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Prescribing Practices of Physicians at Different Health Care Institutions

Farklı Sağlık Kuruluşlarında Çalışan Hekimlerin Reçete Yazma Alışkanlıklarının Değerlendirilmesi

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Abstract

Objective: Irrational pharmacotherapy is a widespread health care problem, and knowing the prescription practices of physicians at an institutional level can present solutions. This study aimed to investigate whether physicians' prescribing patterns showed differences at the level of the health care institution.

Materials and Methods: Photocopies of 3201 prescriptions written at primary health care centers (PHCs), public hospitals, private hospitals, and university hospitals (UHs) were collected from 10 provinces in Turkey. The prescriptions were evaluated according to prescribing indicators, and the details of drug utilization were compared for different health care institutions.

Results: The average number of medicines per prescription was 2.83, and the highest average was noted in PHCs (2.96). The average cost per prescription was US $51.57, and the highest average cost was found in UHs (US $166.10). The most frequently prescribed drug group was different among health care institutions. With the exception of UHs, the "cold-cough medicines" were the most frequently prescribed medicines at all of the institutions. Thirty-nine percent of the prescriptions included antibiotics.

Conclusion: Despite the similarities between the distributions of diagnoses on prescriptions by health care institutions, the contents of the prescriptions showed differences. The high levels of prescriptions for "cold-cough medicines," whose use is widely debated, and the widespread tendency of physicians to prescribe antibiotics suggest that there is a growing need for disseminating the principles of rational pharmacotherapy. Furthermore, institutional differences must be considered when conducting rational pharmacotherapy programs.

Key Words: Health care, institutions, medicine, physicians, rational prescribing

Özet

Amaç: İrrasyonel farmakoterapi dünya genelinde yaygın olarak görülen bir sağlık problemidir ve kurumsal düzeyde hekimlerin reçeteleme alışkanlıklarının bilinmesi bu sorunun giderilmesine katkı sunabilir. Bu araştırmada, çeşitli sağlık merkezlerinde yazılmış reçetelerin içeriklerinin incelenmesi amaçlandı.

Gereç ve Yöntem: Birinci basamak (BB), devlet hastaneleri (DH), özel hastaneler (ÖH) ve üniversite hastanelerinde (ÜH) çalışan hekimlerin yazmış olduğu 3201 reçete fotokopi edilerek toplandı. Reçeteler çeşitli ilaç kullanımı göstergelerine göre değerlendirildi ve ilaç kullanımının ayrıntıları bu reçetelerin yazıldığı sağlık kurumlarına göre karşılaştırıldı.

Bulgular: Reçete başına düşen ortalama ilaç sayısının 2.83 olduğu ve bu değerin en yüksek BB'lerde (2.96) olduğu saptandı. Reçete başına düşen tedavi maliyetinin 51.57$ olduğu ve bu değerin en yüksek ÜH'lerde (166.10$) olduğu saptandı. Reçetelere en sık yazılan ilaç grubunun kurumlar arasında farklılık gösterdiği saptandı. ÜH'ler hariç diğer tüm kurumlarda en sık reçete edilen ilacın "öksürük-soğuk algınlığı ilacı" olduğu saptandı. Reçetelerin %39'unun antibiyotik içerdiği saptandı.

Sonuç: Bu araştırmada her ne kadar reçetelerde yazılı tanıların kurumlara göre dağılımında benzerlikler bulunsa da reçete içerikleri değişkenlik göstermekteydi. Tedavide yer verilmesi tartışma konusu olabilen "öksürük ve soğuk algınlığı ilaçları"nın yüksek oranda reçetelenmesi, hekimlerin antibiyotik yazma eğiliminin yüksek olması gibi tespitler, rasyonel farmakoterapi ilkelerinin yaygınlaştırılmasına duyulan ihtiyaca işaret etmektedir. Rasyonel farmakoterapi konusunda yürütülecek programlarda araştırmada saptanan kurumsal farklılıklar mutlaka göz önünde bulundurulmalıdır.

Anahtar Kelimeler: Akılcı reçeteleme, hekimler, ilaç, kurumlar, sağlık hizmeti

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Introduction

The irrational use of medicines is a global health care problem and includes the overuse, underuse or misuse of medicines, the unnecessary prescribing of antibiotics, and injections or expensive medicines [1]. Rational use of medicines (RUM) has now become one of the main goals of health systems at every stage of the medical treatment process, but it has not yet been successfully implemented worldwide [1-3].

