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The antibiotic knowledge, attitudes and behaviours of patients purchasing antibiotics with prescription in Russia: a qualitative, comparative analysis

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Objectives: The study aimed to investigate behaviour, knowledge and practices towards antibiotic (AB) use among patients who purchased ABs with a prescription across Russia.

Methods: Semi-structured interviews conducted in all eight Federal Districts, Moscow and Saint Petersburg in 2022 by 21 researchers trained specifically for this study. Data were analysed using a directed content analysis approach.

Results: In total, 151 respondents were interviewed. Respiratory symptoms were the most common reason for AB prescription. The majority of patients discussed their complaints with family members or friends before consulting the physician and occasionally looked for information on antimicrobial treatment on the internet. The decision to use an AB was usually made by the physician, although patients often anticipated its prescription. Respondents typically chose to go to the nearest drug store to pick up the medicines, not seeking any recommendation from the local pharmacists. The level of knowledge about the effects of ABs was generally low. In most cases, patients were not aware of antimicrobial resistance and rarely recalled any information campaigns targeting prudent AB use. Respondents admitted COVID-19 had an impact on their behaviour: they have become more caring towards their health, but less likely to seek medical care because of the risk of infection.

Conclusions: Our findings, in particular low awareness of the population about the effects of ABs and antimicrobial resistance, peculiarities of attitudes and behaviour (significant influence of the environment, tendency to self-diagnose, fairly high level of trust in doctors etc.) can be useful for the development of effective initiatives aiming for prudent AB use.

Introduction

Antimicrobial resistance (AMR) remains a global worldwide threat, reducing the treatment effectiveness of a wide range of infections and substantially increasing healthcare expenditure.[1,2] Factors contributing to the spread of AMR are numerous: the prescription of the same classes of ABs in humans and animals; their unwise utilization in livestock production; inappropriate AB use by physicians; and self-medication by patients.[3–5]

One of the reasons for the irrational AB use is insufficient knowledge of antimicrobials' mechanisms of action, expected effects, and consequences of overuse, which are observed both among the healthcare professionals and the patients.[6–9] This is much complicated by the availability of over-the-counter ABs and the tendency of the population to self-medicate, which exists in different countries, including Russia.[10–12]

Numerous studies have examined the potential impact of patients on AB use practices around the world, identifying significant differences in patients' levels of knowledge, motivation for self-medication and relationships with physicians and pharmacists.[13–17] In Russia, such in-depth analyses are still few in

number, and they have been carried out in individual cities (Smolensk) or regions (northwestern part), which may not reflect what is happening in other parts of the country.[18,19]

Thus, the aim of this study was to explore AB knowledge, attitudes and behaviours of patients across Russia in order to explore the underlying reasons for inappropriate AB use and target more effective AB stewardship interventions.

Methods

The study was conducted from February 2022 to June 2022 and covered all Federal Districts (FDs) of the Russian Federation: Central, North-Western, Southern, Volga, Ural, Siberian, Far-Eastern and North Caucasian FD and the two largest cities (Moscow and Saint Petersburg).

Qualitative semi-structured interviews were chosen as the recommended method of examining knowledge about drug use, attitudes and behaviour of patients, in order to gain a deeper understanding of the culture associated with this phenomenon.[20] Interviews were conducted with respondents who had a consultation with a physician that resulted in an AB prescription. Respondents who had purchased an AB in a community pharmacy without a prescription were also analysed, with the results published separately (another part of this nationwide survey).[21]

Training of research teams

All interviewers completed an online training course led by three researchers from the University of Copenhagen. The training included a practical part with a trial interview, its recording and analysis with individual feedback.

Study population and inclusion criteria

The study recruited adults over 18 years old who were taking any systemic AB for the treatment of infectious disease within the last 3 months.

Table 1. Cities participated in the study

FD/centre	City	Population size, *n*	Total number of respondents
	Moscow	12 655 050	13
	Saint Petersburg	5 384 342	6
Central	Smolensk	26 595 950[a]	27
	Yaroslavl		
North-Western	Arkhangelsk	8 557 658[b]	9
	Kaliningrad		
Southern	Volgograd	16 482 500	16
	Krasnodar		
Volga	Saransk	29 070 800	28
	Kazan		
Ural	Tyumen	12 329 500	14
	Chelyabinsk		
Siberian	Novokuznetsk	17 003 900	18
	Krasnoyarsk		
Far-Eastern	Yakutsk	8 124 000	9
	Vladivostok		
North-Caucasian	Grozny	9 967 300	11

[a]The total population of the Central FD excluding Moscow.
[b]The total population of the North-Western FD excluding Saint Petersburg.

