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Partnership for Health System Sustainability and Resilience

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Sustainability and Resilience in the Russian Health System

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1. Executive summary

1.1 Introduction

In 2020, the global community faced an unexpected serious challenge posed by the emergence of a new infectious disease: COVID-19. Since the beginning of the pandemic, over 100 million confirmed COVID-19 cases and over 2 million deaths have been recorded; Russia accounted for about 4 million coronavirus cases, with 2% of them resulting in deaths. As the healthcare system combatted the aggressive disease, the large-scale transformation processes taking place exposed the system's weaknesses and pressure points.

Russia's participation in the Partnership for Global Health Resilience and Sustainability (PHSSR) program allows for a critical assessment of the Russian healthcare system's sustainability, and its resilience to crises. This international cooperation is aimed at exchanging knowledge, and identifying the most effective management and organisational solutions to overcome the crisis.

The list of the key areas discussed within the framework of this project includes:

- Governance
- Health System Financing
- Workforce
- Medicines and Technology
- Service Delivery

This analytical report also includes two "in-practice" case studies, both showcasing examples of the Russian healthcare system's success achieved while adapting to the new work conditions amidst the pandemic.

Every section of the report was based on the latest relevant publicly available statistical data, as well as the latest health policy trends and forecasts made by reputable sources. The list of the project participants included experts from various healthcare industry fields.

1.2 Key findings

Table 1. Sustainability and resilience: summary of findings by key domain

	Sustainability	Resilience
Domain 1: Governance		
Strengths	▪ A clear system of delegation and accountability of healthcare governing bodies, distinct functions (no overlapping) of each governing body, separate budgets. ▪ Regulatory framework is united and interconnected with health development strategy.	▪ Regular and timely analysis and adjustment of recommendations and protocols ▪ Effective interlevel and interagency cooperation in countering the crisis
Weaknesses	▪ Limited public participation in law-making process.	▪ Creation of new legislative basis for emergency regulations was extremely complex ▪ Low degree of public compliance with restrictive measures

Domain 2: Financing		
Strengths	▪ Recommendations available for implementing financial incentives to reward providers, depending on performance against indicators related to access and quality, as well as the effective use of financial resources	▪ Extensive and multifaceted financial support in the event of local and global emergencies (through reallocation of funds and reserve funds of the President of the Russian Federation and the Government of the Russian Federation)
Weaknesses	▪ Mechanisms for rewarding performance are not yet mandated nationally ▪ Natural decline and aging of the population, increasing the financial burden on the country's budget ▪ Low level of healthcare spending	
Domain 3: Workforce		
Strengths	▪ Persistent trend towards increasing medical staff salaries and decreasing personnel turnover ▪ Optimisation of staffing levels in past ten years	▪ Success in mobilising human resources: involving students, residents and teaching staff of medical universities, introducing longer working hours, etc.
Weaknesses	▪ Decline in availability of health workers, increase in number of vacant positions	
Domain 4: Medicines and technology		
Strengths	▪ Political direction set towards reaching digital maturity by creating a single digital environment, introducing innovative technologies (including telemedicine), developing communication infrastructure ▪ New mechanisms of state support for medical and pharmaceutical industry ▪ Program to re-equip state clinics with modern medical equipment	▪ Temporary simplification of the procedure for allowing PPE to the market, so that purchasers can begin to buy goods and services without procurement procedures ▪ Increasing the production of medical equipment, drugs and PPE by 20-50% ▪ Increasing stocks for emergency care in healthcare providers ▪ Maintaining a reserve of special beds for treating patients with coronavirus
Weaknesses	▪ No clear thresholds of economic efficiency for healthcare technology assessment. ▪ Gaps in legislative regulation in provision of telemedicine services	▪ Lack of supplies at the beginning of the pandemic.

Domain 5: Service delivery		
Strengths	▪ Reduction of hospital stay ▪ Federal quality control of medical care ▪ Approved national strategy for healthy living and a three-stage prevention complex	▪ Timely response to the pandemic by repurposing medical facilities and reorganising care
Weaknesses	▪ Patients are responsible for their own referrals and pathway co-ordination between different types of care ▪ Congestion of the inpatient and emergency care segments. Prevention, early diagnosis, rehabilitation and palliative care are underdeveloped	▪ Deferred demand effect observed during the first wave led to a surge in medical requests during the plateau period

1.3 Recommendations

To develop the set of recommendations to improve the healthcare system's sustainability and resilience to crises, the research team carried out a synthesis and analysis of the relevant available materials to assess the pandemic's impact on the Russian healthcare system, and compiled expert assessments and practical examples. This recommendation list is not exhaustive. Moreover, the dynamic nature of the pandemic and current situation invites further and continued research.

Table 2. Recommendations across the five domains

Domain 1: Health System Governance	
Recommendations: Sustainability	**Recommendations: Resilience**
▪ Expanding participation of citizens and civil associations in law-making by adopting a single legal act that regulates and enables public involvement in creation of legislation	▪ Improvement of Russian legislative framework to support quicker responses to epidemiological risks. ▪ Creation of an integral system of legal regulation for public responsibility for their health
Domain 2: Health System Financing	
Recommendations: Sustainability	**Recommendations: Resilience**
▪ Development of Public Private Partnership for purchase of supplies, and assessment of the possibility of providing certain types of medical care on the basis of private medical organisations ▪ Mandatory rollout of mechanisms to incentivise the quality of medical services	▪ Cost-based financing of medical organisations in the process of repurposing or functioning in standby mode due to major shocks ▪ Establishment of a separate fund for reimbursing the costs of combatting pandemics
Domain 3: Workforce	

Recommendations: Sustainability	Recommendations: Resilience
▪ Promote the prestige of medical professions to younger generations	▪ Need for supplementing or revising educational courses on infectious diseases regarding epidemic preparedness

Domain 4: Medicines and Technology

Recommendations: Sustainability	Recommendations: Resilience
▪ Need for a full integration of all electronic medical systems, eliminating the lack of open data, as well as creating a high-quality objective source of professional knowledge ▪ Introduction of a dynamic system of economic viability's threshold values ▪ Improvement of the regulatory framework for provision of telemedicine services ▪ Implementation of a federal program for improving population digital literacy ▪ Creation of a separate National Health Foundation (NHF), using Russian Science Foundation as an example	▪ Need to take legislative measures to temporarily restrict speculation on goods used for treating patients and preventing the spread of COVID-19, to strengthen the work of the FAS (Federal Antimonopoly Service of Russia) and other law-enforcement agencies to prevent speculation in this area

Domain 5: Service Delivery

Recommendations: Sustainability	Recommendations: Resilience
▪ Introducing day-to-day rehabilitation in hospitals, as well as developing institutions for treatment and home care ▪ Overcoming the crisis of public awareness of lifestyle factors in health and further promoting healthy behaviours	▪ Expansion of the outpatient clinics network and conducting a review of hospital facilities' standards

2. Introduction

In 2020, the global community faced an unexpected serious challenge posed by the emergence of a new infectious disease: COVID-19. Since the beginning of the pandemic, over 100 million confirmed COVID-19 cases and over 2 million deaths have been recorded; Russia accounted for about 4 million of coronavirus cases with 2% of them resulting in deaths. As the healthcare system combatted the aggressive disease, large-scale transformation processes that exposed the system's weaknesses and pressure points started taking place.

Russia's participation in the Partnership for Global Health Resilience and Sustainability (PHSSR) program allows for conducting a critical assessment of the Russian healthcare system's sustainability and its resilience to crises, and establishing close international cooperation aimed at exchanging knowledge and identifying the most efficient management and organisational solutions to overcome the crisis.

The main goal of this project is to make a significant long-term contribution to global healthcare in the following areas:

1. Healthcare systems' sustainability (these systems' ability to support, generate resources and provide services, as well as learn and improve);
2. Healthcare systems' resilience to crises (their ability to prevent, mitigate and overcome crises, including the COVID-19 pandemic, environmental and ecological disasters).

The list of the key areas discussed within the framework of this project includes:

- Governance
- Health System Financing
- Workforce
- Medicines and Technology
- Service Delivery

Every section of the report was based on the latest relevant publically available statistical data as well as the latest health policy trends and forecasts made by reputable sources. The list of the project participants included experts from various healthcare industry fields (Appendix 1).

Apart from the analytical materials, each section also includes a set of recommendations aimed at increasing the healthcare industry's sustainability and resilience to crises. This recommendation list is not exhaustive. Moreover, the dynamic nature of the pandemic invites further research on the matter.

Finally, Russia's analytical report also includes two applied case studies showcasing examples of the Russian healthcare system's success achieved while adapting to the new work conditions amidst the pandemic. The first case study is dedicated to optimising service delivery by creating a mobile simulation center. The second case study concerns improving the quality of medical care by creating a remote information center called "PharmaCOVID" for consulting COVID-19 patients on complex pharmacotherapy issues.

Thus, the synthesis and analysis of the relevant available materials carried out with the goal to assess the pandemic's impact on the Russian healthcare system, combined with expert assessments and practical examples, increase the potential significance of this report in terms of ensuring the healthcare system's sustainability and resilience to future crises.

3. Domain 1: Health System Governance

3.1 Governance Sustainability

In 2003, Russian healthcare system was reformed and segmented in federal, regional and municipal levels:

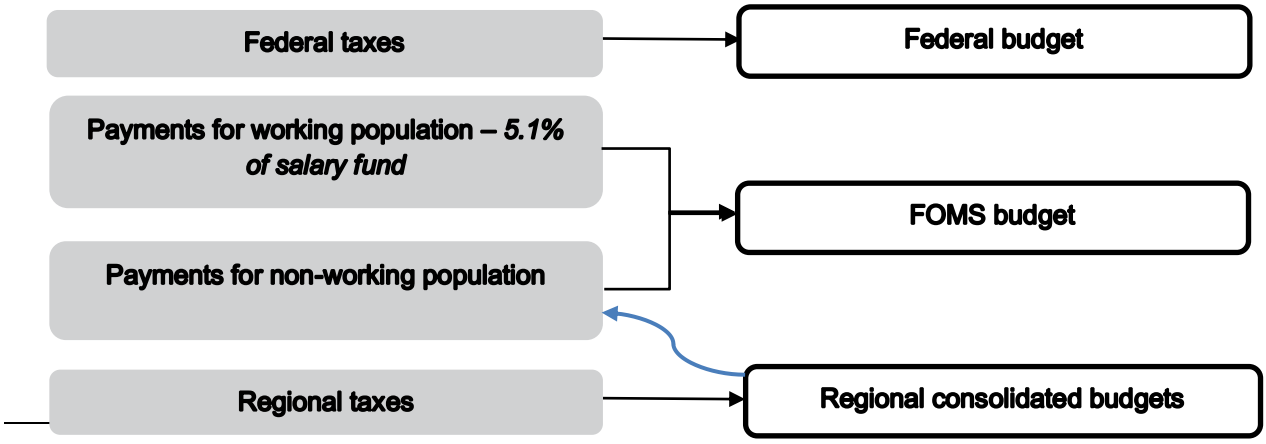
- At the federal level, the central governing body is the Ministry of Health of the Russian Federation, which implements and develops state policy of healthcare, and acts as a legal regulator in healthcare, health insurance, drugs and so forth. As well as the provision medical care, the Ministry regulates the following spheres: pharmaceuticals, quality control, drugs safety and effectiveness, medical devices, health resort services, sanitary and epidemiological conditions, etc. The Ministry is subordinate to the Government of the Russian Federation. The Ministry coordinates and monitors the activities of the Federal Service for Surveillance in Healthcare (Roszdravnadzor) and coordinates activities of the Federal Compulsory Medical Insurance Fund (FFOMS).

- At the regional level, health system management is performed by regional Healthcare Departments and Ministries, which are responsible for the development and realisation of regional health programs, implementation of preventive measures, medical care and expertise, organisation of labor protection and social guarantees for medical personnel, management of medical care in emergency conditions, etc. Regional executive authorities have the power to determine the budget and funding for the provision of specialised medical care. Regional health authorities are subordinate to the regional Governments, which in turn are subordinate to the Governors[1].

