

## CLINICAL INVESTIGATION

# Most Common Infections and Antibiotic Prescribing Habits of Residents: Experience of Three University Hospitals\*

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Received: March 18, 2005

**Abstract:** As the common use of antibiotics is a very important factor in antibiotic resistance, their rational use has to be promoted world. We planned this study in order to define the habits and approach of Turkish residents when prescribing antibiotics, including their selection criteria, and to discover if the availability of laboratory tests affected their approach. In this descriptive study, the residents in the authors' hospitals were visited once during October and November 2001. Anonymous, volunteer-based questionnaires were used, which required the following information: demographic features of resident, the most common types of infections and groups of antibiotics prescribed, any laboratory tests performed, and the antibiotic selection criteria. Chi-square test was used for the statistical analysis. Among 306 residents, 229 (74.8%) participated in the study. We found that upper respiratory tract infection was the most common type of infection, and amoxicillin-clavulonate and ampicillin-sulbactam were the most commonly prescribed antibiotics. Initial selection criteria for antibiotic prescription by our residents were patients' expectations and cost of the therapy. Laboratory did not affect our residents' antibiotic prescription habits. We concluded that the availability of laboratory testing did not affect the residents' decision to prescribe antibiotics. Residents and the community should be educated on rational drug use and prescription.

**Key Words:** Resident, antibiotic, resistance, prescribing, over-prescribing, rational

## Introduction

Antibiotic resistance is a worldwide problem (1) and inappropriate antibiotic use plays a major role in this important issue (2). Rational use of antibiotics has to be promoted. Reducing the use of antibiotics results in reduced resistance to antibiotics; however, prescribing antibiotics is increasing in primary care (3). There are inverse correlations between antibiotic prescribing and resistance (4) and reducing antibiotic consumption is possible (5). Communication with the patients and workshops can reduce the prescribing of antimicrobial agents (6,7). The majority of doctors agree that they

have been over-prescribing antibiotics, but changing the practice is more difficult (6).

Drug consumption in Turkey was valued at \$2,553 million in 2001 and 18.2% of that can be attributed to antibiotics (8). It is interesting to note that the national income in 2001 was \$148 billion (9).

We performed this study in university hospitals for several reasons. Because of the lack of referral rules and quality and efficiency problems associated with Turkish primary care, people generally use hospitals as the initial access step for receiving medical care and they trust the tertiary care hospitals more than the others (10,11);

\* Preliminary results of this study were presented in the 5<sup>th</sup> National Family Medicine Congress, 27-30 March 2002, Adana, Turkey, and the 56<sup>th</sup> Meeting of European General Practice Research Workshop, 8-11 May 2003, Ankara, Turkey.

therefore, the university hospitals play a very important role in treating community-acquired infections in Turkey. Another reason is that in Turkish tertiary care hospitals, residents generally deal not only with inpatients but also with outpatients, and so they can deal with the majority of the population.

The third reason is that in this country, data concerning rational antibiotic use and attitudes towards antibiotic prescribing are minimal. In this study, our goals were to define the criteria used by residents when prescribing antibiotics, to determine their prescribing methodology, and to discover if the availability of laboratory tests affected their approach to prescribing antibiotics. Then, if necessary, we will revise the curriculum of the residents.

## Materials and Methods

This study was performed in the authors' hospitals, Süleyman Demirel University (SDU), Karadeniz Technical University (KTU), and Uludağ University (BUU) in October and November 2001. These universities are located in three different cities (Isparta, Trabzon, and Bursa, respectively) in different regions of Turkey (south, north and west, respectively). In Turkish universities, generally all of the outpatient day clinics are part of the departments of "clinical medical sciences" (the other type of medical sciences is the "basic medical sciences", but these do not generally have any outpatient day clinics). Departments of clinical medical sciences can be divided mainly into 2 parts: internal and surgical. Each outpatient day clinic was visited once, in the morning. The residents who participated in this study completed anonymous, volunteer-based questionnaires, consisting of 12 closed and open-ended questions about demographic features and general approach to antibiotic prescribing in the day clinics. Our target population was all residents working in day clinics during our study period. The residents did not have to put their names on the questionnaires. The questionnaires did require the residents to complete the following information: their age, gender, department, the type of infection most seen, the antibiotic most commonly prescribed, whether and why a laboratory or diagnostic test was performed before the resident prescribed an antibiotic for a patient, for a relative, or for themselves; and the criteria they used to select the antibiotic and their associated reasoning. The

questionnaires were collected at the end of the day. The answers to the open-ended questions were categorized. The residents who did not volunteer or who were absent on that day were not followed up. The data were presented numerically and in percentages. The chi-square test was used for the statistical analysis. A P value that was smaller than 0.05 was considered statistically significant.

## Results

Among the target population of 306 residents working in day clinics during the study period, we were able to speak with 283 of them regarding participating in our study. Among those residents, 251 agreed to participate, with 229 completing the questionnaires (74.8%). In general, residents associated with the surgical departments were unwilling to participate in the study.

