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Sources of information about antibacterial drugs and antibiotic resistance: results of the study in the Republic of Belarus

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ABSTRACT

Aim. To analyze sources of information about antibacterial drugs and antibiotic resistance among the population in the Republic of Belarus.

Materials and methods. The social study included 1,405 people from all regions of Belarus.

Results. The main sources of information about antibacterial drugs were doctor's knowledge (59.4%), medication instructions (45.5%), the Internet (22.7%), and personal (past) experience of using antibacterial drugs (21.0%). In the extended analysis, it was found that in most cases, information about antibacterial drugs was received from a doctor by people with lower-middle income, medication instructions were used more often by respondents with upper-middle income, while individuals with higher education were more likely to receive information from the Internet.

Conclusion. To increase awareness of the population of antibacterial drugs, income, age, and socio-occupational characteristics should be considered. Working with health professionals is also essential: holding annual training events in medical organizations and pharmacies, organizing internships for professional development, conversations with patients during doctor's visits, placing information about the correct use of antibacterial drugs in medical organizations in the form of posters, leaflets, and videos.

Keywords: antibacterial drugs, sources of information, antibiotic resistance, population, Republic of Belarus

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Источники информации об антибактериальных препаратах и антибиотикорезистентности: результаты исследования в Республике Беларусь

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РЕЗЮМЕ

Цель. Проанализировать источники информации об антибактериальных препаратах и антибиотикорезистентности среди населения в Республике Беларусь.

Материалы и методы. В социологическом исследовании приняли участие 1 405 человек из всех областей Республики Беларусь.

Результаты. Основными источниками информации населения об антибактериальных препаратах являлись знания врача (59,4%), инструкции к лекарственным препаратам (45,5%), Интернет (22,7%) и личный (прошлый) опыт применения антибактериальных препаратов (21,0%). При расширенном анализе выявлено, что в большинстве случаев информацию об антибактериальных препаратах от врача получали лица со средним финансовым положением, инструкции к лекарственным препаратам чаще остальных использовали респонденты с финансовым положением выше среднего, а лица с высшим образованием чаще получали вышеуказанную информацию из интернет-источников.

Заключение. Для увеличения охвата информированности населения об антибактериальных препаратах необходимо учитывать их финансовую, возрастную и социально-профессиональную категории. Важным также является работа с медицинскими работниками: проведение ежегодных обучающих мероприятий в медицинских организациях и аптечных пунктах, стажировка с целью повышения квалификации, проведение тематических бесед с пациентами на приеме, размещение информации в медицинских организациях в виде плакатов, роликов и буклетов о правильном приеме антибактериальных препаратов.

Ключевые слова: антибактериальные препараты, источники информации, антибиотикорезистентность, население, Республика Беларусь

Конфликт интересов. Авторы декларируют отсутствие явных и потенциальных конфликтов интересов, связанных с публикацией настоящей статьи.

Источник финансирования. Авторы декларируют отсутствие внешнего финансирования для проведения исследования и публикации статьи.

Соответствие принципам этики. Исследование одобрено этическим комитетом по экспертизе социологических исследований в сфере общественного здравоохранения при ГомГМУ (заключение № 2 от 03.03.2023).

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INTRODUCTION

Antibiotic resistance is currently one of the most important problems in public health. The decreasing number of new antibacterial drugs (AD) entering clinical practice is aggravating the situation. As a result, treatment of infections caused by resistant strains of microorganisms is time-consuming and costly and sometimes leads to reduced quality of life or a lethal outcome in patients [1, 2].

One of the reasons for the development of antibiotic resistance is irrational use of ADs. To optimize this situation, a number of initiatives are underway at national, international, and global levels, requiring continuous education of physicians and patients, as well as dissemination of information supported by a strong evidence base [3, 4].

According to the meta-analysis conducted by S. Schuts et al. in 2016, such factors as empirical prescription of ADs in accordance with clinical protocols, de-escalation of antimicrobial therapy, switching from intravenous to oral administration, therapeutic drug monitoring, use of a limited list of antibiotics and counseling patients on rational use of drugs are the most important goals in antibiotic resistance prevention programs [5]. However, achieving the effectiveness of prevention programs is impossible without sufficient public awareness of antibacterial drugs. The main goal of public awareness campaigns should be to support the correct use of ADs, which can be transferred into practice through competent coordination, professional communication, and citizen education.

