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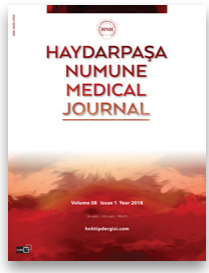

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ORIGINAL ARTICLE

Critical Insights Based on the Ministry of Health's 6-Year Data Analysis: An Epidemiological Study of Patient Visits Trends of Emergency Departments in Türkiye

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Abstract

Introduction: Although emergency services are at a vital point in health systems, they occupy a large place in terms of service capacity and finance. An emergency service visit complaint may be within the scope of the primary health-care service, or it may be a health problem that must be completed with the minutes. Overcrowding of emergency departments (EDs) and delayed visits may be critical for priority patients to receive treatment. In our study, it was aimed to examine all 6-year patient visits to all emergency services in Turkiye in detail and to determine the epidemiological trends of visits.

Methods: The study includes a total of 925,161,028 ED visits, including both children and adults. Data were collected from the EDs of all healthcare institutions in Türkiye, through the Sağlıkta İstatistik ve Nedensel Analizler (Statistics and Causal Analysis in Health) program web inter-face.

Results: Average time from registration to triage was 16.9 min. 787,617,762 triages have been made. About 28.30% were classified as green triage, 68.51% were classified as yellow triage, 3.18% as red triage, <0.01% as black triage, and 137,543,266 visits (14.87% of among total visits) were as other (non-triaged). The highest number of visits, 66.2 million (7.2%), occurred be-tween 20: 00 and 21: 00 weekly, while the lowest number of visits occurred between 5: 00 and 6: 00, with about 6 million visits (0.65%).

Discussion and Conclusion: The high volume of ED visits, particularly during non-office hours and among certain demo-graphic groups, highlights the need for targeted strategies to optimize healthcare delivery. This could include enhancing primary and secondary care services, improving health literacy among the population, and implementing effective triage systems and which, will be key to ensuring the sustainability of Türkiye's health-care system and improving health outcomes for the population.

Keywords: Emergency department visits; Health-care management; Patient demographics

Emergency departments (EDs) hold a vital position within health-care systems, occupying a significant role in terms of service capacity and financial impact. One analysis suggests that ED visits accounted for approximately 12.5% ($328.1 billion) of overall national health expendi-tures in the USA in 2010[1,2]. The cost of care for comparable conditions in an ED appears to be significantly higher (some estimates suggest 10–12 times higher) compared to care provided in an urgent clinic or physician's office[3,4]. Emergency patients may present to the ED with various complaints that could be

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resolved in primary care or outpatient clinics, such as chest pain, shortness of breath, chronic knee pain, itching, or suture removal. However, unnecessary ED visits and misuse of ED services contribute to the burden[5]. While a headache that can be postponed in terms of critical importance is not a trivial issue, prompt and appropriate interven-tion with adequate human resources is essential for a patient facing a time-sensitive situation with a myocardial infarction. Proper utilization of every minute and resource can only be achieved through careful triage. The time elapsed until triage and waiting times are not only indicators of ED volume but also crucial parameters for the flow of the ED. Although some studies suggest that a high number of patients in low triage levels does not decrease the time allocated to patients in high triage levels, crowding can lead to adverse consequences, including longer wait times and worse health outcomes, including higher mortality for patients[6,7]. Emer-gency visits can vary depending on the time, such as hours when outpatient clinics are closed, weekends, and general holidays[8]. In addition, depending on the social structure of the com-munity, they may be used as a back door to the health-care system to bypass appointment sys-tems. Effective management of EDs, which can be affected by so many variables, can only be achieved based on referral and utilization trends.

In our study, we aimed to examine patient visits characteristics to EDs in Türkiye over a 6-year period and determine the referral trends epidemiologically.

Materials and Methods

The study includes a total of 925,161,028 ED visits, including both children and adults. The number of visits includes repeated visits. The total number of ED visits accounts for all types of cases, including urgent, forensic, home accidents, work accidents, and referrals. In Türkiye for the colored triage system, non-triaged patients showed with blue color. Non-triaged visits in-clude referrals from policlinics, minor interventions such as suture removal, or prescribed im/iv medicine admissions. Non-triaged visits (blue color) were not included in percentages of tri-aged patients. The time elapsed from patient registration to triage was calculated.

