

Original article

Sociodemographic and health-related predictors of online information seeking on healthcare providers in Russian adults

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Abstract: The objective of this study was to examine the factors of online information seeking on healthcare providers in Russian adults. *Material and Methods* — Our online survey involved 1,319 participants and regarded their sociodemographic and health-related characteristics, along with online information seeking on healthcare providers. The association of factors to online information seeking on healthcare providers was examined via Pearson's chi-squared test. The odds ratios for determined predictors of online information seeking were obtained from multiple logistic regression model fitted to the data.

Results — Majority of Russian adults – 58.6% (95% CI: 55.9%-61.2%) – used the Internet to collect information on healthcare providers. The most rigorous online information seeking on healthcare providers was exhibited by females (OR: 1.951, $p < 0.001$), adults with graduate degrees (OR: 2.870, $p = 0.036$), adults using the Internet more often (OR: 2.623, $p < 0.001$), adults with two or more chronic diseases (OR: 1.699, $p = 0.005$), and those who had 7 or more medical appointments during the last year preceding the survey (OR: 2.438, $p = 0.002$). However, the age of participants was not significantly associated with online information seeking on healthcare providers ($p = 0.922$). No statistical difference was found between those residing in rural, suburban, and urban areas ($p = 0.518$).

Conclusion — Sociodemographic and health-related factors affect patients in terms of their online information seeking on healthcare providers. The current demand for online information on healthcare providers existing in various groups highlights the need to increase patient engagement and empower the less active among them.

Keywords: patient activation, information-seeking behavior, health information, sociodemographic factors, health care facility.

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Introduction

In recent years, there is an increasing interest in patient engagement and its role in public health and healthcare [1]. The contemporary patient-centered approach to healthcare recognizes the importance of involving patients in the decision-making process by providing information on improving their health literacy and enabling them to take control of their health [2]. These components are habitually considered steps in patient engagement that must be undertaken not only by public health authorities and healthcare providers, but also by communities, patients and their families in order to achieve greater patient activation.

The majority of researchers define patient activation as a set of personal characteristics, referring to their willingness and ability to participate in the health-related decision-making to manage their health [3, 4]. Numerous publications on patient activation and its relation to better patient compliance [5], satisfaction [6], and outcomes [7, 8] emphasize that activation is an important element of the medical care quality. Key components of patient activation enhancement are hygiene and health education, health promotion, improvement of patient health awareness, mastering

their attitude towards treatment and health. Hibbard et al. conceptualized patient activation in 2004 and proposed the tool called Patient Activation Measure (PAM) for its evaluation. What is interesting about PAM is that three of six proposed personality characteristics for assessment are related to the patient's capability to interact with the healthcare system and healthcare providers [9]. It is similar to the definition of patient activation adopted in Russia, which includes not only certain knowledge and responsibility for one's own health, but also the ability to navigate the healthcare system [10].

The important component of patient activation is the ability to select the healthcare provider based on quality and performance. Despite the right of a patient to exercise free selection of a healthcare provider stated in the Federal Law of the Russian Federation N323-FZ of November 21, 2011, *On Basics of Public Health Protection*, an ability to choose provider wisely is a trait requiring personal development [11]. It necessitates not only possession of certain knowledge, but also skills to obtain and evaluate information about healthcare providers [12].

The rapid development of information technology and digital communications makes online information seeking and patient-healthcare interactions more commonplace than ever before [13].

Online information on healthcare providers becomes a major resource for patients [12, 14]. Yandex, the most used search engine in Russia, reports over 7.5 million daily health-related search queries, 16% of which are related to health care facilities and professionals [15]. Comprehensive online information on health care facilities and professionals contributes to more selective behavior of patients regarding the choice of a healthcare provider [16].

Factors influencing online health information-seeking behavior were explored in several studies. It was suggested that sociodemographic and health-related factors, such as patient age [17-21], gender [17-19, 22, 23], education level [18-20, 24, 25], socioeconomic status [21, 22, 26], place of residence [17, 27], health status [18, 28], general use of the Internet [17], and use of health services [22, 29] play a critical role in the variation of online health information-seeking behavior in the population. However, the focus of many studies shifted to health-related issues, including signs, symptoms, medications, and treatment. Despite the fact that health information is associated with information on healthcare providers, very little is known specifically about seeking information on health care facilities and predictive factors for such behavior.

