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A study of the population's attitude to telemedicine technologies on the example of online medical consultations

Abstract. The new law "on telemedicine" requires the population's participation in its implementation. The expansion of new methods of medical consulting should take place in a science-based context. The goal of this research is to educe the attitude of the population to online consultation. 50 semi-structured interviews were conducted, analysis was used in analyzing the scripts. Main results are the picture of population's attitude to online medical consultation, and the structure of the barriers to development of ones. The population understands the imminence of such a format, but relegates it to "not really medical" services and has a narrow interpretation of the scope of online consultation application – in terms of expanding access to services, but not in terms of improving the quality of diagnosis, for instance, in attaining a "second opinion". Survey participants saw the advantage of this format in reducing the time spent and in leveling the territorial inequality in access to medical aid. Medical online consultations often cause distrust and anxiety (anxiety of inaccurate diagnosis, cost-saving at the expense of quality and fear of fraud). We have indicated three groups of barriers: patient and doctor availability, technical and regulatory availability of the healthcare system, and digital inequality in terms of age and geography. The respondents give the principal role in overcoming the barriers to the state, which reflects the general paternalistic attitude of the population in matters of health.

Key words. Healthcare economics, telemedicine management, online consulting, semi-structured interviews, Russia

JEL codes: D19, 51, I18, O33

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Introduction

This study aims to examine the attitude of the population towards the use of telemedicine technologies, in particular, online consultations, and give the idea of the position of these technologies in preserving health and providing medical aid. The description of the research methodology and its results is preceded by a brief overview of empirical studies of the advantages and barriers to the introduction of medical online consultations in foreign countries.

The theoretical framework on which this research relies in the approach to data analysis is based on the theory of diffusion of innovation and Hofstede's theory of cultural dimensions. According to the theory of diffusion of innovation, developed by Everett Rogers in 1962, personal characteristics of people influence the speed of their acceptance of innovations; five groups of the population are allocated — the innovators, early adepts, early majority, late majority and laggards [Rogers, 2010]. The adaptation process is also influenced by the characteristics of the innovation itself — relative advantage, compatibility, complexity, triability, observability [Rogers, Singhal, 2005]. Rogers' theory is successfully applied to study of introduction of digital technologies in healthcare — starting with Whitten & Collins [1997], who were the first to apply the theory of diffusion of innovation to telemedicine as a decentralised and constantly updated, "newly invented" technology, and in recent works dedicated to acceptance of telemedicine by medical staff, for instance, nurses [Taylor et. al, 2014], primary care patients [Zhang et al, 2015] for various diseases, for instance, diabetes [Lien, Jiang, 2016] and others. To explain the cultural differences, the authors also rely on Hofstede's theory of cultural dimensions, according to which the influence of society's culture on the values of the members of society that determine their behavior can be distributed in dimensions, such as individualism, uncertainty avoidance, power distance and masculinity [Hofstede, 1984].

Perspectives and barriers to implementation of online consultations in world medical practice

The first sessions, which are connected with the beginning of the development of telemedicine, were technologically complex operations — for example, the first laparoscopic intercontinental surgical operation, conducted more than twenty years ago in the United States with the participation of doctors from Canada. Today, the range of healthcare tasks that telemedicine enables performing goes beyond the traditional notions of surgeons operating at a distance of thousands of kilometers. Increasingly popular is the holding of online consultations and the receipt of a "second opinion". Telecardiology (remote transmission of electrocardiographic data for remote diagnosis and treatment of diseases of coronary heart disease, arrhythmia and other cardiovascular diseases) allows

for more reliable diagnosis and reducing the risk of cardiovascular disease, compared with traditional reception at a physicians office that is stretched in time [Di Cerbo et al., 2015]. Numerous studies conducted around the world over the last two decades show the efficiency and cost-effectiveness of using the videoconferencing format, patient forums, e-mail correspondence between the doctor and the patient, telephone consultations, Skype consultations and the use of mobile phone applications [Di Cerbo et al., 2015, Jung, Padman, 2015, Greenhalgh et al., 2015].