Study Design and Data Collection

The study was conducted retrospectively. Data were collected from the EDs of all healthcare institutions in Türkiye, which are mandatory to be connected to Turkish Ministry of Health informatics systems, between January 1, 2016, and January 1, 2022. The data were obtained through the Health Statistics and Causal Analyses System (SINA), which is a data management system connected to the Ministry of Health. SINA system is a domestic decision support sys-tem platform that receives real-time data from all healthcare institutions and belongs to the Min-istry of Health. It is a developed personal health record system which is a crucial link in the chain of health data digitalization which is like the E-nabız system in Türkiye[9].

Statistical Analysis

Statistical data in our study were analyzed using SPSS (IBM Corp. Released 2019. IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp). The data were presented in numbers (n), percentages (%), and means.

Results

When all triage groups are examined, there were a total of 925,161,028 ED visits at all EDs in Türkiye over 6 years with an average time from registration to triage of 16.9 minutes. The number of visits and the time to triage have shown fluctuations by months over the years, with a general increasing trend (Figs. 1, 2).

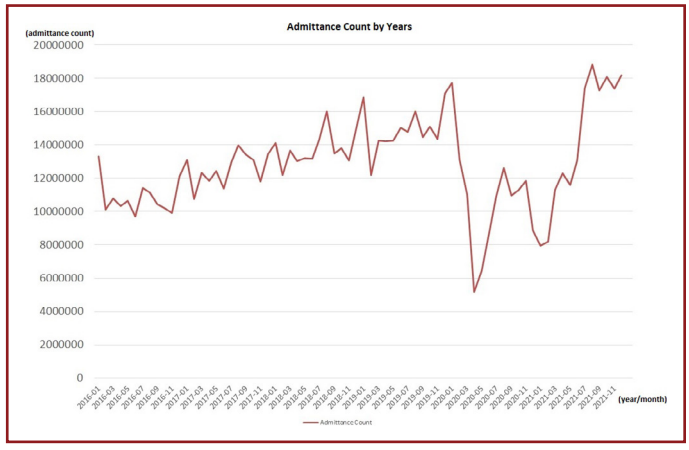

Figure 1. Total admittance count to emergency.

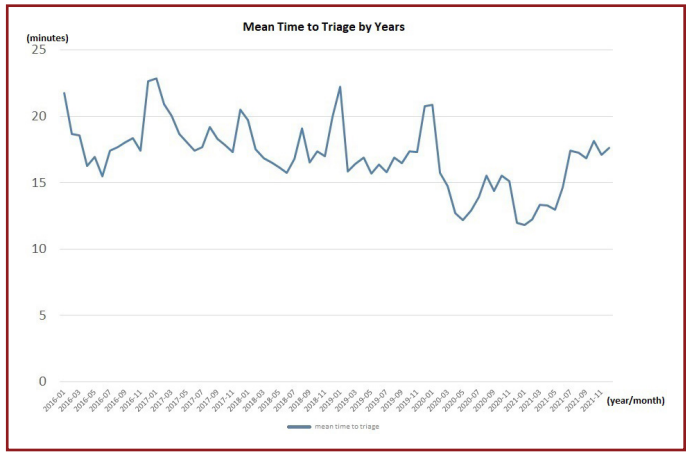

Figure 2. Mean time to triage.

In terms of triage categories, 787,617,762 triages have been made. 222,912,166 visits (28.30% among triaged patients) were classified as green triage, which was the highest number, fol-lowed by 539,579,823 visits (68.51% among triaged patients) classified as yellow triage, 25,078,271 visits (3.18% among triaged patients) as red triage, 47,502 visits (<0.01% among triaged patients) as black triage, and 137,543,266 visits (14.87% of among total visits) were as other (non-triaged) (Fig. 3).

Considering the overall weekly average, the highest number of visits, 66.2 million (7.2%), oc-curred between 20:00 and 21:00, while the lowest number of visits occurred between 5:00 and 6:00, with about 6 million visits (0.65%) (Fig. 4).

The age group with the highest number of visits was the 5–9 age group accounting for 104,149,216 visits (11.3%), and they had the longest average waiting time to triage, which was 18 min, as well as in the 0–4 age group. On the other hand, the shortest waiting time to triage was found to be 15.3 min in the 80–84 age groups (Fig. 5).

Highest ratio of admittance (1.70) within the same age group population percentage in the year 2021 was the 90+ age group as expected. The admittance percentage for 2021 year with the population demographics of Türkiye is shown in Figure 6.