To analyze the rationality of antimicrobial use and knowledge about antibiotic resistance among different population groups in the Republic of Belarus, it is reasonable to study the main sources of information.

MATERIALS AND METHODS

In the present study, the online questionnaire method (CAWI) was used. The questionnaire was validated using the focus group method ($n = 15$). The final version of the questionnaire included 28 questions that constituted six blocks. The developed questionnaire presented: general characteristics of respondents; prescription and purchase of antibacterial drugs; frequency and peculiarities, as well as rationality of taking antibacterial drugs by the population of the Republic of Belarus; knowledge and sources of information of the population about antibacterial drugs and antibiotic resistance. According to the main characteristics: sex, age, level of education, type of

settlement, the sample represents the population of the Republic of Belarus. The electronic questionnaire was filled in for all regions of the Republic of Belarus using the Google platform.

Statistical analysis of the results was performed using the Statistica analytical package (Version 10-Index, StatSoft Inc, USA) and R-studio. Before applying the methods of descriptive statistics, the type of distribution of quantitative variables was determined using the Shapiro – Wilk criterion. For traits with normal distribution, the arithmetic mean and the standard deviation $M \pm \sigma$ were calculated. For traits with a distribution other than normal, the median and the lower 25th and upper 75th quartiles Me (LQ ; UQ) were calculated. The Mann – Whitney test was used to assess statistical significance between unrelated groups. The Kruskal – Wallis test was used to compare three or more samples. Differences were recognized as statistically significant at p (observed) < 0.05 , unless the use of Bonferroni correction was discussed. In this case, statistical significance was estimated at p (observed) $< 0.05/k$, where k is the number of hypotheses under consideration.

RESULTS

The conducted sociological research covered all regional centers of the Republic of Belarus. The total number of respondents amounted to 1,405 people, of which 21.8% ($n = 306$) were men, 78.2% ($n = 1,099$) were women, the average age was 40.7 ± 13.3 years.

In terms of socio-professional categories, the majority of participants (76.1%, $n = 1,069$) belonged to the groups of workers/employees/specialists, as well as to the group of people with middle income (43.1%, $n = 606$). Half of the respondents had higher education (54.9%, $n = 772$), and one third had technical or specialized secondary education (34.7%, $n = 487$).

Fifty-five percent ($n = 419$) of the respondents received information about the correctness of antibiotic use over the last 12 months, of which 75.2% ($n = 316$) would like to continue to receive new data on the above-mentioned topics.

The most popular topics presented to the participants for selection as additional information were rational use of ADs (79%), antibiotic resistance (54%), use of AD in food and agriculture (26%) (Fig. 1).

Based on the conducted research, it was revealed that one of the risk factors for self-medication of AD was the lack of public awareness about these drugs.

