through the time of arrival based on the shift timings and the frequency of visits based on the month.

Disposition was categorized as discharge, admission, or transfer. Discharge included all patients that were discharged after being seen, referred to health centers or to the outpatient clinics. Admissions include all those that were admitted from the ED to inpatient wards or the intensive care unit, or taken directly to the operating room for surgery. Transfers include all transfers made to other hospitals.

Data Analysis

Data analysis was done using SPSS v25 (IBM, Armonk, NY). Patient demographics were analyzed using descriptive statistics, using means and standard deviation for normally distributed data, and medians and interquartile ranges for non-normally distributed data. Categorical data was presented as frequency and percentages.

RESULTS

There were 2,158 high utilizers of 55,748 patients that visited the ED in 2022. Because high utilizers had four or more visits, we took into account that high utilizers represented 12,779 of 105,530 visits made by the overall population. As such, the prevalence of high utilizers or frequent flyers in our ED is 3.9%, accounting for 12.1% of visits. Of these 2,158 patients, 67 were deceased based on hospital records at the time of extraction. Of all high utilizers' visits, 21.0% arrived by ambulance, and 79.0% arrived as walk-ins. It was found that the

greatest number of visits by one patient was 135. The total length of stay was calculated between all visits (Table 1).

Table 1. Patient Demographics and Visit Characteristics

Charicteristics		n (%)
Gender (n = 2158)	Male	871 (40.4%)
	Female	1287 (59.6%)
Age (n = 2158)	Mean ± SD	43.6 ± 20.3
	Median	36.1
	Min	14
	Max	106
Number of visits (n = 2158)	Mean ± SD	5.9 ± 4.7
	Median	5
	Min	4
	Max	135
Arrival mode (n = 12,779)	Ambulance	2683 (21.0%)
	Walk-in	10,096 (79.0%)
Length of stay (hours; n = 12,779)	Mean ± SD	3.6 ± 3.2

Triage level is assigned at the Triage Room based on MTS. Patients are coded into Red or Stat, Orange, Yellow, Green, or Blue. Most high-utilizer visits consisted of level 3, Yellow (48.9%) and level 4, Green (42.8%). The Red triage level consisted of only 0.2% of visits, and the Blue triage level consisted of only 1.0% of visits (Figure 1).

Available records of common comorbidities demonstrated that hypertension (3553, 27.8%) and diabetes (3430, 26.8%) were the most frequent, and sickle cell disease (5, 0.0%) was the least frequent between visits (Table 2). From all the visits, laboratory and radiology investigations were noted (Table 3).

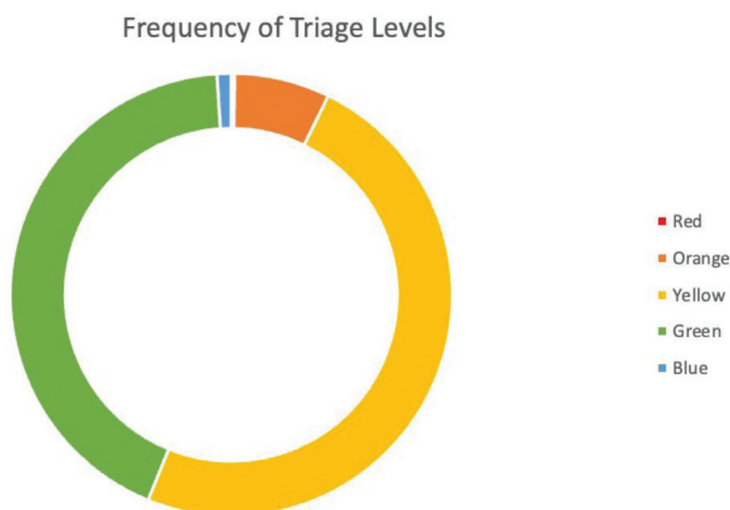

Figure 1. Distribution of triage levels.