The average age of patients in the black triage category was 57.5, 40.6 for red triage, 35.7 for other (non-triaged), 33.8 for yellow triage, and 28.2 for green triage. The average waiting time to triage was 20.4 min for green triage, 20.5 min for other (non-triaged), 16.0 min for yellow triage, 10.4 min for black triage, and 5.0 min for red triage, as shown in Figure 7.

Typically, the winter months experienced the highest number of visits throughout the year, which was more than 30% of all admittances. The outcomes of triaged ED visits showed that 0.04% of visits resulted in medical refusals/

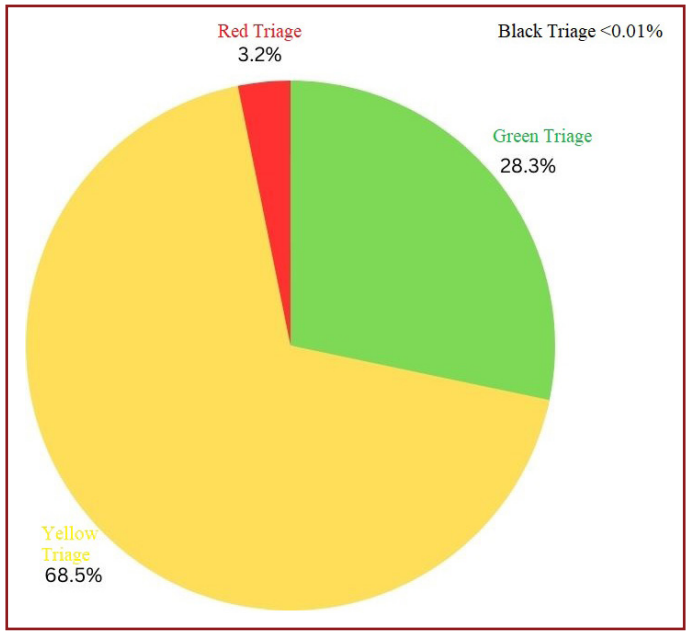

Figure 3. Emergency visit triage percentages.

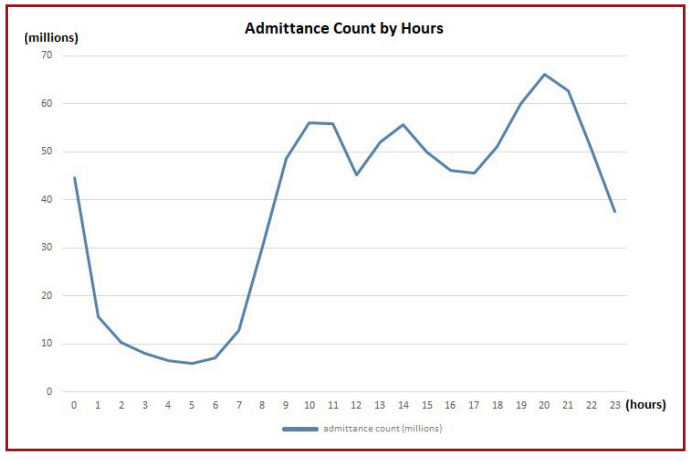

Figure 4. Admittance count by hours.

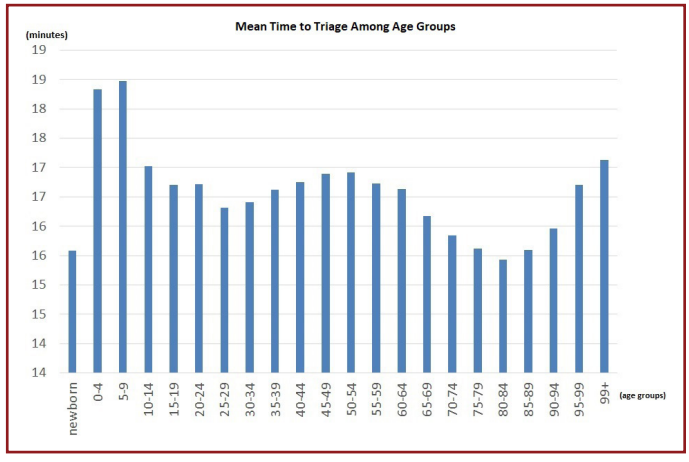

Figure 5. Time to triage within age groups.

