



A 6-Year Review of the Electronic Drug Prescription System in the Republic of Türkiye

Türkiye Cumhuriyeti Elektronik Reçete (E-Reçete) Sistemine 6 Yıllık Bir Bakış

Şuayıp BİRİNCİ¹ [ID], Mustafa Mahir ÜLGÜ² [ID]

¹Republic of Türkiye Ministry of Health, Ankara, Türkiye.

²General Directorate of Health Information Systems, Republic of Türkiye Ministry of Health, Ankara, Türkiye.

Article Info: Received; 30.06.2023. Accepted; 04.07.2023. Published; 08.07.2023.

Correspondence: Mustafa Mahir Ülgü; MD., PhD., General Directorate of Health Information Systems, Republic of Türkiye Ministry of Health, Ankara, Türkiye. E-mail: mahir.ulgu@saglik.gov.tr

Cite as: Birinci Ş, Ülgü MM. A 6-Year Review of the Electronic Drug Prescription System in the Republic of Türkiye. Life Med Sci 2023; 2(3): 101-105.

Abstract

Pharmacoepidemiological studies are important for the development of health systems. The aim of this study is to examine the seasonal and branch changes of prescriptions written in the light of national data. Drug and prescription information between 01.01.2016 and 31.12.2022 analyzed retrospectively from electronic data. In addition to gender and age distribution, the specialty and hospital level at which the prescription was written were examined in temporal terms. Prescribed drugs have been classified according to Anatomical Therapeutic Chemical (ATC) codes previously created by the World Health Organization. It was determined that 1,452,128,177 prescriptions were written during the study period. These included a total of 4,602,556,489 drugs with the ATC code. The most written ATC code group was A (alimentary tract and metabolism), followed by M (musculo-skeletal system), and R (respiratory system) group drugs. In terms of specialization, the group that wrote the most prescriptions was family physicians, followed by emergency physicians, and internal medicine specialists. Examining prescription software trends is important when creating healthcare policies. Developing strategies to reduce prescription costs will contribute to the efficient use of resources and improving the quality and sustainability of health services delivery.

Keywords: Nationwide, Prescription, ATC, Specialty.

Özet

Farmakoepidemiolojik çalışmalar sağlık sistemlerinin gelişimi açısından önemlidir. Bu çalışmanın amacı ulusal veriler ışığında, yazılan reçetelerin dönemsel ve uzmanlık alanlarına göre değişimlerini incelemektir. Bu amaçla, 01.01.2016 - 31.12.2022 tarihleri arasındaki ilaç ve reçete bilgileri elektronik verilerden geriye dönük olarak analiz edildi. Cinsiyet ve yaş dağılımının yanı sıra reçetenin yazıldığı uzmanlık alanı ve hastane düzeyi de zamansal açıdan incelendi. Reçete edilen ilaçlar, Dünya Sağlık Örgütü'nün daha önce oluşturduğu Anatomik Terapötik Kimyasal (ATC) kodlarına göre sınıflandırıldı. Çalışma döneminde 1.452.128.177 adet reçete yazıldığı belirlendi. Yazılan reçeteler ATC kodlu toplam 4.602.556.489 ilacı içermektedir. En çok yazılan ATC kod grubu A (sindirim sistemi ve metabolizma) olurken, bunu M (kas-iskelet sistemi) ve R (solunum sistemi) grubu ilaçlar izledi. Uzmanlık alanı açısından en fazla reçete yazan grup aile

hekimleri olurken, onu acil servis hekimleri ve dahiliye uzmanları izledi. Reçete yazılımlarındaki trendleri incelemek, sağlık politikaları oluştururken önemlidir. Reçete maliyetlerini azaltacak stratejilerin geliştirilmesi, kaynakların verimli kullanımı ve sağlık hizmetleri sunumunda kalitenin artırılmasına ve sürdürülebilirliğe katkı sunacaktır.

Anahtar Kelimeler: Yurt geneli, Reçete, ATC, Uzmanlık.

Introduction

Pharmacoepidemiology studies can make a significant contribution to the development of the health system. In pharmacoepidemiology studies, information on drug use and which drug groups are preferred is obtained from national databases. A comprehensive analysis of drug use can help governments, healthcare providers, and other stakeholders make informed decisions on how to allocate health resources most effectively [1]. This can not only provide economic benefits but also help patients receive better treatment, achieve better outcomes, and improve the overall health of the community.

