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Systematic review of survey/questionnaire-based drug utilization studies in Turkiye

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ABSTRACT

OBJECTIVE: Drug utilization studies (DUS), providing insights into various aspects of pharmacoepidemiology from prescribing to medication use, can be conducted through real-world data from health records and survey-based data. In this study, we aimed to describe survey/questionnaire-based DUS conducted in Turkiye.

METHODS: We searched online databases for the most frequently used keywords in DUS from January 1993 till May 2023 and identified 180 survey-based DUS conducted in Turkiye. We described DUS by their populations, sociodemographic characteristics, timeframe, setting and provinces, data collection method, medication categories, and article-specific variables were evaluated.

RESULTS: We identified that 68.3% of the DUS were in English and 91.7% were indexed in Web of Science (median 1 [interquartile range: 1-2] citation). We found that 21.7% of the articles (n=39) had pharmacology affiliation. Adults are the target population in 37.8% of the studies and age and gender were not reported in 27.2% and 16.7%, respectively. The response rate was not stated in 55.0%. We determined that 48.3% of the studies were focused on a single medication/medication group. The mean time from data collection to publication was 2.5±1.9 years, and the highest number of articles (10.6%) were published in 2021.

CONCLUSION: Our systematic review shows that the majority of DUS were listed in well-known international indices, suggesting that our local studies invoke global interest and hold a valuable position in health research. Nevertheless, lack of reporting of methodological characteristics in substantial part of the studies can be considered an important room for improvement of DUS.

Keywords: Drug utilization studies; pharmacoepidemiology; questionnaire; survey; systematic review.

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Drug utilization studies (DUS) is a versatile scientific discipline that combines descriptive and analytical methods, enabling the evaluation of medical, social, and economic aspects of the prescription, distribution, and consumption processes of drugs [1–3]. DUS also facilitate the testing of interventions aimed at improving quality in these areas [2]. DUS encompasses the assessment of the current state of drug utilization, future trends, drug expenditures, disease prevalence, and the rationality of prescriptions. Being a valuable research field in pharmacoepidemiology, it also serves as a bridge with other health-related disciplines [4]. Therefore, enhancing DUS is considered a priority at both national and international levels [5].

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Survey and questionnaire usage are frequently employed in academic studies as well as various practical applications in fields such as health and education. It is well known that DUS also extensively benefits from these methods [6]. With the widespread adoption of electronic databases today, the evaluation of data related to the process from prescribing to the usage of medications in DUS has become more functional and comprehensive. Besides, the offering of real-world data on drug utilization, coupled with the development of information technologies, makes survey methods even more valuable for DUS, enabling large-scale surveys to be conducted [3, 7]. However, the scarce number of articles examining DUS in Turkiye did not seem to provide a review about survey- or questionnaire-based DUS, focusing merely on particular aspects of the drug utilization [3, 8, 9]. In this study, we aimed to describe survey/questionnaire-based DUS conducted in Turkiye.

Highlight key points

- The vast majority of the survey-based drug utilization studies were published in the journals of the Web of Science.
- The reporting of key methodological characteristics was lacking in a substantial number of studies.
- A number of content- and methodology-related factors were associated with the likelihood of publication in recognized indexes.
- Antibiotics constituted one-third of the medication groups surveyed.

MATERIALS AND METHODS

After approval by the Istanbul Medipol University Non-interventional Clinical Research Ethics Committee (approval no: 11.05.2023-429), in line with the principles of the Declaration of Helsinki, we collected the data from online article databases for the studies published between January 1, 1993, and April 30, 2023. We considered an article as eligible provided that it described an original research study, used survey data related to the drug utilization, and was accessible in English or Turkish full text. We analyzed the parameters related to the population to which surveys were directed and their sociodemographic characteristics, the timeframe of the study, the setting and cities where the surveys were conducted, the data collection method, the presence of scale usage, the investigated drug categories, as well as the qualities of the articles and the journals in which they were published. We referred to the current PRISMA checklist and flowchart during the data collection process in the study [10].

In line with the objectives of this systematic review, we conducted a search using keywords through internet access between May 5, 2023, and May 15, 2023. As a result of this screening, survey-based DUS published during the study period were accessed. In this context, keywords commonly encountered in DUS published worldwide and in Turkiye were identified [3, 11, 12]. The following keywords, detailed below, were searched in both Turkish and English through the PubMed, ScienceDirect, Google Scholar, Web of Science (WoS), SCOPUS, and the National Academic Network and Information Center search engines. We identified 180 original research articles, accessible in English or Turkish full text, using survey data related to the DUS conducted in Turkiye and included in this review.