- At the municipal level, local government bodies manage the healthcare system. Their functions include monitoring and analysing citizens' well-being and medical care provision; organising and coordinating healthcare activities; developing and implementing municipal healthcare programs, etc. Municipal executive authorities have the power to plan the costs for emergency care, primary medical care in outpatient and inpatient facilities, and medical care for women during pregnancy, in labor and after childbirth.

Healthcare is financed by the state through different sources: federal and regional taxes, which are collected in the federal budget and in the consolidated budgets of the constituent entities of the Russian Federation, as well as compulsory health insurance (CHI) payments. These are payments for the working population (5.1% of the salary bill (FOT), which is paid by employers), and regional payments for the non-working population. All CHI funds are accumulated in the Federal CHI Fund (FOMS) (Fig.1) [1].

Figure 1: Sources of funding for the Russian healthcare system [1].



[1] *Amendment to the legislation providing for the direct appointment of the regional healthcare ministers is currently at the final stage of approval*

Authorised financial bodies distribute all budgetary funds for the next financial year and two-year planning period according to articles of expenditure, levels of government and territories. The distribution is dictated by the main goals and objectives of state policy, as well as special decisions of the President of the Russian Federation and the Government of the Russian Federation.

The above goals and objectives of state policy are healthcare are presented in interrelated regulatory legal acts. The main strategic documents in healthcare are:

- Constitution of the Russian Federation (adopted by national referendum on 12 December 1993 including amendments approved by a nationwide vote on 1 July 2020);
- Federal Law on Protection of Citizens' Health dated November 21, 2011 No. 323-FZ;
- Decree of the President of the Russian Federation on *National Goals and Strategic Objectives of Development of the Russian Federation till 2024*;
- Decree of the President of the Russian Federation on *Strategy for Development of Healthcare in the Russian Federation until 2025*;
- Key Guidelines for Government activities till 2024;
- State Program *Development of Healthcare*;
- National project *Healthcare* (within the framework of which a number of national federal projects have been approved, for example, *Development of the Primary Healthcare System* and *Fighting Cancer*), etc.

All documents mentioned above have a high interconnection and continuity. Each document sets deadlines for the indicators which are necessary to reach in order to achieve the goals, names responsible executors and lists expected results. Various strategic acts aimed at healthcare system development were adopted in each subject (administrative areas) of Russia on the basis of these documents.

The main goals of sustainable development in the Russian Federation include population growth and increasing life expectancy to 78 years. To achieve these goals, federal and regional authorities have been assigned a wide range of tasks, including creating conditions for increasing availability and quality of medical care; development, implementation and application of new medical technologies and medicines; prevention of spread of diseases that pose a danger to others, etc. [2].

In general, the Russian legislative system that regulates the healthcare sector is characterised by a high degree of interconnectedness of regulatory legal acts and the absence of inaccuracies and gaps (with the exception of the regulation of measures due to the pandemic and the telemedicine boom caused by it, which will be discussed below). A high degree of continuity of political power greatly contributes to the coordination of measures taken, and the uniformity of approaches to achieving the set goals, which, in turn, has a positive effect on the sustainability of the healthcare system.

Despite the fact that legislative activity is the prerogative of the authorities, modern Russian legislation provides mechanisms of public participation (general population and experts) in the legislative process.

- **Public participation**. The highest form of the expression of public will is a referendum, to which a bill of any level up to the Constitution can be submitted. However, a boom in digital technology is making another means of participation significantly more popular – public debate. A number of online government platforms (for example, https://regulation.gov.ru/) aim to ensure the publicity of legislative process by posting all versions of the draft legal acts as it passes different stages of review, including the possibility of wide public discussion.

- **Expert participation**. Nine specialised expert councils of State Duma Health Protection Committee conduct an internal examination of draft legal acts. Each of them includes various representatives of the medical community (chief physicians, editors of medical journals, directors of medical centers, etc.). External independent expertise is performed by executive authorities (e.g. the Ministry of Justice in terms of legal expertise), non-profit organisations (e.g. National Medical Chamber - a medical community union), other independent associations (for example, an independent expert center *Public Duma*).

The system of public involvement aims to obtain feedback on the prior-developed draft laws, and enables greater consideration of the interests of all social groups when adopting new laws. However, this system has two main limitations. First, because new regulatory legal acts are published on state internet platforms, part of the population is not able to access the documents due to digital illiteracy or lack of necessary resources (computer, internet). Secondly, the authors consider it necessary to expand the area of participation of citizens and civil associations in the legislative process, specifically in terms of their direct involvement in the independent development of draft laws, development of petitions, and submission to deputies for consideration. This measure will allow for a more sensitive response to the needs of the population.

Recommendation 1.1:

To adopt a single normative legal act regulating public legislative initiation, and expanding civil rights in terms of lawmaking.

3.2 Governance Resilience

The strategic document dedicated to the development of Russian healthcare (Decree of the President of the Russian Federation of June 6, 2019 No. 254) outlined the risks similar to the COVID-19 pandemic 6 months prior to the official recognition of the new coronavirus infection. According to the document, the emergence of new infections caused by unknown pathogens requires continuously maintaining a high level of anti-epidemic preparedness. In terms of biosecurity, this includes carrying out a set of prophylactic and anti-epidemic measures to prevent the introduction and spread of infectious diseases with natural foci and zoonotic infections, as well as preparations to respond to natural and intentional biological threats. Thus, even before the COVID-19 pandemic, the development of this biosafety system and prevention of the spread of infectious diseases allowed for an improvement of Russian health system resilience to external threats of an epidemiological nature.

Russia has a sanitary and epidemiological surveillance system organised in accordance with WHO recommendations. It is represented by both medical (sanitary and epidemiological agencies, clinics, in-patient facilities) and non-medical authorities (administrative bodies, organisations, population). The surveillance system hosts: the collection of data and determination of trends in the epidemic progression; the identification of the root causes and conditions enabling the epidemic spread across certain territories; carries out pre-epidemic diagnostics; and makes epidemiological diagnoses. It forecasts the epidemiological situation based on the information flow, and takes management decisions and estimates their effectiveness and efficiency. Within the framework of BRICS, Russia is now evaluating the establishment of an integrated system for preventing risks and epidemiological threats [2]. The Russian Healthcare Ministry has also developed a concept for the modernisation of its infectious disease service: it includes creating a multi-level system for laboratory diagnostics of infectious diseases, modernising the infrastructure of clinics and hospitals, building a federal applied research center for infectious diseases and improving the infectious disease management system.

The fact that Russia started introducing restrictive measures and increasing bed capacity while the pandemic was still developing in China played a major role in combating COVID-19 [4]. This assisted prevention of the

rapid increase in the number of cases, as well as providing medical help to those who needed it. Moscow was originally well-provided for with equipment, and had sufficient bed capacity (28 intensive care beds per 100,000 people, which is 2x higher than the leading countries' average, and 35 artificial lung ventilation machines per 100,000, which is 3 times higher than the leading countries' average); the city promptly increased the bed capacity for COVID patients (up to 38,000 by the middle of May), organised large-scale testing (with a total of 1.6 million tests, or 11.3 tests per case), introduced early lockdown (by the time ~1200 cases were registered), ensured early isolation of senior citizens, and then provided them with social care (via >21,000 volunteers and >3,000 social workers) [5]. Senior citizens were relatively well-isolated (through restricted socialisation and discipline); they also rarely share their living space with young people. Both of these factors played an important role in protecting the elderly from the coronavirus.

To ensure the interlevel and interagency communication across the country, Russian authorities established the Coordination Council for combating the new coronavirus infection; a crisis center for coordinating measures on preventing the introduction and further spread of the infection; a crisis center for economic issues, which was responsible for the development of measures to support local businesses and organisations affected by the pandemic; and an information center for monitoring the coronavirus situation. Official websites of these organisations update the information on the legal framework, official statements by the top public officials, case statistics and other pandemic-related data on a 24/7 basis. The important healthcare information was published on the websites of all federal, regional and municipal healthcare authorities and was broadcast via TV and radio, print media, social networks and hotlines. It is worth noting that these organisations rose to the challenge: they promptly provided different Russian authorities with accurate information and informed the population about all aspects of COVID-19. According to the sociological research conducted by the Moscow Healthcare Department's Research Institute for Healthcare Organization and Medical Management, as of May 2020, 41% of respondents read up on COVID-19 once a day, while 29% of them read up on it several times a day [6].

Apart from introducing these emergency measures, a number of state and non-state expert groups analyze, predict and assess the impact of the crisis caused by the COVID-19 pandemic (Court of Audit, Higher School of Economics' Analytical Center, Accenture, Moscow Healthcare Department's Research Institute for Healthcare Organization and Medical Management and others).

Thus one can conclude that despite the unique nature of the pandemic threat, Russia's healthcare system was largely prepared to handle it. Within the first several months from the start of the pandemic the authorities managed to mobilise Russian business capacity, reduce the country's dependence on foreign producers of medical and personal protection equipment and stock up on supplies. A short 36-hour coronavirus training program was developed for doctors and nurses, teachers, residents and postgraduate students; the telemedicine and remote technology industries experienced a rapid development, two coronavirus vaccines are marketed and the third one is at the final stage of development. Sputnik V vaccine is used for mass vaccination.

At the same time, despite the fact that the authorities showcased their ability to handle new challenges amidst the pandemic shock, it seems advisable to the authors to draw the authorities' attention to the need for improved legislative framework in terms of emergency management. As mentioned above, despite the fact that the Russian legislative system's framework is largely well-developed, the crisis caused by the COVID-19 pandemic called for a modification of the existing and/or adoption of new legal and regulatory instruments of different levels. Moreover, the progression of the coronavirus required regularly analysis of and update to the published methodological recommendations and provisional guidelines. This, in turn, put extra pressure on the administrative bodies. To avoid similar pressure in the future, the authorities will need to issue new laws regulating the actions to be taken in the event of epidemiological emergencies or add these laws to the existing ones, start working on the regulation of the procedure for lifting the high-alert mode, as well as resolve the existing imbalances to make sure the country does not revert to the pre-coronavirus times but rather evolves using this experience.

Recommendation 1.2:

Regulate the actions to be taken in the event of epidemiological emergencies or lifting the high-alert mode.

Within the context of this section, one should also address the issue of the degree to which the decisions taken are enforced. The pandemic showcased that in certain areas they are not enforced well enough. This concerns, for example, the measures to make sure citizens self-isolate (the non-working days were perceived by many as a paid holiday: a license for having walks, visiting family and friends and so forth) and the banking sector policy implements to support businesses and the population (which was often perceived as covert sabotage). According to the sociological research conducted by the Moscow Healthcare Department's Research Institute for Healthcare Organization and Medical Management in June 2020, while forecasting their behavior during the second coronavirus wave, 54% of the respondents stated that they believed that restrictive measures should be followed selectively, 5% stated they were not planning to meet the authorities' demands, and only 39% of the respondents were planning to meet them [6].

Accordingly, in order to increase the efficiency of the measures to curb the coronavirus spread, we find it necessary to introduce legitimate forms of liability for one's health (and the health of those surrounding them). This refers to the introduction of penalties not only for failing to comply with the lockdown, self-isolate, and expose oneself and others to the risk of spreading the infection, but also risking one's health, failing to undergo the scheduled occupational health checkups and assessments [4]. The authorities recently adopted a number of similar measures (for instance, introduced fines for not using personal protective equipment in public places or using it improperly), but did this in a hurry, without proper consideration, and occasionally while exceeding their power. An integrated regulatory system is therefore required, which will comply with the labor, administrative, criminal and other law.

Health awareness and literacy levels of Russian patients are low also, which showcases the need for a centralised state program for improving health literacy, for example via schools on coronary heart disease, diabetes and asthma. Patients must have access to state information resources (in the form of websites and applications) offering reliable up-to-date information on their illnesses, as well as supplementary non-professional resources. They must have access to patient support programs that focus on preventing chronic diseases. Within the framework of this project, one could also engage businesses in the promotion of healthy lifestyle. All of this is of prime importance, because the patient's role in the preservation of their own health is now increasing: in the near future, instead of going to the nearest clinic, patients will be able to perform checks by launching certain applications (like Apple Health). More complex diagnostics can be carried out remotely via AI or telemedicine.

Recommendation 1.3:

Introduce legitimate forms of liability for one's health provided ensuring proper information support to improve citizens' health literacy.

