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Research article

WAYS TO REDUCE HEALTH RISKS IN REMOTE AREAS OF THE RUSSIAN FEDERATION BY IMPROVING HEALTH AND SANITARY CARE

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Healthcare in Russia is facing a serious challenge as the healthcare system needs improvement and any territorial differences in access to healthcare services should be eliminated. Use of a territorial approach to providing healthcare and sanitary services to the population requires solutions that should entail their availability, high quality and low costs.

The aim of this study is to identify promising areas where provision of healthcare and sanitary services can be improved in remote areas of the Russian Federation.

A prototype mobile consultation and diagnostic center Saint Panteleimon has been tested in the operation mode. The center is a train made of railway cars manufactured by the Tver Carriage Works JSC and equipped for providing therapeutic, surgical, ophthalmological and other healthcare services as well as for conducting instrumental research and laboratory tests.

The train followed routes within the Far Eastern and Siberian Federal Districts using the Eastern-Siberian and Zabaykalskaya railways. The total length of the routes was 7065 kilometers; they go through 59 railways stations. It took 86 days (75 of them workdays) to travel these routes completely.

Overall, 9493 diseases were diagnosed in 7263 people who visited the train. Each fourth disease was diagnosed in examined patients for the first time in their lives. Diseases of the circulatory system, endocrine diseases, diseases of the musculoskeletal system, diseases of the eye and adnexa prevailed among those diagnosed in people who applied for healthcare services. One hundred and sixty-two people out of the examined patients were sent to an in-patient hospital. The most common causes for hospital admission included diseases of the musculoskeletal system, neoplasms, diseases of the circulatory system and endocrine diseases. Functioning of railway mobile consultation and diagnostic centers will reduce risks of health losses among population living in remote areas due to available qualified healthcare and sanitary aid, result in longer life expectancy and help preserve active longevity.

Keywords: healthcare and sanitary aid, remote areas, railway, consultation and diagnostic center Saint Panteleimon, risk of health loss, locomotive traction carriages, active longevity, low-mobile population groups.

Primary healthcare plays the most significant role in mitigating health risks in remote areas. It makes the foundation of the healthcare pyramid, is in the greatest demand by people and has a substantial effect on popula-

tion health. Annually, approximately 950 million cases are registered when people apply for primary healthcare¹. Recently, some measures have been implemented in Russia with their aim to develop out-patient healthcare in close

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proximity to residential areas and workplaces. The ultimate goal is to build such a model, which is based on patients' needs as the top priority, rational use of time when healthcare services are provided, their availability and high quality.

As reported in [1], people living in remote areas tend to suffer from chronic diseases more frequently and their average life expectancy is reduced. It is difficult to get qualitative healthcare services in such areas due to small population numbers; elderly people with limited physical and financial mobility prevail in such communities. Moreover, there is always lack of qualified healthcare workers in these areas [2].

The healthcare system in the Russian Federation needs improvement and any territorial differences in access to healthcare services should be eliminated. Use of a territorial approach to providing healthcare and sanitary services to the population in remote areas requires solutions that should entail their availability, high quality and low costs [2–5].

In accordance with the RF Government Order dated October 09, 2019 No. 1304, the Departmental Targeted Program 'Modernization of the Primary Healthcare in the Russian Federation' was approved for the period of 2021–2025. This Program and the 'Development of the Primary Healthcare System' Federal Project are complementary lists of activities aimed at achieving the same goal, which is growing expectancy of health, active and full life for the country population. To solve the task, the Healthcare National Project is being implemented in the Russian Federation at the moment. Its major goals include a growth in the population number in the country and a growth in life expectancy at birth due to providing available healthcare, orientating at prevention as the basic principle in healthcare and, consequently, reducing mortality rates among the country population [3–6].

Certain difficulties typical for the eastern areas of the country arose when a network of healthcare organizations responsible for providing primary healthcare, including specialized one, was being created using a geoinfor-

mation system. They were mostly associated with rendering consultation and diagnostic services to people, who lived in remote, difficult to access and sparsely populated areas. Thus, at present there are 462 towns in the Russian Federation with their population below 20,000 people. Overall, approximately 6 million people live in them. These towns are located far from large urban agglomerations and it is rather difficult to render consultation and diagnostic services to their population or to create programs of scheduled specialized healthcare for them.

The aim of this study is to identify promising areas where provision of healthcare and sanitary services can be improved in remote areas of the Russian Federation.

Materials and methods. We have analyzed specific features of using medical equipment installed in five specifically designed medical trains called 'Zdorovye', 'Svyatitel Luka', 'Terapevt Matvey Mudrov', 'Akademik Fedor Uglov', and 'Khirurg Nikolai Pirogov'.

A prototype mobile consultation and diagnostic center Saint Panteleimon has been tested in the operation mode. The center is a train made of railway cars manufactured by the Tver Carriage Works JSC, specifically designed for rendering primary healthcare and equipped for providing therapeutic, surgical, ophthalmological and other healthcare services as well as for conducting instrumental research and laboratory tests.