The irrational use of medicines is one of the most important problems in Turkey and many other countries [3-10]. With the "Health Transformation Program" implemented in 2003, the Turkish Ministry of Health (MoH) has identified strategies towards the elimination of such irrational use. Conducting field studies and obtaining scientific evidence are among these strategies [10]. A careful review of the prescriptions from different health care settings according to indicators for rational use can help to disseminate RUM [1, 2, 11]. This study aimed to analyze prescriptions given at different health care institutions in various provinces in Turkey and to compare the performances of physicians by their institutions according to the principles of rational use.

Materials and Methods

This study was conducted under the direction of the Turkish School of Public Health, operating within the Turkish MoH on health research projects with permission given by the Turkish MoH Authority. Physicians' performances were analyzed from various perspectives within the framework of comprehensive research by the Turkish School of Public Health. This article analyzes the details of prescriptions collected from the health care centers within the scope of this research. There are 81 provinces in Turkey, and the population of Turkey was 72,561,312 at of the end of 2009. The data for the present cross-sectional study were obtained from 10 provinces (Eskişehir, Denizli, Niğde, Nevşehir, Bartın, Karabük, Gümüşhane, Bayburt, Çankırı and Kırşehir) consisting of a population of 3,326,555 (4.6% of the population of Turkey) [12]. The studied provinces were selected on a stratified basis and to prevent any biases from distorting the findings, it was determined that no pilot studies had previously been carried out in these provinces. A total of 3,201 prescriptions written by physicians employed at the primary health care centers (PHCs), public hospitals (PbHs), private hospitals (PrHs), and university hospitals (UHs) in those 10 provinces were collected on a random basis from November to December 2009. Photocopies of the prescriptions were obtained from the pharmacies. The data collection was performed by health care personnel in the relevant city and a person from the research team. To maintain standardization and prevent any possible biases, these people were trained prior to the data collection process. The data collection personnel were also held to strict rules of confidentiality in terms of patient-identifying information. During the research planning process, the goal was to obtain nearly 100 prescriptions from every health care facility. Although there were PHCs and PbHs in every city where the research was conducted, PrHs could be found in only 8 provinces (Eskişehir, Denizli, Niğde, Nevşehir, Bartın, Karabük, Çankırı and Kırşehir), and UHs could be found in only two cities (Denizli and Eskişehir). Thus, 210 (6.6%) of 3,201 prescriptions were obtained from UHs, 1,055 (33.0%) from PbHs, 1,040 (32.5%) from PHCs, and 896 (28.0%) from PrHs. In this study, pharmacies that were located close to the health care centers in those cities were included. If there was more than one pharmacy near the health care center, the selection was made randomly.

Whereas these prescriptions, which were provided by 951 different physicians, were collected retrospectively, prescriptions given by different physicians were specifically obtained to be able to objectively evaluate the physicians' performance (the number of prescriptions per physician=3.35).

The data from 3,201 prescriptions were entered into a special database created using Excel and SPSS. These prescriptions were analyzed using parameters such as the average number of medicines per prescription (NMPP), the average cost per prescription (CPP), the most prescribed medicine groups, the most prescribed medicines, and the percentages of prescriptions including antibiotics, analgesics, injectable preparations, etc. Analysis of variance (ANOVA), Kruskal Wallis, and Student t tests were used for the statistical analysis. The comparisons were considered statistically significant if $p<0.05$.

The ATC (Anatomic Therapeutic Chemical) classification was used for grouping the medicines. The diagnoses written on prescriptions were analyzed using the International Classification of Diseases (ICD)-10. While calculating the medicine prices, their values as determined by the Health Authority on the data compilation date were considered. In this article, the medicine prices are indicated by their values in American Dollars ($) at the time of the study.

Results

Among the 3,201 prescriptions, with the exception of two prescribed in PHCs, 99.9% included information on the patient's gender. The majority of the patients (59.6%) were females. Patient ages were provided on 38.6% (n=1,237) of the prescriptions, and the mean age of these patients was 43.16±22.80 years.

Most of the prescriptions were written by general practitioners (31.2%), and specialists in internal medicine provided 9.9%, pediatricians provided 7.3%, otolaryngologists provided 6.8%, and gynecologists and obstetricians provided 5.5% (Figure 1).