3.3 Governance Recommendations

The main methods used to increase the resilience and sustainability of the Russian health care system in this particular case are to reinforce the existing regulatory framework in terms of adapting to the current crisis and preparing for potential crises in the future. The data confirms that in general Russian legislative system is highly complex, and in emergency situations it is often difficult for all parties involved to function without proper regulation.

4. Domain 2: Health System Financing

4.1 Financing Sustainability

Russia has a hybrid healthcare financing model that includes both private (from the public) and public funds. Public funds are used to finance the program of state guarantees for providing citizens with free medical care, investment spending, health and educational facilities' maintenance, sanitary and epidemiological service and so forth. Private funds cover the costs of medical care provision both directly via paying for services in state, municipal and private medical organisations as well as via voluntary medical insurance [1].

The data in Table 1 shows that between 2010 and 2018, total expenditure on health increased in absolute terms by 77%, while the GDP rose by 74%; this signifies a balance between these indicators. Meanwhile, the proportion of public and private sources of funding practically stays the same: 2/3 and 1/3 of total expenditure on health, respectively. It is worth noting that the Compulsory Medical Insurance Fund's spending increased (almost twofold).

Table 1: Total expenditure on health, proportion of public and private sources of funding [7, 8].

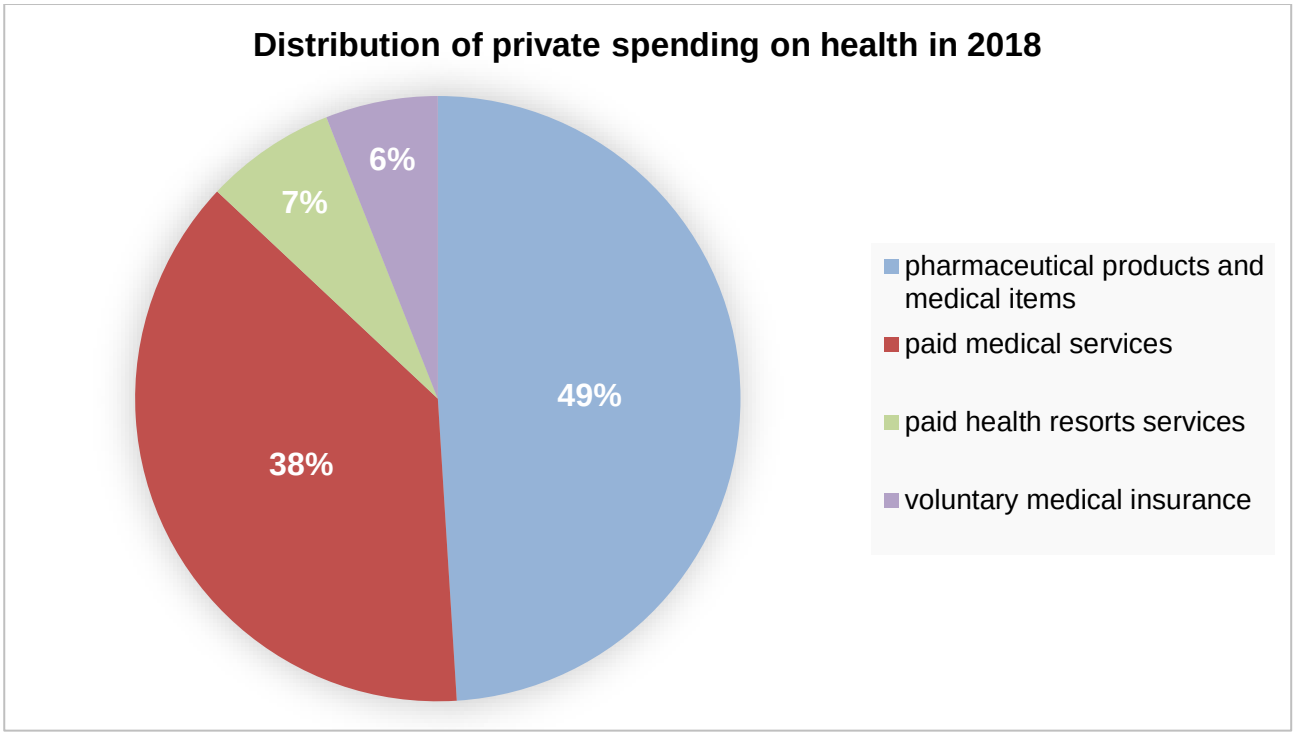
	2010	2011	2012	2013	2014	2015	2016	2017	2018
Total expenditure on health*	5.0	4.8	4.9	5.1	5.2	5.3	5.3	5.3	4.9
Russian budgeting system's budget expenditure**	61.4	62.7	63.7	62.4	61.8	58.7	57.0	57.1	65.0
Including the Compulsory Medical Insurance Fund's spending**	23.7	31.4	30.7	33.9	34.0	35.9	35.7	36.0	39.0
Private expenditure**	38.6	37.3	36.3	37.6	38.2	41.3	43.0	42.9	35.0
Including voluntary medical insurance spending**	2.7	2.6	2.5	2.4	2.1	2.3	2.3	2.2	2.1

** % from GDP*
*** % from total expenditure on health*

Private funding is comprised of voluntary medical insurance payments made by the population and employers, as well as people's personal spending on paid medical care, health resorts and pharmaceutical products. In 2018, private funding was mostly comprised of people's spending on pharmaceutical products and medical items (49%) and medical care and health resorts[2] (45%), while spending on voluntary medical insurance was estimated at a mere 6% (Fig. 1) [1].

[2] *Health resort – preventive and treatment facility that utilizes primarily natural factors (climate, mineral waters, therapeutic mud, sea bathing, etc.) in combination with exercise therapy, physiotherapy and diet, subject to a certain regimen of treatment and rest.*

Figure 1: Structure of private spending on health in 2018 [1]



Regarding the population's medical care coverage, ensuring equal access and high quality of provided medical service across the country and for every population group has been a priority in government healthcare policy throughout the past decade. The main issue is the higher economic attractiveness of some regions in comparison with others, which entails a higher level of salaries, and, consequently, bigger tax revenues to the budget. This, in turn, makes it possible to raise spending on healthcare, improve equipment of medical institutions and attract highly qualified personnel, which generally leads to an increase in the quality of medical care. At the same time, poorer regions (especially in highly remote and hard-to-reach regions) face an outflow of medical personnel to regions with more competitive salaries.

Another inequality in provision of medical services is the absence of total drug coverage. Only certain groups of beneficiaries (veterans, people with disabilities and with certain nosologies) are covered by drug insurance which is dependent on the regional budget stability. This way, some of the patients move to more profitable regions in order to obtain better coverage. However, beneficiaries have to wait sometimes for the purchase and supply of free medicine by the region.

In order to eliminate some of these territorial inequalities, federal authorities have created two state programs - '*Zemsky Doctor'* (local doctor) and *'Zemsky Feldsher'* (local paramedic), aimed at attracting qualified medical personnel to rural areas through financial incentives. In 2019, over 10,000 medical professionals were granted housing within the framework of these programs. However, the issue of imbalance in state health expenditure across different Russian regions was not completely resolved: Central Russia and the Far North regions are traditionally characterised by higher funding. The country's 10 wealthiest regions receive almost double the funding in healthcare than its 10 poorest regions [1].

The issue of improving medical care quality has not been entirely resolved either. Federal Compulsory Medical Insurance Fund has issued recommendations on introducing efficient mechanisms for the remuneration of medical organisations using local compulsory medical insurance supply funds. These recommendations establish remuneration based on the level of access and quality of provided medical care, which is measured using a set of indicators, and offers an opportunity to incentivise performance. It is worth noting that several regions actively use this approach, but this is not consistent across the country. The quality of provided medical

care may improve once the aforementioned recommendations are implemented and recognised as mandatory. At the moment, many medical organisations are aiming to conform to the standards of medical care quality, but their main financial incentive is to comply with the standards in order not to be fined for non-compliant.

Recommendation 2.1:

To mandate the national rollout of financial incentives for improvements in the quality of medical care.

Meanwhile, Russia managed to reduce social differentiation in terms of medical care accessibility. Those wealthy enough can, of course, promptly receive necessary care at private medical organisations. However, in general, every Russian citizen is entitled to free medical care provided within a reasonable time. Insurance agencies pay medical organisations for every patient they treat; each disease is paid for according to its own charge tariff. Compulsory medical insurance funds are used to pay for general medical services (except for those relating to socially significant diseases), specialised (except for the high-tech) medical care and drug provision. Federal and regional budgets fund care for those suffering from socially significant diseases, and the provision of high-tech medical care. The basic compulsory insurance program includes coverage for unemployed population.

The division of medical care into primary, secondary and tertiary within the Russian healthcare system is nominal. Those planning expenditures take into account the types of medical care as described in Table 2. Here's how one can differentiate between them:

1. Primary medical care includes general medical services (including emergency care) and specialised medical care (except for the services provided within the framework of secondary and tertiary medical care);

2. Secondary medical care includes general medical services (including emergency care) and specialised medical care (except for the high-tech one) **provided by medical organisations with designated departments,** clinics etc.;

3. Tertiary medical care includes general medical services (including emergency care) and specialised medical care (including the high-tech one) **provided by medical organisations that offer high-tech medical services.**

Given the stable proportion of expenditure on applied scientific research, the below summary of **budget funds** distribution indicates that between 2013-2018 the expenses on outpatient care and public health and epidemiological welfare increased twofold, and the expenses on other healthcare related issues (emergency care, blood banking etc.) had increased by 1.5 times. Meanwhile, the expenses on in-patient care had decreased twofold and the health resort treatment expenses had decreased by 1.3 times. Because the data presented in Table 2 relate to the distribution of **federal budget** expenditures by type of medical care, the dynamics of distribution demonstrate the reform of the health financing mechanism. It was adjusted following the inclusion of federal medical organisations into the compulsory health insurance system, while the inpatient activity stayed at the same level.

Table 2: Breakdown of expenses according to the medical care type [Error! Reference source not found.**]**

	2013	2014	2015	2016	2017	2018
Inpatient care*	51.0	51.5	39.8	45.6	28.6	24.7
Outpatient care	15.2	16.3	20.1	21.8	31.4	31.3
Health resort treatment	9.1	7.8	8.6	7.1	8.2	7.1
Public health and epidemiological welfare	2.7	3.1	3.9	3.6	4.4	5.5
Applied scientific research in healthcare	4.8	3.9	4.8	3.7	4.3	4.6
Other healthcare-related issues	17.0	17.4	22.8	18.2	23.1	26.8

** % of the total federal healthcare budget*

Every year the authorities plan the budget for the next fiscal year and the upcoming two-year planning period by taking into account the main healthcare policy priorities, most of which are enshrined as goals and target numbers within the framework of the healthcare national project. It is clear that for the economy to develop, the country's labor productivity has to grow. This can be achieved through reducing morbidity, mortality (first of all, among people of working age), temporary and permanent disability, as well as improving the population's health in general. The demographic changes currently taking place in Russia threaten future sustainability of the country's healthcare system. Between 2012 and 2020, the percentage of people over 65 in Russia had been increasing, which indicates demographic ageing of the population and an increased financial burden on the country's budget (Table 3).

Table 3: The percentage of people over 65 years of age [7]

	2012	2013	2014	2015	2016	2017	2018	2019	2020
Percentage of people over 65*	22.7	23.1	23.5	24.0	24.6	25.0	25.4	25.9	25.0

** % of the total population*

Moreover, between 2011 and 2018, labor force participation and employment rates had been falling. This was partially caused by the aforementioned demographic ageing as well as natural population decline (Table 4).

Table 4: Employment and labor force participation rates [7]

	2011	2012	2013	2014	2015	2016	2017	2018
Labor force participation rate* (%)	68.3	68.7	68.5	68.9	69.1	69.5	62.8	62.8
Employment rate (%)**	63.9	64.9	64.8	65.3	65.3	65.7	59.5	59.8

** ratio of people in the labor force to the total population (%)*

*** ratio of those employed to the total population (%)*

Thus, by taking into account the decrease in the working-age population and the accompanying financial burden on the country's budget, as well as comparing Russia's healthcare system financing with that in developed countries, we can conclude that public funding for healthcare must be increased. This is recognised at all levels of government, and even the most pessimistic economic outlooks provide for increased healthcare costs.