In addition to positive economic effects and oncoming universal access to healthcare [WHO, 2016], online consultations can help the healthcare system solve one of the urgent problems — to become more patient-centered (client-oriented)[1]. A remote and therefore more confidential, anonymized patient contact with a specialist allows for consultations, including those on sexual and reproductive health issues, contributing to making informed decisions on the part of the patient [Schmidt-Weitmann et al., 2017]. As foreign experience shows, online counsultation does not always replace a visit to a doctor: a study conducted by Frederick et al. [2014] has demonstrated among 2,357 primary care patients, that using the opportunity to send messages to a doctor via an electronic portal does not correlate with a significant reduction in the number of traditional visits to a doctor. In such cases, telemedicine technologies are likely to become an additional measure used by patients in order to raise their awareness of the disease and ask clarifying questions.

One of the features of digital healthcare application is that the use of digital devices by patients may decrease over time and not yield results if they are not integrated into complex approaches [Dayer et al., 2013]. An example could be applications for mobile phones, reminiscent of taking medication. Such digital reminders can play an important role in the formation of adherence to treatment in the prescription of antibiotics and antivirals with high drug resistance [Zhenwei et al., 2011]. A study by Santo et al. [2016] showed that by 2016 there were 272 mobile phone applications reminding about taking medications, but only a small percentage was estimated as adequate quality. It should be borne in mind here that the willingness of patients to *test* the technology does not mean that after a short period of study of the capabilities of the device or application, it will be used for its intended purpose.

The introduction of telemedicine into the national healthcare system can be fraught with a number of difficulties. For instance, Greenhalgh et al. [2015] distinguish four groups of obstacles: concerns related to clinical risks, the willingness / attitude of patients and medical personnel to telemedicine, technical,

[1] The need to change national health systems towards a more patient-centered nature has been repeatedly confirmed by research and formed the basis for the guidelines and recommendations of the World Health Organization — for more details, see WHO [2007]

logistical and regulatory barriers. The attitude to telemedicine on the part of the population that represents the topic of this study is not the same among different population groups and is associated with socio-demographic characteristics. So, the younger age of the patient correlates with the more intensive use of online consultations [Jung, Padman, 2014]. There are also gender differences: although the use of digital technologies is usually more prevalent among men than among women, it is women who are more likely to use the online consultation opportunities within the American eVisit system, and this was not due to the traditional role of women in the family — caring for other family members [Jung, Padman, 2014]. There are also significant territorial differences: family doctors serving the rural population were twice as likely to prescribe teleconsultations with narrow-profile specialists [Jetty et al., 2017].

It is necessary to pay attention to the fact that the revealed patterns that determine the susceptibility of certain population groups to the possibility of receiving medical online consultations are not universal. For example, in Australia, it was found that only 29% of young people in the study were willing to seek medical advice on sexual health in a video-consultation format. Australia also showed a lower rate of adoption of tele-psychiatry than other countries [systematic literature review, Al-Mahdi et al., 2015]. Thus, the results of foreign research cannot be extrapolated to the Russian population, the study of the attitude to telemedicine technologies and, in particular, to online consultations among various groups of the population in the Russian Federation is an important research task.

Online medical consultation in the Russian Federation

On January 1, 2018 the "Law on Telemedicine" — Federal Law of July 29, 2017, N 242-FL "On Amendments to Certain Legislative Acts of the Russian Federation on the Application of Information Technologies in the Area of Healthcare", came into force in the Russian Federation, which included, inter alia, the definition of "telemedicine technologies"; and the purposes and conditions for their use on the territory of the Russian Federation.

In accordance with the telemedicine law, "telemedicine technologies are information technologies that ensure the remote interaction of medical workers among themselves, with patients and (or) their legal representatives, identification and authentication of these persons, documenting their actions during consultations, councils, remote medical monitoring of the patient's health". Thus, the law regulates interaction both between physicians, and between the doctor and the patient. The law establishes two main goals for the use of telemedicine technologies: first, prevention, collection and analysis of patient complaints, evaluation of treatment effectiveness, monitoring the patient's health and, secondly, deciding whether to conduct a full-time examination or consultation.

One of the challenges facing the Russian healthcare system is the approach of medical care to the population. Large distances between settlements largely explain the reason for the gap in health indicators between Russian regions and within regions between cities and rural areas or hard-to-reach areas. However, in addition to geographical accessibility, barriers formed among patients, among the population also become barriers to the population's healthcare access. The latter can be attributed to the decrease in confidence in doctors in Russia [VTsIOM, 2017; Lyadova, 2016].

