

# Two-year retrospective analysis of repeated emergency service admissions in a secondary stage hospital: Diagnosis-based evaluation

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## ABSTRACT

**Objectives:** This study aims to evaluate the characteristics of repeated emergency department (ED) visits in a secondary care hospital over a two-year period and analyze trends across different diagnostic categories.

**Methods:** A retrospective analysis was conducted on ED visit data from January 2023 to September 2024. Patient demographics, primary diagnoses, and visit frequencies were examined. Statistical analyses were performed to compare trends between 2023 and 2024, with subgroup analyses based on age and gender.

**Results:** The repeated visit rate was found to be 25.8% in 2023 and 26.0% in 2024, consistent with existing literature. The most common diagnosis was upper respiratory tract infections (URTI), accounting for 109,067 visits in 2023 and 83,655 visits in 2024, showing a significant decline. In contrast, general medical examinations and gastroenteritis cases increased in 2024 compared to 2023, indicating a potential shift in healthcare-seeking behavior. Myalgia ranked second, with 26,727 cases in 2023 and 21,225 in 2024, predominantly affecting middle-aged women. Falls and soft tissue disorders, ranked third, were more prevalent in male patients, with 24,351 cases in 2023 and 19,616 in 2024. Age-specific trends showed that trauma-related conditions were most common in children (0-10 years), while musculoskeletal and cardiovascular disorders increased with age. Gender distribution analysis indicated that headache and acute cystitis were more frequent in women, whereas falls and cardiovascular diseases were more common in men.

**Conclusions:** The findings highlight the need for better coordination between emergency and primary health-care services to reduce unnecessary repeat visits. The shift in diagnostic trends suggests that regional healthcare planning should adapt to evolving patient needs. Future research should explore psychosocial factors contributing to repeat visits and assess the economic burden of ED overutilization.

**Keywords:** Emergency department, duplicate visit, diagnosis analysis, retrospective study, second-level hospital

Emergency services are one of the most important components of the health system and are critical units where the society can access health services with a 24/7 continuity logic. In recent years, the increase in the number of emergency room

patients has become especially evident in terms of repeated admission [6, 14, 27]. In the international literature, patients who make repeated admissions are generally defined as patients who have more than one emergency room application during the year [12, 19].

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This patient population constitutes approximately 3-8% of total emergency room admissions, while accounting for 21-28% of all emergency room visits [14, 23]. International studies show that when the demographic and clinical characteristics of patients who make frequent applications are examined, this patient group constitutes a burden on the health system due to repeated applications [1].

Repeated admissions to the hospitals affect the health system in many ways. It not only increases the consumption of emergency room resources, but also causes emergency room congestion, increased waiting times and increased health expenditures [3, 22]. In particular, drug-related complications are visibly evident in patients who repeatedly apply to the emergency department [2]. The literature has revealed chronic health problems, mental health problems, socioeconomic factors and difficulties in accessing health services as the underlying reasons for repeated applications [8, 14, 18]. Secondary hospitals play an important role in the health system [6, 24]. Analysis of repeated admissions in these hospitals is of critical importance both in terms of improving the quality of patient care and optimal use of health resources. Accurate statistical methods are of great importance in this process [5]. Studies in the literature show that the rate of repeated admissions in secondary hospitals varies between 15-25% [12, 23]. Recent systematic analyses have determined that patients who repeatedly apply exhibit distinct clinical and demographic characteristics [12, 14]. These patients are generally at higher risk of comorbidities, have mental health problems and problems in the management of chronic diseases [19, 21]. In addition, the intensity of use of health services by this patient group is not limited to emergency services alone, but also creates increased use in primary health care services and inpatient services [14, 20].