Residents aged 75 years and older were excluded due to difficulties in reproducing detailed facts of AB use.

The number of respondents in each FD was determined in proportion to its share in the total population of the Russian Federation (Table 1). Each FD was represented by two cities/towns. Stratified random sampling of respondents was based on gender (male/female), age, education and place of residence (urban/rural) to be representative of the total population. The age intervals were as follows: 18–44, 45–59 and 60–74 years. According to the level of education, the participants were divided into three groups: higher education (HE), secondary education (SE) and general education (GE). The distribution of respondents for each criterion was based on data from the Federal State Statistics Service.[22]

Recruitment process

In most cases, respondents were selected by professional networks (friends of friends, social networks) and using a 'snowball' recruitment strategy. The method of searching for respondents was not predefined, but was specified in each case.

Data collection

A total of 21 researchers from 18 cities/towns—doctors, pharmacists, a psychologist (Novokuznetsk) and a sociologist (Smolensk)—conducted the interviews. One interviewer supervised one city (excluding Moscow, Saint Petersburg and Arkhangelsk, which had two researchers each).

The interview guide included several parts providing the details about the process of making a diagnosis and decision on issuing a prescription for ABs, reasons for choosing a particular pharmacy, where and how an AB was purchased, satisfaction with the process of buying ABs, attitude towards ABs and AMR etc.

The interviewer had to ask all participants all the questions presented in the interview plan, but the questions could be worded slightly differently than indicated in the interview guide while maintaining their meaning. Interviewers were able to ask spontaneous screening questions to get as detailed descriptions as possible from the respondent.

All interviews were audio recorded and then transcribed by the interviewers. The transcripts were anonymous, and each transcript indicated the overall profile of the interviewee according to a list of various sampling criteria that were predefined. The consistency of the transcription of the audio recording of the interview was checked by the assigned researcher.

Data analysis

Based on the interview transcripts, a directed content analysis was applied.[23] Therefore, according to the topics in the interview guide, responses from transcripts of each interviewee were deductively identified. Extracts from one interviewee related to each topic of the interview guide were then compared with the answers of other survey participants in the same FD. The results were structured according to whether they showed the same trend in all FDs or showed signs of differences between centres. The analysis was carried out by two researchers independently; series of meetings were carried out to discuss the obtained results, regularities and deviations to form the unified joint decision on each FD and overall trends.

Ethics

This study was approved by the Independent Ethics Committee of Smolensk State Medical University, Protocol No. 239 dated 17 February 2022. Informed consent (oral or written) was obtained from every interviewee.

Results

Altogether, 151 interviews were conducted. Most respondents were women (57.6%); urban population prevailed (78.1%); and of those surveyed SE accounted for 48.3%, HE for 35.8% and GE for 15.9%. The detailed demographic characteristics of the respondents are given in Table S1 (available as Supplementary data at *JAC-AMR* Online).

Knowledge

Respondents' knowledge on the mechanism of action of ABs was superficial and not systematized; the majority answered that ABs affect microbes and microorganisms. Less commonly, respondents reported that ABs were effective against viruses. The level of knowledge of the majority of respondents from the Central FD and half of those surveyed from the Siberian FD reflected the general answer 'ABs have a positive effect on my body.' More detailed information about the respondents' views on the actions of ABs is presented in Figure 1.

The interviewees did not come across information campaigns or materials about rational AB use. Just a small proportion of the respondents noticed informational posters when they attended healthcare facilities or pharmacies or were able to recall commercials and shows on the internet and on television. In all cases, the result was the conceptualization of inappropriateness of self-use ABs and the requirement for consultation with a doctor. A small percentage of respondents from all FDs doubted whether they had seen any information campaigns about AB, because they could not remember anything about it. A different trend was revealed in Volga and Far-Eastern FDs, where the majority of respondents saw various information materials for public about proper AB use.