Fifty two percent (n=1,664) of the 3,201 prescriptions were for a single diagnosis, and two or more diagnoses were writ-

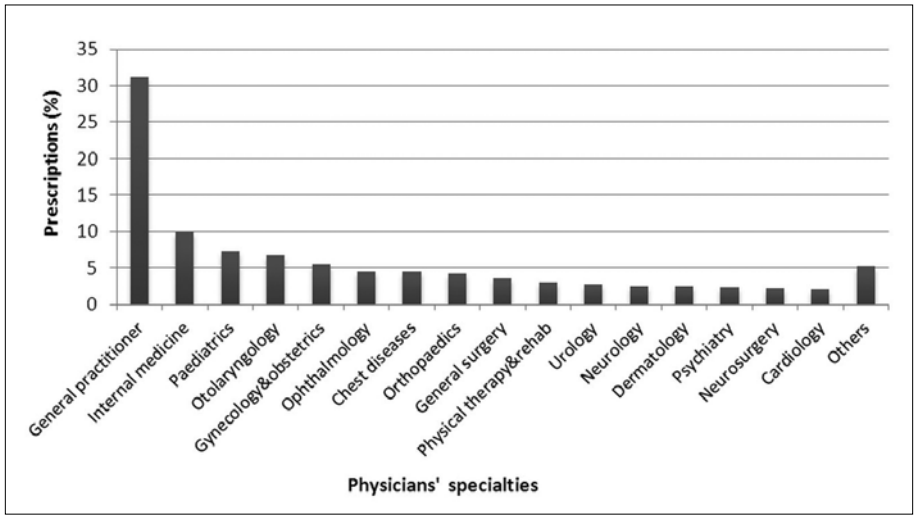

Figure 1. *Distribution of the prescriptions by physicians' specialties.*

ten on the rest of the prescriptions. Tonsillopharyngitis was the most common diagnosis (n=456; 14.2%), followed by dyspepsia (n=274; 8.6%), hypertension (n=198; 6.2%), bronchitis (n=198; 6.2%), and sinusitis (n=164; 5.1%). Tonsillopharyngitis was found to be the most common diagnosis in all health care institutions.

"Respiratory system medicines" (19.6%) represented the most prescribed group of medicines for all institutions combined. When distributed by the institution, "respiratory system medicines" accounted for 24% of the prescriptions written in PHCs; "musculo-skeletal system medicines" accounted for 20.1% and 17.4% in PbHs and PrHs, respectively; and "alimentary tract & metabolism medicines" accounted for 15.5% in UHs (Table 1).

"Other cough and cold medicines" with the ATC code "R05X" were the most prescribed medicines (6.1%) in all of the institutions together. In terms of distribution by institutions, "cold and cough medicines" were the most commonly prescribed for all institutions, with the exception of UHs, which prescribed "amoxicillin+clavulanic acid" most frequently (Table 2).

There were 9,057 medicines (with 623 different generic names) listed on the prescriptions. The average NMPP was 2.83±1.10, with the highest occurring in PHCs (2.96±1.08) and the lowest in PbHs (2.75±1.10). When evaluating the NMPP by health care institution, there was a statistically significant difference toward a higher NMPP in PHCs than in PbHs or PrHs ($p<0.001$, Table 3).

The average CPP was $51.57±294.69, and it was highest in UHs ($166.10±651.13) and lowest in PrHs ($33.11±50.77). When evaluating the CPP by health care institution, there were statistically significant differences ($p<0.001$) between all institutions, with the exception of the difference between PHCs and PrHs. The difference was more evident for the UHs than the others (Table 3).

Of the 3,201 prescriptions, 42.9% included analgesics, 39.1% included antibiotics, and 10% included injectable preparations. The highest number of prescriptions that included antibiotics was prescribed at PrHs (42.6%); the lowest number of prescriptions that included antibiotics was prescribed at PbHs and UHs, at which these accounted for 35.2% of all prescriptions at each type of instituition. The highest number of prescriptions that included analgesics was prescribed at PHCs (48.2%), and the lowest number of prescriptions that included analgesics was prescribed at PbHs (39.7%). The highest number of prescriptions that included injectable preparations was prescribed at UHs (16.7%), and the lowest number of injectable preparations was prescribed at PHCs (4.4%) (Table 4).

Discussion

An analysis of the contents of the prescriptions written by physicians can contribute significantly to RUM by identifying potential problems and providing information on what measures may be necessary. In this study, there were an average of nearly three medicines listed per prescription. The most common group of medicines prescribed differed by health care institution, and "cold and cough" medicines were the most highly prescribed.