The searched keywords were as follows: subgroups of healthcare centers (hospital, primary care, secondary care, pharmacy, etc.), subgroups of healthcare professions (physician, dentist, pharmacist, nurse, midwife, health technician, etc.), specific patient groups (pediatrics, geriatrics, pregnancy, etc.), commonly encountered acute and chronic diseases (upper respiratory tract infection, urinary tract infection, depression, asthma, hypertension, diabetes, etc.), commonly encountered symptoms (fever, nausea, diarrhea, etc.), medications and medication groups commonly used in the treatment of diseases and symptoms (chemotherapeutics, statins, anticoagulants, diuretics, mucolytics, antacids, etc.), the words related to surveys and survey techniques (questionnaire, survey, etc.), words related to the rationality of drug use (rational, irrational, etc.), the concepts related to the effectiveness, safety, suitability, and cost of drugs (inappropriate, generic, price, prescription, etc.), the concepts related to specific conditions of drug use (prophylaxis, off-label drug use, polypharmacy, etc.).

In the examinations conducted at the provincial level, the necessary population data were obtained using the country's "Address-Based Population Registration System Data" for the year 2021 [13]. Additionally, we categorized the examined articles into two groups based on the index of the journal where they were published, as "SCIE (Science Citation Index-Expanded)" and "non-SCIE" and then compared them.

Statistical Analysis

Quantitative data were analyzed using Microsoft Excel 2021 for Windows (Microsoft Corp., Redmond, WA, USA) and IBM SPSS Statistics for Windows 22.0 (IBM Corp., Armonk, NY, USA). The data were expressed as numbers and percentages for categorical variables and as mean±standard deviation or median and interquartile range (IQR) for continuous variables. The chi-square test was used for comparisons involving categorical variables. Cases where the Type 1 error value was below 0.05 were considered statistically significant.

RESULTS

Out of 180 articles, 68.3% were written in English. We accessed 81.1% of these articles from open sources, and 52.8% were published in journals indexed in the SCIE database. We found that 91.7% of the publications were registered in the WoS platform and received a median of 1 (IQR: 1–2) citation. All articles were available on Google Scholar with a median of 2 (IQR: 1–3) citations on this platform. The median number of authors for the articles was 4 (IQR: 1–10), with pharmacology contributions identified in 21.7% (n=39), with two-thirds from medical pharmacology. Ethical committee approval status was declared for 68.3% of the articles (n=123), with 88.6% reporting approval obtained and 11.4% stating that approval was not required. In 59.4% of the publications (n=107), consent for participation in the study was obtained (35.5% not specifying the method of consent acquisition, 36.4% indicating written consent, 25.2% reporting verbal consent, and 2.8% stating both). We further detected that consent was not obtained in 1.7% of the publications, and 38.9% did not provide any information on consent. The presence of sponsorship was not reported in 72.2% of the studies and in 22.2% of the studies, it was stated there was no sponsor. The remaining articles declaring sponsor (5.6%) were supported by various institutions and organizations (60.0%) or pharmaceutical companies (40.0%).

We observed that 51.7% of the studies focused on multiple medication groups, while 87 (48.3%) publications were specifically centered on a single medication or medication group. Among these publications, the highest number of studies were conducted on antibiotics (34.5%), followed by psychopharmacological medications (6.9%), and gastric acid suppressants (5.8%) along with medications for obstructive lung diseases (5.8%).

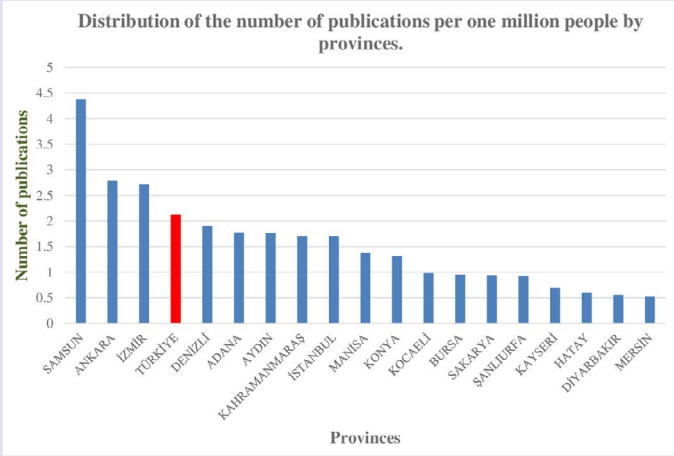

FIGURE 1. Distribution of publications per 1.000.000 people in provinces with a population exceeding one million.