Attitudes

The vast majority of respondents experienced typical symptoms of respiratory tract infection. Most often, respondents had already encountered similar manifestations of the disease previously and described them as fever, sore throat, cough, running nose, dyspnoea and weakness. The respondents assumed they had various diseases: common cold, tonsillitis, COVID-19, bronchitis, sinusitis, influenza or pneumonia. As a rule, respondents consulted a doctor no later than 7 days after the onset of symptoms, and before seeking medical care they self-medicated with symptomatic therapy.

The most common reason for visiting a doctor was to get treatment for their persisting illness and the lack of improvement over time. However, among the primary reasons, some respondents of all FDs indicated the need to get sick leave or expressed their concern about possibly being contagious to their family members. The need to get a prescription became the reason to consult a physician for a respondent from Saint Petersburg because he had been previously denied the sale of an AB without prescription. One of the respondents from the Southern FD confessed she had always self-treated with ABs, and only the absence of ABs in the home first-aid kit forced her to see a doctor.

Only a small proportion of those interviewed in all FDs had no ideas about the possible illness they were experiencing. As a rule, in such cases, the desire of the respondent to know their exact diagnosis was the reason for contacting a doctor.

Interviewees from Central, Ural, Southern, Volga, Far-Eastern, North Caucasian FDs commonly did not seek the medical advice at the medical institution, but preferred to consult with friends or relatives who were working doctors. In this case, the overwhelming majority of consultations took place remotely—by phone or by Messenger. In one case in Siberian FD, the doctor was consulted not by the respondent, but by his wife.

The majority of respondents in all FDs reported they expected to get an examination, diagnosis and treatment from their doctor's consultation. Even before going to the doctor, most of them were inclined to believe that an AB would be necessary for treatment. Another trend was revealed in the Siberian FD, Saint Petersburg and Moscow, where the majority of interviewees did not expect to get an AB prescription. Respondents in the Ural FD equally expected the prescription of an AB by a doctor and hoped that an AB would not be needed.

The decision to use ABs was made by the doctor in the vast majority of cases. More often, the doctor did not involve the respondents in making a decision either about the start of AB therapy or the choice of a specific AB. A proportion of the interviewees (Central, North-Western, Far-Eastern, Ural FDs) regarded their agreement to use an AB as participation in the decision-making process.

The most frequently dispensed ABs by doctors' prescriptions in each FD are presented in Figure 2.

Interviewees described the purchase according to the scheme 'requesting AB—providing a prescription—purchasing AB'. No one had any difficulties with purchasing ABs. The majority of respondents provided prescriptions on their own initiative before receiving such a request from the pharmacist. A total of seven respondents (from Ural, Southern, Volga, Far-Eastern, North Caucasian, Siberian FDs) did not actually have a prescription for an AB, since the interviewees were consulted by familiar doctors through correspondence in Messenger, by phone, or at the unofficial address of relatives. In all cases, the purchase of the AB was successful: the respondent showed the pharmacist a screenshot of the dialogue with the doctor's prescriptions, or a verbal assurance of the prescription of the AB was sufficient.

Behaviour

Respondents from the Central, Ural, Siberian and Volga FDs strongly believed ABs should be used only after a doctor's prescription. Among the indications for the use of ABs, the interviewees also often mentioned bacterial aetiology of illness, severe course of the disease, long-lasting persistence of symptoms and failure of symptomatic therapy. 'When the body can handle itself', 'when it's just a common cold', 'when symptoms are mild', 'when there is no fever'—these are the answers how respondents described the cases when ABs should not be used.

Most of the respondents preferred to discuss their condition with friends and family and as a result received a recommendation to seek a doctor. More often, interviewees did not use the internet to search for information about the signs and symptoms as they believe they know enough about their disease or they do not feel it is trustworthy. Respondents in Saint Petersburg and Volga FDs, on the contrary, more often searched for information about their symptoms and possible diagnosis on the internet.

