



## Research Article

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# AN ANALYSIS OF THE DISTRIBUTION OF PATIENT DIAGNOSES BASED ON ICD CODES IN TURKEY BETWEEN 2016 AND 2022: A DESCRIPTIVE STUDY

 **Mustafa Mahir Ülgü**<sup>1</sup>,  **Şuayip Birinci**<sup>2</sup>

<sup>1</sup>Ministry of Health, General Directorate of Health Information Systems

<sup>2</sup>Ministry of Health, Deputy Minister

### Correspondence:

Mustafa Mahir Ülgü (e-mail: mahir.ulgu@saglik.gov.tr)

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## Abstract

**Objectives:** It is very important for the individual to get to the hospital correctly and on time. This study aims to evaluate hospital admissions and diagnoses nationwide and guide policies to improve patient admissions.

**Materials and Methods:** All data on outpatient and inpatient treatment applications between 01.01.2016 and 31.12.2022 were examined retrospectively by examining the data of the national registry system. The diagnoses entered at each visit on these dates were classified according to ICD-10 and divided into 21 categories. Data related to specialty, hospital level and seasonal information of diagnoses were evaluated.

**Results:** During the study period, 6,662,007,644 diagnoses were entered in hospital visits. While it was seen that the number of diagnoses entered increased gradually from 2016 to 2019, it was noted that there was a decrease in 2020 due to the COVID-19 pandemic. The three most common diagnoses were musculoskeletal system diseases, circulatory system diseases, and diseases due to infectious causes. Infectious, eye, and gastrointestinal diseases were found to vary seasonally in the frequency of diagnosis.

**Conclusion:** Evaluating seasonal and hospital-level patient applications is essential in establishing effective health policies. Raising awareness of patients and increasing the number of health personnel is necessary to use health services effectively.

**Keywords:** Diagnosis, nationwide, ICD-10 code, health policy.

## Introduction

The most fundamental health needs include individuals reaching the hospital as quickly as possible and accessing the correct specialties. That is crucial for the benefit of the individual and the proper functioning of health services in society. The main obstacle to achieving this goal is the inability to properly care for patients due to a shortage of healthcare workers and the unnecessary burden on the healthcare system of people with insufficient knowledge. In order to solve this problem, the healthcare system needs to be organized, and everyone needs to be educated. When diagnosing patients, universally accepted ICD-10 codes are used.<sup>1</sup> These codes not only enable a common language to be used in providing health services but also participate in forming health policies by identifying missing areas. It is necessary to evaluate the diagnoses of individuals during seasonal diagnostic changes or special situations such as a pandemic.<sup>2</sup> In forming these policies, it will be important to determine the distributions within the emergency department and basic medical specialties, including internal medicine, pediatrics, general surgery, and obstetrics and gynecology. In the literature, there are various studies where the diagnoses of patients applying to the emergency department are evaluated on a large scale.<sup>3-5</sup> These studies show that some patients applying to the emergency department have non-specific diagnoses that do not require emergency intervention and can be managed at the primary level. For example, some studies understood that a significant portion of dermatological complaints, which constitute 3-9% of emergency applications, were not urgent.<sup>6,7</sup> This situation leads to the obstruction of the operation of the health system and results in the victimization of really urgent individuals. Not only for normal times, there is a need for alternative ways to prevent such misuse in extraordinary situations like a pandemic. This study aims to compare the temporal changes in the diagnoses received nationwide by specialties and hospital levels during hospital applications. In this way, it is aimed to create health policies that will better direct individuals applying to the hospital.

## Materials and Methods

In the Republic of Türkiye, all individuals' health-related data are recorded with a system called E-nabız.<sup>8</sup> It is possible to obtain disease, medication, mortality, allergies, examination information for each visit, as well as demographic data of patients from the e-Nabız system, which has been actively used since 2014. The study period was taken between 01.01.2016 and 31.12.2022, and all data related to outpatient and inpatient hospital visits during these dates were retrospectively examined. The diagnoses entered during each visit during these dates were classified according to ICD-10. The ICD-10 codes received during hospital visits were also grouped into 21 upper diagnoses, which the Ministry of Health established based on organ and etiology. Patients' diagnoses in 2020 and 2021, the pandemic period, were compared with other years. As shown in some

dermatological and infectious diseases before, seasonal frequency changes were examined nationwide and reviewed seasonally for all diseases.