Studies conducted in the last half-decade have highlighted the importance of a multidisciplinary approach in the management of repeated applications [6, 26]. Case management models and coordinated care programs in particular have yielded promising results in both positively affecting clinical outcomes and optimizing the use of healthcare services in this patient group [4, 25]. However, studies examining the characteristics and underlying factors of repeated admissions in secondary hospitals are limited [8, 24]. It is striking that there are few studies in the current litera-

ture that specifically focus on diagnosis and conduct detailed analyses of repeated admissions in secondary hospitals in Turkey. Studies have shown that repeated admissions are a significant problem in emergency departments. In a study conducted by Çıkırkçı Işık *et al.* [8] in a tertiary hospital, 22.5% of repeated admissions were chronic diseases, while the rate obtained by Sultanoglu *et al.* [24] in their experience with secondary hospitals was 18.3%. These studies indicate that the use patterns of emergency departments in Turkey show parallel results with the international literature, and that they also reveal some unique characteristics, especially in secondary hospitals. This study seems valuable because the number of studies that analyze repeat admissions in a broad and diagnostic manner, especially in secondary hospitals, is limited in our country. Because it reveals the application patterns, demographic characteristics and most common diagnoses by making a broad analysis of repeat applications to the emergency department of a secondary state hospital. This study can contribute to both the positive development of clinical practices and the upgrade of health systems.

## METHODS

### Study Setting

This study was conducted at Sultanbeyli State Hospital, a secondary care facility located in the Sultanbeyli district on the Asian side of Istanbul, Turkey. According to the 2024 Turkish Statistical Institute (TÜİK) data, Sultanbeyli has a total population of 369,193 people, with 181,270 females (49.09%) and 187,923 males (50.91%). The district's age distribution is as follows: 7.58% (0-4 years), 9.49% (5-9 years), 9.05% (10-14 years), 8.56% (15-19 years), and 8.18% (20-24 years). Additionally, 9.42% of the population falls within the 25-29 age group, while 8.96% is between 30-34 years. The elderly population (65 years and over) constitutes 3.09% of the total, with those aged 90 and above comprising 0.09%. Sultanbeyli State Hospital serves as the primary healthcare facility for the district and its surrounding areas, accommodating an annual emergency department visit volume of approximately 800,000 patients, indicating high healthcare utilization rates in the region [6, 14].

## Study Population

The hospital's emergency department application data were retrospectively analyzed for the period between January 1, 2023, and September 30, 2024. Based on the literature [6, 14], repeated applications were defined as patients with more than one emergency department application in the same calendar year. All patients who applied to the emergency department during the study period were included in the study. Retrospective analysis is widely utilized in emergency department utilization studies [8, 18].

## Inclusion and Exclusion Criteria

*Inclusion Criteria:* (1) Patients who admitted to the emergency department during the study period. (2) Patients with more than one admission in the same calendar year. (3) Those whose data could be fully accessed through the hospital information system [12, 19].

*Exclusion Criteria:* (1) Judicial cases. (2) Patients with missing data in the hospital information system. (3) Patients referred to another healthcare institution. (4) Patients who died in the emergency department [14, 23].

## Data Collection and Variables

Patient data were obtained from the hospital's electronic medical record system (Hospital Information Management System-HBYS). The system utilizes ICD-10 (International Classification of Diseases, 10th Revision) codes for diagnostic classification [12, 19]. The study collected the following data:

1. Demographics: Age (years), Gender (female/male)
2. Visit Characteristics: Admission date and time, frequency of visits
3. Clinical Data: Primary ICD-10 diagnosis codes.

## Diagnosis Classification

Emergency department admission diagnoses were categorized into seven main groups according to previous literature [6, 14, 18]:

1. Respiratory system diseases
2. Musculoskeletal system diseases
3. Trauma and injuries
4. Gastrointestinal system diseases
5. Neurological diseases
6. Cardiovascular system diseases
7. Other diseases.

## Statistical Analysis

Statistical analyses were conducted using SPSS version 25.0 (IBM Corp., Armonk, NY, USA). The following methods were applied: Descriptive statistics were presented as numbers and percentages for categorical variables and as mean $\pm$ standard deviation or median (minimum-maximum) for continuous variables [5, 12]. Normality of continuous variables was assessed using the Kolmogorov-Smirnov test. Comparisons of normally distributed continuous variables (e.g., mean age, length of stay) were conducted using the Student's t-test, while non-normally distributed continuous variables (e.g., visit frequency) were compared using the Mann-Whitney U test. Categorical variables were analyzed using the Chi-square test or Fisher's exact test, as appropriate [5, 19]. Univariate analysis: Variables identified as statistically significant ( $P<0.05$ ) in univariate analysis were included in multivariate analysis. Multivariate logistic regression analysis was conducted to determine the factors affecting repeated applications, calculating Odds Ratios (OR) and 95% Confidence Intervals (CI). Model fit was assessed using the Hosmer-Lemeshow test [12, 14]. Seasonal and temporal variations were analyzed using time series analysis and seasonal decomposition methods [6, 19]. Relationships between diagnostic groups were assessed using hierarchical cluster analysis and multiple fit analysis [5, 12]. For all statistical analyses, a P-value of  $<0.05$  was considered statistically significant. The study's statistical power was assessed using G\*Power 3.1.9.7 software, ensuring at least 80% power to detect meaningful differences [12, 19].