The NMPP is a prescribing indicators that is relevant to RUM. A high NMPP can indicate practices of irrational use [2]. In this study, the NMPP was 2.83, and there was a statistically significant difference among the NMPP values for different health care institutions (PHCs=2.96; PrHs=2.79; UHs=2.77 and PbHs=2.75) (Table 3). The NMPP value at PHCs was similar to that reported in a previous study conducted in Turkey [7] and another study conducted in primary health care centers in Uzbekistan [13]. The NMPP values were from 2-2.5 medicines

Table 1. ATC classification of the prescribed medicines by health care center

ATC Classification	PHCs n (%)	PbHs n (%)	PrHs n (%)	UHs n (%)	Total n (%)
Alimentary tract & metabolism (A)	519 (16.9)	394 (13.6)	397 (15.9)	90 (15.5)	1,400 (15.5)
Blood & blood-forming organs (B)	67 (2.2)	75 (2.6)	104 (4.2)	27 (4.6)	273 (3.0)
Cardiovascular system (C)	260 (8.5)	160 (5.5)	117 (4.7)	58 (10.0)	595 (6.6)
Dermatologicals (D)	127 (4.1)	138 (4.8)	78 (3.1)	23 (4.0)	366 (4.0)
Genitourinary system & sex hormones (G)	26 (0.8)	77 (2.7)	61 (2.4)	6 (1.0)	170 (1.9)
Systemic hormonal prep, excluding sex hormones (H)	28 (0.9)	29 (1.0)	34 (1.4)	14 (2.4)	105 (1.2)
General anti-infectives for systemic use (J)	432 (14.1)	374 (12.9)	404 (16.1)	79 (13.6)	1,289 (14.2)
Antineoplastic & immunomodulating agents (L)	1 (0.0)	5 (0.2)	6 (0.2)	22 (3.8)	34 (0.4)
Musculo-skeletal system (M)	520 (16.9)	581 (20.1)	436 (17.4)	87 (14.9)	1,624 (17.9)
Nervous system (N)	314 (10.2)	360 (12.4)	200 (8.0)	57 (9.8)	931 (10.3)
Antiparasitic products (P)	13 (0.4)	21 (0.7)	14 (0.6)	6 (1.0)	54 (0.6)
Respiratory system (R)	737 (24.0)	534 (18.4)	429 (17.1)	71 (12.2)	1,771 (19.6)
Sensory organs (S)	25 (0.8)	133 (4.6)	210 (8.4)	27 (4.6)	395 (4.4)
Various (V)	5 (0.2)	16 (0.6)	14 (0.6)	15 (2.6)	50 (0.6)
Total	3,074 (100.0)	2,897 (100.0)	2,504 (100.0)	582 (100.0)	9,057(100.0)

PHCs: primary health care centers; PbHs: public hospitals; PrHs: private hospitals; UHs: university hospitals

Table 2. Distribution of the ten most commonly prescribed medicines in each health care center

Medicine (ATC Code) Total number of medicines prescribed	PHCs 3,074 n (%)	PbHs 2,897 n (%)	PrHs 2,504 n (%)	UHs 582 n (%)	Total 9,057 n (%)
Other cold combination preparations (R05X)	309 (10.1)	98 (3.4)	121 (4.8)	20 (3.4)	548 (6.1)
Diclofenac (M01AB05)	115 (3.7)	75 (2.6)	49 (2.0)	- (-)	239 (2.6)
Amoxicillin and clavulanic acid (J01CR02)	115 (3.7)	69 (2.4)	46 (1.8)	24 (4.1)	254 (2.8)
Acetylcysteine (R05CB01)	101 (3.3)	94 (3.2)	66 (2.6)	9 (1.5)	270 (3.0)
Lansoprazole (A02BC03)	77 (2.5)	42 (1.4)	- (-)	- (-)	119 (1.3)
Benzydamine (A01AD02)	55 (1.8)	43 (1.5)	- (-)	10 (1.7)	108 (1.2)
Paracetamol (N02BE01)	75 (2.4)	75 (2.6)	68 (2.7)	22 (3.8)	240 (2.6)
Flurbiprofen (M01AE09)	45 (1.5)	- (-)	- (-)	10 (1.7)	- (-)
Paracetamol combinations, excl. psycholeptics (N02BE51)	52 (1.7)	- (-)	38 (1.5)	- (-)	90 (1.0)
Cefuroxime (J01DC02)	37 (1.2)	45 (1.6)	38 (1.5)	- (-)	120 (1.3)
Thiocolchicoside (M03BX05)	- (-)	62 (2.1)	45 (1.8)	- (-)	117 (1.3)
Etodolac (M01AB08)	- (-)	43 (1.5)	- (-)	9 (1.5)	- (-)
Butamirate (R05DB13)	- (-)	- (-)	- (-)	- (-)	- (-)
Ibuprofen (M01AE01)	- (-)	- (-)	43 (1.7)	- (-)	- (-)
Dexketoprofen (M01AE17)	- (-)	- (-)	52 (2.1)	11 (1.9)	- (-)
Pantoprazole (A02BC02)	- (-)	- (-)	- (-)	13 (2.2)	- (-)
Metformin (A10BA02)	- (-)	- (-)	- (-)	9 (1.5)	- (-)