Figure 6. Admittance ratio among population (year 2021).

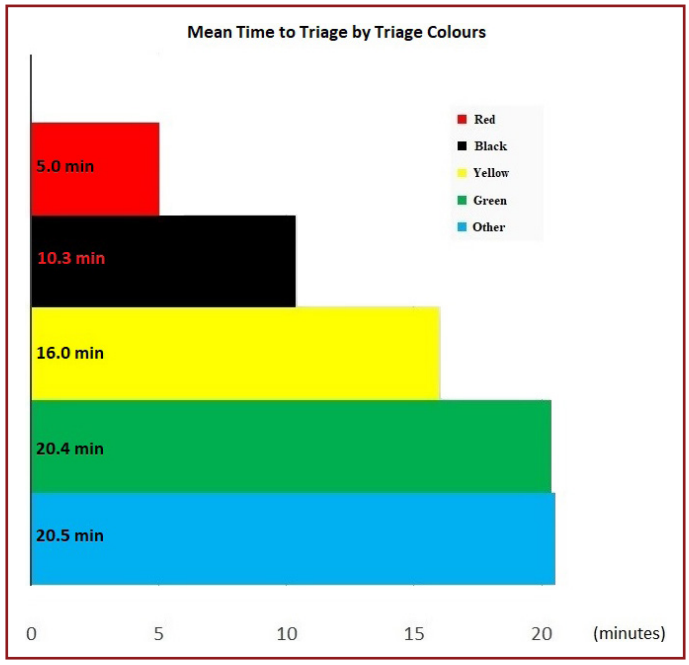

Figure 7. Time to triage among triage colors.

treatments rejected/discharged against medical ad-vice, 0.04% in death, 0.57% in external hospitalization, 0.98% in internal hospital hospitaliza-tion, 33.14% in discharged after recovery with prescription, and 65.05% discharged with the presented situation.

644,837,236 visits (69.7%) to ED have been occurred during non-office hours. The ratio of non-office/office hours' ED visits was found 2,30. The mean waiting time for non-office hours was 16.7 min, opposite to 17.4 min for office hours visits.

Discussion

In Türkiye, the average number of ED visits per 100,000 people has exceeded 150.000 in the past 6 years with 16.9 min of time to triage, which is approximately 5–15 times higher than the European region average of 10,000-30,000 visits per 100,000 people which was about 25% of the population visit the EDs annually[10] and the United States has approximately 40,500 visits per 100,000 people which was 3 times lower than Türkiye, with the mean time to triage was 28.4 min[11]. Waiting times until triage is shorter as the patient's triage status worsens in our study, and waiting times in Türkiye are considerably lower than at global levels. Even though lower number of practicing doctors per population compared to OECD countries the average number of ED visits in Türkiye exceeds the European and United States averages, indicating a higher demand for emergency care. This could suggest the high capacity of health-care services in EDs but also may be due to the time and expectation pressure created by society on healthcare workers. The use of digital systems for health records also speeds up many pro-cesses.

The utilization of health-care services by populations can vary based on socioeconomic and environmental factors such as the distance to health-care facilities and the presence of public transportation[12] also, in Türkiye, public emergency health-care services are completely free, regardless of triage. In 2019 year, practicing doctors per 1000 population in Türkiye was 2.0 and hugely higher than OECD countries like Portugal which was 5.0 or OECD mean 3.6[13]. This may have been leading people who could not get an appointment in primary or secondary care to EDs. In addition, in some rural areas of Türkiye, ED services are tending to be used like primary care services, rural areas are more likely to use EDs in the USA too[14]. Furthermore, shorter waiting times in Türkiye which could have encouraged people to use ED, as compared to those in European and American countries, may contribute to the higher number of ED vis-its.

Some studies suggest that a significant percentage of ED visits are the result of referrals from primary healthcare services due to various reasons,[2] although the exact percentage in Türkiye is still unknown. Patients' health literacy is an important determinant of where they choose to seek medical attention and can also be a significant factor in the number of ED visits.

During the COVID-19 pandemic period, an approximately 30% decrease in ED visits was ob-served in Türkiye in the 3 months following the announcement of the first case in March 2020. Similarly, in the USA, there was a 42% decrease in ED visits from March 2020 to April 2020, with a slight decrease in visits for serious conditions as well[15,16]. This result may indicate that many ED visits were actually unnecessary.

