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Evaluation of Family Physicians' Knowledge and Attitudes Regarding the Rational Use of Antibiotics: A Survey Based Study

Aile Hekimlerinin Akılcı Antibiyotik Kullanımı ile İlgili Bilgi ve Tutumlarının Değerlendirilmesi: Anket Çalışması

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ABSTRACT

Background and Objectives: Antibiotics are widely used all over the world, but the use of appropriate antibiotics in the appropriate dose and duration plays a critical role in reducing the development of resistance, and mortality in particular, as well as undesirable effects and treatment costs associated with infections. The purpose of this study was to investigate the knowledge and attitudes of primary care family physicians regarding the rational use of antibiotics (RUA) and to raise awareness about this issue. **Methods**: Before the "Training for the Rational Use of Antibiotics" for family physicians of primary healthcare in Antalya in 2019, a questionnaire was distributed to the physicians. The questionnaire contained 37 questions, including 27 multiple-choice questions designed to assess physicians' general attitudes toward antibiotic rationalization. The questionnaire, which consists of ten questions, also includes a test at the end, which is calculated over a total of 100 points. The purpose of the test is to assess family physicians' knowledge of rational antibiotic use. Each correct answer was worth 10 points, and the average success and standard deviations of the physicians were computed. **Results:** This study included 143 family physicians in total. The mean success score standard deviation (SD) was found to be 66.5 18.51 out of 100 in the test, which measures the knowledge level of physicians prior to training. The success scores of physicians aged 55 and older were found to be statistically significantly lower than the scores of those in other age groups (55.6 21.2 points (mean SD). Other variables examined within the scope of the study were found to have no effect on the physicians' success scores. It was also discovered that physicians frequently answered incorrectly questions about the use of the Modified Centor Clinical Scoring system.The relevant records showed that only 7867 (27.4%) of 28 712 Rapid Antigen tests (RATs) distributed to family physicians by the Provincial Health Directorate were used. **Conclusions:** Although the majority of the participants stated that they used diagnosis and treatment guidelines when prescribing antibiotics, it was discovered that the use of the Modified Centor clinical scoring system and the RADTs was not common among them, and that there were some deficiencies in the RUA.
Key words: Rational Antibiotic Use, Training, Family Physician

ÖZET

Amaç: Antibiyotikler tüm dünyada yaygın kullanılmakta olup, uygun antibiyotiğin uygun doz ve sürede kullanılması enfeksiyonlara bağlı başta mortalite olmak üzere direnç gelişimi, istenmeyen etkilerin ve tedavi maliyetlerinin azaltılmasında çok önemli rol oynamaktadır. Bu çalışmada Birinci Basamakta hizmet veren aile hekimlerinin akılcı antibiyotik kullanımı hakkında bilgi ve tutumlarını araştırmak, bu konuda farkındalık yaratmak amaçlandı.**Materyal ve Metot:** Antalya ilinde 2019 yılında Birinci Basamakta hizmet veren aile hekimlerine yönelik düzenlenen 'Akılcı Antibiyotik Kullanımı Eğitim' toplantılarında hekimlere eğitim öncesinde anket uygulandı. Anket; hekimlerin demografik bilgilerini içeren ve akılcı antibiyotik kullanımları ile ilgili genel tutumlarını belirlemeye yönelik çoktan seçmeli 27 sorudan oluşmaktadır. Anketin 10 sorudan oluşan son bölümünde; aile hekimlerinin akılcı antibiyotik kullanımı hakkında bilgilerinin değerlendirildiği toplam 100 puan üzerinden hesaplanan testte, doğru yanıtlanan her soru için 10 puan verilmiş hekimlerin başarı puan ortalamaları ve standart sapmaları hesaplanmıştır. **Bulgular:** Çalışmaya 143 aile hekimi katıldı. Eğitim öncesi hekimlerin bilgi düzeyini ölçen testin başarı puanı ortalaması 66.5 ±18,51 (ortalama puan±standart sapma) puan tespit edildi. 55 yaş ve üstü hekimlerin başarı puanları (55.6 ±21.2 puan) diğer yaş gruplarındaki hekimlerin puanlarından istatistiksel olarak anlamlı düşük olduğu tespit edildi. Çalışma kapsamında incelenen diğer değişkenlerin hekimlerin başarı puanlarını etkilemediği saptandı. Modifiye Centor klinik skorlama sisteminin kullanımı ile ilgili soruların hekimler tarafından sıklıkla yanlış cevaplandığı görüldü. İl Sağlık Müdürlüğü tarafından aile hekimlerine dağıtılan 28 712 adet Hızlı Antijen testlerinden (HAT) sadece 7867 adetinin %27.4'ünün kullanıldığı kayıtlardan tespit edildi. **Sonuç:** Aile hekimlerinin çoğunluğu antibiyotik reçetelerken tanı ve tedavi rehberlerinden yararlandığını belirtse de Modifiye Centor klinik skorlama sistemi ve HAT kullanımının yaygın olmadığı, akılcı antibiyotik kullanımı konusunda eksikliklerinin bulunduğu tespit edildi.
Anahtar Kelimeler: Akılcı Antibiyotik Kullanımı, Eğitim, Aile Hekimi