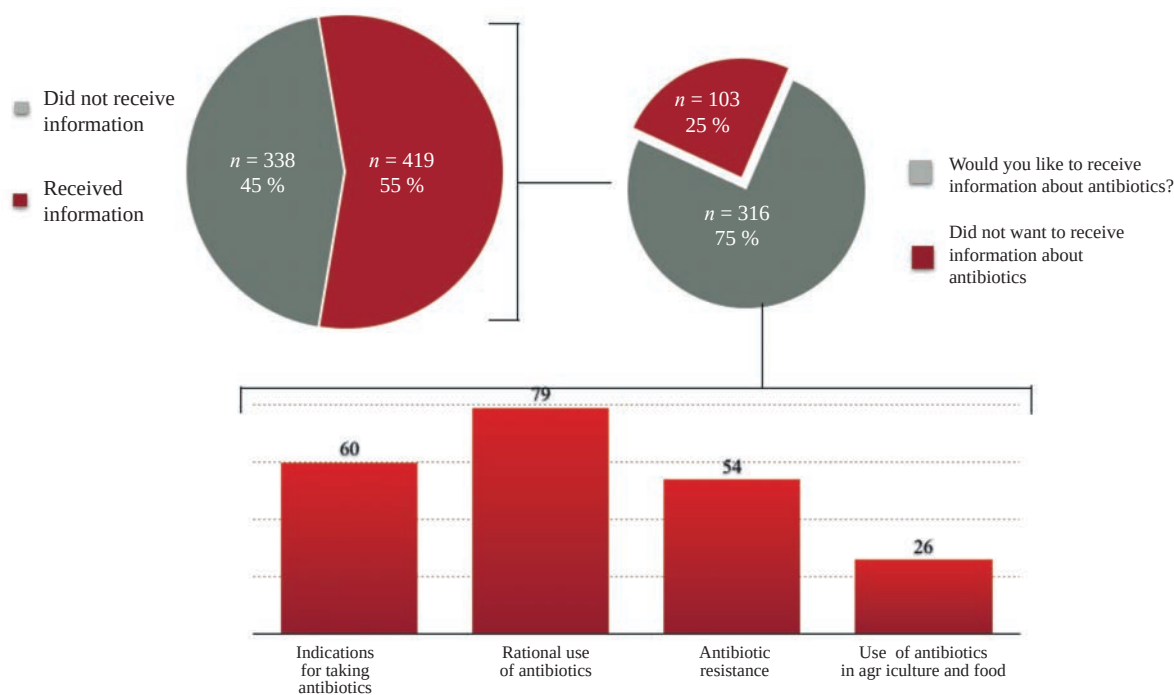


Fig.1. Relevant topics for additional information

Statistically significantly more respondents who did not receive information about the optimal AD use and believed that all ADs were over-the-counter medicines were self-medicating respondents compared to participants who took ADs as prescribed by the doctor (66.7 vs. 80.2%, $p < 0.05$). At the same time, there were fewer citizens who expressed a desire to receive additional information about rational use of AD (17 vs. 26.7%, $p < 0.05$).

According to the questionnaire, each respondent was offered 13 options for sources of information about ADs. The obtained data show that in most cases

citizens used doctor's knowledge (64.9%), medication instructions (39.9%) and the Internet (23.5%) as the main sources of information about ADs (Fig. 2).

The majority of middle-income citizens received information about ADs from a doctor (72%; $p < 0.005$) compared to other respondents. The main source of information for 42.1% ($p < 0.05$) of the respondents with upper-middle income was medication instruction. Those with higher education more often preferred to obtain the above information from Internet sources, as well as from brochures and posters in medical organizations (28.7 and 13.3%, respectively; $p < 0.05$).