We identified that 22.1% (n=46) of the studies were stated to be conducted nationwide without specifying the province in Turkiye. Among the studies where the province was declared, the highest frequencies were found in Istanbul (13.0%), Ankara (7.7%), and Izmir (5.8%). The examined studies had an adjusted ranking of 2.1 per one million population in Turkiye, with Samsun having the highest number of studies among provinces with over one million populations (4.4/million people), followed by Ankara (2.8/million people) and Izmir (2.7/million people), (Fig. 1).

We found that 67.8% of the studies lasted ≤1 year (8.9% of all studies did not specify the duration of the study). The years 2017 and 2019 had the highest coverage in terms of data collection duration (8.3%). The mean time to publish the study after completion of data collection was 2.5±1.9 years, with the highest number of articles (10.6%, n=19) published in 2021. We observed that 76 publications (42.2%) were published in the last 5 years, with an increasing trend in the number of publications (Fig. 2).

We detected cross-sectional studies as the most preferred design, accounting for 57.8%. In 5.6% of the publications, there was no statement about the study design. The studies were most frequently conducted in healthcare centers (59.4%), followed by those conducted through remote access (12.8%; online or by phone), educational settings (8.9%), home visits (8.3%), and other environments (3.3%). In addition, we noted that the environment where the study was conducted was not specified in 7.2% of the publications.

The target audience was adult population in 37.8% of the studies. The studies were conducted with different age groups in 27.2%, with the elderly in 5.6%, and with chil-

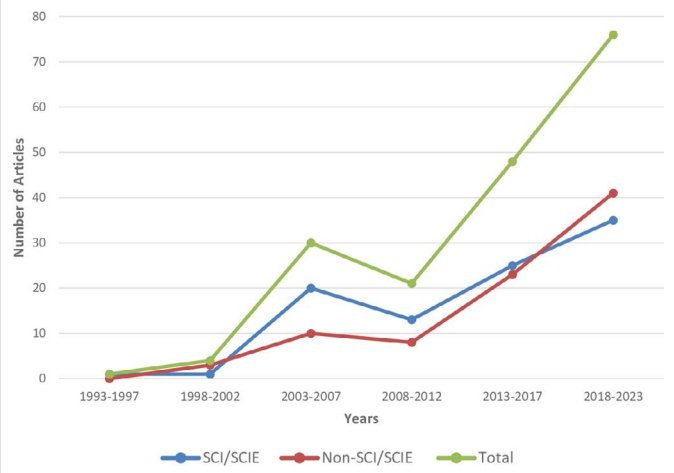

Figure 2. Distribution of the number of articles by publication years.

SCIE: Science citation index-expanded.

dren in 2.2%. More than a quarter of the studies (27.2%) did not report age data. While the gender was not specified in 16.7% of the publications, surveys were conducted exclusively in either women or men in 2.7%, with the remaining (80.6%) covering both male and female participants. We further detected that the predominant gender among audience was women in 69.5% of studies. The majority of individuals surveyed were healthcare professionals (48.6%), followed by the general population (27.6%) and patients (23.8%).

We failed to find a statement regarding the participants' response rate to the questionnaire in 55.0% of the publications. Among those who reported this rate (n=81), the average was 77.4 per hundred participants. Face-to-face interviews constituted the data collection method in 40.8% of the studies, followed by self-administered questionnaire forms (32.6%) and 16.9% through remote access (87.1% online, 12.9% by phone). There was no information about the method of obtaining data in 9.8% of the studies. We determined that in 94.4% of the studies, the data collection process was solely through surveys, while 3.3% included surveys related to interventions (all were educational interventions).

We found that 92.2% of the studies did not include a criterion for assessing whether medication use was rational. In 83.9% of the publications, there was no declaration of using any scale related to the questionnaire. The remaining were detected to use different scales, with one-third of them utilizing Likert scales. We observed that 61.1% of the surveys assessed participants' knowledge, and 69.4% assessed their attitudes.