Our study objective was to identify factors and their predictive abilities in online information seeking on healthcare providers in Russian adult population.

Material and Methods

Study design and participants

We recruited online survey participants from 8 August – 8 September, 2020, through social media advertisement campaign, including targeted advertising and direct advertising in social media groups. The initial sample comprised 2,090 participants. The survey was pretested by authors to identify probable technical issues, and optimize its layout and conditional logic. The sampling continued until at least an approximate number of 500 completed survey submissions were collected in each age group. We accepted only completed survey submissions. The questionnaire did not include an additional participant-driven answer review step.

Repeated submissions were limited by unique IP and cookie-based protection. Eligible participants who matched the inclusion criteria were identified by place of residence (Russia), age (18 years old or over), and time to complete the survey (331 seconds or longer). Introduction of minimum required time to fill in the questionnaire, determined as the first quartile value of all submitted survey responses to exclude participants who could have clicked through the answers without carefully reading and understanding the questions, enhanced the reliability of the sample.

Ethical consideration and privacy

Prior to conducting the study, ethical clearance was obtained from Sechenov University Ethics Committee.

Following the best practices, the survey page complied with the General Data Protection Regulation (GDPR). The survey web page header contained comprehensive information about privacy policy and rights of the participants. The survey form contained mandatory informed consent checkbox, which prevented submission without the participant's formal agreement. The survey participants were connected securely using the HTTPS

protocol. All collected data was stored in a MySQL database, secured with a server firewall and protected from external access.

Variables

Using single-selection questions, participants were asked about their health-related and sociodemographic characteristics, including gender, education, daily Internet use time, chronic conditions, frequency of medical visits, and Internet use for obtaining information on health care facilities. The survey contained two open-ended questions on participant's age and place of residence. Age variable was classified into three categories: young, middle-aged, and older adults. Thus, all independent variables were qualitative, including categorical (*age and place of residence*) and ordinal (*education, daily Internet use time, chronic conditions, and frequency of medical visits*).

We considered online information seeking on healthcare providers a dependent variable. Since it could take only two possible values, it was deemed dichotomous. It is worth mentioning that due to the nature of Russian health care policy, individual healthcare professionals cannot obtain the medical license to provide health care services; hence, we explored the Internet use by the patients solely for seeking information about institutional providers.

Statistical analyses

We performed a bivariate Pearson's chi-squared test to assess the statistical significance of the differences in information seeking on healthcare providers between health-related and sociodemographic factor groups. The multiple logistic regression model was applied to examine online information seeking in healthcare providers in groups that were chosen based on chi-squared test results. Odds ratios (OR) were employed to report the logistic regression model application results. Both test results were considered significant at a $p < 0.05$. Statistical analyses were performed using SPSS Statistics software (version 24).

Results

We included 1,319 survey responses in our study based on selection criteria. The median age of participants was 40 years old with a minimum of 18 and a maximum of 81 years old. Of those surveyed, 58.6% specified that they used the Internet to seek information about health care facilities. *Table 1* presents the distribution of sample sociodemographic and health-related characteristics.

Barely over half of the sample (53.1%) were women. Females exhibited significantly higher rates of using the Internet for information seeking on health care facilities ($p < 0.001$). The difference between the frequencies of males and females who used the Internet for information on healthcare providers was as follows: half of males (49.5%), compared with two-thirds of females (66.6%).

Participants were divided into three age groups of adults: young (18-34 years old), middle-aged (35-49 years old), and older (50 years old or over). In a final sample, 36.8% of participants were in the 18-34 age group, 33.7% were in the 35-49 age group, and ≥ 50 age group was the smallest, comprising just 29.6% of survey participants. Despite observed differences in distribution, online information seeking on healthcare providers did not differ significantly among age groups ($p = 0.922$).