In the literature, thanks to drug databases that cover entire countries, especially in Scandinavian countries, patterns and amounts of drug use have been examined as real-life data [2,3]. These databases are quite valuable in showing doctors' and patients' trends regarding drug use in clinical practice.

E-prescribing describes a process where a traditional paper prescription is replaced by a system that allows the physician to create a prescription and then transmit it electronically to a pharmacy. Moreover, it includes the administration and monitoring of drug use. Many countries have started using this system, which facilitates the monitoring and regulation of the health system [4–8]. Since 2014, the Republic of Türkiye has started to store patient and drug

records electronically through the E-NABIZ system [9]. Thanks to this the access to the demographic data of patients and drug-related data is available nationwide. Prescription numbers, the number of drugs they contain, and the distribution of the World Health Organization's (WHO) Anatomical Therapeutic Chemical (ATC) codes to which each drug belongs are also recorded in the system [10]. The distribution of these by years and by the branches they were written in is significant in forming health policies since they reflect the tendencies of patients and doctors.

The aim of this study is to examine the distribution and number of prescriptions written nationwide, to reveal how it changes according to years, seasons, and specialties, and to help formulate policies that will enable more efficient drug use.

Material and Method

Between 01.01.2016 and 31.12.2022, e-health data, which includes all drug and prescription records nationwide (*Türkiye*), was retrospectively examined.

The amount of medication prescribed by age and gender was examined. Drugs written according to the 14 ATC classes (*Table 1*) previously established by the WHO were grouped, and their distribution according to specialties, years, and seasons was examined.

Table 1. World Health Organization- Anatomical Therapeutic Chemical (ATC) classification groups [10].

Group	Explanation	Group	Explanation
A	Alimentary tract and metabolism	L	Antineoplastic and immunomodulating agents
B	Blood and blood forming organs	M	Musculo-skeletal system
C	Cardiovascular system	N	Nervous system
D	Dermatologicals	P	Antiparasitic products, insecticides and repellents
G	Genito urinary system and sex hormones	R	Respiratory system
H	Systemic hormonal preparations, excluding sex hormones and insulins	S	Sensory organs
J	Antiinfective for systemic use	V	Various

This study was conducted according to the Declaration of Helsinki and received approval from the Turkish Ministry of Health with a waiver of informed consent for retrospective data analysis (95741342-020/27112019).

Results

During the study period, a total of 1,452,128,177 prescriptions were written. Within these prescriptions, there were 4,602,556,489

drugs with ATC codes. The most frequently prescribed drug type was drugs related to the digestive system and metabolism, indicated with the letter A, with 799,545,194 units (17.4%), followed by drugs related to the musculoskeletal system, M, with 715,579,077 units (15.5%) and drugs related to the respiratory system, R, with 644,265,655 units (14%). The distribution of all prescribed drugs (according to WHO ATC/DDD Index 2023 [10]) and is shown in Figure 1.