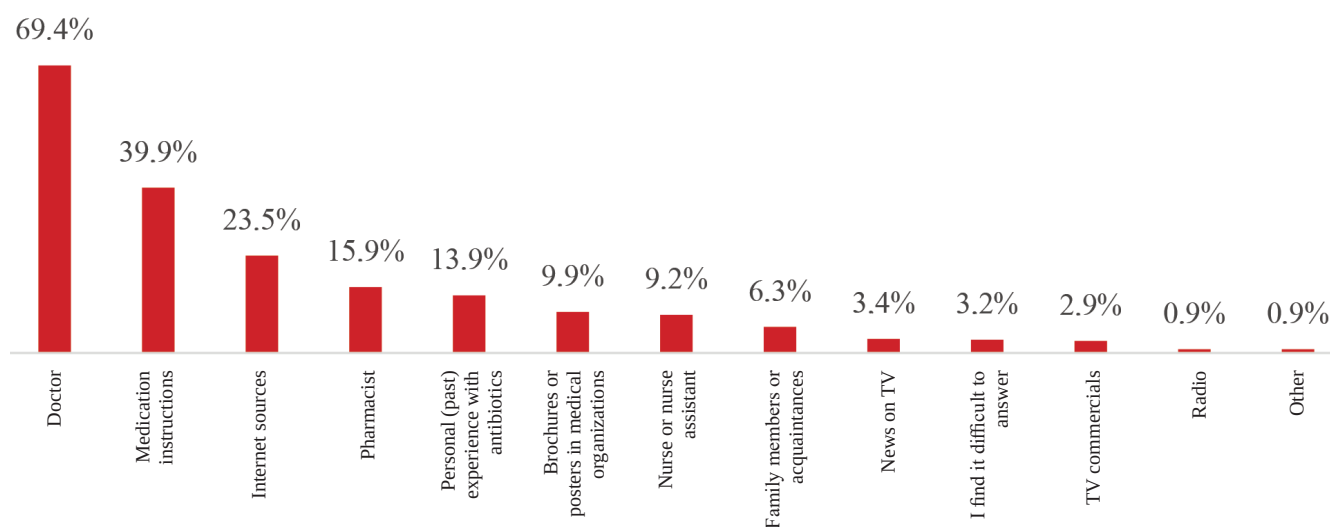


Fig. 2. Sources of information about antibacterial drugs

It is worth noting that the group of persons over 65 years of age from the socio-professional category of pensioners (11.2 and 11.5%, respectively ($p < 0.05$)) relied on TV commercials broadcasting information about ADs. Instructions to medicines as the main source of information about rational use of AD were

used by 52.9% ($p < 0.05$) of the respondents over 35 years from the group of employees / managers. Physician's knowledge as the main source of information about ADs was selected in the group of persons with secondary education (72%, $p < 0.05$) (Table 1).

Table 1

Distribution of the Respondents Depending on Sources of Information about Antibacterial Drugs										
Parameter		Physician, % ($n = 525$, 69.3%)	Medication instruction, % ($n = 302$, 39.9%)	Internet sources, % ($n = 178$, 23.5%)	Personal (past) experience, % ($n = 105$, 13.9%)	Pharmacist, % ($n = 120$, 15.8%)	Medical nurse/ paramedic, % ($n = 70$, 9.2%)	TV commer- cials, % ($n = 22$, 2.9%)	Family members or acquaint- ances, % ($n = 48$, 6.3%)	Brochures or posters in health care organizations, % ($n = 75$, 9.9%)
Age groups	18–24 years	76.2	44.0	19.0	11.9	23.8	13.1	2.4*	9.5	7.1
	25–34 years	73.9	44.9	28.4	17.6	19.9	10.2	1.7*	5.1	11.9
	35–44 years	70.8	37.6	22.3	11.9	13.9	6.9	1.5*	1.9	8.9
	45–54 years	65.9	38.9	29.9	16.7	10.4	6.9	2.8*	7.6	12.5
	55–64 years	64.0	34.8	16.9	11.2	12.4	10.1	3.4*	10.1	11.2
	65+ years	58.1	37.1	14.5	9.7	17.7	12.9	11.2*	11.2	3.2
Socio-professional category	Manager	72.5	52.9*	19.6	11.8	11.7	7.8	3.9	3.9	17.6
	Self-employed	44.0	20.0	20.0	20.0	12.0	4.0	0.0	8.0	0.0
	Entrepreneur	80.0	10.0*	25.0	0.0	20.0	20.0	5.0	0.0	5.0
	Employee/ specialist	71.3	42.3	25.2	15.2	15.7	9.1	1.9*	5.5	10.2
	Unemployed	55.6	11.1*	33.3	11.1	16.7	0.0	5.6	11.1	16.7
	Pensioner	60.7	31.1	16.4	8.2	18.0	14.8	11.5*	14.8	4.9
Income	Student	68.2	45.5	4.5	9.1	22.7	4.5	0.0	9.1	9.1
	Extremely low	23.8*	23.8*	19.0	9.5	9.5	4.8	0.0	9.5	14.3
	Low	70.5*	31.8*	18.6	15.5	18.6	8.5	2.4	10.1	6.2
	Middle	72.0*	43.4	23.3	12.9	16.0	10.4	2.5	5.9	8.2
	Upper-middle	69.2*	42.1*	29.9	14.9	17.2	9.9	4.1	4.9	14.5
	High	20.8*	36.8	14.7	13.2	7.4	4.4	2.9	4.4	8.8
Level of education	Completed secondary	75.9	22.4	6.9*	6.9	24.1	13.8	3.4	12.1	3.4
	Secondary vocational	70.9	30.5	20.7	11.6	16.5	12.3	2.1	6.3	7.0*
	Unfinished higher education	58.1	38.7	16.1	9.7	19.4	13.2	3.2	9.7	6.5
	Higher education	68.1	49.6	28.7*	16.9	13.8	6.8	3.4	5.2	13.3*

* $p < 0.05$ between the groups.