Medical online consultations can both provide the Russian healthcare system a solution to the problem of the geographical distance between a highly specialized professional and a patient, and "restructure"; the format of rendering assistance with regards to individual medical needs of the patient and his sociocultural characteristics. However, in order to plan for phased introduction of telemedicine into the *health care system*, knowledge is required not only about the technological readiness of the system to use telemedicine and about the financial costs of implementation, but also about the willingness of the population to use these technologies. If impirical research on the issue of attitude of doctors to some or other telemedicine services was conducted in Russia [for instance, Tarasenko, 2014], the population's attitude to online consultations remains poorly studied by Russian scientists.

Data and methods

In April-June 2017 a qualitative study "Health preservation and new technologies in the eyes of the inhabitants of Moscow Region" was carried out on the basis of the Faculty of Economics of the Lomonosov Moscow State University. The research goal was to investigate the population's attitude towards the usage of new information technology in the area of healthcare and the position of these technologies in health preservation and provision of medical aid.

The research was held within the "Qualitative research in economics and demography" academic seminar[1].

The study was performed with the usage of the semi-structured interview method based on a survey developed by the research group. The survey contained, apart from the general introduction and conclusive parts, seven thematic blocks – the usage of medical devices at home, perspectives for the development of medical online consultations, mobile health applications, health promotion devices and applications, self-health control, control over consumption of bioactive supplements, state-of-the-art technology in self-protective behavior, exercise

[1] This academic seminar takes place since 2006 and is chaired by Professor Irina Kalabikhina, the Department of Population of the Faculty of Economics of Moscow State University (for full texts of the results of past studies, see https://demography.econ.msu.ru/library/qualitative-research /).

and fitness. The survey (extended version) included, besides thematic blocks, a list of questions which the respondents could lean upon during the interview, however, these questions were not compulsory.

Information sheets on research goals and participation principles (voluntariness and confidentiality), as well as forms of informed consent were developed specifically for this research. All interviewers – Master Degree students of the Faculty of Economics – participated in the development of the survey and its testing and had been trained on performing a semi-structured interview. Interviewers also signed a form on non-disclosure of personal information attained from respondents within the study.

Altogether, 50 semi-structured interviews were conducted. Research participants were inhabitants of Moscow region aged from 18 to 80 (three people under 20, twenty-seven participants aged 20-24, eight aged 25-30, six aged 30-39, two aged 40-49, one aged 50-59, three over 60), 34 participants were women. Among those who took part in the research, six have children. Among research participants, three groups — "medics", "athletes" and "parents to pre-school children", were allocated as representatives of population groups that have special needs, ("parents to pre-school children"), who have specific experience of using digital devices to measure health indicators ("athletes") and who have a professional attitude to the healthcare system and experience of providing medical services. The interviews were, with the participants' permission, recorded and decoded. The analytical approach was based on the method of thematic analysis.

Results

Research participants most often did not have direct experience in online medical consultation and on the most part had not heard of any relatives or acquaintances using such services. Their comments mainly referred to what position online medical consultations might occupy in the medical aid provision system, benefits, barriers and limitations, as well as the role of government in broad scale implementation of online consultations in the RF.

The position of online consultations in the system of medical care. For most participants of the study, the main purpose of online consultations is diagnosis. Only two participants mentioned the possibility of obtaining a second opinion from another city or country and two more mentioned an online prescription statement:

> *"If there is a good specialist in another city, I would ask him if it makes sense to visit him personally, or you can consult via Skype, or you can find a specialist in your city. Such a consultation is good in answering the question of "what should I do?", not "what disease do you have?";* (Male, 22, "athletes" group)

"If such services appear in the clinic, then I will contact some doctors if I am taught to. And also I would like to apply online for discharge of prescriptions, which I request every month" (Male, 80)

Another two of the study participants expressed an opinion that online consultations may help in managing the flow of patients to reduce the workload of the primary link. Several participants also pointed out the importance of online consultations in conditions of long distances:

"People from the other end of Russia go for an operation, fly back home, but keep in touch with the attending physician via Skype, so that the doctor is aware of the dynamics of the disease" (Female, 23)

Respondents, in general, showed a wary attitude toward medical online consultations and described them as "*superficial*", "*unreliable*", "*not serious*", "*inappropriate*", "*nonsense*", "*about the same as self-diagnosis on the Internet*".