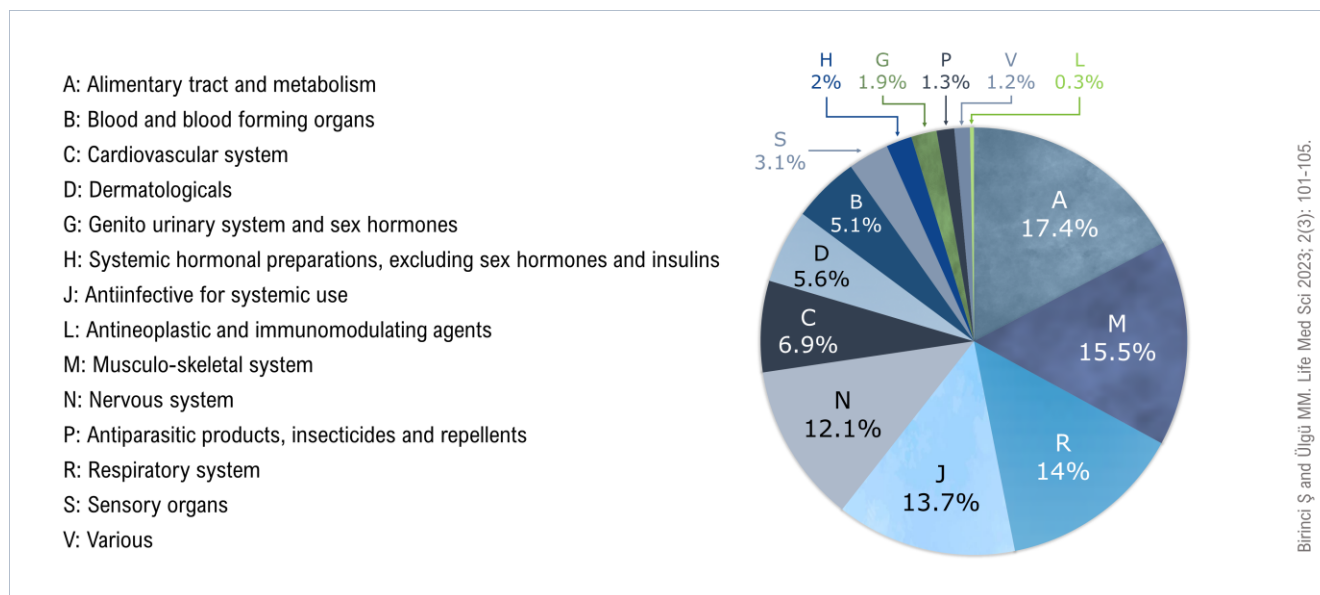


Figure 1. Distribution of prescribed drugs between 01.01.2016 and 31.12.2022 in Türkiye. A-V codes indicate World Health Organization - Anatomical Therapeutic Chemical (ATC) Classification codes.

When looking at the distribution of drugs over the years, drugs in the A (alimentary tract and metabolism) and M (musculo-skeletal system) groups consistently ranked the highest, while drugs in the J (anti-infectives for systemic use) and R groups alternated between third and fourth places. Seasonally, while drugs in the A group remained the most common, drugs in the M group were most commonly prescribed in all seasons except winter. In winter, R group drugs, which were the second most prescribed, dropped to fifth place in the summer .

The distribution of prescribed drugs also varied by department. In emergency services, the most prescribed drugs were in the J group (22.8%), followed by R (17.9%) and M (17.9%). In pediatrics, the top three were R (24.7%), J (24.5%), and A (13.46%). In general surgery and internal medicine, the most commonly prescribed

drugs were from group A, with rates of 27.3% and 31.3%, respectively. In general surgery, J (16.7%) and M (16.7%) followed, while in internal medicine, C (drugs related to the cardiovascular system) (12.6%) and J (10.2%) followed. In gynecology, the top three prescribed drug groups were G (drugs related to the genito urinary system and sex hormones) (24.9%), J (17.4%), and B (drugs related to blood and blood-forming organs) (16.8%).

Examining healthcare levels, in both primary and tertiary care hospitals revealed that; drugs from the A group were the most commonly prescribed, whereas in secondary care hospitals, drugs from the J group were the most commonly prescribed. In primary care, R and M group drugs were the other most commonly prescribed, in secondary care, A and M groups, and in tertiary care, J and M groups.

Looking at the number of drugs prescribed per prescription by gender and age, the average number of drugs decreased as age increased. Up to the age of 44, more drugs were prescribed to men than women. This number started favoring women after the age of 44. Between 01.01.2017 and 31.12.2020, looking at the number of drugs

prescribed by specialty, family medicine led with a clear margin, with 1,726,461,985 (37.5%) prescriptions. This was followed by emergency medicine (387,716,903; 8.4%) and internal medicine (267,501,763; 5.8%). The data for the top 10 specialties with the most prescriptions are shown in [Figure 2](#).