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INTRODUCTION

The rational drug use (RDU) includes the following steps: Defining a patient's problem, especially in accordance with diagnosis and treatment guidelines, carefully determining the treatment goals, prescribing cost-effectively for an appropriate and reliable treatment with proven effectiveness among treatment options, at the optimal dose and length of treatment, explaining the treatment to the patient, monitoring the results of the given treatment, and reporting any undesirable effects.[1]

Antibiotics are widely used throughout the world. The incorrect, unnecessary, and ineffective use of antibiotics, on the other hand, is a major public health issue. Rational use of antibiotics plays a critical role in reducing the undesirable effects and treatment costs, especially in the development of resistance. [2] The analysis of prescriptions given by primary healthcare in the UK between 2013 and 2015 revealed that the majority of antibiotics were prescribed for respiratory tract infections, however, the necessity of antibiotic use was not documented for any clinical reason in almost one third of all prescriptions. [3] Sore throat is one of the most common medical complaints, and respiratory tract infections appear to be the reason for approximately 75% of the diagnoses of patients receiving antibiotics. Viral agents being its most common cause, acute tonsillopharyngitis takes the first place for the use of antibiotics, while it does not necessarily require antibiotic treatment. [4,5] On the other hand, Group A Streptococcal (GAS infections are the most common bacterial cause. Diagnosis is made via microbiological tests performed in addition to clinical signs and symptoms. A rapid antigen detection test (RADT) and/or throat culture are diagnostic tests of the disease.[6] Clinical scoring systems have been developed to differentiate between viral and bacterial infections in tonsillopharyngitis cases, and the Modified Centor Scoring system is used in Turkey, the United States, and Europe.[7, 8]

In the Antibiotics Congress held in 2011, it was emphasized that the use of antibiotics in the framework of drug use was in the first place in Turkey, and that 40-50% of this was unnecessary. The importance of antibiotic use guidance was also emphasized.. [9] According to the data of the Turkish Ministry of Health, the second most consumed drug group in pharmaceutical sales in 2013 was the systemic anti-infectives group (14.46%), in which antibiotics made up the majority. According to Turkish Ministry of Health regulations, although this rate had decreased over the years, it decreased to 11.17 percent in 2018, with systemic anti-infectives being the fourth most consumed drug group.[10] However, the Organization for Economic Cooperation and Development (OECD) reported that, as a result of the studies conducted in November 2018, Turkey was found to be among the countries with the highest average rate of antibiotic resistance (35%). [10,11] Such a result manifests the magnitude of the problem that until 2050, 10 million people and 100 trillion USD per year will be at risk unless proactive solutions are found against the development of antimicrobial resistance (AMR), since 700 thousand people die from resistant infections every year. [12]

They emphasized in a review prepared with the goal of preventing irrational drug use in our country that physicians should prescribe cost-effective drugs after diagnosis, especially without being influenced by any external factors such as the pharmaceutical company or patient demands, and that pharmacists should serve without commercial concerns. According to the findings of the review, policies concerning the rational use of drugs should be developed in such a way that physicians, pharmacists, pharmaceutical companies, and patients are all involved..[13] It has also been emphasized that there is a need for training programs to be conducted at regular intervals within the scope of continuous medical education about the RDU so that the tendency for the rational use of antibiotics will increase, and that the risk of resistance will decrease in line with up-to-date training.[13-15] The Vice Presidency of Rational Drug Use, and Provincial Coordination Office affiliated to the Turkish Medicines and Medical Devices Agency provide physicians in various specialties- family physicians in particular-, pharmacists, and the public with trainings on rational use of antibiotics. The present study aimed to investigate the knowledge and attitudes of family physicians about the RUA, and to evaluate the usage rates of RADTs distributed by the Provincial Directorate of Health as well as the data on antibiotic use obtained from the Prescription Information System (PIS).