The forecast for the long-term social and economic development of the Russian Federation up to 2030 suggests several scenarios for the healthcare development:

1. *Conservative:* in the context of low economic growth, the maximum increase in health care spending expected by 2030 is 6.2% of GDP. At this level, however, the levels of qualified clinical staff, logistics and supplies management in medical providers would not be able to meet modern standards;

2. *Innovative:* increase in expenditure of up to 7.1% of GDP by 2030. This enables a qualitative breakthrough in the healthcare system: increasing the structural efficiency of medical organisation, expanding innovative activities in medical and scientific organisations in order to develop and implement new medical technologies and information systems;

3. *Forced:* increase in expenditures up to 9.4% of GDP by 2030. The main measures in this scenario are aimed at reducing mortality rate, improving organisation of medical care provision and increasing its accessibility, preventing socially significant diseases, mortality from road traffic accidents and cancer [10].

In our opinion, a number of measures can contribute to solving the issue of the financial deficit:

- Development of public-private partnerships (PPP) (attracting co-financing from banks, financial institutions, insurance companies, telemedicine technology developers and vendors, etc.). Involvement of private capital in medicine helps to minimise the dissonance between public funding possibilities and rapidly developing technologies in the medical field, and, in turn, contributes to improving the quality of medical services and modernisation of the healthcare system.

  There are three main areas of PPP in healthcare:

  - in production (e.g. investment in establishing a telemedicine infrastructure at polyclinics);
  - in production and service (e.g. creation and wide implementation of functional diagnostic devices and software applications, gathering and analysing data from them);
  - in service (e.g. online distribution of patients flow to medical organisations).

- By this cooperation the government benefits in terms of reducing costs (e.g. of purchasing medical equipment or specialised software) and the private investors gain access to state support, which ensures stability of business development and guarantees long-term funding.

- Those funds then can be redistributed: half to increase the salaries of medical workers, a quarter to provide the general population (not only beneficiaries) with free medicines in outpatient setting, and the remaining funds to increase qualifications of medical workers, prepare for crisis situations and ensure service of medical organisations in conditions of increased infectious safety.

> ***Recommendation 2.2:***
>
> *Development of PPP for medical supplies, and assessment of the possibility of providing certain types of medical care in private medical organisations.*

The Administration and Government of Russia recognises the importance of extending financial planning and assessing long-term risks: a short-term solution is to plan three-year budgets; meanwhile a long-term one is to coordinate strategic and budget planning, taking into account long-term risks based on analysis of long-term prospects of up to 20 years. The main tool for determining fiscal sustainability is creating fiscal projections based on assessments of government revenue and expenditure figures, which are predicted while taking into account long-term risks and priorities of socio-economic development, as well their compliance with objectives of budget policy. These objectives include achieving a balanced budget at the end of the period under review; a set amount of public debt (as a percentage of GDP); compliance of debt burden at the end of the fiscal period

with the initial value, etc. Fiscal sustainability has not only financial implications but also social and political ones, and applies to current and future generations.

One of the main pillars of fiscal sustainability of the healthcare system is the Federal Compulsory Medical Insurance Fund (FFOMS). FFOMS ensures leveling of conditions for financing territorial programs, collection of insurance premiums, and social justice and equality for all citizens in receiving medical care. Data in Table 5 show unstable fluctuations in the deficit/surplus of the FFOMS budget funds. It should be noted that draft law on the FFOMS budget for 2021–2023 considers a deficit that will be gradually decreasing.

Annually, the law on the FFOMS budget for the current year and planning period approves the chief administrators of the financing sources covering FFOMS deficit, as well as sources of internal financing for FFOMS deficit. The periodically arising deficit of FFOMS is covered by transferring balances of the FFOMS own funds. In case of emergency, funds from the federal budget can be used to cover the deficit of the FFOMS funds.

Table 5: Calculation of the FFOMS budget surplus [7, 8]

	2013	2014	2015	2016	2017	2018	2019
Budget surplus (%)	0.072	-0.023	-0.079	0.079	0.089	-0.089	-0.057

** Surplus(%) = (P-D)*100/GDP, where P is the absolute expenditures of FFOMS, and D is the absolute revenues of FFOMS.*

Ultimately, an important indicator for assessing the sustainability of a health care system is the size of internal and external debt (Table 6). Analysis of the dynamics of Russia internal and external debts shows an increase of almost double in 2019 compared to 2011. It should be noted that Russia has inherited USSR government debts. In addition, since the external debts of the Russian Federation are measured in US dollars, the total amount of the country's public debt is directly dependent on currency fluctuations. This explains the sharp spike in government debt in 2015. These debts are repaid in accordance with the payment schedule established by the Central Bank of Russia.

Table 6: Share of government debt [12]

	2011	2012	2013	2014	2015	2016	2017	2018	2019
Share of government debt*	6.9	7.8	8.9	9.5	12.4	12.8	12.1	11.0	11.4

4.2 Financing Resilience

There are 3 sources of funding for activity of state medical organisations: (1) funds of state extra-budgetary funds, including FFOMS (to compensate for free medical services, sick leaves, etc.); (2) extra-budgetary funds (shares from paid medical services, paid seminars, etc.); (3) budget funds of the Russian Federation (subsidies for capital repairs, equipment purchase, assistance to patients with socially significant diseases, etc.). State financial support in case of a local and global emergency can be provided by redistributing funds by articles of expenditure, or from the reserve funds of the President of the Russian Federation and the Government of the Russian Federation.

Examples of government support for medical institutions during the COVID-19 pandemic:

1. Financial support from the reserve fund of the Russian Federation: e.g. incentive payments to medical workers working with COVID-positive patients, to purchase medical equipment; from Rospotrebnadzor funds to subsidise subordinate organisations and ensure the production of pilot testing kits; from the Ministry of Emergency Situations to organise and design field hospitals to provide medical care to

patients with COVID-19; from the Ministry of Industry and Trade for purchase, storage and delivery of personal protective equipment, medical devices and disinfectants with their subsequent free transfer to final recipients, etc.;

2. Amendments to budget's articles of expenditure reallocating funds to support measures for prevention and elimination of the consequences of the coronavirus infection.

In addition, those who lost their jobs during the pandemic receive maximum unemployment benefit. In general, due to the pandemic, the minimum and maximum unemployment benefits have been increased and additional payments for the children of unemployed parents have been established.

However, the main disadvantage of the abovementioned process for redistributing budgetary funds is the costs of delay. The pandemic made one consider the need to create a permanent special center for combating epidemics with expanded powers and a separate budget, so that, if necessary, it would be possible to use budget funds without delay. An alternative solution is to create an anti-crisis fund to cover additional costs associated with the epidemic.

Recommendation 2.3:

Creation of a separate fund to compensate for the costs of fighting epidemics.

In this context, we also think it appropriate to provide for a special financing mechanism for organisations that are in the process of repurposing or functioning in standby mode (i.e. ready to provide medical care to patients with coronavirus, if necessary), as well as in other cases of serious financial losses. This mechanism involves a temporary transition to funding based on costing. This measure will increase resistance of medical organisations to difficult financial situations, which means, in general, will increase sustainability of the healthcare system.

Recommendation 2.4:

Financing of medical providers based on costing during crisis situations.

4.3 Financing Recommendations

The main solution to strengthen the sustainability of the healthcare system is to increase its funding. Additional budgetary funds allocated for development of the healthcare sector can be used, among other things, for preparing for crisis situations and ensuring the work of medical organisations in conditions of increased infectious safety. This measure will be especially effective if a separate fund is created to compensate for the costs of combating epidemics, and a mechanism for crisis financing of medical organisations based on costing is established. This, in turn, will offer an increased level of resilience within the healthcare system.

5. Domain 3: Workforce

5.1 Workforce Sustainability

In Russian healthcare, there are three categories of clinical personnel: (1) higher — physician, (2) middle — nurse, (3) junior — orderly. The latter is responsible for daily cleaning, patient sanitation and care, helping nurses with simple tasks, transporting and accompanying patients.

In general, the Russian medical sector has sufficient work force. According to Table 1, between 2010 and 2019, the staffing level in Russian **state organisations**[3] had been decreasing. Thus, within a decade, the number of physicians decreased by 16%, nurses by 9.6%, and nursing assistive personnel by 65.8%.

Table 1: The number of physicians, nurses and nursing assistive personnel [13]

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Number of physicians*	4.4	4.1	4.2	4.1	3.7	3.7	3.7	3.7	3.7	3.7
Number of nurses	9.4	9.2	9.1	9.0	9.2	9.0	8.8	8.6	8.6	8.5
Number of nursing assistive personnel	3.8	3.8	3.6	3.6	3.9	3.4	3.0	1.8	1.4	1.3

** per 1,000 people*

Meanwhile, according to 2015–2019 statistical data presented in Table 2, the number of vacancies in every category is growing every year.

Table 2: The ratio of vacancies to total positions (among physicians, nurses and nursing assistive personnel) at state medical organisations [13]

	2015	2016	2017	2018	2019
Physicians*	12.2	13.1	13.9	14.8	16.2
Nurses	8.3	9.0	10.0	10.6	11.6
Nursing assistive personnel	9.0	10.1	12.5	13.6	15.0

** percent of vacancies from the total number of positions*

Considering the above information, we could conclude that medical professions lost their popularity among the population; however, in 2012, a state program was launched to increase the health professionals' wages. The results of this policy are represented in Table 3. Between 2013 and 2020, the wages of medical professionals had been increasing annually. Given the 56% increase in the minimum wage compared to 2013, the physicians' wage grew by 106%, the nurses' — by 86%, and the nursing assistive personnel's — by 174%.

Table 3: The correlation between the average physicians', nurses' and nursing assistive personnel's wages and minimum wage [7, 14]

	2013	2014	2015	2016	2017	2018	2019	2020
Physicians*	5.8	5.6	5.1	5.2	5.8	7.3	7.6	7.6
Nurses	3.3	3.2	2.9	2.9	3.1	3.6	3.7	3.9
Nursing assistive personnel	2.0	2.0	1.8	1.9	2.2	3.4	3.4	3.4

** the ratio between the medical professionals' wages and minimum wage*

[3] *Hereafter in this domain the statistics on state organizations only is provided.*

Thus, the above data for doctors and nurses demonstrates a decrease in staffing, as well as an increase in the number of vacant positions, while there is a significant increase in the salaries of these health workers. These dynamics reflect a downward change in the demand for specialists in healthcare sector.

The situation with nursing assistive personnel, however, is quite different: up to 2017, it was characterised by the same tendencies as those with physicians and nurses. In 2017, the nursing assistive personnel's staffing levels dropped almost threefold. This was caused by the publication of the Junior Medical Staff professional standard in 2016, and the subsequent evaluation of nursing assistive personnel and their duties' compliance with the standard. The reason for this was to determine the percentage of nursing assistive personnel whose duties include cleaning and exclude helping provide medical care, and reassign them as janitors or lay them off in favor of an outsourcing cleaning company. This led to significant changes in medical organisations' staffing figures. However, given the growing number of vacancies and increasing wages, it is safe to assume that this measure was justified and carried out in a timely way.

The conclusion that these changes are natural and not indicative of insufficient staffing is supported by the turnover rate dynamics (Table 4). The data indicates a significant decrease in the physicians' turnover rate and a slight decrease in the nurse turnover rate in 2019 compared with 2015.

Table 4: Staff turnover rate [7]

	2015	2016	2017	2018	2019
Physicians*	9.3	8.6	9.5	9.5	7.2
Nurses	8.2	7.7	8.4	9.5	8.0

** turnover rates (%) are a percentage of those resigned, fired due to the staffing table changes, reorganisation and so forth, or fired for other reason (physicians, nurses), who worked in medical organisations run under Russian health authorities*

A comparison of Russia's admission and dismissal of medical employees between 2010 and 2018 (Table 5) shows that both admission and dismissal decreased by 12%. Comparison of these indicators shows that the staffing has become less susceptible to voluntary rotations in medical organisations, which may be partly due to the improvement in working conditions on average in healthcare sector.