Table 1. Sociodemographic and health-related sample characteristics, and results of Pearson's chi-square tests of association

	N (%)	Sought information about health care facilities, % (95% CI)	p-value
Sample	1,319 (100)	58.6 (55.9-61.2)	
Gender			<0.001
Male	618 (46.9)	49.5 (45.6-53.5)	
Female	701 (53.1)	66.6 (63.1-70.0)	
Age group			0.922
18-34	485 (36.8)	57.9 (53.5-62.3)	
35-49	444 (33.7)	59.2 (54.6-63.7)	
50 and over	390 (29.6)	58.7 (53.8-63.5)	
Residence area			0.518
Urban	1,188 (90.1)	59.1 (56.3-61.9)	
Rural	113 (8.5)	54.9 (45.7-63.8)	
Suburban	18 (1.4)	50.0 (28.4-71.6)	
Education			<0.001
Basic general	52 (3.9)	30.8 (19.5-44.1)	
Secondary general	134 (10.2)	50.0 (41.6-58.4)	
Secondary vocational	563 (42.7)	59.0 (54.9-63.0)	
Higher	541 (41.0)	62.8 (58.7-66.8)	
Graduate degree	29 (2.2)	62.1 (44.0-77.9)	
Daily Internet use			0.012
Less than 1 hr	134 (10.2)	45.5 (37.3-54.0)	
1-2 hrs.	277 (21.0)	59.2 (53.3-64.9)	
3-4 hrs.	425 (32.2)	61.4 (56.7-65.9)	
5 or more hrs.	483 (36.6)	59.4 (55.0-63.7)	
Chronic conditions			<0.001
None	569 (43.1)	52.4 (48.3-56.5)	
One	445 (33.7)	62.7 (58.1-67.1)	
Two or more	217 (16.5)	67.7 (61.3-73.7)	
Unsure	88 (6.7)	55.7 (45.3-65.7)	
Medical Visits			<0.001
None	301 (22.8)	46.5 (40.9-52.2)	
1-3 times	750 (56.9)	60.5 (57.0-64.0)	
4-6 times	183 (13.9)	64.5 (57.4-71.1)	
7 or more times	85 (6.4)	71.8 (61.6-80.5)	

Table 2. Observed vs. predicted frequencies of information seeking on healthcare provider establishments among Russian adults obtained via logistic regression with a probability cutoff value of 0.500

Observed	Predicted		% Correct
	No	Yes	
Did not seek information (No)	190	356	34.8
Sought information (Yes)	125	648	83.8
Overall % of correct			63.5

The vast majority of survey participants lived in urban areas (90.1%), 8.5% of participants lived in rural areas, and 1.4% of participants provided only the name of the residential area; accordingly, they were considered suburban population. However, the residence was not significantly associated with online information seeking on healthcare providers ($p=0.518$).

As shown in Table 1, education level was significantly associated with online information seeking on healthcare providers. The Internet use for information on healthcare providers increased with education level: it was 30.8% in basic general group, 50.0% in the secondary general group, 59.0% in secondary vocational group, 62.8% in higher education group, and 62.1% in graduate degree group, with a 2.03-fold difference between the lowest and the highest group-related frequency ($p<0.001$).

We grouped study participants into five categories in terms of their mean daily Internet use time (less than 1 hr, 1-2 hrs., 3-4 hrs.,

and 5 or more hrs. per day). Mean daily Internet use was significantly associated with online information seeking on healthcare providers with the 1.31-fold difference between the most and the least active Internet users ($p=0.012$).

Respondents who reported two or more chronic diseases used the Internet to find information about health care facilities 1.29 and 1.07 times more frequently than those who had just one or none, respectively ($p<0.001$).

The number of respondents who used the Internet for seeking information about healthcare providers as directly associated with a number of medical visits over the past year. Respondents who had 7 or over, 4-6, and 1-3 visits in the past year prior to the study had 1.54-fold, 1.39-fold, and 1.3-fold interest, respectively, in seeking information on healthcare providers over the Internet than those who did not visit health care facilities at all ($p<0.001$).

The effect of predictor variables on online information seeking about healthcare providers were also explored by logistic regression. Variables for the test were selected based on the previously conducted bivariate chi-squared test for association. Online information seeking on healthcare providers was assumed to be predicted by gender, education, mean daily Internet use time, number of medical visits in the past year preceding the study, and number of chronic conditions.

The result of the omnibus test revealed that the new model significantly reduced -2 log-likelihood, thereby making an improvement over the baseline model and explaining more of the variance in the use of information about health care facilities by respondents (chi-square=104.861, $df=14$, $p<0.001$). The null hypothesis of alternative model good fit to the data was accepted based on the Hosmer-Lemeshow test (chi-square=12.228, $df=8$, $p=0.141$).