METHOD

This study is a descriptive and cross-sectional study. Ethical approval was obtained from the Ethics Committee of Akdeniz University Faculty of Medicine, dated 31.10.2018 with the Decision No: 766. A questionnaire prepared on the basis of the literature review was administered to the physicians whose informed consents were obtained at the Training for Rational Use of Antibiotics held for Family Physicians in Antalya in 2019 by the Rational Drug Use Coordination Office of the Antalya Provincial Directorate of Health.[19]

The survey consists of three parts, the first of which comprises open and closed-ended questions about the professional and personal

characteristics of physicians, including demographic information regarding their gender, age, length of work as family physicians, and their specialty. The second part aims to determine the general attitudes of physicians about the RUA under 27 questions in relation to such topics as "the situations to be considered while prescribing antibiotics, informing the patients, following the results of a treatment, reporting when adverse effects occur, prescribing antibiotics according to a patient's request, and having knowledge about the RUA". In the third part, a 10-question test was used to evaluate the general knowledge of family physicians with respect to the topics covered in the training on the use of antibiotics. The questions given in Table 2 were administered to family physicians as a multiple-choice test, and 10 points were given for each question answered correctly out of a total of 100 points, and success score averages and standard deviations were calculated accordingly.

The data were analysed by using IBM SPSS-20 (IBM Corp, Armonk) program and assessed with descriptive statistics, t-test and one-way ANOVA analysis. A level of 0.05 was considered significant.

RESULTS

Demographic Data

In 2019, 769 family physicians were working in Antalya, and 228 of them participated in "Training for the Rational Use of Antibiotics", and 143 of them were included in the study. There were no exclusion criteria in this study, and all family physicians who agreed to participate in the study were administered a questionnaire. The mean age of the physicians was 49.1±7.7 years old (min 26 –max 59 years old) and the gender of physicians was 43.4% female, 56.6% male. Of all the participants, 10.6% of them were specialist family physicians, while 89.4% were GPs. Although the study demanded information as to the length of work as a family physician, some physicians perceived it as the length of work in general; hence, the information about the length of work was not included in the statistics and those data were not used. When it came to their knowledge about the RUA, it was found that 36.7% of the family physicians received relevant trainings while they were students at medical school, whereas 87.2% received such trainings after graduation. Of all the participants, 86% of them stated that they applied the knowledge they gained in their training on the RUA during the treatment.

The Evaluation of Family Physicians' Attitudes Towards Antibiotic Use

When asked about their sources of information while prescribing antibiotics, 70.6% of the family physicians stated that they use the Diagnosis and Treatment Guide, 42% stated that they do research on the internet, and 35.7% stated that they check the handbook of healthcare product (vade-mecum).

The participants also mentioned that while prescribing antibiotics, they mostly pay attention to the diagnosis of the disease, the dose and regimen of the drug, and its possible contraindications (Figure 1).

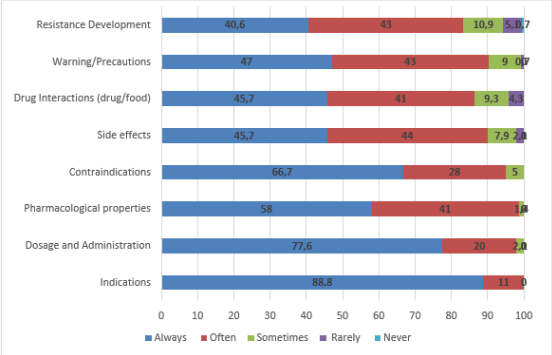

Figure 1. The criteria that family physicians pay attention to when prescribing antibiotics

In the present study, 96.5% of the family physicians stated that they think they make the correct diagnosis for their patients, 95.8% of them stated that they choose and prescribe the most appropriate antibiotic (effective and reliable) that meets the clinical needs of a patient, and 30.8% of them stated that the cost of antibiotic selection is insignificant. While prescribing antibiotics, 69.3% of the participants stated that they question patients' comorbidity and 92.8% of them stated that they question whether or not a patient is pregnant.