Based on the results obtained in the course of the sociological survey, the respondents were

characterized depending on their trust in sources of information about AD (Tables 2, 3).

Table 2

Characteristics of the Respondents Depending on Their Trust in Sources of Information about Antibacterial Drugs	
Source of information	Respondent characteristics
Physician	Female 43.7±14.2 years old, who bought AD according to the doctor's prescription, followed the doctor's recommendations for the use of APs, had a high mean score of knowledge about AD, received information about the correct use of AD during the last 12 months
Instructions to AD	A woman who purchased AD from a pharmacy without a doctor's prescription, self-medicated, used leftover AD from a previous course of treatment, with higher education and a high average score of knowledge about AD, who expressed a desire to receive more information about AD
Internet sources	A person who purchased AD without a doctor's prescription, with higher education, who had a high average score of knowledge about AD, and expressed a desire to expand their knowledge about AD
TV commercials	A person 50.2 ± 16.8 years old who took AD following the advice of a pharmacist, with a low mean score of knowledge about AD
Personal experience	A person with higher education, who took AD following the advice of family members or acquaintances, engaged in self-treatment, at the same time having a high average score of knowledge about AD and willing to expand their knowledge about AD

Table 3

Characteristics of the Respondents Depending on Sources of Information about Antibacterial Drugs										
Parameter	Source of information about antibacterial drugs									
	Physician		Medication instruction		Internet sources		TV commercials		Personal (past) experience	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Female gender, %	77.5	68.9	80.8	70.9	–	–	–	–	–	–
Settlement type – village, %	–	–	5.9	15.8	–	–	–	–	–	–
Age, years	40.7 ± 13.7	43.7 ± 14.1	–	–	–	–	50.2 ± 16.8	41.4 ± 13.7	–	–
Higher education, %	–	–	62.9	42.4	61.8	47.2	–	–	61.9	48.8
Pensioners, %	–	–	–	–	–	–	4.5	7.3	–	–
Took antibiotics in tablet (capsule) form	95.2	87.1	–	–	–	–	81.8	93.1	–	–
Took antibiotics in syrup form	0.8	2.6	–	–	–	–	9.1	1.1	–	–
Took antibiotics in the form of an ointment			–	–	–	–	–	–	2.9	0.6
Purchased antibiotics following a prescription or received them during hospitalization, %	64.6	52.2	–	–	–	–	–	–	–	–
Purchased antibiotics from a pharmacy without a doctor's prescription	37.1	46.6	47.0	35.4	49.4	37.1	–	–	58.1	37.1
Received antibiotics from family members / acquaintances	–	–	–	–	–	–	–	–	3.8	1.2
Took leftover antibiotics from the previous treatment, %	–	–	10.9	4.6	–	–	–	–		
The source of antibiotic prescription is the physician	89.3	62.9	–	–	–	–	–	–	74.3	82.4
The source of antibiotic prescription is the paramedic	1.1	3.4	–	–	–	–	–	–	–	–
Source of antibiotic prescription is the pharmacist	–	–	–	–	–	–	31.8	3.9	–	–
The source of antibiotic prescription is users in the Telegram channel	–	–	–	–	–	–	4.5	0.0	0.9	0.0
The source of antibiotic prescription is a family member or acquaintance	1.9	6.5	–	–	–	–	–	–	–	–
Self-medication with antibiotics.	9.3	21.1	19.5	8.6	–	–	–	–	22.9	11.3
Rational use of antibiotics, %	49.3	40.5	–	–	–	–	–	–	–	–
Completed the full treatment course with antibiotics, %	89.3	80.6	–	–	–	–	–	–	–	–