Table 1. Distribution of the top 25 most frequently used keywords in publications

Rank	Keywords	n	%
1	Rational use of drugs	37	6.8
2	Self-medication	13	2.4
3	Antibiotic	11	2.0
4	Elderly	10	1.8
5	Medication	10	1.8
6	Medication adherence	9	1.6
7	Physician	9	1.6
8	Survey	8	1.5
9	Attitude	7	1.3
10	Knowledge	7	1.3
11	Nurse	7	1.3
12	Prescription	7	1.3
13	Patient	6	1.1
14	Primary care	6	1.1
15	Behavior	5	0.9
16	Drug	5	0.9
17	Turkiye	5	0.9
18	Community pharmacy	4	0.7
19	Diabetes	4	0.7
20	Education	4	0.7
21	Gastroesophageal reflux disease	4	0.7
22	Medication use	4	0.7
23	Over-the-counter	4	0.7
24	Questionnaire	4	0.7
25	Antibiotic resistance	3	0.5
	Other	354	64.7
	Total	547	100.0

The mean number of keywords used in the publications was determined to be 4.1±1.5, with no keywords in 10 articles (5.6%). Among the total of 547 keywords/keyword groups used in the publications, the most commonly encountered (6.8%) was "rational use of drugs" (Table 1).

We further analyzed the relationship between the characteristics of the publications and the indexing status of the journals they were published in. Accordingly, studies that were in English ($p<0.0001$), focused on a single drug/drug group ($p<0.007$), declared the response rate of the survey ($p<0.001$), declared the sponsorship status of the study ($p<0.028$), and had more than 4 authors in the publication ($p<0.005$) were significantly more likely to be published in the journals indexed in the SCIE (Table 2).

Table 2. Comparison of the relationship between the characteristics of publications and the indexing status of the journals in which they were published

Characteristics of the published article	SCIE, n=95	Non-SCIE, n=85	Total, n	p
Language				
English	73.2	26.8	123	0.0001
Turkish	8.8	91.2	57	
Number of examined medication/medication group				
Single medication/medication group	63.2	36.8	87	0.007
Multiple medication groups	43.0	57.0	93	
Response rate				
Declared	66.7	33.3	81	0.001
Not declared	41.4	58.6	99	
Sponsorship status				
Declared	66.0	34.0	50	0.028
Not declared	47.7	52.3	130	
Number of authors				
Less than or equal to four authors	44.7	55.3	114	0.005
More than four authors	66.7	33.3	66	
Environment of the study conducted in				
Healthcare related environment	47.7	52.3	107	0.051
Other environments	63.3	36.7	60	
Age of target audience				
Declared	49.6	50.4	131	0.165
Not declared	61.2	38.8	49	
Gender of target audience				
Declared	51.3	48.7	150	0.385
Not declared	60.0	40.0	30	
Target audience				
Healthcare professional	57.5	42.5	87	0.222
General population/Patients	48.4	51.6	93	
Study design				
Declared	52.4	47.6	170	0.638
Not declared	60.0	40.0	10	
Data collection method				
Declared	89.5	47.5	162	0.803
Not declared	55.6	44.4	18	
Obtainment of informed consent				
Declared	50.0	50.0	110	0.349
Not declared	57.1	42.9	70	
Approval of ethics committee				
Declared	48.0	52.0	123	0.58
Not declared	63.2	36.8	57	
Pharmacology branch contribution				
Present	53.8	46.2	39	0.883
Absent	52.5	47.5	139	

SCIE: Science citation index-expanded

DISCUSSION

In this study, we examined 180 survey-based DUS performed in the last 30 years in Turkiye and observed a number of unfavorable findings, especially about reporting of their key methodological characteristics. These include lack of response rate and/or obtainment of informed consent in around half of the studies, lack of age and/or gender information near one-third, and lack of location and/or data collection method in ten percent. This was remarkable as the majority of the papers were published in journals within the WoS platform and SCIE coverage. In terms of the medications focused on, a significant portion of them addressed antibiotics, much like non-survey-based studies on medication use conducted in Turkiye [3].