Table 5: Admission and dismissal of medical professionals in Russia [7]

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Healthcare admission*	19,9	20,5	20,5	22,5	19,8	19,2	18,5	18,6	18,2	18,4
Healthcare dismissal*	20,4	20,5	20,8	22,0	20,0	20,5	19,6	19,9	18,7	18,6

**percent of headcount*

In broad terms, Russia's healthcare staffing policy focuses on changing and shaping a structure for managing healthcare staff. This structure will be established by: (1) planning staff training and employment, (2) using innovative and relevant educational technologies and (3) efficient incentives that will help provide medical authorities and institutions with skilled staff in order to improve the quality of provided medical assistance.

1. To **plan staff training and employment**, the Russian Ministry of Health created a single register for healthcare specialists and workers, including administrative, management and maintenance personnel, in order to identify the current and future necessities for clinical personnel in the Russian Federation's constituent entities. Moreover, staffing levels can be efficiently managed by increasing the number of students admitted to medical education institutions with the goal of their further employment as well as organising job fairs for young professionals.

2. The list of **innovative and relevant educational technologies** includes the implementation of the continuous staff training system that takes into account the professionals' educational activity throughout their qualification grade attestation and accrual of incentives. The continuous adjustment of educational programs helps medical professionals gain the most relevant knowledge. Our research institute (NIIOZMM), for instance, offers health specialists internships at the best foreign hospitals.

3. On one hand, **incentives** increase staff inflow into healthcare; on the other, they prevent the so-called brain drain. The list of main incentives includes raising the prestige and attractiveness of working in healthcare (for instance, by increasing wages, organising recognition awards including for "best physician" and "best professional with a secondary medical or pharmaceutical education", entitling people to cash payments, benefits, social benefits, compensations and so forth). To make sure students stay employed after completing higher professional education, they are granted personal scholarships. Given that the Russian healthcare system is characterised by the imbalance in geographical distribution of the staff, the authorities launched the Rural Physician program to attract medical workers to the countryside [11].

Russia has a well-developed system for distributing duties between physicians and nurses in order to decrease the load on the physicians. This can be exemplified by the Lean Polyclinic (Berezhlivaya Polyklinika) program, where nurses actively help providing preventive, primary, outpatient care as well as rehabilitation and palliative assistance, performing duties of secondary medical education professionals that do not require physician training (for instance, filling out medical paperwork, joining medico-social teams to help patients with limited mobility, offering pre-doctor services and so forth). Moreover, several regions introduced a new position: the general clinical nurse, who performs duties of desk, dressing and procedural nurses.

To estimate job sastisfaction levels among medical professionals, in 2019, NIIOZMM carried out a survey among Moscow medical organisations' physicians and nurses to calculate a loyalty index and the main factors that affect the professionals' loyalty to their organisations. According to the survey, the loyalty index was positive (this means, more professionals are satisfied with their job rather than not); physicians were the most committed to their job. The list of factors that affected professionals' loyalty positively includes good psycho-emotional environment; those that affected it negatively included inadequate financial incentives and high workloads [15].

Given this information, we can assume that a sufficient staffing level in healthcare indicates good potential for resilience in the Russian healthcare system. However, it seems advisable for the authorities to focus on raising the prestige of medical professions among new generations and raising awareness about their role in maintaining and promoting the nation's health (by organising public hearings, seminars and training sessions for young people, public and expert councils and so on).

Recommendation 3.1:

Focus on raising the prestige of medical professions among new generations.

5.2 Workforce Resilience

Because of the pandemic, many countries including Russia faced a labor shortage. Mobilisation of resources, which included engaging students, residents and medical university professors in work, turning hospital rooms into infectious disease units, promptly building new hospitals, training staff and increasing shift time helped take the situation under control. To solve this issue, the authorities started working on a special system for pandemics and emergencies that will help decide, which clinics and to what extent to repurpose as infectious diseases centers [16].

The pandemic showed us that capacity can be ramped up, and staff can be redistributed. The training issue, however, is not that easy to resolve: physicians lack triage skills, and ability to work in PPE, which indicates the need for organising additional or revised educational and training programs on infectious diseases.

> ***Recommendation 3.2:***
>
> *To prepare staff for possible pandemics, additional or revised educational and training programs on infectious diseases should be organised.*

To ensure medical workers' safety, the authorities introduced regularly updated methodological recommendations and instructions, including those on the use of PPE. Hospitals were divided into contaminated, non-contaminated and transitional areas and provided with PPE, sanitisers, air disinfectants and ultraviolet lamps. The authorities also organised emotional support hotlines and developed recommendations on the psychological support of medical professionals. Moreover, to eliminate the possibility of health workers' infecting their families, special rooms were designated at hotels and dorms to facilitate the staff working at the hospitals' infectious disease units. Authors suggest distributing medical creams and ointments among the staff to prevent flare-ups of eczema and other skin diseases caused by continuously wearing PPE.

Unfortunately, despite all the implemented measures, medical workers still run a high risk of contracting the infection. Russian medical professionals launched the Memory List project that features deceased health workers who contracted the disease in the line of duty. The list may not be statistically accurate. It is worth noting that when a medical worker contracts coronavirus in the line of duty, their case is subject to investigation by the Russian Federal Service for Surveillance on Consumer Rights as a case of occupational disease; an appropriate occupational disease act is then filed and forwarded together with investigation files to the Social Insurance Fund's local office. Federal statistical observation monitors the data on occupational trauma and diseases across the Russian Federation according to the type of economic activity, however, it does not publish the breakdown of total cases according to the list of occupational diseases.

5.3 Workforce Recommendations

The work on maintaining and increasing the Russian healthcare system's resilience should focus primarily on raising the prestige of working as a physician. This includes increasing salary competitiveness, providing opportunities for career development and introducing additional benefits for years of service and/or high performance, working on the profession's image and so forth. This will lead to increased competition, improved quality of provided services and reduced risks around staff retention, which will help improve the healthcare system's stability.

To improve the system's resilience to crises, it seems advisable to the authors to expand educational programs on infectious diseases and epidemic preparation for the medical workers. Moreover, there is also a need to develop short first aid-like educational courses for the public on risks and combating epidemics.

6. Domain 4: Medicines and Technology

6.1 Medicines and Technology Sustainability

Health Technology Assessment (HTA) which includes drugs, medical devices, procedures and organisational systems, is actively used in Russia as a tool for shaping healthcare policy. It involves a comprehensive study of medical, social and economic efficiency of methods for maintaining and restoring health. The mechanisms available for economic evaluation enable comparison according to several selected criteria and support choice of the most effective alternative (for example, comparison of ophthalmological and cardiological programs in terms of increasing the working life or quality adjusted life years). At the same time, the legislation of the Russian Federation does not clearly establish threshold values of economic efficiency[4].

In this regard, the authors raise a question around possible unification and legislative consolidation of indicators for threshold values of economic efficiency, for example, the cost of quality adjusted life years or the disability adjusted life year. On the one hand, this increases the consistency and transparency of the decision-making process. On the other hand, a necessity to make decisions based on a single factor deprives authorities of certain flexibility and does not allow for taking into account other factors apart from economic ones. In addition, for different nosologies, diseases and periods in the state development, threshold values of economic efficiency can be various. Thus, it seems reasonable to introduce a dynamic system of threshold values for economic efficiency, subjected to periodic revision for making an objective reflection of the economic situation in the country. It should take into account the possibility and mechanisms of promising medical technologies usage, and highlight diseases or patient groups that are the first to be financed. It should also recognise where new technologies could be made available through co-payments, where there are clear quality benefits but they are not yet economically effective on a large scale.

Recommendation 4.1:

To implement a dynamic system of threshold values of economic efficiency.

When it comes to medicines assessment (hereinafter referred to as the Essential Medicines List (EML)), following a complex study the Ministry of Health Commission takes a decision to include (exclude, refuse to include) a medicine in the lists: (1) vital and essential drugs[5] (formed annually); (2) expensive drugs; and (3) the minimum range (formed at least once every 3 years). This decision is dictated by the principles of relevance, acceptability and cost effectiveness (this means that additional costs are justified by the efficiency increase). Therefore, the final group of drug consumers and the source of funding depend on this decision. For example. the inclusion of a drug in the essential drug list its authorisation for marketing, which is essential for state purchases, usually takes 1-3 years (some may never be included due to their high costs or other considerations).

In accordance with current legislation, the Ministry of Health of Russia is responsible for the registration and evaluation of medicines in Russia. General medicine registration usually takes 210 working days. During the pandemic, a simplified and accelerated procedure of new medicine registration was introduced in Russia. If necessary, it was permitted to purchase drugs from a single supplier. This procedure will be valid until January 1, 2022.

The Federal Service for Surveillance in Healthcare is responsible for the state registration of medical devices. The registration procedure is carried out within a period not exceeding 50 working days from approval to start

[4] *But the discussion is ongoing and the probability of establishment in 2022 is high.*

[5] *Covers free of charge inpatient treatment and provision for certain patient groups in the outpatient setting.*

state registration of a medical device. The authorised body makes a decision to cancel the state registration of a medical technology if there is/are:

1. filled application for cancellation of medical technology state registration;
2. court judgement on intellectual copyright violation;
3. circumstances that pose a threat to the life and health of citizens and medical workers who use this medical technology, or inaccurate data contained in the registration dossier, which influenced the examination of quality, effectiveness and safety of a medical device;
4. non-confirmation of the state registration of the medicine after the expiration of a five-year certificate;
5. results of the examination demonstrating that the functional purpose and (or) the principle of operation of the medical technology cannot be used for medical purposes, or the owner's refusal to amend the instructions in connection with the new confirmed data.

Finally, in accordance with the amendments to the Agreement on Uniform Principles and Rules of Medical Devices within the Eurasian Economic Union, mandatory scheduled and unscheduled inspections of medical equipment are carried out. The examined medical devices are associated with a high risk to a patient well-being, and its circulation could be suspended or terminated if the inspection fails.

Thus, health technology assessment is a critical step in speed, mechanisms and health technology coverage. For example, due to the high cost of targeted and immune therapy for the treatment of oncological diseases, 32 of the 36 drugs adopted in international oncological practice and approved in the Russian Federation, were actually used only in Moscow. That is the case because since 2019 Moscow has been a pioneer that has switched to new federal clinical guidelines for oncology, which propose usage of more modern drugs for cancer treatment. The results of Moscow Oncological Service will be broadcast to the regions of Russia, which will subsequently receive the aforementioned drugs. Generally, Russia keeps up with the general trend, although some drugs are never marketed in Russia due to requirements to conduct local clinical trials for approval, and/or drugs are simply too expensive for inclusion in the essential drugs list.

In order to support the introduction and development of high-cost new technologies in medical institutions, federal funding is available for high-tech medical care and care for clinical testing of preventive methods, diagnosis, treatment and rehabilitation. In 2019, this funding accounted for 23.8% of the total federal budget expenditures on healthcare. In 2020, funding was increased by 10.7% compared to 2019, and it is planned to be increased by another 2.1% in 2021.

Moreover, budget funding is provided for the development and implementation of innovative methods for disease diagnostics, prevention and treatment, as well as basic personalised medicine services. This project's main objectives include: (1) creating conditions for providing high-quality diagnostics and treatment using nuclear medicine technology; (2) developing innovative diagnostic tools, pharmaceuticals and biomedical cellular products; (3) increasing the implementation efficiency of medical and technical healthcare projects for early diagnosis, effective treatment and rehabilitation with the goal to reduce the time necessary for the patients' recovery. At the same time, the authorities often cover the supplementary targeted funding for priority areas of healthcare system development, e.g. for providing budgetary institutions with telemedical equipment.

In general, the healthcare system's reaching "digital maturity" is enshrined at the legislative level as one of the main national development goals of the Russian Federation for the period through to 2030. As a result, the share of mass essential services available online should increase to 95% [**Error! Reference source not found.**].

Since 2019, the technological transformation of healthcare has been carried out according to the Healthcare national project. It focuses mainly on creating a single digital circuit and implementing innovative technologies (which takes up 10% of the total project funding). According to the project aims, by 2024, the number of citizens who consistently use electronic medical information systems should increase over a thousandfold and constitute one quarter of the Russian population, while by 2022, all Russian medical organisations, both public and private, should start using medical information systems.

