

Antibiotic Resistance Correlated to Patient Profile Factors in the Central Region of Romania

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Abstract

Antibiotics are a class of active substances that have significant impact in medicine. Antibiotic resistance grew to concerning levels. The way patients behave is one of the main factors contributing to the control of antibiotic resistance levels. According to the European Antimicrobial Resistance Surveillance Network, Romania is among the member states with the highest levels of antimicrobial resistance in Europe. The aim of this study was to identify the pattern of antibiotic use of patients from the center of Romania, and to highlight the behaviors that most contribute to the rise of antibiotic resistance. 996 patients responded to a specific 25 items questionnaire. All of them used antibiotics during their lifetime. 58.2% used antibiotics during the last 12 months. 94.4% declared they used the antibiotics in accordance to the prescription. 70.4% had more than one dose of antibiotics available at the end of the treatment. 41.5% tried to buy antibiotics without prescription. 74.2% knew that antibiotics are useful only against bacteria. 82.6% declared they have some knowledge about specific rules of antibiotherapy, but only half of them could mention some of those rules. Romanian patients need more knowledge about the use and side effects of antibiotics. Doctors and pharmacists form a team that focuses on the health of the patient. The prescription of antibiotics should be carefully planned to contain exactly the antibiotic most suited to each patient, the right dose and the right number of doses. The pharmacist, being the last health specialist that the patient sees before using the medicines, can help improve the situation by counseling the patients, underlining the rules and precautions associated to antibiotherapy and self-medication.

Keywords: Antibiotics; Antibiotic Resistance Levels; Romania; Patient Behavior; Counseling

Introduction

Antibiotics significantly decreased the incidence of infectious diseases and reduced morbidity and mortality

in patients, thus increasing their lifespan, but the effects of antibiotics are compromised by the rapid increasing of antibiotic resistance. Studies show that there is an

association between the increased usage of antibiotics and antibiotic resistance [1].

Antibiotic resistance consists in the ability of bacteria to evolve and hold out against the effects of antibiotics, and it is considered a significant cause of mortality all over the world [2,3]. The rates of antibiotic resistance can increase due to the incorrect choice of antibiotic, length of the treatment, irrational prescription or excessive usage in agriculture [4-6].

The World Health Organization defines the rational use of medicine as the way in which patients are treated with the medications that are appropriate for them, in doses that meet their requirements, for a well-established period and at the lowest costs. The irrational use of medicine occurs when one or more of these requirements are not met [7].

The aim of this study was to identify the pattern of antibiotic use of patients from the center of Romania, and to highlight the behaviors that most contribute to the rise of antibiotic resistance. Given the importance that antibiotics acquire in medical practice, the way they become more and more used, not necessary in a correct manner, the study took into consideration the degree of knowledge and how the term "antibiotic" is perceived by the population of Romania.

Materials and Methods

A specific questionnaire was conceived in order to assess the way patients report themselves to antibiotics. The study was carried out by statistical analysis of the answers obtained.

The questionnaire was distributed for 6 months (between October 2018 - April 2019, in the online environment, and could be redistributed by the participants. Statistical processing of responses was done using Google Docs.

There were 996 unique responses. The name of the persons who completed the questionnaire was not mentioned.

The questionnaire included 25 items, for 20 of them there were multiple choice answers, and in the case of 5 questions there was the possibility to answer by a short description or enumeration, depending on the requirement of the question. The questions were presented in 5 sections. In the first part, the socio-cultural

character of the respondents was established, by asking for information regarding age, sex and the environment of origin. In the second phase, information was requested on how people act when they have medical problems, to whom they call for health related information, what types of infections can be treated with antibiotics, if they have been prescribed and if they have purchased them or not, what type of infection was treated and with what antibiotic, if any adverse effects occurred or if they used other drugs during antibiotherapy. The third section was designed to identify the importance that people attach to the medication recommended by the doctor and pharmacist. The next section was meant to establish the effects that individuals hope to achieve after antibiotic treatment. Finally, the focus was on the knowledge of antibiotherapy principles and rules.

Results and Discussions

The majority of responses (95.0%) were attributed to the population aged 18 to 45, from the central area of Romania, 94.5% of the respondents were women, 72.3% from urban area.

All of them used antibiotics during their lifetime. This fact could be linked to the direct access to a physician and to a pharmacy. According to the annual report by the Pharmaceutical Group of the European Union (GPUE) for 2018, in Europe, the average share of pharmacies located in rural areas is 31%, 98% of the population can access a community pharmacy in less than 30 minutes, and 93% of the countries have night shifts [8].

A significant percentage of 90.3% declared they go to the doctor or ask the pharmacist for advice regarding their health, which suggests that people are aware of the risks they face by using medicines without requiring qualified assistance.

The respondents considered that antibiotics are useful against: bacteria (74.8%), viruses (5.1%), any microorganism (20.1%). The correct answer was selected by three quarters of the population. In this case it is encouraging that most of the population has basic knowledge about antibiotic efficiency, but still a large number of persons need to be educated regarding the therapeutic area of antibiotics. Lack of public knowledge and awareness is one of the main causes of antibiotic resistance in Europe [6].