The majority of respondents did not find ABs in their home first-aid kit (Table 2). Some of the interviewees did not check

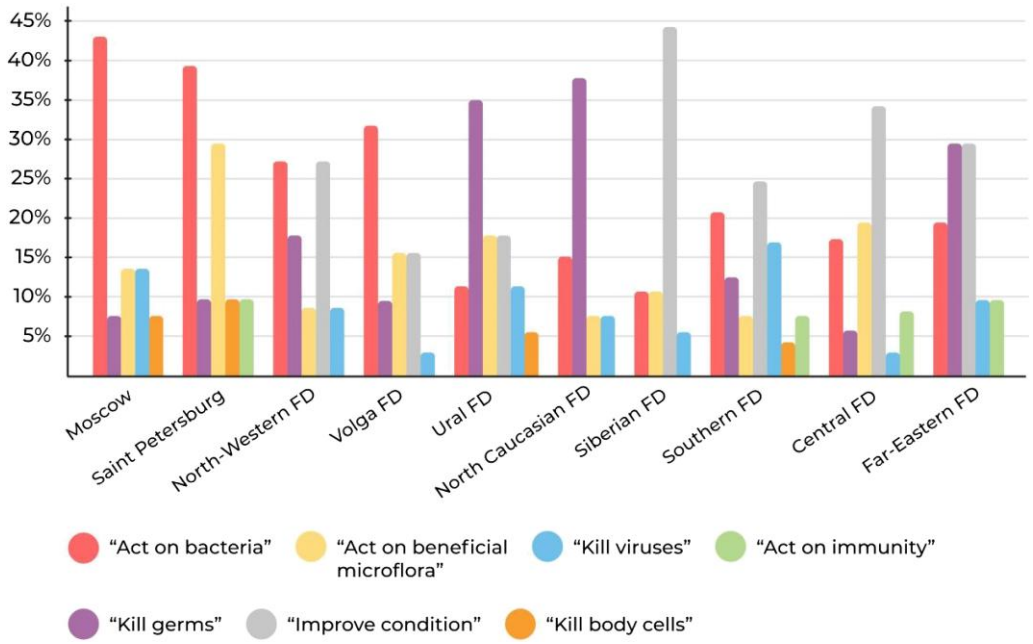

Figure 1. Structure of respondents' answers to the request to describe the mechanism of action of ABs. Respondents were unable to describe the mechanism of action of ABs in 23 cases (1 North-Western FD and Southern FD, 4 Central FD, 5 Siberian FD, 8 Volga FD).

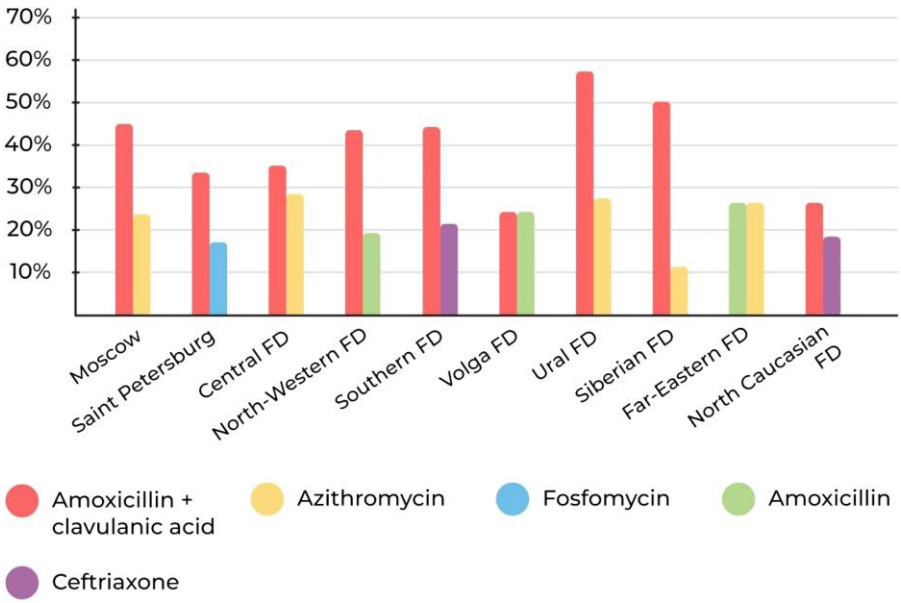

Figure 2. Top two ABs dispensed by doctor's prescription.

availability, being sure of a trouble-free purchase with having a prescription for an AB. Only two respondents from the Southern FD and one from the Siberian FD used ABs left over from previous treatment to start therapy in the described case. At the same time, all of the respondents still went to the pharmacy to purchase an AB in order to complete the full course of treatment.