End of table 3

Parameter	Source of information about antibacterial drugs									
	Physician		Medication instruction		Internet sources		TV commercials		Personal (past) experience	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Had tests performed before the initiation of antibacterial therapy	57.3	38.4	–	–	–	–	–	–	–	–
Average score of knowledge about antibiotics	11.5 ± 2.2	10.5 ± 2.8	11.7 ± 2.1	10.8 ± 2.5	11.8 ± 2.2	10.9 ± 2.4	9.8 ± 3.1	11.2 ± 2.4	11.6 ± 2.3	11.1 ± 2.4
Were aware of the ban on the sale of antibiotics without a doctor's prescription, %	81.7	68.1	81.8	74.7	–	–	–	–	–	–
Received information on correct antibiotic use in the last year, %	50.5	31.5	–	–	57.3	40.8	–	–	–	–
Would like to receive more information about antibiotic resistance	–	–	26.8	19.6	–	–	–	–	33.4	20.9
Would like to receive more information about the rational use of antibiotics	–	–	42.7	26.8	39.3	31.3	–	–	45.7	31.1
Would like to receive more information about the indications for antibiotic use	–	–	28.8	22.2	–	–	–	–	–	–
Would like to receive more information about the use of antibiotics in agriculture	–	–	14.2	8.8	17.4	8.9	–	–	–	–

Note. The table shows values at which $p < 0.05$ when comparing variables within groups for positive and negative answers from the respondents.

DISCUSSION

When comparing the data obtained in the present study with the results of a one-stage observational study in the Russian Federation ($n = 2,725$, 2023), the similarity of information sources about ADs was noted [6]. The top three most common information sources were knowledge and opinion of a doctor (69.4% in the Republic of Belarus and 59.4% in the Russian Federation), medication instructions (39.9% in the Republic of Belarus and 45.5% in the Russian Federation), and Internet sources (23.5% in the Republic of Belarus and 22.7% in the Russian Federation). According to the study by S. Miyano et al. [7], involving 2,045 respondents, doctors and paramedics (46.3%) were also the main source of information about the rational use of ADs, followed by an advice from family members or friends (38.9%) and mass media (26.1%). In an Italian study

by R. Zucco et al. with 913 participants, it was found that 73.4% of the respondents received information about ADs from the Internet, and 45% preferred messengers [8].

At the same time, the Republic of Belarus had twice as large a proportion of citizens who received information about the harm of incorrect AP use in the last year (55.0%, $n = 419$) compared to citizens from the Russian Federation (23.6%, $n = 642$). The proportion of citizens who wanted to receive information about ADs was identical in both countries (75.2% in the Russian Federation and 75.0% in the Republic of Belarus). The risk group of low public awareness about ADs in both countries was also identical: men with low income, who took ADs without a doctor's prescription following the advice of family members or acquaintances, who self-medicated and did not use drugs normalizing intestinal microflora.

According to the results of the study, obtaining information about the rational use of AD over the last 12 months, and following the recommendations and using the knowledge of a doctor as the main source of information about AD contributed to a decrease in the number of respondents who self-medicated and, as a consequence, to more correct use of ADs. This trend is typical of both the Republic of Belarus and the Russian Federation.

CONCLUSION

Thus, there is a need to raise public awareness of antibiotic resistance and increase commitment of citizens to optimal use of ADs. Income, age, and socio-professional categories of the population should be taken into account to elevate awareness of the population around ADs.

Working with health professionals is also essential: holding annual training events in medical organizations and pharmacies, organizing internships for professional development, holding conversations with patients during doctor's visits, placing information about the correct use of antibacterial drugs in medical organizations in the form of posters, leaflets, and videos.

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Author Contribution

Kolchanova N.E. – literature review, acquisition and interpretation of the data, drafting the article, final approval of the manuscript for publication. Sharshakova T.M. – coordination of the study, critical revision of the manuscript for important intellectual content, final approval of the manuscript for publication. Braga A.Y. – literature review, interpretation of the data, compilation of the database, final approval of the manuscript for publication. Chigrina V.P. – statistical processing of the data, critical revision of the manuscript for important intellectual content, drafting the article, final approval of the manuscript for publication. Tyufilin D.S. – acquisition and interpretation of the data, compilation of the database, final approval of the manuscript for publication. Kobayakova O.S. – conception and design of the study, coordination of the study, final approval of the manuscript for publication. Stoma I.O. – coordination of the study, final approval of the manuscript for publication.

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