One hundred twenty-five residents (54.6%) from internal departments and 104 residents (45.4%) from surgical departments took part in the study. The mean age of the residents was  $28.3 \pm 0.2$  (range 23-39 years). Seventy-seven of them (33.6%) were from SDU, 86 (37.6%) were from KTU, and 66 (28.8%) were from BUU. Among the residents, 88 were female (38.4%).

The most common type of infection was acute upper respiratory tract infection (53.7%) (Figure 1), and the most often prescribed antibiotic groups were ampicillin-sulbactam and amoxicillin-clavulonate (52.8%) (Figure 2). There was no statistical significance in these variables according to gender, departments, or medical schools ( $P > 0.05$ ).

If the test results were negative, the residents generally made their decision depending on the clinical diagnosis, rather than the diagnostic or laboratory test findings (177 residents, 77.3%). No statistical significance was observed according to gender, departments, or medical schools ( $P > 0.05$ ). Although 217 residents (94.8%) stated that they had performed laboratory or diagnostic tests in order to confirm the clinical diagnosis, 151 residents (65.9%) prescribed antimicrobial agents for the patients before obtaining the test results. There was also no significant difference between gender, departments, or universities for this variable ( $P > 0.05$ ). The most important reasons for prescribing an antibiotic before the resident received the

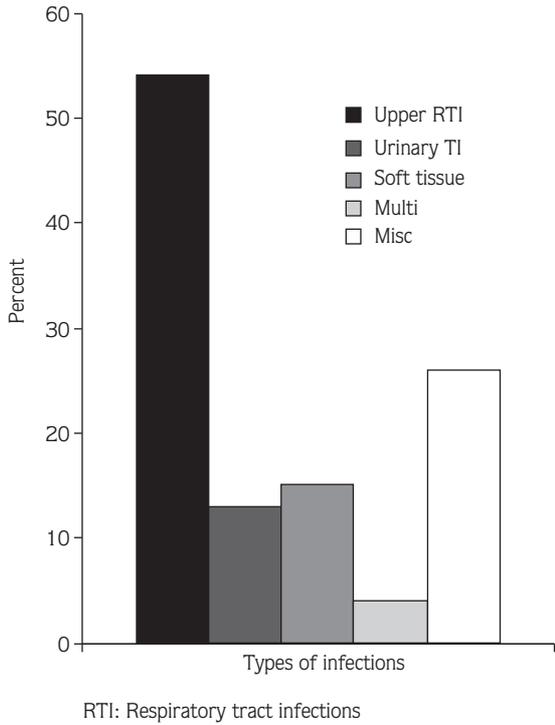


Figure 1. The most common types of infection that the residents face.

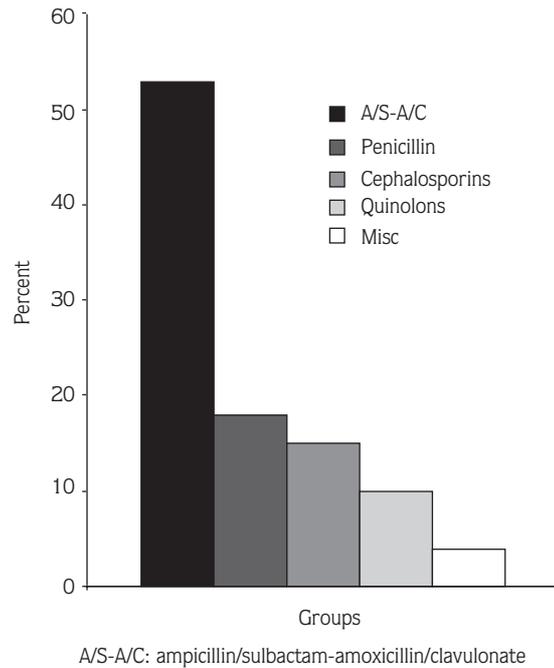


Figure 2. The most frequently prescribed antibiotic groups.

test results were the fear that the patient could worsen and not come back for the test results, lack of sufficient time for explaining the importance of the laboratory tests to the patient, and because of the patients' expectations.

Our study revealed that 78 residents (34.1%) waited for the test results in order to prescribe antibiotics for patients, but 167 residents (72.9%) waited for the results if they or their relatives were under consideration. This was found to be very significant ( $P < 0.0001$ ). In those cases where the resident did not wait for test results prior to prescribing an antibiotic, the resident explained that he/she feared that the patient could worsen and could not be reached by the resident once the patient left the clinic.