Respondents admit that the COVID-19 pandemic had an impact on their behaviour in the described case: they were afraid for their health, followed anti-epidemic recommendations such as social distancing, were afraid of contracting a coronavirus infection in healthcare facilities, felt an increased responsibility to others, especially family members and colleagues at work. It forced the majority to contact a doctor immediately and to ask for sick leave. All the respondents preferred to call a doctor, rather than going to a healthcare facility.

Table 2. Features of storage and use of ABs from home first-aid kits

FD/centre	Total number of respondents	Availability of ABs in the first-aid kit[a], % (*n*)			Used ABs from first-aid kit, % (*n*)	
		Yes	No	Did not check	Yes	No
Moscow	13	0	69.2 (9)	23.1 (3)	0	100 (13)
Saint Petersburg	6	33.3 (2)	50 (3)	0 (0)	0 (0)	100 (6)
Central	27	3.7 (1)	63 (17)	11.1 (3)	0 (0)	100 (27)
North-Western	9	22.2 (2)	44.4 (4)	22.2 (2)	0 (0)	100 (9)
Southern	16	18.8 (3)	31.3 (5)	25 (4)	12.5 (2)	87.5 (14)
Volga	28	28.6 (8)	32.1 (9)	35.7 (10)	0 (0)	100 (28)
Ural	14	21.4 (3)	28.6 (4)	50 (7)	0 (0)	100 (14)
Siberian	18	16.7 (3)	44.4 (8)	38.9 (7)	5.6 (1)	94.4 (17)
Far-Eastern	9	0 (0)	66.7 (6)	33.3 (3)	0 (0)	100 (9)
North-Caucasian	11	18.2 (2)	45.5 (5)	36.4 (4)	0 (0)	100 (11)
Total	151	16 (24)	46.4 (70)	28.5 (43)	2 (3)	98 (148)

[a]Question about the availability of AB in the home first-aid kit was not asked in 14 cases (1 in Moscow, Saint Petersburg, North-Western FD and Volga FD, 4 in Southern FD, 6 in Central FD).

Discussion

It is well known that the process of obtaining and using ABs in outpatient practice depends on many factors, including the availability and cost of drugs, the quality of medical care, the level of knowledge of physicians and pharmacists, over-the-counter AB dispensing and many others.[10]

In our survey we focused on factors from the perspective of the patient with a prescription to learn more about AB use practices, their knowledge and attitudes.

Low awareness of ABs' actions and AMR

A significant variation in the level of knowledge of respondents about ABs was revealed. It's worth mentioning that the interviewees who were well aware of the mechanism of AB action also reported that they always used ABs on prescription and/or took them much less frequently during their lifetime. This is in line with the previous study showing that people who had not taken ABs recently had better health literacy than participants who used it in the previous 12 months.[24] However, in general, the level of knowledge indicated insufficient effectiveness of the existing system of informing the population about ABs and their proper use.

Unfortunately, respondents were not taking the AMR issue into consideration. Even if they expressed some concern about it, they were treating it more as a potential problem but not the existing one, which can directly affect the quality and effectiveness of their treatment. Our findings are consistent with the results of the systematic review by McCullough *et al.*[25] Nevertheless, one of the main reasons for going to the doctor was fear for the health of family members, which indicates a high level of responsibility of the respondents. Thereby these findings might be useful in guiding and refining the content of messages in public health campaigns and clinical consultations about AMR. Bakhit *et al.*[26] have shown that most participants were quite concerned about learning about resistance spread, suggesting this information could contribute to altering people's attitudes and behaviour towards AB use.

Many countries, including Russia, conduct local and national information campaigns aimed at raising public awareness and providing proper education on the use of ABs.[27–29] However, the majority of respondents in this study didn't notice any of these public outreach activities or didn't remember any information about it. This may indicate an incorrect choice of target audience and/or means of communication, requiring aims to change behaviour rather than just providing information when planning them in future.