"*Online one may search "I have a headache" and do not wait for an answer from some doctor on Skype*" (Male, 25)

If the participants of the study do see some value in the introduction of online consultations, they most often determine their position in the system of medical care as for the solution of "*not very serious issues*", "*in cases of non-serious diseases", "with familiar symptoms".*

"Online consultation can take place if I want to consult about some kind of ***neutral***" medication (Female, 33, "parents with preschool children" group),

Only one participant believes that online consultations are suitable for "*sick people who cannot get out of bed at all*" (Male, 20, "medics" group).

Advantages of online consultation. Participants of the study were practically unanimous in that online consultations would help reduce time costs associated with providing medical care. Most often it was about saving time on the part of the patient, the ability to avoid queuing, "*not breathing bacilli*":

"*Getting the right necessary information by a person in a difficult situation, plus the opportunity to avoid queues*" (Male, 25, "medics" group)

Queues to the doctor is the main problem around which informants build their positive expectations from the implementation of online consultations. Significantly less often there were comments on the financial savings that online

consultations can provide. In the statements of informants, there is a link between saving resources and reducing the quality of aid:

> " *The main thing is that saving time does not go to the detriment of health*" (Male, 25)

> *"Saving money is a controversial issue. It seems to me that you cannot economize on health, it's better to be expensive but of high quality*" (Female, 21)

Many participants identified certain groups of people for whom the introduction of online consultations would be beneficial: these are elderly people, women with children and inhabitants of territories where there are no experts of necessary qualification. At the same time, several participants said that those who need help more than others (elderly people) will not be able to use the services:

> "*Generally, in terms of this, medicine as a whole develops, there used to be a live queue, etc., now everything is done electronically and this makes life easier, and it should be taken into account that it's difficult for elder people to go to clinics for prescription, so renewing prescriptions is a big plus for them and not the only one*" (Male, 25, "medics" group)

Two participants of the study also mentioned the benefits of online consultations for doctors ("*There is a plus for doctors themselves that they will have another way to earn money",* male, aged 25), but this topic was not further developed in the interview.

Trust. The topic of trust in doctors was one of the central questions in the respondents' answers to questions about online consultations.

Only one of the study's participants linked distrust to online consultations with their *novelty,* with fear of a new experience; basically, those participants who spoke about the novelty of online consultations mentioned them in a positive way:

> "*If there were such a topic, I would have, purely for myself. I'm the type of person who needs to know, feel something new, understand it. Be in a trend, let's say. I would have probed it all, looked through it. And then, based on the experience gained, I would draw some conclusions*" (Male, 20, "medics" group)

In most cases, such consultations cause distrust due to the fact that the patient can not control who acts as a medical officer on the other side of the screen: "*There is no certainty that the doctor is really a doctor."* According to respondents, this may be a "*charlatan*", "*inexperienced doctor*" or " someone *self-taught*". At the same time, none of the study's participants mentioned that when visiting

a medical institution, they check or otherwise monitor the qualifications and experience of the doctor.

"*It's just that whereas on some specific medical websites, and* ***I do not know where they came from*** *and so on, there are some online consultations, yes, I would not trust them*" (Female, 22)

According to the informants, the inability to verify the qualification of a medical specialist in the consultation process increases the risk of misdiagnosis. Only one of the informants pointed to the problem of data security, "*information leakage*".

Barriers. As a result of the analysis of the interviews, several types of barriers were identified for the implementation of online medical consultations. First of all, it is the impossibility of tactile contact. The majority of participants stated that the doctor should "*feel*", "*inspect*", "*touch*", "*knock*", in order to make the correct diagnosis.

The second barrier is the poor quality of data transmission online, which makes informants evaluate online consultations as more risky than traditional contact with a doctor.

"*A drawback is a bad view of the patient, and because of this there may be an inaccurate diagnosis or an error*" (Male, 23)

"*Because of poor communication quality, a doctor may not hear, misunderstand a patient and therefore make an incorrect diagnosis*" (Male, 22)

In a separate group of barriers can be identified the inability or unwillingness of the population to authentically tell about their condition, "*the correctness of the testimony of the patient himself*".