According to Nagelkerke pseudo-R-squared measures, the model and its predictor variables explained 10.3% of the variance in Internet use for information about healthcare providers. The model successfully classified 83.8% of positive events. However, the accuracy of classifying negative events was lower (34.8%). The overall classification accuracy was 63.5%, as shown in Table 2.

The logistic regression was fitted to the data to test the research hypothesis regarding the relation of online information seeking on healthcare providers and its predictor variables. It can be seen from the data in Table 3 that logistic regression test results revealed that gender, education, daily Internet use, number of medical visits, and number of chronic conditions were significantly associated with intention to use the Internet for seeking information about healthcare providers.

We established that women were 1.951 times more likely to use the Internet for information on healthcare providers than men ($p<0.001$).

Online information seeking on healthcare providers was 2.564 times higher in participants who had at least secondary vocational education level ($p=0.004$). Participants who had higher education and graduate degree were 2.713 and 2.870 times more likely to use the Internet for information about healthcare providers ($p=0.002$ and $p=0.036$, respectively).

The higher mean daily Internet use time was associated with higher odds of online information seeking on healthcare providers as well. We detected the highest odds to use the internet for information on health care facilities in participants who used the Internet for 5 or more hrs. daily, compared with those who used it

less than an hour per day (OR 2.623, $p=0.002$). Participants who used the Internet for 1-2 and 3-4 hrs. daily were also 1.972 and 2.461 times more likely to use it for information seeking on healthcare providers versus the reference group ($p<0.001$, $p=0.002$, respectively).

From the data in Table 3, it is apparent that Internet use for information about healthcare providers was directly associated with a number of medical visits. Odds ratios of Internet use for information on health care facilities in groups of participants who visited them 1-3, 4-6, and 7 or more times in the past year were significantly higher than in the reference group containing those who did not visit health care facilities at all during the same period (OR: 1.498, $p=0.006$; OR: 1.630, $p=0.021$; OR: 2.438, $p=0.002$).

The number of chronic diseases also resulted in a greater interest in the information about healthcare providers. Participants who reported one chronic condition were 1.405 times more likely to use the Internet for information on healthcare providers than those who had none ($p=0.017$). Participants who had two or more chronic diseases had 1.699 times higher odds to use the Internet for information about health care facilities than those who had none ($p=0.005$). There was no significant difference between those who were unsure about their chronic diseases and those who reported no chronic conditions ($p=0.650$).

Discussion

Our study was designed to model determinants of online information seeking on healthcare providers in adults of the Russian Federation, using the web-based survey data. The chi-squared test was applied to the data to determine predictor variables. The following multiple logistic regression, including the previously identified predictor variables, was performed to explain the variance of both dependent variables.

While reviewing published sources, we discovered the data on association of dependent variables (age, gender, education level, socioeconomic status, place of residence, health status, general

use of the Internet, and use of health services) with online information seeking behavior regarding health issues. In the present study, models of Internet use to obtain information about health care facilities exhibited a good fit for the data. The results of our study demonstrated that factors associated with health status played a greater role in online information seeking on health care facilities than sociodemographic factors, such as age and place of residence.

The overall proportion of participants who reported using the Internet for information on healthcare providers was 58.6%. This result was similar to the findings of the studies conducted in the United States and European countries [22, 26, 31], while exposing a greater proportion of adults using the Internet for health information than in previously conducted studies in the Russian Federation [30]. Our finding demonstrates an increasing tendency to use the Internet for information about healthcare providers in Russian adults. It also emphasizes an importance of exploring and improving approaches to digital communication and quality assessment of digital medical resources. Our hypothesis was supported by the fact that despite an existence of legal requirements to the quality of medical websites in Russia, fewer than 20% of websites complied with them; even so, existing requirements cover only basic aspects of medical website quality [32].

Our finding that women are more actively seeking information about healthcare providers falls in between the results of Lee et al. (OR: 1.6) [18], Nölke et al. (OR: 1.5) [22], and Tennant et al. who established that women were 2.63 times more likely to use the Internet to obtain medical information than men [19]. In terms of patient activation, this is consistent with the well-known fact that women are have a greater capacity of taking care of their own health and the health of their family members [33], making them decision makers and influencers who can activate their relatives and support them in their decision-making process.