The train followed routes within the Far Eastern and Siberian Federal Districts in six RF regions (Buryatia, Zabaikalskii Krai, Khabarovskii Krai, Amur region, Irkutsk region and the Jewish Autonomous Area) using the Eastern-Siberian and Zabaikalskaya railways.

Results and discussion. The railway mobile consultation and diagnostic center Saint Panteleimon consists of railway cars, which are specifically equipped for providing outpatient healthcare and conducting laboratory and diagnostic tests. Equipment and layouts of the train interior allow rendering healthcare services by healthcare experts in different fields (therapist, pediatrician, geriatrician, car-

diologist, ophthalmologist, ENT doctor, endocrinologist, dentist, neurologist, surgeon, urologist, and obstetrician-gynecologist). High-precision equipment makes it possible to conduct x-ray and endoscopic examinations, ultrasound diagnostics, functional diagnostic and clinical laboratory tests. Healthcare services rendered by this mobile consultation and diagnostic center are fully available for low-mobile population groups.

The analysis was performed upon completion of six routes. The Saint Panteleimon Center covered 7065 kilometers over 86 calendar days (75 workdays). Healthcare services were rendered in 59 settlements with their population varying between 100 and 4500 people. 7263 people applied for medical aid, 675 of them were children (Table 1).

Over the analyzed period, 18,284 visits to a healthcare specialist were registered (including 823 visits by children) (Table 2). The Center was open for one day in each settlement; two days of work were rather rare. On average, one patient visited three different specialists a day and took part in five laboratory and diagnostic examinations together with getting their results explained to them.

Following the examinations, 162 patients were sent to an in-patient hospital for admission.

The number of visits to different healthcare experts is provided in Table 3.

Analysis of data provided in Table 3 established what medical specialties were in the highest demand; they included therapist, ophthalmologist, cardiologist, neurologist, endocrinologist, gynecologists, and geriatrician.

Table 1

The list of settlements (railway stations) where consolation and diagnostic services were rendered to population

Region	Settlements	The route length (km)	The number of people who visited the Center / of them, children
Far Eastern Federal District	Verkhnezeisk, Tutaul, Marevaya, Dipkun, Tungala, Dugda, Fevral'sk, Isa, Etyrken, Alonka, Tyrma, Sogda, Elga, Nobii Urgan, Soloni, Suluk, Gerbi, Dzhamku, Amgun, Postyshevo, Evoron, Kharpicha, Bolen, Gorin, Khurmuli	3042	2595 / 374
Zabaikalskii Krai	Ekaterinoslavka, Mukhinskaya, Sivaki, Ushumun, Chalgany, Tygda, Gonzha, Gudachi, Taldan, Skovorodino, Bamovskaya, Urusha, Erofei Pavlovich, Amazar, Semiozernyi, Sbegga, Mogocha, Ksen'evskaya.	2331	2646 / 193
Eastern-Siberian Federal District	Gorkhon, Novoi'nskii, Zaigraevo, Gusinoe Ozero, Zagustai, Naushki, Selenduma, Dzhida, Tataurovo, Selenga, Mysovaya, Tankhoi, Vydrino, Baikal, Kultuk, Slyudyanka-1, Andrianovskaya	1692	2022 / 108
TOTAL		7065	7263 / 675

Table 2

The number of visits to a doctor (out-patient care)

Region	Number / of them, children		
	Visits to a healthcare expert	Laboratory and diagnostic examinations	Sent to an in-patient hospital for admission
Far Eastern Federal District	8961 / 459	20,851 / 230	126 / 3
Zabaikalskii Krai	5548 / 255	10,495 / 152	31 / 0
Eastern-Siberian Federal District	3775 / 109	5918 / 48	5 / 0
Total	18,284 / 823	37,264 / 430	162 / 3

Table 3

The number of visit to different healthcare experts

Expert	Number of visits				
	Far Eastern Federal District	Zabaikalskii Krai	Eastern-Siberian Federal District	Total	Proportion (%)
Ophthalmologist	819	266	394	1479	11.80
Cardiologist	678	329	386	1393	11.11
Therapist	502	173	538	1213	11.86
Surgeon	386	126	368	880	7.021
Neurologist	539	248	353	1140	9.09
ENT doctor	367	185	288	840	6.70
Gynecologist	468	307	421	775	9.54
Endocrinologist	503	247	465	1215	9.69
Urologist	331	134	284	749	5.98
Pediatrician	280	71	107	458	3.65
Dentist	312	148	171	631	5.03
Geriatrician	896	169	0	1065	8.50
TOTAL	6355	3775	2403	12,533	100

X-ray, ultrasound and functional diagnostics (ECG) also turned out to be in high demand; endoscopic tests were not so popular. The most popular laboratory tests included biochemical blood test, tests to identify levels of hormones and tumor marker tests, tests to identify hepatitis viruses, examinations of the hemostasis system, gynecological smears, and microscopic examinations.

Table 4 provides data on the number of diseases diagnosed in patients who applied for primary healthcare by healthcare experts as well as based on conducted diagnostic and laboratory tests.