Table 2. Distribution of Common Comorbidities

Common Commorbidities	Frequency
Asthma	703
Diabetes	3430
Epilepsy	175
Hypertension	3553
Hyperlipidemia	2085
Stroke	511
Ischemic heart disease	1153
Malignancy	108
Sickle cell disease	5
Other	3832

Table 3. High Utilizers' Clinical Investigations

Laboratory	Yes	10,341 (80.9%)
Investigations (n = 12,779)	No	2438 (19.1%)
Radiology	Yes	5882 (46.0%)
Investigations (n = 12,779)	No	6897 (54.0%)

The top eight most frequent chief complaints were: sore throat (16.8%), unwell adult (15.1%), abdominal pain (12.8%), shortness of breath (7.7%), limb problems (7.4%), chest pain (5.7%), urinary problems (5.5%), and pregnancy (4.3%) (Figure 2).

The highest number of visits recorded was in January, and the least was in December (Figure 3). The time of day at which high utilizers attended the ED is approximately equal: 43.3% attended during the daytime (00:00–11:59 am) and 56.7% attended during the evening or nighttime (12:00–11:59 pm). Time of arrival was divided based on the three shifts: morning (7:00 am-2:59 pm), evening (3:00 pm–10:59 pm), and night (11:00 pm–6:59 am). The difference between the three shifts did not differ by a significant difference: 23.9% presented at night, 37.8% in the morning, and 38.8% in the evening.

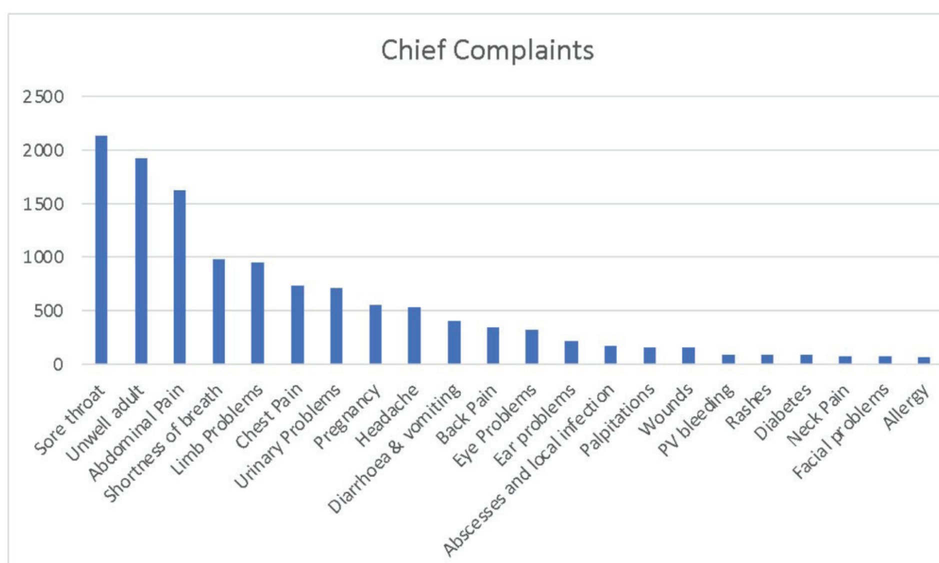

Figure 2. Distribution of chief complaints where the number of cases is 60 or greater by high utilizers.

Most high utilizers (80.2%) were discharged home after being seen, whereas 5.4% left against medical advice. The admission rate in the high utilizer population is 13.6% in our emergency clinic, and < 1% were deceased while admitted. Transfers to other hospitals accounted for 0.8% of the visits (Figure 4).

DISCUSSION

We conducted a descriptive study looking at the characteristics of high utilizers in the ED from January 2022 to December 2022. There was a total of 12,779/105,612 visits in that year, with 2,158/55,748 patients having four or more visits. The prevalence of these patients was 3.9%,

Figure 3. Frequency of high utilizers visits per month.