Interpretation of attitudes to ABs

Not surprisingly, the most common reason for AB use in all FDs was acute respiratory infections. Both the decision to prescribe an AB and the choice of it were usually made by the physician, although patients often anticipated an AB to be prescribed in a particular case. At the same time, the interviewees did not expect doctors to discuss their decisions with them and were mostly satisfied with the quality of visit, which demonstrates a high degree of trust in doctors, as has been noted in other Russian studies.[18,19] It should be mentioned that there was a trend to ask the familiar healthcare professionals for medical help, often remotely. This may be a consequence of the pandemic-associated risks of infection, as well as evidence of a certain overload of outpatient physicians and difficulties to access appointments.

Participants typically chose to go to the nearest drug store to pick up the medicines. It is important to note that patients with a prescription did not expect any difficulties in going to the pharmacy and were not set up to receive any additional information from the pharmacist, treating the visit roughly like 'going to the store'. In this regard, it is unlikely that involving pharmacists in informing and educating patients can be effective in Russia.

Consolidated practice of behaviour

Our study showed that the patients' environment had a significant influence on their behaviour, including motivation to seek for the medical help. Regarding the internet, the interviewees

more often did not use it. Among the reasons for this behaviour, many patients stated the lack of need as they considered themselves quite experienced in recognizing symptoms on their own or were scared of getting unreliable information. This finding requires attention as for this particular target group there may be also the prejudice on the reliability of any web campaigns on rational AB use.

Regarding the availability of ABs, the majority of respondents reported they should be sold by prescription, as they are quite 'serious' drugs. Nevertheless, their conviction did not always correlate with actual behaviour—a significant proportion had leftover drugs in their home medicine cabinet, and the fact that patients did not use them was more likely due to understanding that the prescription provided an opportunity to freely purchase the drug, leaving the existing one as a reserve. This is consistent with other studies that suggest that the self-medication of patients seemed the normal practice and ABs can still be purchased without a prescription.[14–16,30–33]

Strength and limitations

This study has several limitations. Primarily, the limitations are due to the method itself—a semi-structured interview. Some shortcomings were identified during the interview on processing the data. Namely, some interviewers did not ask all questions from the structure of the interview; the result of this could be the omission of useful information in the study. The structure of the interview contained open-ended questions to generate narratives and probe during interviews on the answers received. However, the possibility of clarifying questions was not used by the interviewers in all cases. Situations were much less common, when the respondents misunderstood the question asked, but the interviewer, unfortunately, did not give explanations and did not try to reformulate the question.

As a rule, participants were recruited by the 'snowball method'; in rare cases, respondents were familiar with the interviewers, so they could intentionally describe a more competent examination by a doctor or mitigate shortcomings during the consultation.

The strength of this study is the number of surveyed respondents and interviewees from different regions of Russia. To our knowledge, currently it is the largest nationwide survey on this problem. The estimated sample for determining individual inclusion criteria for each participant was based on the data of the State statistics available at the time of the study. This allows us to consider that the results obtained can be extrapolated to the whole country.

During the study, many new aspects were identified regarding the knowledge, attitudes and behaviour of respondents in relation to ABs. This suggests that, despite the described limitations, qualitative research can be applied to study the practice of AB use in the population.

Conclusions

The AMR problem is complex and multifactorial, requiring an integrated approach to solving it. That is why, despite the enormous contribution of self-medication provoking a dramatic increase in AMR, it is crucial to evaluate and consider the features regarding the prescription use of ABs to develop more effective initiatives aiming for prudent AB use. Even considering the high level of patient trust in physicians, seeking medical help is not a routine behaviour, since respondents consulted a doctor only when their condition worsened. The reason for this behaviour is a common practice of self-diagnosis, insufficient level of knowledge about ABs and AMR, and the substantial influence of the environment, which were identified during the study. The pandemic played a significant role: respondents have become more responsible for their health, but at the same time they have certain fears when visiting the outpatient clinic, preferring to call a doctor at home or even for a remote consultation.

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Transparency declarations

No potential conflicts of interest were reported by the authors.

Author contributions

Conceptualization, S.R.; methodology, S.R. and P.Z.; investigation, S.R., P.Z., D.M., K.S., D.S.; writing—original draft preparation, S.R., P.Z. and I.P.; writing—review and editing, S.R. and R.K. All authors have read and agreed to the published version of the manuscript.

Supplementary data

Table S1 is available as Supplementary data at *JAC-AMR* Online.

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