## Results

Between determined dates, a total of 6,662,007,644 diagnoses were entered in hospital visits. The number of diagnoses entered gradually increased during the 2016 – 2019 period, and a decrease occurred in 2020, with a 30.1% decrease in the number of diagnoses taken compared to the previous year. The number of diagnoses in 2019 was reached again in 2022 (Figure 1). The top 10 diagnoses entered according to the ICD-10 codes were as follows: musculoskeletal system diseases (n=2), circulatory system diseases (n=1), illnesses due to infectious causes (n=2), situations due to symptoms and abnormal laboratory findings (n=3), gastrointestinal diseases (n=1) and eye diseases (n=1). When examined as an upper group, 17.14% of all diagnoses were respiratory system diseases, 12.55% were digestive system diseases, and 11.81% were musculoskeletal system diseases. In terms of the years, this order was followed by respiratory system diseases, musculoskeletal system, and digestive system diseases in 2020 and 2021. The most common ten diagnoses were given in Table 1 in terms of years and specialties in Table 2. When examined seasonally, musculoskeletal system diseases and primary hypertension were in the first two places, while acute upper respiratory tract infections were in the third place in the winter and fall periods, and gastroesophageal reflux disease was in the third place in the summer. It was observed that the number of visits and the incidence of eye (from 4.74% to 4.93%) and dermatological (from 3.99% to 4.68%) diseases increased in the summer season.

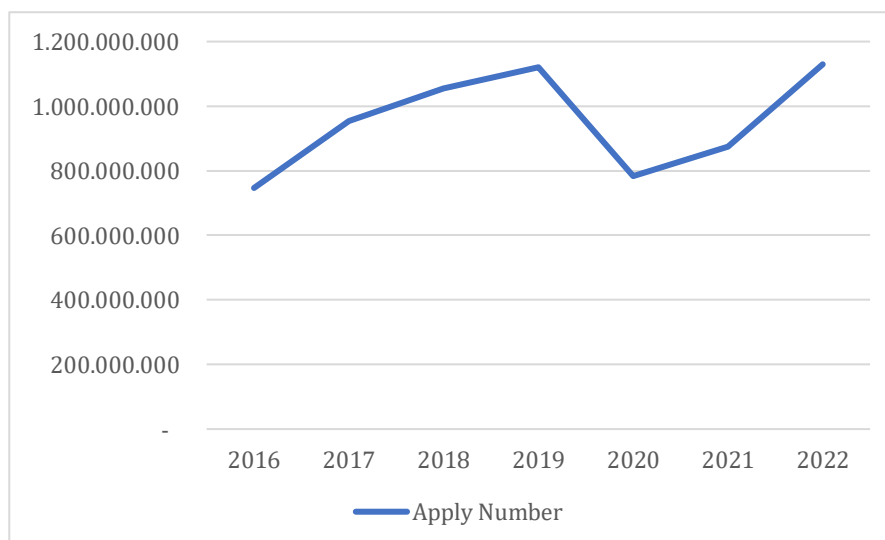


Figure 1. Number of admissions in terms of years

**Table 1.** The most common 10 diagnosis in terms of years

Diagnosis	2016 (%)	2017 (%)	2018 (%)	2019 (%)	2020 (%)	2021 (%)	2022 (%)
Respiratory Disease	19.17	17.22	17.40	17.47	15.68	15.03	17.79
Gastrointestinal Disease	13.26	13.03	12.63	12.39	12.04	12.42	12.20
Musculoskeletal Disease	11.57	11.56	11.47	11.39	12.26	12.75	11.88
Symptoms, Abnormal Laboratory Findings	9.84	10.43	10.51	10.39	10.78	11.79	10.88
Circulatory Disease	8.21	8.29	8.26	8.33	7.92	6.25	7.31
Endocrine Disease	6.54	6.98	7.49	8.56	8.40	8.60	9.43
Genitourinary Disease	5.79	6	5.90	5.81	6.24	6.41	5.64
Eye Disease	4.74	4.96	4.94	4.81	4.60	4.96	4.68
Skin Disease	4.20	4.24	4.19	4.19	4.58	4.64	4.18
Mental and Behavioral Disease	3.30	3.24	3.18	2.94	2.76	2.23	2.29

**Table 2.** Frequency of diagnosis in terms of specialties

Diagnosis	Primary care (%)	Emergency Medicine (%)	Internal Medicine (%)	Pediatrics (%)	General Surgery (%)	Obstetrics and Gynecology * (%)
Respiratory Disease	20.28	28.33	11.05	43.46	1.23	0.27
Gastrointestinal Disease	12.62	6.83	14.23	6.30	31.50	1.40
Musculoskeletal Disease	12,91	14.71	8.72	0.94	6.73	0.49
Symptoms, abnormal lab findings	5.83	24.96	11.15	14.99	15.44	9.56
Circulatory Disease	11.99	3,04	11.45	0.28	6.22	0.67
Endocrine Disease	11.07	0.92	27.67	8.67	8.58	4.21
Genitourinary Disease	3.81	4.02	4.23	3.58	15.05	48.30
Eye Disease	1.82	1.10	0.21	0.99	0.12	0.00
Skin Disease	5.48	1.76	1.01	4.05	8.58	0.59
Mental and Behavioral Disease	3.03	0.91	0.86	0.56	0.29	0.04
Other	11.16	13.42	9.42	16.18	6.26	12.4

\* The second most common diagnosis was pregnancy, accounting for 22.07% of all diagnoses; the fourth most common diagnosis was blood and blood-producing organs, accounting for 7.06% of all diagnoses.