"*The population is not prepared for such a program. They will not understand how to describe their symptoms and what to conduct a dialog about*" (Female, 23, "medics" group)

"*It is very difficult, because people are trustful, on the basis of emotions they can very vividly describe what they feel*" (Male, 22)

Less commonly, barriers related to the level of digitalization among different population groups were identified:

"*Online consultations are good where there is a general computerization of society, I believe that not even all people have color telephones, and you are talking about*

online consultations. Old men and women do not use such gadgets and have no idea how to use them, and it is them, after all, who directly need medical help more often" (Male, 25, "medics" group)

"*Online consultations can be held so far only in large cities* " (Male, 46, "medics" group)

Promotion of online consultations. Most of the study's participants allocated the main role in promoting online consultations to the state. Here the following functions could be allocated: standardization of services, quality control, certification of doctors, the educational function, provision of access. Firstly, the state should:

"To *delineate the boundaries when it is possible, in which cases such consultation will be justified* (Female, 22)

Further, many participants hope that the state will provide protection from possible scammers and low-skilled doctors.

[It is necessary to create] "a *unified database of clinics where this online consultation is* ***allowed****, which have undergone some certification"* (Female, 22)

"*There should be advanced technologies, medical devices, equipment, there must be some kind of list of services, procedures or* ***specialists that can work online***" (Female, 21)

The state should also be responsible for training physicians in the provision of remote services, and for educating patients. The position of one of the study's participants on external (instrumental) control over the provision of information from the patient is interesting in this regard:

"*When a patient consults a doctor, he must provide objective data about his state of health. These data can be shown by devices. In this case, everyone should be provided with these devices*" (Female, 22)

The role of the state is also to create and equip information systems — improving access to the Internet and the quality of communication, creating portals with the possibility of free choice of a medical specialist. The role of healthcare facilities themselves in promoting online services was raised much less often:

"*Well, if a paid clinic is interested in promoting this area out into the world, then I would resort to marketing moves, I would make free consultations there. And*

only then, when a person verifies, he could say: "now this is good, this is bad." (Male, 20, "medics" group)

Discussion and conclusions

As residents of Moscow region — a region with a high coverage of high-quality Internet — most of the participants in the study did not have personal experience in online medical consultations, they did not rely on the experience of their acquaintances and, on the whole, demonstrated general reasoning about the subject. This is because the telemedicine law came into effect only after the study was conducted, and online consultations were not widely available. However, among the study's participants, there are clearly several early adopters to online consultations that had started using the technology before the law came into force. It should be noted that the topic of conversation caused live interest among many informants, willingness to try new technology and the need to form an opinion on the basis of personal experience.

Analysis of the interview showed that online medical consultations often cause distrust and fear among the population. This means fear of two kinds. Firstly, it is the fear of misdiagnosis in the process of online consultation, which, apparently, is a continuation of mistrust to the healthcare system so characteristic of the Russian population. Secondly, it is the fear of fraud on the Internet, when an attacker, using the inability to authorize his identity, attempts to gain access to the user's personal information. We can talk about the manifestation of such a feature characteristic of the Russian population as high uncertainty avoidance [the value of the indicator for Russia is 93, Hofstede Insights]. However, this fear may be a temporary phenomenon strengthened by the general alertness of the population to the transmission of data via the Internet, related to the cases of financial fraud on the Internet that have become more frequent in recent years and the spread of awareness campaigns about such fraud among the population. Increased reports of financial Internet fraud seem to have an impact on people's perceptions of the risks associated with online medical consultations.

Despite the cautious attitude towards telemedicine, the population demonstrates an understanding of the inevitability of introducing telemedicine in the context of the rapid development of digital technologies. However, medical online consultations are perceived as not fully medical, but external to the health care system, which could be relegated to "*non-serious cases*", which most likely would have remained without medical intervention. Online consultations are an additional option for "*searching for symptoms on the Internet*", a quasi-medical service (just as quasi-medical as 'discharging sick leave' - as one of the participants of the study says an example of why she could use online consultations). Here the young medical specialist's view about the inadmissibility of substituting contact consultations with online consultations that "*are not medicine*" draws attention

as an example of the negative attitude / incompetence of specialists within the health system itself.