It was also found that the family physicians in the present study mostly give information to a patient about the daily dose of the drug, duration of treatment, and regimen about the prescribed antibiotic.

Furthermore, 76.9% of the family physicians thought that the information they give to patients about the prescribed antibiotic is sufficient, since such drugs would not be able to provide effective treatment if they were not used correctly. The rate of physicians who check whether the patient has understood or not after informing him/her about the antibiotic prescribed is 73.4% as they stated that it is important for a patient to fully understand how to use the drug. When asked by the patients to prescribe antibiotics, 68.3% of the participants stated that they never prescribe antibiotics without examining the patient first, while 26.6% stated that they accept it because it would cause an argument if they did not prescribe it.

When the family physicians were asked about for how many of the 100 patients, who apply to them, they prescribe antibiotics on average, 54.7% of them were found to prescribe antibiotics to 15-24% of the patients and 41% to 25-34% of the patients.

When asked about the antibiotic group that they most often prescribe for a patient diagnosed with GAS Tonsillopharyngitis, 38.5% of the participants stated that they prefer amoxicillin and enzyme inhibitors, whereas 36.4% of them prefer penicillin and 25.2% of them amoxicillin. On the other hand, 82.7% of the physicians emphasized that they do not make a notification for the antibiotic they suspect to cause an adverse reaction.

The participants were also asked some questions to determine their general attitudes other than the RUA. In this respect, 44% of them mentioned that they observed the use of equivalent medicine having the same effect on patients. Regarding prescribing antibiotics in pediatric patients, 45.3% of the physicians stated that they recommend the use of probiotics concurrently. In addition, 39.6% of the physicians stated that they recommend the use of herbal drogs other than drugs to their patients. Moreover, 77.7% of the participants stated that they do not want to participate in any clinical drug research as a researcher (doctor), while 92.2% indicated that they do not want to participate in a study as a volunteer.

The Evaluation of Physicians' Knowledge About Antibiotic Use

The average success scores out of 100 in the test, which measures the physicians' knowledge level prior to training, were determined to be 66.56 ± 18.51 (mean± SD). While there was no statistically significant difference in the level of knowledge of family physicians based on gender, title, or institution, it was discovered that the average age of physicians affected their level of knowledge. In particular, it appeared that the average success score of family physicians aged 55 and above (55.6 ± 21.2 (meanSD)) was statistically significantly lower than the scores of those in other age groups (54 years) ($p<0.05$) (Table 1).The mean success score of family physicians who received pre-graduate training on the RUA 67.45 ± 21.34 (mean±SD) was found to be statistically significantly higher than those who did not ($p<0.05$). It was reported that 87.2% of the physicians received a RUA training after graduation, and the difference between the groups that received and did not receive any trainings was not calculated. The percentages of incorrect answers by family physicians to the questions about the Modified Centor Clinical Scoring System (Questions 3 and 9) were higher than those of correct answers (Table 2).

Table 1. Distribution of success scores of family physicians by age

Age of family physicians	Success Scoress (mean ±SD)
<40 years old (n=22)	64.5 ± 20,9
40-44 years old (n=11)	70.0 ± 10,0
45-49 years old (n=26)	70.4 ± 13,4
50-54 years old (n=4)	70.4 ± 17,9
≥ 55 years old (n=25)	55.6 ± 21,2*
Total (n=131)	66.7 ± 18,5

One Way Anova test; Values are expressed as mean ± standard deviation.
(*) success scores lower than other ages $P<0.05$ significant

As for the use of rapid antigen diagnostic tests (RADTs), records show that 769 family physicians work in Antalya, and although the Provincial Directorate of Health distributed 28,712 RADTs in 2019, only 7,867 (27.4%) of them were used.

DISCUSSION

The RUA plays a critical role in preventing antibiotic indiscriminate use, reducing side effects and antimicrobial resistance, and preventing economic losses by enabling family physicians working in primary healthcare institutions to develop approaches to making the correct diagnosis. The goal of this study is to assess family physicians' knowledge and attitudes toward antibiotic use, and our findings will aid in the implementation of the RUA and the identification of deficiencies in this area. The rational antibiotic prescribing criteria were investigated in this study to determine the knowledge and attitudes of Antalya-based family physicians. The key items to promote Rational Drug Use, one of which is the use of diagnostic and treatment guidelines, were identified. [16] The relevant studies conducted in Turkey have revealed that the sources that physicians get help while prescribing antibiotics are listed as diagnosis and treatment guides in the first place, followed by the Internet.[17-19] In this study, 69.3% of the family physicians stated that they question about the presence of any chronic disease and 92.8% indicated that they ask about the presence of pregnancy while prescribing antibiotics. In addition, some other studies investigating rational drug use reported that nearly half of the physicians always questioned the presence of any chronic diseases and pregnancy. [17,18] The reason for the difference could be that family physicians monitor the patients continuously and thoroughly.