## Discussion

In this comprehensive study examining all the data across the country, it is seen that the most common diagnoses are musculoskeletal system diseases, infectious causes, and circulatory system diseases, although they are susceptible to seasonal changes and influences like a pandemic.<sup>9,10</sup> While this cannot be known with certainty in the analysis of big data, The fact that primary care and emergency services are the same in terms of the most common diagnosis makes us believe that the problems of individuals who apply for emergency services are not typically urgent and can be resolved at the primary level. That supports the idea that individuals are not directed correctly and that the system is improperly used. As seen in some studies, the non-emergency use of the emergency department is common in many countries and is an important problem to be solved in health services.<sup>3,4</sup> Besides, Considering the diverse work environment in the emergency department has been shown to put pressure on the physician when entering the ICD code in the ED.<sup>11,12</sup> Studies are carried out to reduce the differences in diagnosis codes that occur during admission and discharge in the emergency department, among the solutions proposed to reduce the workload in the emergency, the establishment of online triage systems has become an option.<sup>13</sup> "Neyim var?" (<https://neyimvar.gov.tr/>) application, a type of online triage system also mentioned in the MHRs appointment system by the Ministry of Health, has recently started to be used for this purpose. In a comprehensive review, the accuracy of the pre-diagnosis for online triage was not as good as the doctor's, and the patient's compliance with the online recommendations was poor. On the other hand, it has been revealed that the satisfaction rate with this system is high and young and educated individuals are more willing to use it.<sup>14</sup> In particular, it is very important to increase the health literacy of patients applying to the hospital to receive appropriate treatment in the appropriate branch. In addition, emphasis can be placed on strengthening primary health care services to prevent hospital crowding. Entering the wrong diagnosis in outpatient clinic applications other than the emergency department is among the important problems. A study conducted in the USA revealed that about 5% of annual outpatient clinic admissions are diagnostic errors, and 12 million people are affected by this condition, half of which may face serious consequences.<sup>15</sup> As all these studies show, health policies should be developed to prevent these diagnostic errors in hospital admissions.

In this study, there has been observed a seasonal increase in the frequency of dermatological and eye diseases, and the prevalence of both diseases was increased in the summer period as they were in our study.<sup>6,7,16</sup> This is important in terms of forming and arranging health policies. It is expected that there will be an increase in the diagnosis rate of respiratory system diseases in 2020 and 2021 due to the COVID-19 pandemic, but this increase is much less compared to the total applications, and there is a decrease in the total number of diagnoses due to the decrease in total applications.<sup>17-19</sup> In our study, a 30.1% decrease was detected in 2020, when the COVID pandemic started, compared to the previous year, while a decrease between 20.1% and 73.2% was found in the studies looked at in this literature. That may result from the fear caused by the pandemic and

the reduced accessibility of other services due to the focus of health services on pandemic management. Once again, this shows how important it is to prepare health services for extraordinary situations such as a pandemic.

This study, while comprehensive in its approach, does present several limitations. Firstly, the data was retrospectively obtained from a single health information system, e-Nabız. As a result, this study may be subject to biases inherent in retrospective studies, and the generalizability of the findings may be limited to regions using similar health systems. Furthermore, while standardized, the ICD-10 coding system leaves room for interpretation and variability in coding practices, potentially impacting the accuracy of diagnosis classifications. Seasonal variations in diseases were analyzed; however, the specific geographic and climatic factors of different regions within the country that might influence these variations were not considered. The pandemic years of 2020 and 2021 also present unique circumstances that significantly influenced healthcare practices and patient behavior, making comparisons with these years complex. It should be remembered that ICD-10 codes do not reflect the real diagnoses of the patients, and sometimes diagnoses that will facilitate the payment of medicines are entered into the system. Lastly, this study did not evaluate the impact of various healthcare policies or educational programs that might have been implemented during the study period and could have influenced hospital visit trends and diagnosis distributions.

In conclusion, this study reveals the importance of examining the distribution of diagnoses received in hospital applications according to time, season, and specialties for the effective management of health services and the formation of health policies. It emphasizes the need to increase the awareness of individuals and increase health personnel to unnecessarily reduce the number of patients applying to the emergency department. Patients using primary care more effectively will reduce the workforce burden on hospitals, especially emergency services. Therefore, there is a need for more comprehensive and detailed studies to plan and manage health services more effectively.

