Social Network-Based Digital Stroke Prevention: Opportunities, Results and Prospects

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Aim. To study the possibilities and limitations of the social network as a digital medical tool, which is aimed at improving programs for primary and secondary stroke prevention in young people.

Material and methods. The study was carried out in the format of online training for volunteers. At the first stage of the work, the online school "Stroke in Young People" was announced in 8 medical blogs. As part of the school, a special account was created for readers (n=1354). At the second stage, 49 respondents (4% of men, whose average age was 24.4±5.2 years) were selected from 1354 listeners, who were surveyed on "Awareness of risk factors and stroke symptoms among users of social networks" before and after the online school.

Results. The online school audience is predominantly female (91%), and 43% of readers were in the 25-34 age group. The total number of people who listened to and read the online school material is 8712 people. 17% worked in the healthcare system, and 22% of respondents had a history of stroke. 38 (78%) people of the 2nd stage among the respondents independently searched for information about stroke earlier, and 30 (61%) received this information passively from medical workers in 2020. Before the online school start, the majority of respondents (over 60%) were aware of 2 out of 7 stroke risk factors (dyslipidemia and arterial hypertension) and 3 out of 6 stroke signs (drooping of the face half, weakness in the limbs and difficulty speaking). Less than 40% of the participants considered the stroke risk factors for diabetes mellitus, other cardiovascular diseases (CVD), obesity, and alcohol use; less than 20% were aware of stroke symptoms such as impaired vision and coordination and very severe headache. After completing online learning, the greatest increase in knowledge was found among the following risk factors – smoking and other CVDs (p<0.05); stroke symptoms - headache and drooping of the face half (p<0.05).

Conclusion. The online school aroused interest among healthcare workers and people without medical education, including those with stroke. Most of the respondents believed that they knew how to prevent a stroke (over 80%) and would be able to provide first aid to a person with a stroke (over 90%). At the same time, the awareness of risk factors and stroke symptoms was low prior to the start of learning, even though the study included healthcare workers and stroke survivors. Online learning has led to increased awareness of some risk factors and stroke symptoms. Social media can be one of the tools for medical prevention of stroke in young people, but program planning should take into account the way the material is presented and its readability.

Keywords: diseases of the circulatory system, stroke, social network, primary prevention, secondary prevention, online school, Instagram.

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Introduction

Technological advances and the rapid development of the Internet are changing the way healthcare workers interact with each other, as well as with patients. Currently, social networks such as Instagram, Facebook, Twitter and YouTube are already used to train medical personnel, as well as to provide information to patients (the project «Together for Healthy Hearts» with the support of the Federal State Budgetary Institution of National Medical Research Center of Cardiology of the Ministry of Health of Russia, the National Society for Preventive Cardiology) or doctors, both on the territory of the Russian Federation and in European countries [1,2].

Often, more and more scientists and doctors agree that the use of social networks to promote, discuss knowledge, research, projects and news in the health field has become one of the most effective ways of communication, and in part more useful and operational than traditional methods [3]. For example, the use of social media has been shown to be effective in educating obese and diabetic patients [4,5].

Earlier, a pilot study was conducted for the first time on the territory of the Russian Federation, concerning testing the capabilities of a social network as a platform for the primary prevention of the circulatory system diseases, which are the main cause of death in our country [2]. During the work, certain limitations and prospects of using this social network as a primary prevention tool were identified.

This study is a continuation of the above work; it's being conducted for the first time on the territory of the Russian Federation and is devoted to the search for methods of improving primary and secondary stroke prevention programs in young people under the age of 40 on the basis of a social network.

The study aim is to study the possibilities and limitations of the social network as a digital medical tool, which is aimed at improving programs for primary and secondary stroke prevention in young people.

Materials and methods

The study protocol was approved by the ethical committee of the Scientific and Practical Clinical Center for Diagnostics and Telemedicine Technologies of the Moscow Department of Health. All participants gave written informed consent to participate in the study.

At the first stage, an open Stroke in young people online school was announced in 8 medical blogs from 17 to 24 October 2020: @doc_4_you and @kardiolog_mv (blogs about cardiology); @neurology_concilium_zhetishev, @doctor_kotlyar, @doc.olgakeln (blogs about neurology), @revmatolog_sarapulova (blog about rheumatology), @true_gyn (blog about gynecology), @dr.v.kuvaev (blog about hematology).

A special account @insult.u.molodjh was created for the online school, which had 1,354 readers as of October 24, 2020. The Stroke in Young People online school included text publications for patients on the following topics: Stroke Prevention, Stroke Symptoms, and an online lecture, Causes and Risk Factors of Stroke in Young People. Online lectures were held for doctors on the following topics: a diagnostic search algorithm for cryptogenic stroke, the main causes of stroke in people under the age of 40, stroke in children, stroke during pregnancy and after childbirth, neurological causes of stroke in young people, diseases of the hematopoietic system which can lead to stroke, foramen ovale, and stroke.