During the last 12 months 580 of 996 persons underwent antibiotherapy, more than half of the survey

population. The data is consistent with the high rates of antibiotic use in Romania. The data processed by the European Surveillance System (TESSy) for 2012-2016 regarding the use of antimicrobials, obtained using the Anatomical Therapeutic Chemical (ATC) classification system and the defined daily dose methodology (DDD) developed by the Center for Cooperation of the World Health Organization (Oslo, Norway) provides a rough estimate of the proportion of the population treated daily with antimicrobials, being recommended as the main indicator for monitoring antibiotic consumption in the outpatient setting. In Romania, the total consumption of antibiotics for systemic use was 30 DDD / 1000 inhabitants / day, in comparison to the European average of 24 [9].

The most common infections treated with antibiotics were respiratory (28.1%), dental (20.0%) and urinary (19.2%). At the same time, 14.5% of the people who answered did not remember for what pathology the antibiotic was prescribed.

The following item, regarding the name of the prescribed antibiotic, offered the opportunity to write down the brand of the medicinal product. Only 200 respondents could mention an example. In general, the answers were not repetitive. From the answers obtained, the most frequent ones included representatives of beta-lactamines, for example amoxicillin whether associated with beta-lactamase inhibitors, ciprofloxacin, cefuroxime. The answers can be linked directly to the treatment of the most common infections declared above. The presence of cefuroxime (second generation cephalosporin) in top three antibiotics mentioned by the public can be alarming.

The patients declared they used the antibiotic in accordance to the prescription (94.4%). Regarding antibiotics, non-compliance with their administration can have significant consequences. In most cases, patients do not comply with treatment for several reasons. Some patients find that there is no need to respect the duration of treatment when they see positive changes in their health even after 1-2 days of treatment. On the other hand, another reason why treatment is not adhered to is that people forget to use it at fixed times or stop taking it so as not to develop side effects, such as diarrhea [10]. Side effects were present for 14.4% of the patients. Among the side effects people know and can recognize, from 512 answers, the most common are: allergies, nausea, vomiting, stomach pain and diarrhea, fungal infections with *Candida sp.*, impaired intestinal flora and development of resistance to antibiotics.

A total of 600 respondents (60.2%) purchased antibiotics for children or other members of the family. The answers may also be influenced by the age distribution of the lot, the majority being women between the ages of 18 and 45, possible mothers. In Europe, children presenting fever were prescribed antibiotics in various proportions from 19% to 64% [11]. From this point of view, the results from Central Romania are in accordance to other studies. Preparation of antibiotic suspensions for children was considered difficult by 27.9% of the respondents. Treatment errors due to incorrect antibiotic preparation may occur, such as: the use of too large or too small water quantities, shaking or not shaking the product before administration, or usage of the medicinal product for too long after the preparation [12].

One or more antibiotic doses were still available for 71.4% of the patients at the end of the prescribed treatment. The remaining antibiotics were caused by poor adherence to therapy or by an exceeding quantity of prescribed antibiotics in relation to the duration of treatment.

Regarding the usage of antibiotics together with other medicine, 68.7% of the respondents declare that they used antibiotics associated with other medicine, and 31.3%, that they used antibiotics in monotherapy. For the usage of more medicine at a time, several aspects have to be considered, like: the possibility of enhancement of adverse reactions and medicine interactions.

According to the 559 responses, the most frequent medicines administered together with antibiotics are probiotics, analgesics, anti-inflammatories, antipyretics, proton pump inhibitors, antiallergics, antitussives, antispasmodics, expectorants and bronchodilators.

A significant percentage of 95.2% of the respondents use antibiotics only after an examination at the doctors' office. This means that people are aware that an antibiotic therapy is efficient when prescribed by a specialist. 2.6% of the respondents declare that they use antibiotics whenever they feel ill and do not manage to consult a doctor or go to the pharmacy for advice, and 2.2% of them declare that they use antibiotics regardless of the nature of their condition.

In 2018, The World Health Organization (WHO) released a report of surveillance regarding antibiotic consumption, which presented the antibiotic consumption of 65 countries and areas. The results show

that the studied countries and regions have extended variations regarding the quantities of consumed antibiotics. The overall consumption ranged from 4.4 to 64.4 DDD/ 1000 inhabitants/day [13].

The acquisition of antibiotics without a prescription was intended by 41.5% of the respondents with the purpose of getting better sooner, but only 35.7% of them succeeded to purchase these medicines, due to the legislation that permits the administration of an emergency dose of antibiotic.

82.6% of the respondents have learned the rules that have to be followed when taking antibiotics from the doctor and from the pharmacist, and 17.4% are having trouble remembering these aspects after the treatment is over.

The pharmacists' role in the decreasing of irrational antibiotic consumption is very important due to their interaction with the patient and their counseling skills [14].

Conclusions

Antibiotics possess a great significance regarding human health. Due to their usage in bacterial infections, much pathology that in the past were considered deadly, nowadays can be cured.

All the 996 respondents that participated in this study have knowledge about the existence of these medicines. The benefits of the antibacterial compounds are well known and are associated with the eradication of infections of bacterial etiology. Most of the respondents have correct information regarding the main risks that are implied when antibiotics are used improperly, and they have knowledge about the way they should be administered. The association of antibiotics with other medicines has proven to benefit the patients due to the increase in the efficacy of the treatment and the alleviation of the infection's associated symptoms.

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