Similar to the present study, some other studies in the literature reported that relevant information was given mostly about the daily dose of a drug, as well as the regimen and duration of treatment, whereas the least information was given about the price of a prescribed drug. [17,18]

Table 2. Questions evaluating the knowledge of family physicians about the use of antibiotics		
Questions	True % (n)	False % (n)
1. What is the most common cause of tonsillopharyngitis? (70-80%) Is it viral or bacterial?	85,1 (120)	14,9(21)
2. It is very important when ASO is high, and antibiotics should be administered immediately.	88,7 (125)	11,3 (16)
3. Antibiotics should be administered immediately after evaluation according to the Modified Centor criteria (score ≥4).	47,0(54)	53,0 (61)
4. Antibiotics should be administered immediately to prevent the spread of infection.	74,5(105)	25,5 (36)
5. Antibiotics should be administered immediately to prevent complications.	75,9(104)	24,1(33)
6. Antibiotics should be administered immediately as a prophylactic to prevent the development of ARA.	52,5(73)	47,5 (66)
7. Antibiotics should be administered immediately to achieve clinical improvement.	89,9(124)	10,1 (14)
8. Ahmet is a 2-year-old boy, presenting with crying, loss of appetite, fever, runny nose and cough. Antibiotics should be administered immediately.	97,1(136)	2,9 (4)
9. Ayşe is an 8-year-old girl with a fever >38 C°. In case of tonsil enlargement and tender anterior cervicallymphadenitis, antibiotics should be administered immediately.	41,0(57)	59,0 (82)
10. Kemal is a 15-year-old boy with tonsillar hyperemia. He has no fever or cough. Antibiotics should be administered immediately in accordance with the result of streptococcal antigen test (RADT).	61,6 (85)	38,4 (53)

Only 30.8% of the physicians stated that they always pay attention to the cost while prescribing antibiotics, a situation which raises questions about the rational drug use criteria and the cost-effective use of a drug, which is the responsibility of a physician. A study conducted in Turkey found that 24.97% (35,364,710 prescriptions) of prescriptions written by family physicians in 2017 contained at least one antibiotic as a medicine. The total number of antibiotic items in prescriptions was determined as 7.41% (n=29,284,158) of the total number of drug items, and the total cost of antibiotics was determined as 3.45% of the total cost of drugs (554,866,690 TL). [20]

A retrospective study of prescriptions in primary health care facilities reported that antibiotics were prescribed in 56.0% of prescriptions, accounting for 46.0% of the total cost of prescribed drugs. Upper respiratory tract infection appeared to be the most common diagnosis for which antibiotics were prescribed, and laboratory investigation was performed for only about 27% of those cases. In this respect, it has been concluded that the high rate of empirical antibiotic prescription in healthcare facilities increases the antimicrobial resistance in Turkey.[21] In this study, only 40.6% of family physicians stated that they always pay attention to the development of antibiotic resistance when prescribing antibiotics. Inappropriate use of antibiotics causes financial losses as well as harming the patients due to drug side effects, and negatively contributes to the development of resistance to antimicrobials, which has ultimately reached a threatening level for the whole world. [22]

It is also necessary to follow up, treat, and report the drug-related adverse reactions in a patient, which is one of the essential criteria in the rational use of antibiotics. In the present study, 82.7% of family physicians stated that they do not report any antibiotics that they think caused adverse reactions. Similarly, it appeared that the physicians in this study did not have sufficient awareness of pharmacovigilance.[18] The low reporting rate is one of the shortcomings in the rational use of drugs and antibiotics in our country.