The learning format is publications of up to 4 thousand characters and open access lectures lasting 60 minutes.

To study the effectiveness of an online educational school, at the second stage, an electronic random number generator selected 49 respondents (47 [95.9%] women, the average age was 24.4±5.2 years) out of 1354 listeners who were surveyed on the topic «Awareness of risk factors and stroke symptoms among users of the Instagram social network» before the scientific school. 45 people were resurveyed at the end of the educational program (Table 1).

Statistical data processing. Methods of descriptive statistics were used for the data statistical processing, indicating the number and proportion of subjects in each category for categorical variables. McNemar's exact test was used to compare the proportion of subjects with a «Yes» answer before and after learning. Statistical processing was performed using the Stata14 program. The value of 0.05 was taken as the level of statistical significance.

Results

The audience of the Stroke in Young People online school was mainly female (91.0%; n=1232), 43% of readers (n=582) were in the 25-34 age group, 31.9% (n=433) were between the ages of 35 and 44, and 10.0% (n=135) were between the ages of 45 and 54.

Up to 20% of subscribed readers of medical blogs lived in Moscow, up to 5% lived in St. Petersburg. The total number of people who listened to and read the online school material was 8,712 people, the total involvement (comments, reposts, and the material saving) was 470 people. The characteristics of the persons included in the study are presented in Table 2.

Among the respondents, 38 (78%) people independently searched for information about stroke earlier, and 30 (61%) received this information passively from medical workers in 2020.

Before starting online school, the majority of respondents (67%) were aware of such stroke factors as cholesterol and its forms, high blood pressure. Less than 40% of those surveyed knew that diabetes mellitus and other cardiovascular diseases can influence the stroke development, and less than 30% were aware of such risk factors as alcohol and obesity. The most significant increases in risk factor awareness following online learning were found for smoking, cholesterol, other CVDs, and diabetes mellitus. At the same time, statistically significant dynamics was determined only for smoking and other CVDs. Online education practically didn't lead to an increase in the proportion of respondents with a positive answer for such a stroke risk factor as alcohol consumption (Table 3).

The initial survey found that 82% of the respondents believed they could provide first aid to a person with a stroke. At the same time, more than 70% of the participants were aware of the three most common signs of stroke (drooping of the face half, weakness in the limbs, and difficulty speaking), and less than 20% of the respondents were aware of such symptoms as visual impairment and coordination and very severe headache. The study revealed a percentage increase in the proportion of subjects with the «Yes» answer after learning for all stroke signs, but a statically significant trend was obtained only for drooping the face half and headache (Table 4).

Discussion

Social media can be used to educate patients and create digital prevention programs. The effectiveness of educational programs in relation to CVD risk factors such as diabetes mellitus and obesity has been previously established [4,5]. In this study, learning at the online school also led to an increase in respondents' awareness of virtually all risk factors for stroke. At the same time, the fact of the initial low awareness of the respondents in

Table 1. Questionnaire «Awareness of risk factors and stroke symptoms among participants of the online school»

Question	Answer options
1. Age	
2. Your gender	
3. Are you related to medicine?	Doctor, Resident, Student, I don't have
4. Your education	Secondary, Higher
5. What are the most common causes of young people death in Russia (open question).	
6. Do you know the concept of «good» and «bad» cholesterol?	Yes, No
7. Do you consider high blood pressure a risk factor for the circulatory system diseases?	Yes, No
8. Have you had strokes?	Yes, No
9. Have you seen or heard any information about stroke this year? If so, where? (open question)	Yes, No
10. Have you tried to find information about stroke on your own? If so, where? (open question)	Yes, No
11. Can you determine that a person has a stroke?	Yes, No
12. What signs of a stroke do you know? (Yes/No)	Lowering half of the face Weakness in the arm/leg Difficulty speaking Visual impairment Impaired coordination and gait Very severe headache
13. Do you know how to provide first aid to a person with a stroke?	Yes, No
14. What conditions increase the stroke risk? (Yes/No)	Smoking Alcohol Drugs Hypertension Heart diseases Diabetes mellitus Obesity
15. Do you know what a person can do to prevent a stroke?	Yes, No

relation to such risk factors as smoking, alcohol consumption, obesity, other CVDs and diabetes mellitus stands out.