Nine thousand four hundred and ninety-three diseases were diagnosed in 7263 people who applied for primary healthcare (1.3 diseases per one patient). Each fourth disease was diagnosed in examined patients for the first time in their lives. Cardiovascular diseases, endocrine diseases, diseases of the musculoskeletal system, diseases of the eye and adnexa and diseases of the digestive system prevailed in the structure of diseases diagnosed in people who applied for primary healthcare. One hundred and sixty-two patients out of the examined people were sent to an in-patient hospital for admission. The most common reasons for hospital admission included diseases

of the musculoskeletal system (arthritis, arthrosis, and osteochondrosis); diseases of the eye (cataract and glaucoma); neoplasms (uterus, ovaries, breast, urinary bladder, kidneys, skin, etc.); diseases of the circulatory system (unstable angina pectoris and atherosclerosis); endocrine diseases (type II diabetes mellitus). Availability, timeliness and quality of rendered healthcare services are known to have substantial influence on life expectancy at birth (LEB) [6–10]. The number of hospital beds is an indicator, which has been widely used so far to estimate how well people's demand in qualitative healthcare is satisfied and to measure economic efficiency of healthcare organizations. But at present this indicator is losing its leading position in assessment of healthcare quality in remote and hard-to-reach areas [11–15].

Similar travelling medical and preventive work was accomplished in remote areas by oncologists from the Tambov Regional Oncological Hospital; they consulted patients, did some methodological work and conducted joint examinations. As a result, there was a substantial growth in the number of people who underwent diagnostic tests and this led to a decline in the number of neglected cases and one-year cancer mortality rates. Ultimately,

Table 4

The number of diseases detected in people who applied for primary healthcare
(including those diagnosed for the first time)

Nosologies	Detected diseases		
	Overall	Including those diagnosed for the first time	Proportion of first diagnosed diseases (%)
Registered diseases, total:	9493	2457	25.88
<i>Of them:</i> tuberculosis	1	1	100.00
Neoplasms, total:	206	30	14.56
<i>Of them:</i> malignant neoplasms	16	0	0.00
Diseases of the blood and blood-forming organs	33	4	12.12
Endocrine, nutritional and metabolic diseases	1381	181	13.11
<i>Of them:</i> diseases of the thyroid gland	680	117	17.21
Diabetes mellitus	285	23	8.07
Diseases of the nervous system	381	218	57.22
Diseases of the eye and adnexa	1018	424	41.65
<i>Of them:</i> cataract	452	247	54.64
glaucoma	117	30	25.64
Diseases of the ear and mastoid	411	237	57.66
<i>Of them:</i> conductive and sensorineural hearing loss	162	94	58.02
Diseases of the circulatory system, total:	2199	224	10.19
<i>Of them:</i> hypertensive diseases	1258	42	3.34
Ischaemic heart diseases	436	23	5.28
Cerebrovascular diseases	292	109	37.33
Diseases of the respiratory system	442	212	47.96
Diseases of the digestive system, total:	1073	379	35.32
<i>Of them:</i> stomach and duodenum ulcer	105	17	16.19
Diseases of the liver	40	2	5.00
Disorders of gallbladder, biliary tract	158	24	15.19
Diseases of the skin and subcutaneous tissue	57	9	15.78
Diseases of the musculoskeletal system and connective tissue	1051	340	32.35
<i>Of them:</i> arthropathies	347	120	34.58
osteopathies and chondropathies	276	128	46.37
Diseases of the genitourinary system	1092	157	14.37
<i>Of them:</i> urolithiasis	122	8	6.55
Congenital malformations	8	1	12.50
Pregnancy, childbirth and the puerperium	14	6	42.86
Injury and poisoning	41	6	14.63

this promoted a decline in the overall cancer mortality [16]. In addition, the studies [17–20] reported that a decrease in the number of in-patient hospital beds with simultaneous rise in volumes and quality of out-patient primary healthcare provided for population had a positive effect on LEB due to timely diagnostics of diseases and early start of therapy and, consequently, a decline in risks of a disease becoming chronic.

Conclusion. Design, construction and operation of the mobile railway consultation and diagnostic center Saint Panteleimon give evidence of correct managerial decisions aimed at implementing postulates fixed in the Healthcare National Project and the Program for State Guarantee of free-of-charge primary healthcare provided for the country citizens in 2024 and the planned period of 2025–2026. As the Center

operated for three months, primary healthcare and sanitary services were provided for people in 59 remote and sparsely populated settlements. More than 7 thousand people were able to get access to qualified primary healthcare over the shortest period of time. More than 37 thousand of relevant diagnostic and laboratory tests were conducted; relevant treatment was timely selected and started. One hundred and sixty-two patients were sent to an in-patient hospital for admission. Operations of such rail-

way centers can be considered a promising trend in reforming the primary healthcare system. Implementation of such projects will reduce risks of health losses among population living in remote areas, result in longer life expectancy and help preserve active longevity.

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