At the time of prescribing, most of the residents mentioned that their criterion for selecting an antibiotic was the patient's expectation and the second was cost of the therapy (Figure 3). There was no statistically significant difference between departments and universities, but there was a significant difference according to gender ( $P < 0.05$ ). For example, cost was much more important for female residents (it was the most common selection criterion among females), while it

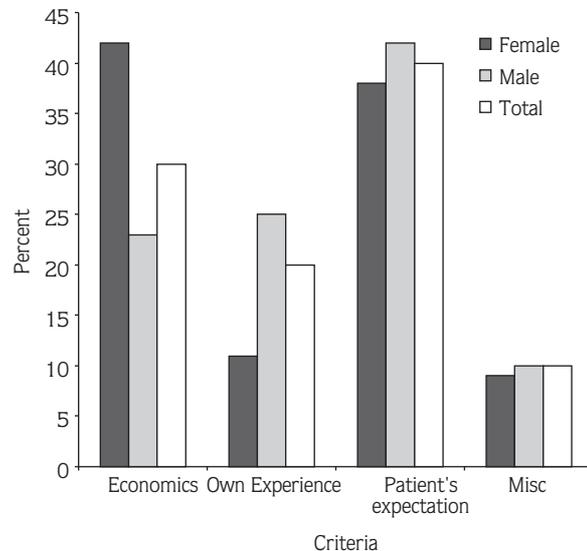


Figure 3. Selection criteria according to gender.

was the second choice of the male residents. The first selection criterion among the male residents was the "patients' expectation."

One hundred sixty-four residents (71.6%) stated that visits from drug companies were important factors in their preference for one antibiotic over another. There was no significant difference in the effect of drug company visits according to gender, department, or medical school ( $P > 0.05$ ).

## Discussion

Belongia and Schwartz state that more than a fifth of all antibiotic prescriptions for children and adults in the United States are written for upper respiratory tract infections or bronchitis that were generally viral infections (2). In our study, the most common infection was also upper respiratory tract infection. Although the doctors, who participated in Belongia and Schwartz's study, thought that 10% to 50% of the antibiotic prescriptions given to outpatients are unnecessary, they mention the main reasons for the overuse of antibiotics as "lack of education, prior experience, patients' expectations and economics" (2). In our study, residents also stated that patients' expectations and economics were the most important selection criteria. Macfarlane et al. also found that patients' expectations had a significant effect on prescribing (12). In our study, we found that our residents postponed prescribing if they or their relatives were the patients. This result is interesting as it indicates that patient factors are facilitative for common prescribing.

Maraha et al. investigated antibiotic prescribing in a Dutch university hospital and found that microbiological evaluations are performed in 88% of the therapeutic episodes and those clinical suspicions are confirmed microbiologically in only 61% of the episodes (13). In their study, 78% of the respiratory tract infection episodes are considered community-acquired, and 69% of them are not documented as microbiological. Prescriptions for respiratory tract infections are about 75% of the total community prescriptions (1). In our study, residents stated that respiratory tract infections were the most frequently seen type of infection among the outpatients, with a rate of about 54%.

In a previous study at SDU (14), the concordance between empirical antibiotic treatment and the results of antibiotic susceptibility tests were evaluated considering

78 patients who did not receive the appropriate empirical treatment. Despite the fact that the tests were not concordant in 59 of them (75.6%), their antimicrobial agents were not changed. Similarly, Maraha et al. showed that microbiological culture results infrequently influence antibiotic prescribing (15). In our study, residents stated that they generally depended on their clinical diagnosis if the test results were incompatible with the clinical diagnosis.

Many countries could reduce antibiotic use through educational campaigns and strategies (1). In a university hospital, antibiotic utilization was decreased after a policy that restricted antibiotic usage was implemented (16). Besides educating the public and primary care doctors, hospital clinicians need to be educated about this important issue (17,18), especially since the microbiology and infectious disease departments of medical schools have a strong influence on primary care doctors, medical students, and junior doctors (18,19).

Representatives from pharmaceutical industries perform face-to-face interviews with doctors in order to promote their products (2). In another study, performed among Turkish primary care physicians, it was found that doctors were highly influenced by drug company representatives and patients (20). Our study had similar findings.

There are also some limitations of this study. Although we did not research residents' actual prescribing behavior, we think that this study is important because there are limited data on the antibiotic prescribing habits and attitudes of residents, especially in Turkey. As we could not find a validated questionnaire for this study, we used an unvalidated. We did not follow up the residents who were absent or who did not volunteer, but, as the reply rate was high, we think that the results can be generalized for all of our residents in these 3 schools.

Clinical guidelines are needed to promote the judicious use of antimicrobials, and infectious disease departments can play a major role in this effort (2,17). We suggest that our residents from both the internal and surgical departments need continuous postgraduate education regarding rational antibiotic prescribing. Further investigations are needed to define the residents' actual criteria for prescribing.

## Conclusion

Our residents tend to write prescriptions mostly according to their patients' expectations and rely on their own clinical experience rather than on laboratory findings. As our residents stated in this study, they preferred to wait for test results for their relatives; consequently, this shows that prescribing can be postponed until test results are obtained. We also concluded that the availability of laboratory methods was not the only factor affecting common antibiotic prescribing.

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## Acknowledgments

We thank our participants and Onur Kaya, Hakan Ozdemir and Guler Yayli for their help in collecting the data, and we acknowledge Ms. Janice O. Vantrease for her grammatical review.

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