Currently, the Instagram social network has more than 1000 million active users and provides the opportunity to share images, text publications and video lectures, which

Table 2. Social and demographic characteristics of respondents

Parameter		Before school (n=49)	After school (n=45)
Age, n (%)	Young (18-44 years old)	47 (96)	45 (100)
	Medium (45-59 years old)	2 (4)	0
Gender, n (%)	Male	2 (4)	2 (4)
	Female	47 (96)	43 (96)
Attitude to medicine, n (%)	Yes	17 (35)	16 (36)
	No	32 (65)	29 (64)
Education, n (%)	Secondary	11 (24)	10 (22)
	Higher secondary	38 (76)	35 (78)
History of stroke, n (%)		11 (22)	11 (24)

opens up a lot of opportunities for learning [6]. The main users of the social network are people under the age of 40. Women are most active online. An analysis of the online school audience also made it possible to identify the trends described above: younger people, mostly women, have completed their studies at an online school. However, according to the authors of the publication, this is not a limitation of such online programs, given the significant role of women in maintaining health in the family [7]. At the same time, the total involvement of the conducted online school was 5% (n=470) of the total number of people who listened to and read the school materials, which is lower than the involvement in the previous study, where this figure was 9.2% [2]. The lower involvement in the Stroke in Young People online school may be related to the more complex topics of this work.

Before the start of this educational program, more than half of the respondents had received information about a stroke earlier, including through active search on their own. This is most likely due to the fact that the respondents included medical workers, as well as people

who have suffered a stroke. The fact that a history of stroke didn't affect knowledge of risk factors, stroke symptoms (with the exception of one symptom), and the rules of first aid seems to be very important. According to the authors of the article, this is due to the fact that information in medical institutions is not effective enough and dictates the need to find ways to improve patient informativeness [8].

Education at the Stroke in Young People school led to an increase in correct answers for all risk factors and knowledge about the stroke signs. But even after learning, awareness of risk factors such as obesity, alcohol use, and diabetes mellitus, as well as stroke symptoms such as visual, coordination and gait impairment, and severe headaches, was consistent with less than 50%. Perhaps this is due to the fact that the readability of any online resources for patients is a separate problem, since most people don't understand the information provided to them [9-11]. Another reason for such results could be the format and duration of video lectures, because the most optimal for perception are short video clips in the form of a doctor-patient dialogue, as study results show [12].

Thus, epidemiological factors (gender and age composition), the way the material is presented and its readability must be taken into account when planning a preventive program in a social network as an element of digital prevention.

Conclusion

The Stroke in Young People online school aroused interest among medical workers and people without medical education, including those who have suffered a stroke. Most of the respondents believed that they knew how to prevent a stroke (over 80%) and would be able to provide first aid to a person with a stroke (over 90%). At

Table 3. Participants' awareness of risk factors for stroke

Risk factor awareness	Percentage of subjects with the «Yes» answer			p
	Before learning	After learning	Δ, %	(McNemar)
Cholesterol, n (%)	33 (67.3)	40 (88.9)	+21.6	0.057
Smoking, n (%)	15 (30.6)	25 (55.6)	+25.0	0.002
Alcohol, n (%)	12 (24.5)	17 (37.8)	+3.3	0.125
Arterial hypertension, n (%)	36 (73.5)	38 (84.4)	+10.9	0.070
Other cardiovascular diseases, n (%)	16 (32.7)	23 (51.1)	+18.4	0.039
Diabetes mellitus, n (%)	18 (36.7)	22 (48.9)	+12.2	0.070
Obesity, n (%)	14 (28.6)	17 (37.8)	+9.2	0.125

Table 4. Participants' knowledge of the stroke signs

Stroke sign	Percentage of subjects with the «Yes» answer			p
	Before learning	**After learning**	**Δ, %**	**(McNemar)**
Lowering half of the face, n (%)	40 (81.6)	42 (93.3)	+11.7	0.0313
Weakness in the limbs, n (%)	38 (75.6)	39 (86.7)	+11.1	0.289
Difficulty speaking, n (%)	39 (79.6)	40 (88.9)	+9.3	0.180
Visual impairment, n (%)	10 (20.4)	16 (35.6)	+15.2	0.109
Impaired coordination and gait, n (%)	8 (16.0)	9 (20.0)	+4.0	0.625
Very severe headache, n (%)	7 (14.3)	12 (26.7)	+12.4	0.0156

the same time, knowledge about risk factors and stroke symptoms was low before the start of learning: awareness of 5 risk factors out of 7 was below 40% and awareness of 3 stroke symptoms out of 6 was below 20%, despite the fact that the study included medical workers and persons who have suffered a stroke. Most of the respondents (>60%) knew that dyslipidemia and hypertension are risk factors for stroke, and were aware of the most common stroke symptoms (drooping the face half, weakness in the limbs, and difficulty speaking).

The social network can be one of the tools for medical prevention of stroke in young people, but the way the material is presented and its readability must be considered when planning a program.

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