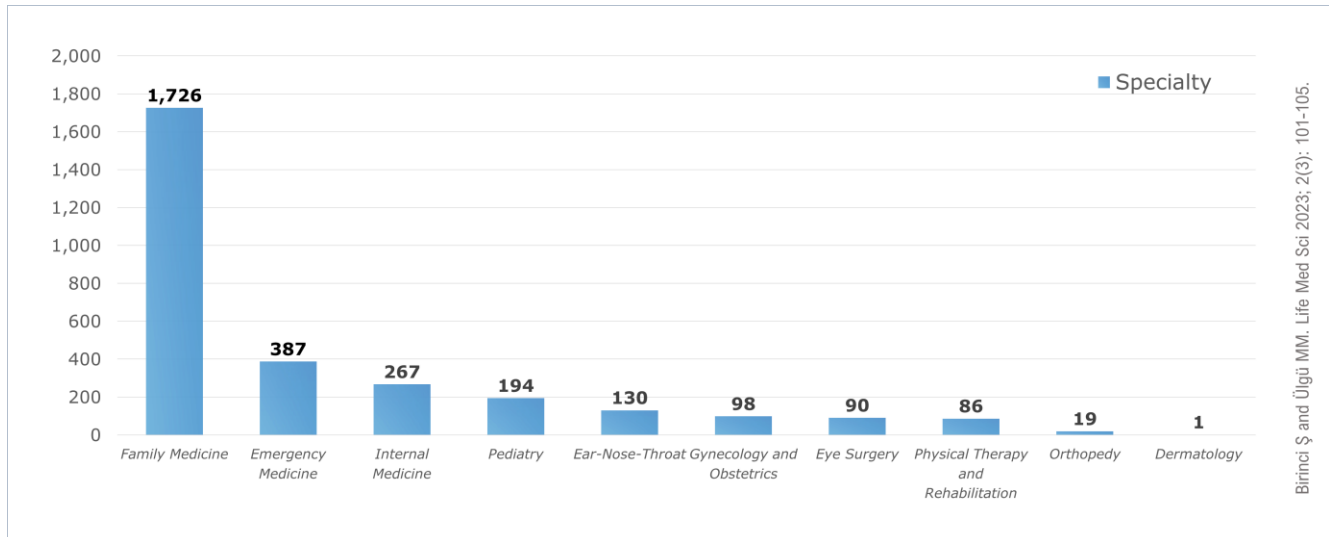


Figure 2: Total number of prescription number according to specialties (x1.000.000).

Discussion

During the period the study was conducted, a total of 4,602,556,489 medications were prescribed, with drugs related to the digestive, musculoskeletal, and respiratory systems being the most commonly prescribed groups. Although rankings varied seasonally and by specialty, physicians' prescription preferences mainly focused on these groups. From a specialty perspective, it has been revealed that family medicine carries a significant portion of the prescription burden compared to other specialties.

Family physicians play a crucial role in managing health services [11]. It's not surprising that family doctors bear a significant prescription burden, as they are the first point of contact for patients with non-urgent health concerns. Consistent with previous studies, family physicians emerge as the specialty that prescribes the most medications [12]. Moreover, a significant reason patients visit family physicians is to get their desired medication prescribed [13]. It's essential for family doctors to be vigilant about smart medication use, as this will have a

significant impact on prescription costs [14]. On the other hand, patients also need to be informed and conscious about medication use.

Seasonal factors do influence the prevalence of diseases. The incidence of infections, particularly upper respiratory tract infections, and related disorders increase during certain seasons [15]. As a result, prescription preferences also change. Implementing preventive measures like vaccinations can reduce the incidence of these diseases and thus lower the prescription burden [16].

Additionally, this study highlights seasonal effects on medication usage. This can be beneficial in fields such as epidemic disease management, vaccination program planning, and the effective distribution of health resources.

Furthermore, patient awareness and education are of critical importance to support rational drug use and prevent incorrect and unnecessary medication use.

Examining medication use by gender, age, and specialty provides an opportunity for personalized prescription policies. Such an

approach can be more effective in achieving targeted health outcomes. The increase in medication usage among the elderly population can raise issues like polypharmacy (one patient using many different medications) [14]. These can lead to increased side effects, drug interactions, and a general negative impact on a patient's health. Addressing and managing these issues should be a focal point for health policies.

This study has some limitations. Although covering a 6-year period is substantial, it is limited in terms of showcasing time-dependent changes in prescription habits. It would be beneficial to examine temporal and seasonal effects specific to each specialty to develop more effective health policies. The ability to examine all prescription system records and its significance concerning the total sample size means this study provides

valuable information. It's evident that this study will guide subsequent research.