Inattentive conduct of the design and analysis of DUS bring along various criticisms, limitations, and quality issues. Despite occasional occurrence of such shortcomings, surveys and questionnaires are still used as important tools in DUS because they can reflect real-life data and provide irreplaceable information about participants' knowledge and attitudes [14–16]. Survey and questionnaire studies, often tending to focus more on local characteristics, may have relatively less universal appeal compared to other types of research [6]. However, surveys conducted in the field of health, by being able to focus on emerging local features, can serve as fundamental sources to better understand health issues, habits, and particularly the knowledge and attitudes of participants regarding medication use in specific communities or regions [16–18]. The overwhelming majority of the publications examined in this study, with academically prestigious attributes such as being on the WoS platform (92%) and more than half being indexed in SCIE, suggest that DUS conducted in Turkiye attract universal interest and, implying their authentic value within health research. The results of survey studies in a country like Turkiye, which has a current population of about 85 million people and provides the opportunity to compare the findings with many other populations, may also be a contributing factor in this global interest. On the other hand, if the shortcomings of these studies are overcome in the future, they could serve as a more functional and appealing resource for the effective and appropriate development of health policies and treatment approaches.

One of the positive findings obtained in the study is the continuous increasing trend in DUS, particularly in recent years. The general upward trend in the number of scientific publications in the country, especially in the field of health, is likely applicable to these studies as well [19]. Additionally, this trend could also be attributed to the advantages of conducting surveys, especially online, in the past decades and the increasing interest in scientific data obtained through surveys and questionnaires regarding rational drug use [3, 20].

Comparing the simultaneous examination of different medications to focusing on a single medication/medication group, the latter approach in DUS often offer advantages in analysis, interpretation, and presentation [21–23]. Studies related to medication classes that are controversial on their effects, adverse effects, and usage patterns can receive more attention. For instance, antibiotics have emerged as the most compelling medication class globally in recent decades, triggering extensive discussions [24, 25]. In this context, our study reveals that research on individual medications/medication groups, particularly antibiotics, tends to be published in more qualified journals and receive universal recognition compared to studies covering multiple medications. The prominence of antibiotics is further evident in our findings, as they are the most frequently mentioned drug class among the keywords. This observation aligns with the increasing global significance of antibiotic use and its associated consequences in both our country and worldwide [26–28].

The target population that a survey study examines faces various challenges in accurately representing the entire country [29]. Despite these challenges, interestingly, in our study, it seems valuable at first glance that more than a quarter of the publications declare being conducted nationwide in Turkiye to address this deficiency. However, upon closer inspection of the methodology, it is evident that the studies fall short of meeting this expectation. This indication of a methodological deficiency highlights that researchers and evaluators of these studies may not have adequately considered the ability of the data to represent the entire country. On the other hand, when examined on a provincial level, it was observed that the majority of studies were conducted in Istanbul (15%) and Ankara (8%), in parallel with the size of their populations. Similar findings in relation to drug usage were also reported in another study in Turkiye [3]. However, when the studies were examined in proportion to the population, the fact that the highest number of publications was in Samsun could not be attributed to a specific reason related to this province. This province was followed by Ankara (2.8/

million people) and Izmir (2.7/million people). This situation could be associated with the higher number of universities and educational hospitals in these two provinces compared to other provinces (excluding Istanbul). It could be considered that the excessive population density of Istanbul, Turkiye's largest metropolis, might have caused this province to fall behind in the population-adjusted publication ranking [30].

Obtaining up-to-date information through surveys and questionnaires is possible in a short time, and it is expected to be quickly shared with its audience [6]. In the literature, it has been reported that other non-survey drug use studies in Turkiye are published within an average of 3 years [3]. While the relatively shorter duration for survey studies (2.5 years) is favorable, considering the increasing expectation of recent data to the readers, exploring ways to further shorten this duration in the future might be necessary.

While it is expected that studies are more frequently conducted in healthcare centers, evaluating this situation along with information on who participated in the survey can provide a better interpretation. For instance, the objectivity of responses from patients in a healthcare center may differ from the responses given by healthcare professionals in the same centers [6]. Considering that these surveys are conducted more frequently among healthcare professionals compared to other populations (48.6%), the preference for healthcare centers as the study environment (59.4%) might explain the choice of assessing the prescribing habits of physicians in DUS [3, 8]. The share of patient surveys as less than a quarter of DUS suggests the need for more studies to reveal the knowledge and attitudes of patients regarding medication use in Turkiye. Among the preferred study environments, remote access, ranking second after healthcare centers (12.8%), can be explained by the increasing use of the internet in modern times and the various conveniences it provides for conducting survey methods [20]. On the other hand, increasing use of such surveys could bring along challenges related to data protection, security, privacy management, and visualization of complex questions are expected to become more prominent in health-related research. It is anticipated that the development of specialized tools will be necessary [31].