**Ethical Considerations:** This study was conducted according to the Declaration of Helsinki and received approval from the Turkish Ministry of Health for retrospective data analysis (95741342-020/27112019).

**Conflict of Interest:** The authors declare no conflict of interest.

## References

1. Xue QL. The frailty syndrome: definition and natural history. *Clinics in geriatric medicine*. 2011;27(1):1-15 (doi:10.1016/j.cger.2010.08.009).
2. Cao Y, Shan J, Gong Z, Kuang J, Gao Y. Status and Challenges of Public Health Emergency Management in China Related to COVID-19. *Frontiers in public health*. 2020;8:250 (doi:10.3389/fpubh.2020.00250).
3. Hooker EA, Mallow PJ, Oglesby MM. Characteristics and Trends of Emergency Department Visits in the United States (2010-2014). *The Journal of emergency medicine*. 2019;56(3):344-51 (doi:10.1016/j.jemermed.2018.12.025).
4. Quinn K, Herman M, Lin D, Supapol W, Worster A. Common Diagnoses and Outcomes in Elderly Patients Who Present to the Emergency Department with Non-Specific Complaints. *Cjem*. 2015;17(5):516-22 (doi:10.1017/cem.2015.35).
5. Wier LM, Yu H, Owens PL, Washington R. Overview of Children in the Emergency Department, 2010. Healthcare Cost and Utilization Project (HCUP) Statistical Briefs. Rockville (MD): Agency for Healthcare Research and Quality (US); 2006.
6. Kilic D, Yigit O, Kilic T, Buyurgan CS, Dicle O. Epidemiologic Characteristics of Patients Admitted to Emergency Department with Dermatological Complaints; a Retrospective Cross sectional Study. *Archives of academic emergency medicine*. 2019;7(1):e47.
7. Rubegni P, Cevenini G, Lamberti A, et al. Dermatological conditions presenting at the Emergency Department in Siena University Hospital from 2006 to 2011. *Journal of the European Academy of Dermatology and Venereology : JEADV*. 2015;29(1):164-8 (doi:10.1111/jdv.12513).
8. Birinci Ş. A Digital Opportunity for Patients to Manage Their Health: Turkey National Personal Health Record System (The e-Nabız). *Balkan medical journal*. 2023;40(3):215-21 (doi:10.4274/balkanmedj.galenos.2023.2023-2-77).
9. Rusticucci M, Bettolli ML, de l A. Association between weather conditions and the number of patients at the emergency room in an Argentine hospital. *International journal of biometeorology*. 2002;46(1):42-51 (doi:10.1007/s00484-001-0113-z).
10. Vilkmán S, Keistinen T, Tuuponen T, Kivelä SL. Seasonal variation in hospital admissions for chronic obstructive pulmonary disease in Finland. *Arctic medical research*. 1996;55(4):182-6.
11. Zavala AM, Day GE, Plummer D, Bamford-Wade AJAHR. Decision-making under pressure: medical errors in uncertain and dynamic environments. 2017;42(4):395-402.
12. Newman-Toker DEJD. A unified conceptual model for diagnostic errors: underdiagnosis, overdiagnosis, and misdiagnosis. 2014;1(1):43-8.
13. Hautz SC, Schuler L, Kämmer JE, et al. Factors predicting a change in diagnosis in patients hospitalised through the emergency room: a prospective observational study. 2016;6(5):e011585.



14. Chambers D, Cantrell AJ, Johnson M, et al. Digital and online symptom checkers and health assessment/triage services for urgent health problems: systematic review. 2019;9(8):e027743.
15. Singh H, Meyer AN, Thomas EJJBq, safety. The frequency of diagnostic errors in outpatient care: estimations from three large observational studies involving US adult populations. 2014;23(9):727-31.
16. Gorski M, Genis A, Yushvayev S, Awwad A, Lazzaro DR. Seasonal Variation in the Presentation of Infectious Keratitis. *Eye & contact lens*. 2016;42(5):295-7 (doi:10.1097/icl.0000000000000213).
17. Rabbone I, Tagliaferri F, Carboni E, et al. Changing Admission Patterns in Pediatric Emergency Departments during the COVID-19 Pandemic in Italy Were Due to Reductions in Inappropriate Accesses. *Children (Basel, Switzerland)*. 2021;8(11) (doi:10.3390/children8110962).
18. Kalanj K, Marshall R, Karol K, Tiljak MK, Orešković S. The Impact of COVID-19 on Hospital Admissions in Croatia. *Frontiers in public health*. 2021;9:720948 (doi:10.3389/fpubh.2021.720948).
19. Henriques CO, Gouveia MC. Assessing the impact of COVID-19 on the efficiency of Portuguese state-owned enterprise hospitals. *Socio-economic planning sciences*. 2022;84:101387 (doi:10.1016/j.seps.2022.101387).