Conclusion

In conclusion, this study underscores the need for continuous monitoring and evaluation of medication prescription habits. This can aid in providing appropriate and effective health care. Health policymakers and clinical practitioners need to develop effective strategies through the continuous monitoring and evaluation of healthcare and medication usage. This approach aims to enhance the quality and safety of patient care, manage health system costs, and achieve national health objectives, and plan and evaluate health policies. It's a crucial step towards both improving individual health and supporting the overall health of the community.

Conflict of interest: The authors declare that there is no conflict of interest. The authors alone are responsible for the content and writing of the paper. **Financial disclosure:** There is no financial support for this study.

References

1. European Medicines Agency (EMA), Amsterdam, Netherlands. E The European Network of Centres for Pharmacoepidemiology and Pharmacovigilance (ENCePP). Guide on Methodological Standards in Pharmacoepidemiology (Revision 8). EMA/95098/2010 Available at: https://www.encepp.eu/standards_and_guidances/documents/GuideMethodRev8.pdf [Accessed May 29, 2023].
2. Laugesen K, Ludvigsson JF, Schmidt M, Gissler M, Valdimarsdottir UA, Lunde A, et al. Nordic Health Registry-Based Research: A Review of Health Care Systems and Key Registries. *Clin Epidemiol* 2021; 13: 533-54. [Crossref] [PubMed]
3. Pacurariu A, Plueschke K, McGettigan P, Morales DR, Slattery J, Vogl D, et al. Electronic healthcare databases in Europe: descriptive analysis of characteristics and potential for use in medicines regulation. *BMJ Open* 2018; 8(9): e023090. Erratum in: *BMJ Open* 2019; 8(11): e023090corr1. [Crossref] [PubMed]
4. Webster P. Infoway calls for e-prescribing proposals. *CMAJ* 2016; 188(12): E273-E274. [Crossref] [PubMed]
5. Anderson JG. Social, ethical and legal barriers to e-health. *Int J Med Inform* 2007; 76(5-6): 480-3. [PubMed]
6. Gabriel M, Swain M. E-prescribing Trends in the United States. The Office of the National Coordinator for Health Information Technology, ONC Data Brief; No.18. 2014, Washington, DC.
7. Deetjen U. European e-prescriptions: benefits and success factors. Working Paper Series, No.5. 2016, University of Oxford.
8. Hellström L, Waern K, Montelius E, Astrand B, Rydberg T, Petersson G. Physicians' attitudes towards ePrescribing-evaluation of a Swedish full-scale implementation. *BMC Med Inform Decis Mak* 2009; 9: 37. [Crossref] [PubMed]
9. Birinci Ş. A Digital Opportunity for Patients to Manage Their Health: Turkey National Personal Health Record System (The e-Nabız). *Balkan Med J* 2023; 40(3): 215-21. [Crossref] [PubMed]
10. World Health Organization (WHO), Geneva, Switzerland. WHO Collaborating Centre for Drug Statistics Methodology, ATC/DDD Index 2023. Available at: https://www.whocc.no/atc_ddd_index/ [Accessed May 18, 2023]
11. Peterson ML. The Institute of Medicine report, "A Manpower Policy for Primary Health Care": a commentary from the American College of Physicians. *Ann Intern Med* 1980; 92(6): 843-51. [Crossref] [PubMed]
12. Ohta R, Sano C. Implementation of the Principles of Family Medicine in Modern Family Medicine Education Needing System-Specific Approaches. *Cureus* 2022; 14(11): e31177. [Crossref] [PubMed]
13. İlhan SÖ, Yıldız M, Tüzün H, Dikmen AU. Evaluation of irrational drug use of individuals over the age of 18 who applied to a university hospital. *Turk J Med Sci* 2022; 52(2): 484-93. [Crossref] [PubMed]
14. Akyon ŞH, Yılmaz TE, Akyon FÇ. Family Medicine Residents' Awareness of Rational Drug Use in Geriatric Patients and Their Need for a Web Application. *Life Med Sci* 2023; 2(2): 61-9. [Crossref]
15. Fares A. Factors influencing the seasonal patterns of infectious diseases. *Int J Prev Med* 2013; 4(2): 128-32. [PubMed]
16. Gallagher T, Lipsitch M. Postexposure Effects of Vaccines on Infectious Diseases. *Epidemiol Rev* 2019; 41(1): 13-27. [Crossref] [PubMed]