Table 3. Logistic regression analysis of 1,319 Russian adults seeking online information on healthcare providers

Predictor	β	SE β	Wald's χ^2	df	p-value	e^β (odds ratio)
Constant	-2.239	0.381	34.507	1	<0.001	0.107
Gender (ref.cat. Male)						
Female	0.668	0.118	32.006	1	<0.001	1.951
Education (ref.cat. Basic general)						
Secondary general	0.687	0.357	3.718	1	0.054	1.989
Secondary vocational	0.942	0.325	8.397	1	0.004	2.564
Higher	0.998	0.327	9.334	1	0.002	2.713
Graduate degree	1.054	0.504	4.382	1	0.036	2.870
Daily Internet use (ref.cat. Less than 1 hr)						
1-2 hrs.	0.679	0.221	9.479	1	0.002	1.972
3-4 hrs.	0.901	0.211	18.222	1	<0.001	2.461
5 or more hrs.	0.964	0.212	20.713	1	<0.001	2.623
Chronic conditions (ref.cat. None)						
One	0.340	0.142	5.727	1	0.017	1.405
Two or more	0.530	0.190	7.817	1	0.005	1.699
Unsure	0.109	0.241	0.206	1	0.650	1.115
Medical visits (ref.cat. None)						
1-3 times	0.404	0.146	7.609	1	0.006	1.498
4-6 times	0.488	0.212	5.301	1	0.021	1.630
7 or more times	0.891	0.286	9.702	1	0.002	2.438

ref.cat., reference category.

The results of our research were consistent with previous studies demonstrating that more educated respondents used the Internet more often to obtain medical information [18, 19, 21]. However, the difference in online information seeking about healthcare providers was not significant between basic general education and secondary general education ($p=0.054$). Both of these education levels are predominantly associated with schooling without vocational training. A better education could be associated with better digital skills, better literacy, and, accordingly, a greater interest in general health-related topics and online healthcare provider information.

Another important finding was that both the number of chronic diseases and the number of medical visits in the past year were associated with the use of the Internet to obtain information about health care facilities. The number of chronic diseases, along with more frequent visits to the doctor, may also imply a deterioration of the health status. This is supported by previous observational data, which have shown that more frequent use of health services [22], living with one or more chronic diseases [31], and poor health [18] were associated with greater interest in a wide range of health information topics on the Internet. A likely explanation for this could be that adults in need of visiting health facilities used the Internet to obtain information about them. Surprisingly, online information seeking on healthcare providers did not differ significantly between those without chronic conditions and those who were unsure of their chronic conditions. Respondents' uncertainty could be caused by the fact that they were not activated and had lower health literacy, which may be due to a two-way relationship between the latter and information-seeking behavior. Therefore, this assumption should be interpreted with caution and requires further investigation.

Conclusion

The findings of this study raise interesting questions regarding the nature and extent of patient activation and awareness about healthcare providers in Russian Federation adults. The fact that over half of adults collect information about healthcare providers online indicates the growing demand for such information, which raises an important issue of its quality and accessibility. On the other hand, we established that some groups used the Internet more actively than others for obtaining information regarding healthcare providers. This finding emphasizes the necessity to engage and empower more inert groups of patients including men, less educated adults, adults with lower online activity, patients who rarely interact with healthcare providers, and especially those who have not experienced chronic conditions yet, because their better activation and health literacy may potentially prevent chronic diseases or benefit their early detection.

Limitations

The generalizability of these results is somewhat limited. For instance, the web survey required participants to have at least basic computer skills and Internet access. An issue that was not addressed in our study was whether personal or family income could influence online information seeking on healthcare providers by means of relevant question extraction due to the low response rate to this question in the pilot survey. Besides, it is necessary to investigate the relationship between independent and dependent variables on a larger sample in order to obtain more accurate results at the population level. The greater power of the study

could also detect additional associations that were not found in the smaller sample.

Ethical approval

The ethical clearance was obtained from the Ethics Committee at Sechenov University, Moscow, Russia (Protocol No.19-20 July 2, 2020). The web-based survey contained a mandatory informed consent checkbox, along with detailed information on the privacy policy and rights of the study participants.

Conflict of interest

The authors declare no conflicts of interest.

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