While prescribing antibiotics, 96.5% of the participants stated that they made the correct diagnosis and 95.8% stated that they prescribed the most appropriate antibiotic. However, the records show that only 27.4% of the Rapid Antigen Diagnostic Tests (RADTs) distributed to family physicians by the Provincial Directorate of Health have been used to help diagnose the disease, which is one of the most common reasons for family physicians to prescribe antibiotics. The participants ended up responding to 61.67% of the questions about the Modified Centor criteria correctly, which suggests that the recommended clinical scoring was not used at the diagnosis stage. In studies that retrospectively investigated the reliability and clinical usability of the RADTs in the differential diagnosis of bacterial/viral tonsillopharyngitis and the effects of antibiotics prescriptions under the guidance of Centor clinical scoring, it was revealed that such practices significantly reduced the rate of inappropriate antibiotic prescribing.[23-25] In addition, we believe that when patients are satisfied with the evidence-based negative results of the RADTs and

abandon their insistent attitude in getting prescribed antibiotics, the situation may improve.

One of the reasons for the over-prescription of antibiotics in primary care appears to be the difficulty in distinguishing between viral and bacterial infections, as well as patients' belief in the efficacy of antibiotic therapy in viral infections. No matter how vehemently patients ask their doctors to prescribe antibiotics, the doctors' explanation of the situation is unquestionably the most important factor.[26,27] Many studies conducted with patients, who were questioned about the purpose of antibiotics use, reported that most of the participants (76% fever, 69% cough) stated that antibiotics are used in the treatment of fever and cough.[28] A study examining the reasons for prescribing antibiotics reported that 28.6% of family physicians expressed the case as a pressure from patients and their relatives. Similarly, in this study, 26.6% of the physicians indicated that they agree to prescribe antibiotics when asked by the patients because, otherwise, they would have an argument with them.[29] Informing patients about the development of resistance by emphasizing effective management of symptoms without the use of antibiotics, and by making use of public campaigns, patient education materials and brochures will reduce patient expectations and prevent irrational antibiotic prescribing.[30,31] The studies conducted in Turkey have emphasized that since it has been discovered that patients use antibiotic drugs without a doctor's advice, there is a need for training in the rational use of antibiotics in the society and that the media should also play an important role in this regard. [32,33]

The current study found that physicians aged 55 and older had a lower mean RUA-related test score than younger physicians. Similarly, in another study, physicians' relevant knowledge about and attitudes toward prescribing antibiotics were found to be significantly higher in the 25-29 age group than in the older age groups.[34] Some other studies have also reported that providing sustainable education programs for physicians on rational antibiotic use after graduation may contribute positively to reducing antimicrobial resistance rates, increasing awareness, and the RUA.[29] The Turkish Ministry of Health found that antibiotics were included in 34.94% of family physicians' prescriptions in 2011. As a result of the rational antibiotic use programs and trainings provided by the Ministry of Health the rate of antibiotic prescription by family physicians decreased to 24.55 % in 2018, the rate of antibiotic prescription by family physicians found 23.87% in 2019.[35] Such data have demonstrated that the studies on rational use of antibiotics are beneficial. This study also discovered that the average achievement score (67.45±21.34) of family physicians who received RUA training during their undergraduate education was statistically significantly higher than that of physicians who did not (p0.05), demonstrating the importance of offering RUA courses in Medical Schools. There is a clear need for continuous and repeated RUA training programs for family physicians, and it is necessary to publish updated RUA diagnosis and treatment guidelines for family physicians to use, as well as to encourage the use of such guidelines.

LIMITATIONS OF THE STUDY

In the study, only a pre-training questionnaire was administered in order to investigate the knowledge and attitudes of family physicians about rational use of antibiotics, yet no application was made after the training. Therefore, the clinical practices of physicians could not be evaluated and there may be differences between what the physicians express and what their approaches are towards patients in practice.

CONCLUSION

The family physicians in the current study reported that, when prescribing antibiotics, they mostly pay attention to the indication, dose, regimen, and contraindications of antibiotics, while they pay the least attention to the development of resistance and the cost of drugs. Despite the critical importance of follow-up and treatment and reporting of drug-related side effects in terms of antibiotics use, only one-fifth of the participants stated that they report such cases. In addition, it has also been determined that the trainings provided about the RUA during the medical school education are of great importance for introducing the rational use of antibiotics, and that the need for training programs increases for older physicians. This study has revealed that family physicians need continuous and periodic training programs on the RUA, and that such training activities eventually prove successful.

This study was approved by the Clinical Research Ethics Committee, Akdeniz University Faculty of Medicine, dated 31.10.2018 with the Decision No: 766.

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