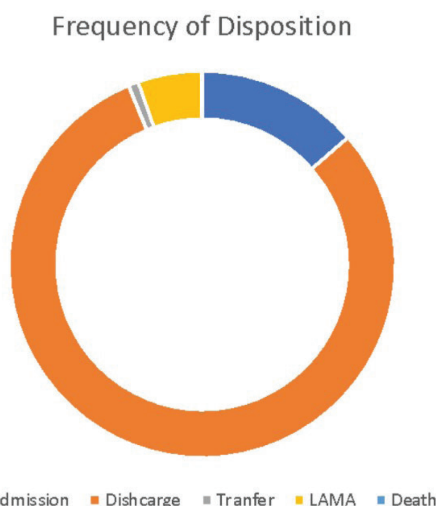

Figure 4. Frequency of disposition in the high-utilizers population.

accounting for 12.1% of the total visits in 2022. We found that our prevalence rate of 3.9% is similar to the literature, where prior studies indicated a rate between 3% and 10%. Similarly, the number of visits made by frequent ED users in our study was 12.1%, which is within the expected range of 12% to 34%.[4,19,26–28]

The most common triage category assigned was level 3, followed by level 4, both consisting of more than 90% of the visits. This is in line with the findings of Al-Surimi et al., which stated that most of the patients who return are stable and nonemergent.[26] Most of our high utilizers arrive as walk-ins (79%) rather than by ambulance (21%), nearly the exact percentage found in a Netherlands-based study.[29] The patient with the greatest revisit rate made 135 visits and represented an outlier.

Despite having more female patients that attended the ED in the given year (59.6%), the average number of visits made by males (6.2 ± 4.5) was higher than the average number of visits made by females (5.7 ± 4.8). The mean age of high utilizers was 43.6 ± 20.3 years, which reflects the population distribution of Bahrain, which tips more

toward a younger demographic, as 71.1% of the population is aged between 20 and 64 years.[30] This is in concordance with the age groups found in most previous studies.[6,11,12,26]

High utilizers had several comorbidities such as diabetes and hyperlipidemia. A similar trend was noticed with regards to gender and multimorbidity status among studies conducted in neighboring Saudi Arabia, as well as internationally.[6,11,12,26] The most significantly associated health conditions with frequent visits were diabetes, hypertension, and the sequalae of those respective diseases. It can be inferred that these patients carry a greater burden of disease and are therefore more medically vulnerable.

The most common chief complaints were: sore throat (16.8%), unwell adult (15.1%), abdominal pain (12.8%), shortness of breath (7.7%), limb problems (7.4%), chest pain (5.7%), urinary problems (5.5%), and pregnancy (4.3%) (Table 2). Aside from the first two, Al-Surimi et al. had the same common chief complaints of gastrointestinal, orthopedics, obstetrics & gynecological, respiratory, and chest pain.[26] The unwell adult complaint relates to patients with nonspecific symptoms such as malaise or fatigue, and it has been found that patients with multiple complaints that are vague tend to return more. We also saw a high number of "sore throat" revisits, as this study looked at data during the COVID-19 pandemic waves. Patients with upper respiratory symptoms frequently attended our ED, often to receive symptomatic treatment or due to persistence of symptoms.

Although the overall average length of stay at the ED is 6.9 hr, we found that patients who revisited the ED had shorter stays, with an average of 3.6 ± 3.2 hr, whereas a longer stay of 4.4 ± 6 hr, was found by AlSurimi et al.[26] The distribution of visits according to time of day followed the normal flow, as the greatest frequency was observed in the morning to afternoon times and tapered off during the nights, similar to other studies.[26,29] We also found that high utilizers tend to be over-investigated, with additional blood tests taken in at least 80.9% of the revisits and imaging in approximately 46% of the patients, which is significantly higher than the rates of imaging studies done for 8% of patients at King Abdulaziz Medical City.[26] This provides evidence that high utilizers contribute to an increased usage of time and resources.