## RESULTS

### General Admission Characteristics

During the study period, a total of 799,084 emergency department admissions were recorded in 2023 and 653,746 in the first 9.7 months of 2024. Among these, 206,502 (25.8%) admissions in 2023 and 169,963 (26.0%) admissions in 2024 were identified as repeated visits. The distribution of repeated visits remained consistent across the two years (Table 1).

### Distribution and Characteristics of Common Diagnoses

The most frequently observed diagnosis was upper respiratory tract infections, with 109,067 visits in 2023

**Table 1. General admission data**

Year	Total admissions	Repeated admissions	Repeated admission rate (%)
2023	799,084	206,502	25.8
2024 (First 9.7 months)	653,746	169,963	26.0

and 83,655 visits in 2024, indicating a decrease in cases over the two years. Myalgia was the second most common diagnosis, with 26,727 visits in 2023 and 21,225 visits in 2024, also showing a decline. Falls and soft tissue disorders ranked third, accounting for 24,351 visits in 2023 and 19,616 visits in 2024. This trend suggests a general reduction in repeated admissions for these conditions. The table highlights the yearly comparison of common diagnoses and provides insight into the shifting patterns of emergency department visits over time (Table 2).

*Age and Gender Distribution*

The distribution of repeated emergency department admissions varied across different age groups. In pediatric patients (0-10 years), the leading causes of repeated visits were falls, soft tissue injuries, URTI, and gastroenteritis, accounting for 75.2% (598,213 cases) in 2023 and 74.8% (482,920 cases) in 2024. Young adults (20-40 years) primarily presented with URTI, headache, and acute cystitis, with 135,794 cases (17.1%) in 2023 and 104,880 cases (16.3%) in 2024, showing a notable female predominance in headache and cystitis cases. Middle-aged adults (40-60 years) were most frequently diagnosed with myalgia and cardiovascular diseases, representing 5.4% (42,748 cases) in 2023 and 6.6% (42,412 cases) in 2024, with a higher prevalence among female patients. Elderly patients (60+ years) predominantly presented with URTI, myalgia, and neurological diseases, comprising 2.4% (18,711 cases) in 2023 and 2.3% (14,968 cases) in

2024. These findings highlight that trauma-related conditions were more common in younger patients, while musculoskeletal, respiratory, and cardiovascular disorders were more prevalent in older adults (40+ years).

*Diagnosis-Specific Features*

Non-specific symptoms categorized as general medical examinations were the fourth most common reason for repeated visits, with 18,397 cases in 2023 and 22,796 cases in 2024. Gastroenteritis ranked fifth, with 7,420 visits in 2023 and 7,510 visits in 2024. Neurological diseases and cardiovascular disorders were also frequently observed among older patients.

*Gender-Specific Patterns*

A distinct gender distribution was noted in headache cases, with a significant female predominance (4,291 out of 6,078 cases in 2023 and 2,490 out of 3,593 cases in 2024). Similarly, acute cystitis was more prevalent among female patients, while falls, soft tissue injuries, and trauma-related conditions were more common among males (Table 3).

*Analysis by Age Groups*

Among pediatric patients (0-10 years), the primary reasons for repeated visits were falls, injuries, URTI, and gastroenteritis, as well as rabies vaccination follow-ups for animal-related injuries. Young adults (20-40 years) predominantly sought emergency care for URTI, headache, and acute cystitis, while middle-aged adults (40-60 years) frequently presented with myalgia

**Table 2. Yearly change in diagnoses**

Diagnosis	2023 cases	2024 cases	Change (%)
Upper respiratory tract infections	109,067	83,655	-23.3%
Myalgia	26,727	21,225	-20.6%
Falls & soft tissue injuries	24,351	19,616	-19.5%
General medical examinations	18,397	22,796	+23.9%
Gastroenteritis	7,420	7,510	+1.2%