PHCs: primary health care centers; PbHs: public hospitals; PrHs: private hospitals; UHs: university hospitals

Table 3. The average number of medicines per prescription (NMPP) and average cost per prescription (CPP) by health care center

Health care Centers (n=Total number of medicines prescribed)	NMPP±SD	CPP±SD ($) (Median CPP)	Total number of prescriptions
PHCs (n=3,074)	2.96±1.08*	38.54±75.84 (23.11)	1,040
PbHs (n=2,897)	2.75±1.10	57.30±410.64 (21.83)	1,055
PrHs (n=2,504)	2.79±1.08	33.11±50.77 (20.46)	896
UHs (n=582)	2.77±1.23	166.10±651.13 (27.89)	210
Total (n=9,057)	2.83±1.10	51.57±294.69 (22.43)	3,201
Statistics	p<0.001	p<0.001#	

PHCs: primary health care centers; PbHs: public hospitals; PrHs: private hospitals; UHs: university hospitals; *: PHCs vs. PbHs and PrHs, #: comparison among all groups except for PHCs and PrHs

in studies from other countries, which are lower than the value obtained from the PHCs in this study [14-18]. The difference between Turkey and other countries suggests that physicians employed at PHCs in Turkey are more inclined to engage in polypharmacy. In contrast, the rational use of "cold and cough medicines," which were found to be the most frequently prescribed medicines in this study, is debatable [19, 20]. In the present study, these medicines were mostly prescribed in PHCs. Excessive use of these medicines could be one of the factors contributing to the high value of NMPP found in PHCs.

There were 9,057 medicines prescribed under 623 generic names. This diversity is because the medicines were prescribed by physicians with different specializations (Figure 1). When considering that approximately one third of the prescriptions (31.2%) analyzed in this study were written at PHCs, it can be concluded that according to the RUM principles, the physicians may need to be award of too many generic products. This may compound the problem of irrational use because it is impossible to know the exact information for all the medicines in practice, thus highlighting the importance of creating lists of essential medicines that will allow physicians to have more detailed knowledge for fewer medicines and deliver better health care services [1-4].

Although there was a statistically significant difference between the PHCs and the other health care institutions in terms of NMPP values, there were also similarities between hospitals in this regard (Table 3). In contrast, in a study conducted in India, differences between public and private health care institutions in terms of the NMPP (2.4 and 2.9 medicines, respectively) were observed [21].

Accordingly, it can be concluded that physicians employed at public health care institutions in Turkey prescribe more medicines compared to those in India, while the opposite is the case for private health care institutions.

In addition to the contents of the prescriptions, another important parameter that is used in measuring physicians' performances in terms of RUM is the cost of the medicines that are prescribed [1, 2, 11]. The average CPP was determined to be $51.57, with the highest occurring in UHs ($166.10, p<0.001; Table 3). In a study conducted on primary health care in Turkey, the CPP value changed during the monitoring process but was found to be between $27 and 32 [9]. Accordingly, the cost of prescribed medicine has increased over the years. It may not be possible to objectively compare the CPP values of different countries because of the differences in purchasing power; however, the CPP values of countries can provide insight with respect to pharmacoeconomic evaluations [2, 22]. Indeed, the CPP value found in UHs in the current study is 9 times higher than the value found in a study on tertiary care in China ($18.24) [23]. When the growth of health care expenditures (including the increasing rate of medicine expenditures) in Turkey in recent years are considered, this finding becomes more important [10, 22].

While most of the diagnoses in prescriptions were for respiratory tract infections, it is worth noting that the order of the medicine groups analyzed in this study did not match that of the diagnoses. This was because some of the prescriptions included more than one diagnosis. Therefore, when analyzing the medicine groups in the prescriptions, we tried to evaluate the use of the medicines that were prescribed instead of analyzing them with regard to the diagnoses. The most prescribed group of medicines was different among the health care institutions (Table 1). In addition to the differences between the health care institutions, the most prescribed medicine groups also appear to differ from one country to another. In this study, "respiratory system medicines" were the most prescribed group in PHCs, studies performed in Norway and Holland reported that they ranked third among the most prescribed medicine groups [24, 25]. Although the size of populations differed, a study conducted in New Zealand found that the most prescribed medicine group for people between the ages of 13 and 19 were "respiratory system medicines" (27.8%), which was similar to the current finding [26].