We found that 80.2% of high utilizers were then subsequently discharged; while comparing our findings to the region, it was noted that Saudi Arabia had only 53% of visits that resulted in discharge.[26] The admission rate in our high-utilizer population was found to be 13.6%; while comparing our findings on an international level, the United States had an admission rate of 20%.[11] It is unclear if these rates are related to the characteristics of our high-utilizer population or to the followed practice in our institute. Studies did not find a significant difference in the disposition between frequent and nonfrequent patients.[11,26]

Traditionally, poverty, mental illnesses, drug abuse, and burden of disease are linked with increased ED visits.[4,6,11,12,26,31,32] Due to the cultural and religious perceptions in Bahrain, there is no national registry that tracks patients with drug abuse, or mental illness, and there is no regular screening for such conditions. These conditions are patient-reported and treated on a case-bycase basis. As such, we do not have adequate data to be analyzed

and reflected on in our results. Furthermore, due to the free health care provided to all Bahraini citizens based on their demographical location, poverty levels are not a factor to reflect on in this study.

We recommend that future studies include population statistics such as marital status, employment status, income, disability, mental illness, and substance abuse in Bahrain to ascertain why frequent visits are made to the ED regularly. There is no clear explanation for gender difference in the literature. It is also unclear if high utilization rates are affected by gender bias. Furthermore, due to a lack of significance in the disposition throughout literature, future directions can explore the results and indicate possible assumptions on why disposition does not play a factor between frequent and nonfrequent patients.

Among many other strategies, the case management approach with its different variations, is increasingly being reported to be most effective in reducing rates of ED's high utilizers and cutting overall costs.[10,33–35] Having recognized the characteristics of our high utilizers in the ED, it would be imperative to establish individualized case management programs, aiming to help meeting patients' health and social needs away from the overwhelmed EDs.

Limitations

Our study design has a number of limitations. Firstly, data were extracted using patients' electronic medical records at KHUH, which relied on the physician's documentation and final diagnosis. Henceforth, inaccurate documentation or incomplete files might have influenced the results. Our results assume there was no difference in our findings between the patients who were included and those who were excluded due to missing data or departure ahead of physician evaluation. Because our access was minimal due to data privacy and protection, we ensured to the best of our abilities that we reduce bias from the available data, resulting in minimal alteration rates of high utilizers and their visits.[22,23,25] In addition, due to insufficient data extraction methods, a comparison between nonfrequent and the frequent utilizer population was not achieved.

Secondly, due to eligibility criteria at KHUH for free health care access, the study might not reflect the number of high utilizers in the Kingdom of Bahrain. This can be further defined with a power analysis in a prospective manner among government-funded hospitals. Our exclusion of oncology patients from Bahrain Oncology Centre, due to their unsteady health status, may have affected our prevalence rate for the high utilizers, and we hypothesize that the actual figure may be higher. In addition, Bahrain has a large proportion of people with hereditary blood disorders such as sickle cell disease, thalassemia, or G6PD deficiency, and these patients usually will have recurrent visits due to the pathophysiology of their illness. However, our ED is not the primary destination for patients with hemoglobinopathies, these patients are instead directed to the National Hereditary Blood Disease Center.

A third limitation that we indicated are the waves of the COVID-19 pandemic that may have influenced patients' return to test against COVID-19, as such it may have inflated the number of high utilizers. Lastly, by conducting the study solely in KHUH and relying on the electronic system, mortality statistics are not have been accurate, because only deaths occurring in the hospital are visible on the system.

CONCLUSION

Falling within the range based on literature, 12.1% (12,799/105,612) of ED visits in 2022, made by 3.9% (2,158/55,748) of our ED visitors are defined as high utilizers. Our results found that our high utilizers are mostly middle-aged females, with walk-in and low acuity visits. However, we emphasize the importance of further national research projects to obtain a deeper insight into the phenomenon and characteristics of high utilizers in EDs all over the Kingdom of Bahrain, to develop appropriate strategies and interventions to decrease its burden, and improve overall patient care and resource utilization.

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