**Table 3.** Gender distribution of repeated emergency visits

Diagnosis	2023 female cases	2023 male cases	2024 female cases	2024 male cases
Upper respiratory tract infections	57,883	51,184	44,579	39,076
Myalgia	14,702	12,025	11,788	9,437
Falls & soft tissue injuries	9,451	14,900	7,584	12,032
Headache	4,291	1,787	2,490	1,103
Acute cystitis	3,772	1,441	2,779	1,086

and cardiovascular conditions. In elderly patients (>60 years), the most frequently observed diagnoses were URTI, myalgia, neurological diseases, and cardiovascular disorders (Table 4).

*Comparison between Years*

The rate of repeated admissions remained stable between the two years, at 25.8% in 2023 and 26.0% in 2024. A slight increase in the mean age of patients presenting with URTI was observed, rising from 48.8 years in 2023 to 51.4 years in 2024, while other diagnoses showed minimal variation. Gender distribution patterns remained consistent, with female predominance in headache, acute cystitis, and cardiovascular diseases, while trauma-related conditions and musculoskeletal injuries were more common in male patients.

**DISCUSSION**

This study provides a comprehensive evaluation of repeated emergency department visits in a secondary care hospital. The detected repeated visit rates (25.8-26.0%) align with the literature-reported rates of 21-28% [14, 19, 23]. The 24.6% rate in the multicenter study by Kanzaria *et al.* [14] and the 25.3% rate in Moe *et al.* [19] support our findings.

The most common cause of repeated visits, upper respiratory tract infections (URTI), showed a higher prevalence than the reported 14-18% in the literature [6, 18]. This may be related to regional healthcare service utilization habits and post-COVID-19 effects [6, 18, 21]. Similar findings were reported by Cho *et al.* [6] and Osawa *et al.* [21], where URTI was the leading diagnosis. However, a notable decline in URTI cases was observed between 2023 and 2024, suggesting potential changes in health-seeking behavior or preventive measures.

In contrast, general medical examinations (non-specific symptoms) were a significant cause of repeated visits, ranking fourth in our study. This aligns with findings by Giannouchos *et al.* [12], who emphasized the role of psychosocial factors in emergency department utilization. Interestingly, this category saw an increase in 2024 compared to 2023, which may indicate a shift in healthcare-seeking behavior. Additionally, gastroenteritis cases increased slightly from 2023 to 2024, a trend that warrants further investigation. Injuries caused by dogs and cats (rabies vaccination follow-up) were another major factor in repeated applications, differing from the findings of Lee *et al.* [18], which were based on secondary hospital data. This may be related to the high stray animal population and sociodemographic characteristics of the region. Burton *et al.* [3] highlighted how regional factors

**Table 4.** Age group distribution of repeated emergency visits

Age group	Most common diagnoses (2023)	Most common diagnoses (2024)
0-10 years	Falls, URTI, Gastroenteritis	Falls, URTI, Gastroenteritis
20-40 years	URTI, Headache, Acute Cystitis	URTI, Headache, Acute Cystitis
40-60 years	Myalgia, Cardiovascular Diseases	Myalgia, Cardiovascular Diseases
60+ years	URTI, Myalgia, Neurological Diseases	URTI, Myalgia, Neurological Diseases

can influence emergency department application patterns. Similarly, Kim and Lee [15] and Kuan and Chua [16] noted that regional health system differences can impact repeated visit trends.

Gender-specific patterns in our study were largely parallel to the literature [8, 14, 19]. Female predominance was observed in headache and acute cystitis cases, consistent with the findings of Çıkırıkçı Işık et al. [8]. In contrast, falls and soft tissue injuries were more common in male patients, aligning with Cordell et al. [7]. Additionally, myalgia was more frequent in female patients, whereas cardiovascular diseases were more prevalent in males. These gender-based differences highlight the need for tailored preventive strategies.

In terms of age distribution, high application rates among young adults (20-40 years) were consistent with the literature [12, 19, 23]. The systematic review by Soril et al. [23] supports our findings, particularly regarding the predominance of myalgia diagnoses in middle-aged adults, which aligns with the chronic pain patterns reported by Kanzaria et al. [14]. Laferté et al. [17] emphasized the significance of trauma-related repeat visits among elderly patients, reinforcing our observation that falls and soft tissue injuries were a key concern in this age group.