The examples of digital maturity policies include the development of AI, such as clinical testing of computer vision algorithms and neural network models capable of analysing and interpreting images, gradual introduction of systems for medical decision support and cloud-based remote anatomical diagnostics, which allows detecting cancer remotely without microscopes, and introduction of an electronic prescription system. Within this system, a prescription request is made in a mobile application. After this, the doctor determines whether the patient is required to come in in person; if not, the prescription is forwarded automatically via the mobile application.

Russia also introduced the Uniform State Health Information System — a national system for providing healthcare authorities and organisations, as well as citizens, with efficient information support. Today, this system includes over 1.2 billion case records. It offers the following services: an electronic registration service, a managerial accounting system for administrative and economic activities, an information system for medical management and a federal integrated electronic medical record service. Each region has its own unified electronic patient registration system used for providing all kinds of medical services. So far, several regions, including Moscow, have already introduced electronic medical records, which are available to both patients and all regional doctors. By 2022, all regional systems must be integrated into the Uniform State Health Information System to ensure the consistency of medical care provision throughout the country.

Telemedicine started gaining popularity in Russia even before the COVID-19 pandemic. In 2019, 679,000 telemedicine consultations were organised; 85% of them were held in the "doctor-patient" format. Compared to 2018, the number of online consultations has doubled. In the first half of 2020, the demand for remote medical consultations increased by 177% compared to the same period in 2019 [18]. To ensure an adequate response to the epidemiological threat, a specialised federal register and necessary reference books were created in a short time (of about two weeks) in order to estimate the transmission rate and the medical institutions' capacity, as well as develop analytical forecasts. This system will also keep records of vaccinated citizens.

However, in this context, the lack of open data, including the data integrated into the registers, will threaten the Russian healthcare system's resilience. Apart from the COVID-19 register, there are several similar federal registers in Russia created for certain diseases only, such as diabetes, orphan diseases and neoplasms. The introduction of federal registers for all disease groups will enable the collection of detailed information, analysing it and identifying patterns, as well as tracking the effectiveness of different clinical approaches. This will ultimately improve the quality of healthcare management decisions. In addition, these registers will help create a high-quality non-biased source of professional knowledge (possibly at a supranational level) — a system offering reference information on differential diagnosis and treatment.

We also see it necessary to complete work on the aforementioned single information circuit, and finish the process of integration. This means completing the mutual integration of electronic medical systems at all levels within the framework of the national project. This will help ensure the continuity of treatment in any Russian healthcare constitution and establish a powerful analytical and statistical tool.

Recommendation 4.2:

To achieve complete mutual integration among all electronic medical systems, resolve the issue of lacking open data and create a high-quality objective source of professional knowledge.

It is worth noting that digital services are not identical to the services provided in person; there is also no procedure for providing such services remotely. Every digital service was introduced following the analytical work to identify niches or improve the quality/accessibility of medical services provided in person. Therefore, the integration is proceeding smoothly and evolutionarily, taking into account the feedback from the medical services' providers and consumers.

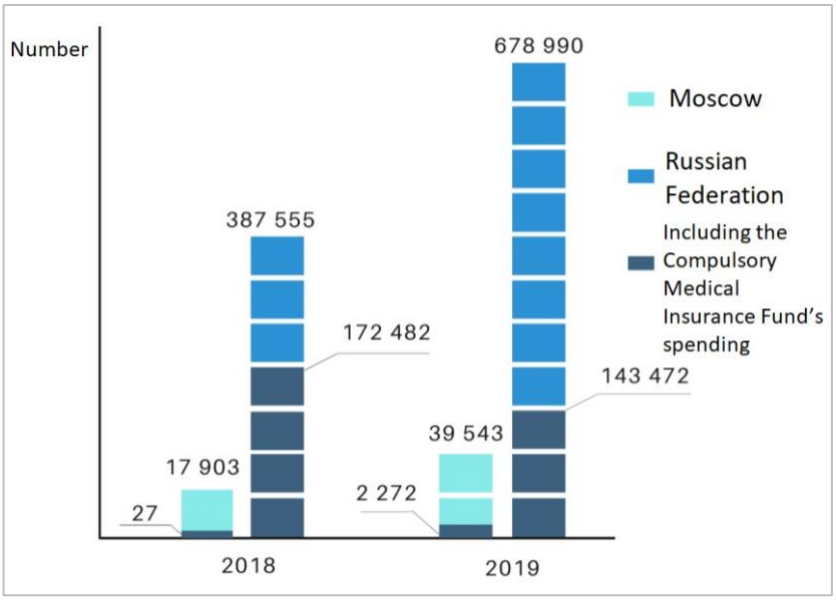
Regarding reimbursement of expenses for providing telemedicine consultations, financing in this area is carried out in two stages. The first stage includes providing budgetary institutions with telemedical equipment using budget funds, as mentioned above. The second stage involves directly financing the provision of telemedicine services through compulsory medical insurance funds.

The compulsory medical insurance tariffs for providing telemedicine consultations, including doctor consultations, are now being approved in accordance with Russian legislative norms. At the same time, tariffs are defined differentially according to the type of medical service and consultation profile. Tariffs for telemedicine consultations should include the carrier company costs — the expenses of mobile and internet providers.

According to the Report of the Accounts Chamber, in 2017 payment for medical services using telemedicine technologies was provided by Compulsory Heath Insurance (CHI) in 17 subjects of the Russian Federation (20%), and in 2018 – in 19 subjects of the Russian Federation (22,3%). The difference in the average cost of medical services using telemedicine technologies in the subjects of the Russian Federation in 2017 was 20 times, and in 2018 – 25 times [19].

According to Rosstat (Federal State Statistics Service), 21% of telemedicine consultations in 2019 were paid for from the CHI budget, in 2018 – 44%. For Moscow, this figure was 0,1% in 2019 and 5,7% in 2018 (Figure 1) [8]. Taking into account a surge in demand for telehealth in 2019, it can be noted that in 2019 the number of telemedicine consultations paid for from the CHI budget in Moscow increased by 98% compared to 2018.

Figure 1: Dynamics of telemedicine consultations (2018-2019)



Thus, the data above indicates that despite the observed telehealth boom, the territory of the Russian Federation is still far from 100% coverage of telemedicine services, partly due to the fact that remote consultations have been included in the basic CHI program only in a number of pilot regions. In addition, the following fundamental gaps in legal regulation serve as a factor hindering the development of telemedicine:

- ambiguous approach to remote diagnosis;
- absence of legally established norms that regulate the stages of healthcare provision using telemedicine technologies, structural units that provide such assistance, standards of healthcare provision using telemedicine technologies, which would determine the minimum equipment required for the 'virtual doctor's office', goals of telehealth provision;
- insufficient level of certainty of patient identification in some cases;
- risks of personal data breach and violation of medical confidentiality by providing personal information to third parties;
- weak regulation of cybersecurity and lack of a well-established system of penalties for cybercrime, etc.

For example, according to a sociological survey conducted by NIIOZMM in 2019, 19% of doctors answered that they work with personal data in accordance with regulatory policy, 52% of doctors operate according to personal experience and perceived common sense, and 3% have no idea how to work with personal data [20].

The main recommendation for strengthening health system sustainability when providing support to telemedicine technologies and ensuring equal access to telehealth throughout the country is to improve the existing regulatory framework.

Recommendation 4.3:

To improve existing regulatory framework in telemedicine services and cybersecurity.

In addition, we see a need to improve the information literacy of doctors and patients. According to the survey mentioned above, 32% of doctors would like to attend educational courses in order to improve their knowledge [20]. Regarding digital literacy of the population, only 24% of respondents believe they know what telemedicine is [21]. In general, 53% of respondents face difficulties using digital technologies. Thus, in order to improve digital literacy of the population, free courses are constantly held in many large cities of Russia. It should be noted that improving digital literacy is one of the two main directions aimed at eliminating digital inequality.

The second area of concern is the development of communication infrastructure carried out in accordance with the centralised federal program. In 2020, all Russian cities, 88% of settlements with population 500-10.000 people and 57% of settlements with a population 250-500 people are provided with stable internet connection. The further goal of the project is to provide internet access to all settlements with a population of 100 people and more, and increase the speed of the internet connection to 10 Mbit/s, as well as to ensure legislative consolidation of non-discriminatory access to internet access points.

Thus, for further development on governmental level the authors propose to implement a federal program aimed at improving the information literacy of the population. This should oblige regional and municipal authorities to provide free courses on computer literacy, and, if necessary, organise study groups, in which anybody can use the computer with Internet access.

Recommendation 4.4:

To implement a federal program aimed at improving the information literacy of the population населения.

Currently, medical science is developing based on two regulatory documents: state program '*Scientific and Technological Development of the Russian Federation'* and '*Strategy for the Development of Medical Science in the Russian Federation through to 2025*'. In addition, in accordance with the amendments to the Constitution, the knowledge-intensive industry, which includes IT-technologies, medicine and research activities, has become one of the priority areas of funding as well as social support.

New mechanisms of state support for the medical and pharmaceutical industries provide financial security for manufacture costs on projects from R&D stage and clinical studies/trials to mass production; determine grant recipients upon the results of competition; establish performance indicators based on project results. This is a very important step towards a competitive funding scheme for science.

In recent years, hospitals and polyclinics have been re-equipped with the latest medical equipment, including CT, MRI, PET, angiographs, etc. State medical institutions are recommended to purchase medical products and equipment of domestic manufacturers with equivalent technological characteristics.

The Russian Foundation for Basic Research (RFBR) functions as a scientific foundation with diversified grant mechanisms, independent expertise, result monitoring and popularisation of scientific achievements and corresponds to international standards.

Thus, the main goal is to protect, support and develop national production, which at the same time does not limit the possibility of technology transfer, stimulate the localisation of foreign production and the development of projects involving foreign investment. Patent activity may serve as an example of measurable results of such a policy. In 2018 Russian applicants filed 2,000 patent applications for inventions in the field of medical technologies, 1,200 in pharmaceuticals, and 500 in biotechnologies, which corresponds to the 11th, 10th and 13th places in the world ranking of patent applications for inventions in the field of medical technologies, respectively. In 2019, the volume of the medical devices market increased by 6% compared to the previous year. Experts predict a further increase in the market volume by a total of 48% by 2024 [22].

Funding for medical science is carried out in two main areas: support for medical universities (5.5% of the federal budget expenditures on healthcare in 2019, planned to increase by 61% by 2030) and the development of basic and applied science in healthcare (3.2% of the federal budget expenditures on healthcare in 2020, planned to increase by 14% in 2021).

At the same time, it seems reasonable to establish a separate National Health Fund (NHF) based on the model of the Russian Foundation for Basic Research (RFBR). The RFBR has a role in fundamentally goal-setting for all sciences and education, while the NHF should focus entirely on healthcare issues. A combination of all scientific research in one fund poses a threat of absorption of the general scientific fund by the medical one since the expenditures on medical science are several times higher than on other scientific areas. Separate funding (at least comparable to the RFBR one) will allow grants to strengthen medical research in universities and academic institutions across the country, to support the best scientists and improve organisational and structural capabilities. Such a fund will attract not only medical scientists, but also mathematicians, physicists, chemists, biologists, sociologists, and economists to solve key healthcare problems. It is also necessary to find an organisational form to interact with medical research centers in Russia in key areas of healthcare. It is necessary to encourage interaction between academic science and biomedical companies that provide innovative diagnostics, medicines, vaccines, and devices.

Recommendation 4.5:

To establish a separate National Health Fund based on the model of the Russian Foundation for Basic Research.

6.2 Medicines and Technology Resilience

As planned, Russia annually draws up standards for medicine stocks, PPE, beds and medical equipment in the event of an influenza pandemic. This work is carried out by Rospotrebnadzor. In 2020, when the spread of new coronavirus infection was declared a global pandemic, Rospotrebnadzor compiled a table comparing the existing standards with the ones required for coronavirus outbreak. At the same time, when the new coronavirus infection started to spread across the country, Russia faced a lack of necessary product volumes available in the market. Consequently, federal authorities have temporarily simplified the procedure for PPE approval to enter the market, so customers had better access to goods and services, and many manufacturers increased production by 20-50%. Currently, there is an increase in the stocks of emergency medical care products in medical organisations (despite the fact that more than 24 countries have imposed restrictions or bans on export of medical devices). There is also a special bed stock for patients with diagnosed coronavirus infection. Such measures have helped to create PPE stocks that expect to have one month's worth. At the same time, the existing industrial capacity can meet the needs of all means that are used for care, prevention and treatment of the new coronavirus.