Regarding triage, approximately more than one-fourth of the visits were in the green zone triage, and in developed countries like Canada, this number was low as 15%[17]. Considering that most visits occur during weekdays or non-office hours, increasing the capacity of primary healthcare facilities covered by general health insurance and/or polyclinics during non-weekend hours could reduce green zone visits. Charging fees for green zone triage visits during office hours, especially on weekdays, could also lead to a significant reduction in visits. Yellow zone triage visits constitute more than half of all triage visits may suggest a large por-tion of the visits in Türkiye might be necessary, but

hospitalization rates for patients were very low. Therefore, standardizing and using different methods in triage could be necessary, as alt-hough triage is generally correlated with the severity of the condition, there are studies showing that it is not always the decisive factor[4,18].

Regarding age distribution, ED visit ratio of population percentage was highest with 1.38 under geriatric ages, in the 5–9 age group (Fig. 5). The longest waiting times in all triage levels are also observed in the 0–4 age group with the 5–9 age group, which may be related to the sepa-rate existence of specialized children's hospitals and EDs that people were more likely to visit to, especially in big cities.

The majority of triage-level visits (green, yellow, and red) occurred around 8–9 pm. This may be due to patients' expectations of decreased symptoms during the daytime, transportation dif-ficulties especially for domesticated people with one vehicle, the inability of the working and/or studying population to use clinical appointments during working/school hours specifically for green zone patients, and hesitation to call an ambulance. Having patients with non-black triage levels presenting at the same time can also be important in reducing unnecessary or postponable green zone visits for creating more time and resources for needier patients. Coordinating pa-tients with non-urgent conditions to visit during non-peak hours could help optimize resources and prioritize more critical cases. Although there are some opposite findings,[19] creating more opportunities like late hours appointments in non-EDs may decrease the crowding in certain hours, in different societies and health literacy levels.

The huge number of non-triaged visits – which tells its nature by its name – should alert us about the misusage of EDs. Different approaches including flexible office hours would be val-uable to shift these visits to other departments.

Of all ED visits, 63.9% resulted in the patient being discharged either as presented or improved. In Medicaid hospitals in the USA in 2018 which are free or low costed, this rate was found to be 80.2% and more than 20 million (14.1%) of the total 142 million ED visits resulted in hos-pitalization at the same hospital[1]. The differences in hospitalization rates may be due to differ-ent emergency triage systems, or more unnecessary usage of EDs.

The fact that 1 in every 1000 patients leaves without accepting medical advice/treatment may suggest that these visits were unnecessary. The very low rate of out-of-hospital referrals unlike the USA emergency rates (3%)[1] may indicate that the health-care system in Türkiye can re-spond to problems at the same hospitals.

Limitations

This study, while comprehensive, has several limitations that should be considered. The data, sourced from all healthcare institutions in Turkey, may contain errors or inconsistencies that could affect the results. The study focuses on the distribution of ED visits by age and hours, but does not fully explore the impact of other demographic factors such as gender, ethnicity, and socioeconomic status. The specific medical conditions prompting these visits are also not detailed. The noted decrease in visits during the COVID-19 pandemic is observed, but the broader impacts of the pandemic on ED operations and resource usage are not fully examined. The study does not provide information about the number and expertise of medical personnel in EDs, which could significantly impact capacity and triage times. Finally, while the study exam-ines the use of EDs in Turkey, it does not fully explore patients' access to or use of primary and secondary healthcare services, which could be a significant factor in the high number of ED visits.

Conclusions

Overall, understanding the patterns and factors influencing ED visits is crucial for effective management and resource allocation in Türkiye's health-care system. The findings of this study not only provide insights into the utilization of emergency services but also have broader im-plications for public health and health-care policy. The high volume of ED visits, particularly during non-office hours and among certain demographic groups, highlights the need for tar-geted strategies to optimize health-care delivery. This could include enhancing primary and secondary care services, improving health literacy among the population, and implementing effective triage systems. Furthermore, the impact of socioeconomic factors and the COVID-19 pandemic on ED visits underscores the importance of considering broader social determinants of health in health-care planning and policy-making. Ultimately, addressing these issues will be key to ensuring the sustainability of Türkiye's health-care system and improving health out-comes for the population.

Ethics Committee Approval: Data usage from Türkiye's Ministiry of Health permission was taken on date 21 November 2019, id:95741342-020.

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