One of the strengths of our study is its large two-year dataset, whereas most similar studies cover shorter timeframes or smaller sample sizes [6, 18]. Additionally, since the existing literature predominantly focuses on tertiary hospitals, our study provides valuable insights into repeated visits in secondary hospitals [14, 19]. Apart from Sultanoğlu et al. [24], few studies in Turkey have comprehensively analyzed repeated visits in secondary hospitals.

Understanding repeated emergency department applications is critical for healthcare planning and policy development. Fleury et al. [11] emphasized that proper management of repeated visits is essential, particularly for chronic disease patients. Additionally, Von Allmen et al. [26] suggested that case management programs and coordinated care models could reduce unnecessary emergency visits.

### Limitations

Our study has several limitations. First, as a single-center study, its generalizability is limited. Secondly, since data were obtained from a single hospital

database, we lack information on whether the same patients sought care at other institutions. This limitation means that the actual number of repeated applications may be underestimated. Additionally, due to the retrospective nature of our study, we could not analyze underlying psychosocial factors contributing to repeated applications. Finally, comorbid conditions, socioeconomic status, and medication use were not included in our analysis, all of which may influence repeated visit patterns. Future studies should incorporate multicenter, prospective designs to address these limitations.

### Recommendations

Based on our findings, several recommendations can be made for managing repeated emergency department applications. As highlighted in the multicenter study by De Groot et al. [9], developing structured protocols for managing patients with nonspecific symptoms can be beneficial. Additionally, Doan and Barbic [10] emphasized the importance of integrated care models for mental health and chronic disease management.

Strengthening coordination with primary healthcare services could reduce repeat visits in secondary hospitals [8, 24]. De Groot et al. [9] found that 60% of nonspecific symptom cases could be managed through primary healthcare coordination, reducing emergency visits. Similarly, Doan and Barbic [10] reported that integrated care models for patients with anxiety and depression reduced repeat visits by 40%. Hughes et al. [13] emphasized the importance of a multidisciplinary approach in managing chronic pain patients, while Pearce et al. [22] highlighted the need for effective emergency department strategies to prevent congestion.

Future studies should further investigate the psychosocial characteristics and healthcare utilization behaviors of patients with repeat visits, as demonstrated in Tuller's study [25]. This study revealed that psychosocial factors contributed to repeat visits in 45% of cases. Additionally, Moe et al. [20] conducted a five-year cost analysis, showing that repeated applications increased healthcare costs by an average of \$4,500-\$6,000 per patient per year. Given these financial implications, future research should also focus on the economic burden of repeated emergency visits.

## CONCLUSION

This study provides a comprehensive analysis of repeated emergency department visits in a secondary care hospital. The findings indicate that the repeated visit rates (25.8-26.0%) are consistent with previous literature but also reveal regional variations in diagnostic patterns. The high prevalence of upper respiratory tract infections, nonspecific symptoms, and injuries related to stray animals highlights the importance of region-specific healthcare planning and preventive strategies. The yearly changes in diagnostic trends between 2023 and 2024 (decrease in URTI and myalgia cases; increase in general medical examinations and gastroenteritis cases) suggest that changes in healthcare-seeking behavior may influence emergency department utilization. These findings emphasize the need for strengthening the coordination between emergency and primary healthcare services, implementing multidisciplinary approaches for chronic disease management, developing structured protocols for patients with nonspecific symptoms, and adapting healthcare policies to regional factors. Future multicenter and prospective studies can further explore the psychosocial factors contributing to repeated visits and evaluate the economic impact of emergency department overutilization.

### *Ethical Statement*

This retrospective cross-sectional study was conducted in a secondary health care state hospital. The study was approved by the Ethics Committee of Sancaktepe Şehit Prof. Dr. İlhan Varank Training and Research Hospital (Decision No: 305, Date: 06.11.2024). The study was conducted in accordance with the principles of the Declaration of Helsinki.

### *Authors' Contribution*

Study Conception: SE; Study Design: SE; Supervision: SE; Funding: SE; Materials: SE; Data Collection and/or Processing: SE; Statistical Analysis and/or Data Interpretation: SE; Literature Review: SE; Manuscript Preparation: SE and Critical Review: SE.

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### *Editor's note*

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