In general, competent planning and forecasting of the industry's needs for medical products (consumables, medicines, etc.), as well as extensive opportunities of domestic production, allow Russia to independently and timely cope with changes in the epidemiological situation.

Nevertheless, in our opinion, the speed of introducing existing measures aimed at controlling the price level of PPE and medicines do not fully support efforts to address the situation. It is necessary to take legislative measures for a certain period to restrict speculation in relation to certain types of goods that are necessary for prevention and treatment of COVID-19. At the same time, it is important to strengthen the FAS activities and law enforcement authorities aimed at preventing speculation in this area. However, excessive price regulation should also not be allowed, as it inevitably leads to deficit. In this context it should be mentioned that Russia is starting to use a serialisation process whereby every drug in the country is visible in the system, which assists in stock-planning.

Recommendation 4.6:

Legislative consolidation of temporary measures to restrict speculation in procuring certain groups of goods necessary for prevention and treatment of COVID-19; strengthening activities of FAS and law enforcement authorities aimed at preventing speculation in this area.

6.3 Medicines and Technology Recommendations

Thus, in order to improve the sustainability of healthcare system in medicines and technologies, the main recommendation of the authors is to maximise digitalisation of the healthcare sector, since at present it is a logical and essential stage of sustainable human development. It requires plenty of measures, such as: eliminating legal barriers that hinder technological development, improving legal framework for better provision of telemedicine services and cybersecurity, accomplishing digital health coverage, which consists in comprehensive integration of all electronic medical systems and elimination of shortage of the open data, and improving information literacy of the population.

In addition, in order to increase the transparency of decision-making process and support the introduction and use of health technologies, it is proposed to create a flexible system of economic efficiency thresholds, as well as a separate National Health Fund focusing exclusively on healthcare issues.

Finally, to enhance health system resilience it seems appropriate to improve control measures over certain types of goods needed for prevention and treatment of COVID-19, such as legislative consolidation of interim measures to restrict mediation in relation to certain goods and strengthening of the FAS activities and law enforcement authorities to monitor compliance with those measures.

7. Domain 5: Service Delivery

7.1 Service Delivery Sustainability

The federal law '*On the basics of public health protection in the Russian Federation'* defines the concept of quality of medical care as a set of characteristics that reflect the promptness of medical care, the correct choice of methods for prevention, diagnosis, treatment and rehabilitation, and the degree to which expected results are achieved. Criteria for assessing the quality of medical care are formed by groups of diseases or conditions based on the procedures for providing medical care, standards of medical care, and clinical recommendations (treatment protocols), and are approved by the Ministry of Health of the Russian Federation (Minzdrav) [23]. The main functions of monitoring (controlling) the quality of medical care are assigned to the Federal Service for Surveillance in Healthcare (Roszdravnadzor) and its territorial bodies.

The quality of the provided medical care is one of the criteria, and it contributes to reducing length of inpatient stay. This applies not only to high-quality treatment in hospitals, but also the quality of outpatient medical services, since one of the reasons for the long inpatient stay is insufficient examination and treatment in outpatient clinics (polyclinics). Improving continuity between outpatient clinics and hospitals also shortens the length of time patients are admitted.

Table 1 presents the past decade's data on length of inpatient stay, demonstrating a sustained reduction (by 16% from 2010 to 2019). The dynamics of the readmission rate from 2015 to 2019 by the number of patients with acute and recurrent myocardial infarction show a 10% decrease (Table 2). Taking into account the trend of population aging and changes in the age distribution of hospitalised people (i.e. more elderly people with diseases requiring longer treatment are hospitalised) the above statistics indicate an improvement in the quality of medical care.

Table 1: Average length of inpatient stay (days) [8]

	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Average length of inpatient stay*	12.6	12.4	12.3	12.0	11.6	11.5	11.1	11.0	10.7	10.6

* *days*

Table 2: Readmission rates for myocardial infarction [13]

	2015	2016	2017	2018	2019
Number of patients with acute and recurrent myocardial infarction*	205 583.0	199 376.0	198 387.0	181 500.0	185 127.0

* *people*

Quality of outpatient care and the continuity of care between services have improved partly due to the popularisation of the hospital-based general physician profession. A hospital-based general physician differs from a district (local) physician by having deeper knowledge and skills in various fields of medicine. The main tasks of a hospital-based general physician are prevention, diagnosis and treatment of the most common diseases; provision of emergency and urgent medical care; performance of medical procedures, as well as preventive observation of chronic patients. In comparison, a district physician mainly refers patients to specialists and issues sick leave. Both are primary care specialists. The specialty of a hospital-based general physician is more in demand in rural areas due to the economic inefficiency of building medical and preventive institutions in each local area. In Moscow, hospital-based general physicians receive a monthly payment as an incentive to promote this profession; authorities organise public information campaigns to raise awareness about the possibility of visiting a hospital-based general physician in an outpatient clinic.

Regarding the continuity of medical care there are two main routes for patients into medical care, which allow for the provision of comprehensive medical services. They are as follows:

1. *Elective care.* A citizen visits a primary care specialist in an outpatient facility (district physician, hospital-based general physician), who orders treatment or refers the patient to a specialist for examination in an outpatient facility. A medical specialist either orders treatment or refers patient for hospitalisation to a specialised inpatient facility, where the patient is provided with specialised (and, if necessary, high-tech) medical care. After discharge, the patient continues to be monitored in an outpatient facility. If the disease is severe, the patient receives palliative care in outpatient or inpatient facilities.

2. *Emergency care.* Emergency and urgent medical services are provided in situations that require immediate medical intervention. They can be provided either outside the medical organisation (at the place where the emergency medical team is called), or in an outpatient clinic or hospital, if resources of an outpatient facility do not allow for provision of the necessary care. If necessary, the patient is transferred to a specialised hospital.

However, this system has one significant drawback: the responsibility for 'transition' from one type of care to another lies with the patient (except in emergency cases). If the patient requires a full cycle of medical care – from primary to palliative – they must be highly motivated to access this. They are responsible not only for the primary visit and compliance with the proposed treatment, but also for hospitalisation by referral from a specialist, as well as for applying for prescribed rehabilitation and/or palliative care after inpatient treatment. A widely-publicised hospital-based general physician may solve this problem by following-up assigned patients and ensuring continuity between each part of the treatment process. Improved integration can also be achieved by creating a uniform information space, and developing digital technologies.

If policymakers identify a need to implement a new treatment model, then they aim to introduce a new direction in general policy, including both regulatory and financial support. An example of this is the introduction of the hospital-based general physician into urban settings (mentioned above), and subsequent state programs *'Zemsky Doktor'* (*Local Doctor*) and *'Zemsky Feldsher'* (*Local Paramedic*) in rural settings. These programs are fully funded from the Russian budget and have significantly raised the level of accessibility of medical care in rural areas. Another example is the federal project '***Berezhlivaya Polyclinica'*** (Lean Polyclinic), which significantly reduced time spent in queues/waiting lists, improved the quality of outpatient care and receives funding from the state budget.

Another good example is transformation of the largest federal medical centers into national medical research centers, the responsibilities of which include strategic development of healthcare in specialised areas and organisational and methodological support to specialised regional medical institutions. This project also had a significant impact on the development of telemedicine in 'doctor-to-doctor' communication.

Thus, when forming the budget for the approaching financial year, priority is given to promising areas of development and financing is provided for selected areas. In case of an urgent need for changes (for example, a pandemic), there are mechanisms for reallocating budget funds with additional payments from the Reserve Fund of the President of the Russian Federation, and the Reserve Fund of the Government of the Russian Federation, as well as reallocating funds from other less prioritised areas.

At present, the focus of the current healthcare system in Russia is on inpatient and emergency care, while prevention, early diagnosis, rehabilitation and palliative care do not receive proper development, which ultimately leads to a significant increase in burden on healthcare resources. For example, rehabilitation beds make up only 2% of the inpatient bed capacity.

To eliminate the above bias the '*Healthcare Development Strategy until 2025'* included prevention of diseases as one of its main objectives. In 2020 authorities also approved the '*Strategy on Healthy Lifestyles, Prevention and Control of Non-Communicable Diseases throughout 2025'* (hereinafter – the Strategy on HLS). In Russia, there is a three-stage preventive structure, where the first stage includes measures aimed at preventing diseases (for example, promotion of healthy lifestyle, preventive immunisation). Second stage involves early detection and prevention of exacerbations and complications of diseases, physical decline and premature mortality (for example, regular medical examination, physical therapy, sanatorium-resort treatment). Third stage (or rehabilitation) focuses on eliminating or compensating for disability in order to restore limited functions as much as possible. Preventive measures are performed in inpatient and outpatient facilities or specialised centers for public health and prevention of diseases created in accordance with '*Order of the Ministry of Health of the Russian Federation No. 748n dated July 28, 2020'*.

The above-mentioned '*Strategy on Healthy Lifestyles'*, as well as in the national projects '*Healthcare'* and '*Demography'* demonstrate special attention to prevention and control of cardiovascular diseases, malignant tumors, chronic respiratory diseases and diabetes. In 2018, the total mortality from diseases of the circulatory system was 46.8%; tumors 16.3%; diseases of the digestive system 5.2%; and respiratory diseases 3.3%.

In line with the established performance targets, by 2024 it is planned to reduce mortality from circulatory diseases by 23.4% (including the level of hospital mortality from myocardial infarction from 13.2% to 8%), from tumors by 7.8%, and, in general, the death rate of the working-age population by 27.8% (compared to 2017). In addition, there are plans to increase the coverage of preventive medical examinations twofold. As a result of the policy aimed at mass preventive examinations and regular medical examination of population, the percentage of early detection of malignant tumors has increased (56.4% for the first and second stages) that led to lower one-year mortality (22.2%) and an increase in five-year survival rate (54.4%) [24]. In general, according to a sociological survey conducted by the Research Institute NIIOZMM in 2020, 66% of respondents have undergone a medical examination or preventive medical examination over the past 2 years [25].

To implement the main goals of national projects authorities created specialised federal projects. For example, in 2020 budget funding for the '*Fight against Cardiovascular Diseases'* project amounted to 2.6% of the total federal budget expenditures on healthcare; for the '*Fight against Cancer*' project it was 6.7%; and 30.9% on expenditures on improving medical care, including disease prevention and promotion of healthy lifestyle.

When calculating the amount of funding for each project, all funds of the budget system are taken into account, as well as the actual need for funding to achieve the set indicators within the established period.

Thus, despite the fact that preventive medicine in Russia is not inferior in quality and accessibility to any other type of medical care, there is limited awareness about its importance within the general public. The main reason that survey respondents visit an outpatient facility is presenting complaints, and not a preventive examination. According to a sociological survey conducted by the Research Institute NIIOZMM in 2020, only 31% of respondents see the doctor in a timely way [25]. Therefore, we think that the main focus of policy in this area is to overcome this crisis of social consciousness and keep promoting healthy behavior. Moreover, such events as *'World Heart Day', 'Day against binge drinking'*, etc., held routinely across all regions of Russia, are very successful in encouraging more sustainable forms of behavior. Currently, only 28% of Russians eat healthily, and 24% participate in sports, however, the number of Russians who report performing physical exercise has more than doubled since 2006, which indicates a positive trend. [26]. It is noticeable that healthy lifestyle in Moscow is more than twice as popular as on average in Russia (according to a sociological survey conducted by the Research Institute NIIOZMM in 2020): 62% respondents indicated that they routinely or often eat healthy, 54% lead an active lifestyle and participate in sports [25].

Recommendation 5.1:

To take action to address poor public awareness of lifestyle factors in health and wellbeing, and further promote healthy lifestyles.

As a solution to overcome the overload of inpatient and emergency care, it is proposed to introduce daily rehabilitation in hospitals. Another option is to develop institutions for treatment and home care that provide narcotic analgesics to all patients who have a prescription (to prevent excessive referrals to emergency care, as now emergency medical teams can be called to measure blood pressure or give an injection). In addition, patients in geriatric departments are often more in need of home care than treatment. Conversely, elderly residents of residential care homes who need medical care often do not receive it to the appropriate degree.