The ten most prescribed medicines at the different health care institutions were agreed with the findings in the main ATC groups. The high rate of prescription of medicines with the ATC code R05X, which are used for the symptomatic treatment of colds, is also a notable finding (Table 2). Future risk-benefit analyses concerning "cold and cough medicines", whose safety is sometimes debated, should benefit from these data that show the frequent use of these medicines in Turkey.

The degree to which prescriptions include antibiotics and injectable preparations is considered a prescribing indicator with respect to RUM [1, 2, 11]. Of all the prescriptions, 39.1% included antibiotics, and this was much higher than the values found in previous studies (Table 4). Prescriptions in Turkey contained antibiotics nearly twice as often as prescriptions in Brazil or India (21.3% and 26%, respectively) [27, 21]. Antibiotic prescriptions were found to be the highest in PrHs (42.6%), followed by PHCs (40.7%), PbHs (35.2%), and UHs (35.2%) (Table 4). In a study of primary health care in Turkey, 25.9% of all patients were prescribed antibiotics [6]. In another study conducted on primary health care in Turkey, nearly half of the physicians (48.4%) stated that they had written antibiotics on one of every three prescriptions (30%) [28]. All these findings indicate an overuse of antibiotics in Turkey. In contrast, the high numbers of antibiotic prescriptions could be because the data for this study were collected in winter, as no attempt was made to remove the confounding factor of seasonal variations (e.g., collecting data throughout the year). Another limitation of this study was the fact that no steps were taken to prove the reliability of the diagnoses on the prescriptions. Given that antibiotics are prescribed irrationally for the treatment of viral infections [29], it may not be possible to verify whether such irrational use practices occurred.

This study also has other limitations. The ten provinces that were studied were not selected randomly based on the reasons were stated in the Method. Therefore, this study should be considered a warning concerning RUM in Turkey could aid in the design of larger field studies that represent the entire population.

Ten percent of the prescriptions included injectable preparations (Table 4). The percentage of the prescriptions including injectable preparations may differ by indication and country. For instance, according to some studies, this value was 22.9% in Western China, 18.1% in Egypt, 8.3% in Brazil and 5.3% in India [18, 21, 27, 30]. When the literature data are compared, there is a smaller tendency in Turkey towards prescribing injectable preparations compared to Western China and Egypt, and there is a larger tendency compared to Brazil and India. The percentage of prescriptions containing injectable preparations was the lowest in PHCs (4.4%) and highest in UHs and PrHs (16.7% and 14.6%, respectively), (Table 4). Similarly, a study conducted in Egypt found that injectable preparations were prescribed least in primary health care institutions compared to hospitals [30]. In a study conducted at primary health care institutions in Uzbekistan, it was found that 57% of the patients were prescribed injectable preparations, and another study of tertiary health care in China stated that 22.6% of the prescriptions included injectable preparations [13, 23]. When compared to the literature data, the findings of this study provides a clearer picture, although the high rate of injectable preparations given in UHs and PrHs is still debatable. If universities are considered to provide tertiary health care services, patients who need more complicated or parenteral treatment can be considered to be in the group receiving more services from UHs within the referral chain. This can explain the widespread use of parenteral forms in prescriptions in UHs. However, it is not easy to explain the widespread use of parenteral forms in prescriptions given in PrHs.

In conclusion, although similarities regarding the distribution of diagnoses in prescriptions by health care institutions were found, there were differences between the prescriptions given in primary, secondary, and tertiary health care institutions with respect to their NMPP, CPP, and the medicine groups they included. This study has shown that there was an tendency towards prescribing greater numbers of medicines in primary health care; prescriptions given in UHs were more costly; PrHs were more inclined to give prescriptions including antibiotics; UHs and PrHs were more inclined to give prescriptions containing parenteral medicines. However, the high numbers of prescribed "cold and cough medicines", whose use is debatable, and the physicians' tendency toward prescribing antibiotics show that there is a need to promote RUM in Turkey. The differences between health care institutions indicate that different strategies should be adopted in future interventions for the promotion of RUM. When the universality of irrational use of medicines is considered, the findings of this study will provide guidance for future studies examining similar problems.

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