The insufficient knowledge of the sociodemographic characteristics of the individuals surveyed is a significant factor that compels the accurate evaluation of the data [32]. In a significant portion of the publications examined in our study, the absence of age (27%) and gender (17%) information can be considered important deficiencies, hindering the accurate evaluation of research data. In the literature, there are various findings and interpretations suggesting that women seek health services more frequently and use more medication in DUS [33, 34]. In our analyses involving survey studies that include both genders, the majority of participants were found to be women (70%), consistent with findings in the literature.

In survey and questionnaire studies, the response rate is a key finding for assessing selection bias [35]. In more than half of the examined publications, there is no statement regarding the participants' response rate, which can be considered a prominent deficiency in survey-based DUS in Turkiye. The issue appears to become further worse and complicates accurate analysis, considering the lack of reporting of obtainment of informed consent in nearly half of the studies. Additionally, the disclosure of the response rate has a positive impact on the quality indicators of the publication, as highlighted in our analysis. Accordingly, articles that disclosed the response rate (%66.7) were more likely to be indexed in the SCIE compared to those that did not (%41.4). We observed a similar positive effect in association with publications that included a sponsorship statement.

It is observed that the utilization of concrete scales related to the rationality of drug use is quite low in the examined articles (7.8%) [36]. However, the concept of 'rationality' is encountered more frequently than expected among the declared keywords in the publications. This suggests that, despite authors finding the concept of rationality interesting, they often fail to adequately examine the measurable aspect of the subject in their studies. This can be partly explained by the lower-than-expected contribution of the pharmacology discipline in the articles. This finding indicates the necessity for greater participation of pharmacologists in these studies, who are assumed to be more knowledgeable about evaluations related to the rationality of drug use [37, 38].

The abundance of authorship in scientific publications is a controversial issue. Various developments, such as increased collaborations between different centers and individuals in research topics, advancements in technology, and the requirements of interdisciplinary communication, have led to a gradual increase in the number of authors in articles compared to the past [20]. Beyond the numerical value, it can be argued that the active contribution of authors to the study, their fair representation

in the published work, may be more important than the quantity of authors, which could positively impact the quality of a publication [39, 40]. In our study, having more than four authors has a positive impact on the quality of publications, supporting a favorable approach to publications with a relatively larger number of authors.

Our findings should be interpreted with their limitations. The first potential limitation could be about the declared keywords in identifying articles. While we identified the articles to be included in the study through search engines with the use of keywords, those articles that may have conducted a survey on medication use but did not specify appropriate keywords might have been excluded from our analysis. Our inability to examine survey/questionnaire-based DUS that were not digitally accessible is another limitation. In our study, the focus was primarily on the methodological characteristics and format information of the articles. Due to the diverse nature of the medication-focused content in the publications, detailed analyses specific to medications/medication groups were not extensively included in our study to avoid complicating the interpretation of the findings further. This approach can be considered another limitation of the study.

Conclusion

In recent years, the majority of survey and questionnaire-based DUS, which have been increasingly conducted, particularly in prestigious journals, indicate that such studies conducted in Turkiye attract universal attention and hold a valuable position in health-related research. Focusing on a specific medication/medication group in DUS is considered a positive attribute for an article, and the preference for conducting DUS through survey and questionnaire methods has been observed to provide researchers with opportunities to shorten the time to publication. Additionally, the careful design of comprehensive surveys and questionnaires, complete recording of demographic data, achieving higher response rates, and the publication of studies that represent diverse populations well are crucial for improving the quality and methodology of DUS in Turkiye. The comparably low contribution of pharmacologists can be considered another important area for the development of DUS. Addressing these needs can serve the purpose of DUS producing more reliable results and serving as a guide for stakeholders in the effective management of healthcare services and resources.

Ethics Committee Approval: The Istanbul Medipol University Non-interventional Clinical Research Ethics Committee granted approval for this study (date: 11.05.2023, number: 429).

Authorship Contributions: Concept – AA, VA; Design – AA, VA; Supervision – AA, VA; Fundings – AA; Data collection and/or processing – DH, BC, OG, NH; Analysis and/or interpretation – VA, AA, OG; Literature review – OG, NH, BC, DH; Writing – OG, BC, NH, DH; Critical review – AA, VA.

Conflict of Interest: No conflict of interest was declared by the authors.

Use of AI for Writing Assistance: No artificial intelligence (AI) or assisted technologies (such as Large Language Models [LLMs], chatbots, or image creators) was used in the production of this work.

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Peer-review: Externally peer-reviewed.

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