In the context of the adoption of the law on telemedicine in January 2018, such an attitude of the population towards online consultations, at first glance, may seem alarming. But, in fact, there are no sharp contradictions: negatively-minded respondents see the purpose of online consultations in *the diagnosis*, however, diagnosis itself is not part of the goal of using telemedicine technologies (see above definition of telemedicine technologies according to 242-FL).

Thus, the telemedicine law responds to the concerns of patients associated with a high risk of medical errors in the diagnosis without on-site contact. The problem is that it will take time and purposeful efforts of the state to change the population's perception of online consultations as primarily diagnostic ones, and also to popularize the idea of online consultations as increasing the accuracy of diagnosis through remote obtaining of a second opinion.

Another problem is that though several participants of the study mentioned remote councils or consultations in terms of obtaining a second opinion, the remote medical observation of the patient's health condition, mentioned in the telemedicine law, was practically not spoken of during the interview. Perhaps this is due to the fact that interviewers named consultations via Skype, not mentioning technical equipment for remote monitoring of the patient's condition as an example of online consultations. However, the almost complete silence of informants on this score indicates a lack of awareness of the Russian population on this issue. This can be explained by the fact that the technology of online consultations via Skype, in contrast to equipment for remote monitoring, has a higher degree of observability; and a higher degree of complexity, which, according to Rogers' theory, explains the different speed in adapting to these innovations.

The results of the study show that the population of Moscow region sees online consultations as a solution to the problem of access to medical care, but not as a solution to the quality of health services. Informants distinguish two possible benefits from online consultations: firstly, a reduction in time costs, mainly for the patient, and, secondly, equalization of territorial inequality in access to medical care. But the main expectation from online consultations is their ability to defeat queues.

With regard to the quality of medical care, the population, as mentioned above, is extremely wary of online consultation — it is more likely to compromise the quality of health services, the guarantor of which, in the eyes of the population, is a doctor able to "*touch*" the patient and trustworthy, since he is physically located on the territory of the prevention and treatment facility. The main problem here is that the population quite narrowly perceives the comparative superiority of online consultations — they look like a substitute for some basic outpatient medical service, and not as an addition to it, capable of improving the quality.

And this service is, by definition, diagnostic — because, as evidenced by the analysis of interviews, it is the diagnosis that is the main goal of contact with the healthcare system, and not the prevention or support of the patient in the process of treatment. It also plays a role in the fact that the population tends to contrast economizing and efficiency / quality of medical services — and since online consultations are more likely to be seen as a method of economizing, there is a risk of quality reduction.

Analysis of the statements related to barriers to the introduction of telemedicine reveals three groups of such barriers: patient readiness (including patient skills in assessing their condition and communicating information to the doctor), technical and regulatory readiness of the health care system (communication quality and certification of medical professionals), and barriers related to digital inequality. The latter concerns both spatial digital inequality and inequality between age groups. In the eyes of the population, those who are most in need of online consultations will not be able to use them precisely because of digital inequality. In this case, the development of telemedicine in the near future would not be able to solve the problem of approximating care to patients. On the other hand, one can not but note the readiness of elder participants in the study to learn and use various forms of telemedicine services.

The role of overcoming barriers is given, first of all, to the state. Almost all the statements of participants on this matter are on strengthening state control through the creation of standards and databases of certified doctors / clinics. The role of patient communities, research institutes and, with rare exceptions, business was not discussed by the participants. This, in all likelihood, reflects the public's views on the prerogative of the state in the field of health and is consistent with the indicators of the index of cultural measurements across Russia in terms of a significant power distance [Hosftede Insights, no date].

Online medical consultation will develop in the Russian socio-cultural and technological environment, where the idea of paternalistic statehood in matters of health has taken root and the expectation of state responsibility for all manifestations of new formats, a high level of mistrust of the health system, technological inequality in the generation and spatial context, as well as in the situation of lack of modern knowledge in doctors and patients about the possibilities of online consultation. If the lack of knowledge could be eliminated relatively quickly (but this goal should be set at the beginning of the development of new technology), and age disparity will fade with age maturity of *digitized* generations (and the modern elder generation demonstrates a willingness to learn), spatial digital inequality is more difficult to eliminate. At the same time, sociocultural aspects — mistrust and paternalism — require a more complex integrated approach targeted not just at the quality of digital medicine in Russia.

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