Recommendation 5.2:

To introduce day-to-day rehabilitation in inpatient facilities, and develop institutions for treatment and home care.

7.2 Service Delivery Resilience

During the first wave of COVID-19 pandemic, in order to ensure public health protection and containment of the new coronavirus infection, authorities suspended the all-Russian regular medical examination, as well as preventive medical examinations (except for certain groups of the population, for example, for high-altitude workers). In addition, hospitals that were temporarily converted into infectious hospitals canceled hospitalisation and planned surgeries for other patients. Many non-urgent elective surgeries, including plastic surgeries, were postponed to avoid system overload owing to the spread of the coronavirus infection. At the same time, cancer care, chemotherapy, radiation therapy, hemodialysis and a number of other types of medical care were provided as usual.

On one hand, the reduction of planned medical care and diagnostics has led to lower costs due to savings on medicines, food, etc in the short term. On the other hand, this effect of deferred demand, which has been observed for three months, has led to a surge in people seeking medical care (especially regarding the appointments to specialists), which has not yet been fully met in a number of regions. There was additionally a trend among the population wanting to be examined “for the future” due to the fear of the second wave of the pandemic. As a result, in September 2020, the demand for medical services was not fully met in a number of regions.

At the same time, authorities took measures to increase the capacity of hospitals to receive coronavirus patients. First, they determined hospitals that should receive COVID-19 patients and repurposed them fully (or some departments). Secondly, patients with mild to moderate severity of COVID-19 were hospitalised at home, and some medical services were provided online, for example monitoring the condition of patients. Finally, potentially suitable non-medical facilities were repurposed into hospitals for patients with coronavirus infection, and temporary medical posts (for example, mobile hospitals) were set up.

In the context of medical services provision, the Russian healthcare system demonstrated a high level of resilience to the pandemic. The only area in which we could recommend improvement is expanding the network of outpatient clinics (feldsher-obstetric clinics, feldsher health centers) and revise their equipment standards (air system, modern isolation wards for infectious patients, etc.). As a result, they can become hubs for fighting possible future infections and epidemics.

Recommendation 5.3:

To expand the network of outpatient clinics and revise their equipment standards.

7.3 Service Delivery Recommendations

The main recommendation for strengthening the sustainability of the healthcare system is to reduce the burden on inpatient and emergency care by redistributing it to preventive care and rehabilitation. To achieve this goal, it is proposed to introduce day-to-day rehabilitation in inpatient facilities, develop institutions for treatment and home care, as well as promote healthy behavior, including through preventive medical services.

In terms of the health system's resilience, the authors recommend developing a network of outpatient clinics that can serve as an intermediary in isolating the sick during the outbreak of future infections and epidemics.

8. Case studies

8.1 Theme 1: Optimising the location of health services delivery

Context: The pandemic caused by a new coronavirus infection has significantly increased the burden of the Russian healthcare system. The demand for specialists in anesthesiology and infectious diseases has sharply increased, urgent adaptation of hospital bed capacity has been required, and the logistics of supplies of consumables, medicines and personal protective equipment have changed. These changes created an urgent need to quickly organise training of medical specialists in compliance with the principles of infectious safety. The International Medical Cluster Foundation (IMC Foundation), created by the Moscow Government to improve the quality of healthcare through advanced medical technologies and practices, has developed an innovative solution to this challenge: to create a De Novo Mobile Simulation Center (hereinafter referred to as the Simulation Center), that provides training by simulating scenarios relevant to the COVID - 19 pandemic using in situ simulation [27].

Goal: The idea of creating the Simulation Center is not new. There are many educational organisations in Russia which provide courses that are based on their facilities. IMC Foundation was the first to make it mobile. This approach brought such advantages as: (1) a more personalised education program responsive to feedback (e.g. the lecture about the appropriate use of PPE equipment (available at that particular hospital) was followed by training, during which all the mistakes were analysed and corrected); (2) maximising attendance of medical workers (there is more chance that medical workers can find time to attend all lessons compared with online training and training in central simulation centers); (3) higher level of epidemiological safety (compared with training in central simulation centers). As a result, the operation of the Simulation Center during the first wave of the pandemic has shown significant growth of awareness among healthcare personnel of a COVID-center on the best practices for diagnosis and treatment of patients with COVID-19, and increased their skills to provide care, and to operate specialised medical equipment. In turn this has improved the quality of care and, importantly, provided the proper level of epidemiological safety.[6]

Relevant Domains: This example demonstrates the efficiency (the Simulation Center was implemented in 1 week) and the effectiveness of the healthcare system in responding to the crises (Domain 1 - Governance). It shows also the level of attention given to the safety and well-being of medical personnel (Domain 3 - Workforce).

The Case: As a response to the COVID-19 outbreak, the Moscow clinical center for infectious diseases “Voronovskoe” was built in a month. It comprises 50 buildings and 800 beds, and more than 1000 highly qualified specialists from 81 cities of Russia are working there. The main challenges were: different experience and skill levels of employees, lack of teamwork, the need to quickly adapt to new working conditions and new equipment, a high degree of uncertainty due to constantly updated information about recommended methods of diagnosis and treatment of patients with COVID-19.

An individual training program was prepared for the specified conditions and a comprehensive “on-site” training complex with high throughput and infection safety was organised. The training took place at two sites: a residence for doctors (classroom with the possibility of broadcasts, face-to-face classes and master classes, and a simulation room with training simulator for practice) and hospital buildings: these were properly equipped and prepared to receive patients, but at the time of training were empty and this enabled medical personnel to become acquainted with medical equipment and immerse themselves in the treatment process.

[6] *The outcomes described are based on physician feedback.*

Each lesson consisted of a lecture and hands-on training to practice the acquired knowledge and skills, as well as feedback (debriefing), when the main mistakes and questions were analysed. The lesson plan included:

1. Training in the use of PPE and practice using it. The result was the adaptation of the protocol for putting on and removing PPE for specific types of PPE presented in the hospital, as well as for the organised regime and rules in the departments where doctors work, and the convenience of using PPE by staff in compliance with all the requirements and rules of infection safety.

2. Training in cardiopulmonary resuscitation. As a result, a scenario to help patients with COVID-19 was developed, errors in performing manipulations were minimised, and roles in the team were distributed, which helped to increase the effectiveness of work teams.

3. Training using unfamiliar equipment. For example, training using the Lucas2 Chest Compression System revealed that the compression depth cannot be manually adjusted, which can lead to significant injuries to the patient. As a result, it was decided to use the device with caution and only if the compression depth will not harm the patient.

In addition, the Simulation Center team encouraged medical professionals to ask for additional training (Appendix 2), resulting in, for example, a course on ultrasound diagnostics for resuscitators, which turned out to be a useful skill for timely assessment of patient condition, changes in treatment where necessary, and an important auxiliary method for vascular catheterisation. In total, more than 20 additional educational events were organised, including 2 international conferences, master classes, webinars and a round table with international participation.

The implementation of the Simulation Center has increased professional competence of medical personnel, improved their self-confidence, and, consequently, a led to a decrease in the level of stress, as well as an increase in the quality of medical care provided. It should be noted that these results were achieved without interrupting their work and the lessons were held at a convenient time for doctors, as well as without the risks of infection that would have been present in any case if training was organised in ex situ simulation centers.

Analysis: This system of organising a simulation center has demonstrated the possibility of rapid onsite implementation of medical personnel interaction (teamwork) model on the spot in order to develop new practical and theoretical skills. At the same time, the key idea of the project is to provide simulation training closer to the workplace for maximum individualisation of the training program (taking into account territorial, personnel and situational aspects). When considering the prospect of transferring this project into the wider Russian and foreign healthcare systems, it should be noted that a significant advantage of the Simulation Center is the opportunity to quickly develop the necessary skills in conditions of complete or partial isolation due to infectious diseases. Consequently, the Moscow experience can be adopted with minimal changes that relate mainly to the training program (for example, the most challenging seminar topics[7] or differences in hospital logistics). In addition, the widespread provision of simulation centers can potentially solve the problem of geographical isolation associated some hospitals' remote location away from major medical and educational centers. Simulation centers may also be in demand for disaster medicine, when the medical personnel of other specialisations is involved in providing specialised medical care or performing individual medical manipulations and procedures, and should be trained in a limited period of time. The creation of a simulation center is promising when opening new hospitals and departments, implementing new medical care and purchasing new equipment. One potential direction of the project's development is a possibility to transfer some of the most common and popular theoretical educational programs to online platforms in order to further increase availability.

[7] *See App.1*

Key Findings/ Recommendations: Thus, summing up the results of the Simulation Center project, we can assume a positive relationship between a personalised approach to training and improving the quality of medical services provided. To successfully use the Moscow experience, healthcare organisers should ensure effective communication between the group organising the project, management and staff of the medical institution where the project will be implemented. A clear understanding of the needs of the medical organisation and its personnel, which may change according to the situation, especially in the context of a pandemic (and therefore in conditions of high uncertainty and burden on medical personnel), is key to create a high-quality training program. In addition, it is necessary to consider the project resources: the need to transport high-tech equipment with broad functionality, as well as lecturers, experts, and service groups; the presence of an extensive network of educational partners to comply with the requests of healthcare workers.

Limitations: The experience of implementing Simulation Center in medical training did not undergo a systematic quantitative assessment of the impact of training on the quality of medical services. In this regard, it is very difficult as yet to analyse the economic or social benefits of the project. The feedback received (in the form of questionnaires) from trained specialists showed a high degree of their satisfaction with the project. One of the areas for further research is to identify indicators and build models for evaluating the usefulness of simulation centers within individual healthcare systems.

8.2 Theme 2: Enhancing the quality of health services

Context: The COVID-19 pandemic is straining the whole healthcare system. The problem of high workload and irregular working hours also affected clinical pharmacologists, who are an essential part of multidisciplinary teams to fight against the new coronavirus infection. During the pandemic, they were faced with a huge number of questions related to the use of medications. This included medication use outside defined indications, drug interactions and adverse reactions (including life-threatening ones), the need to change drug therapy in elderly patients, patients with renal or hepatic insufficiency, etc., in the context of daily updated information about the most effective approaches to COVID-19 treatment. The Research Institute NIIOZMM helped to counter the critical lack of available and reliable scientific evidence by organising informational and technical support of a website dedicated to various aspects of treatment and prevention of COVID-19. In the shortest possible time, a resource was created that contained current regulations, successful treatment practices, and foreign experience, all translated into Russian. In the Russian regions the resource is still actively used by medical specialists to choose the optimal treatment, diagnose and plan rehabilitation of patients with a new coronavirus infection, prevent and maintain the protective measures.

The Russian Medical Academy of Continuous Professional Education (hereinafter referred to as the Academy) has chosen to create a remote information center on complex issues of pharmacotherapy in patients with a new coronavirus infection, "*PharmaCOVID"* (hereinafter referred to as the Center), as its method of fighting against the pandemic [28]. At the beginning of the project, the organisational project was funded by the Academy and the experts volunteered to work at the Center pro bono in their spare time. Now, since the Center has proved its efficiency, the issue of its financing from the federal budget is under consideration.

Goal: Engagement of independent experts in decision-making process in pharmacotherapy is aimed at reducing the number of medication errors, improving the rationality of prescriptions, and increasing early detection/prevention of adverse reactions, thereby improving the quality and safety of medical care. The wide distribution of independent objective data on pharmaceuticals is also targeted at improving the skills of medical personnel.

Relevant Domains: This example shows the efficiency and effectiveness of the healthcare system response to crises (Domain 1 - Governance). It also describes the capabilities of the healthcare system in terms of workload reallocation (Domain 3 - Workforce), and indeed access to information about medicines (Domain 4 – Medicines and technology).

The Case: The pandemic has led to a significant increase in demand for the experience and knowledge of clinical pharmacologists. In a number of rural areas, physicians did not have the opportunity to receive accurate and qualified advice on complex issues related to the use of medications. As a result, a group of innovative pharmacologists created a Center from the academic basis of a state institution with an extensive network of clinical bases in medical institutions of the country.

The organisational structure of the Center was built in the following way: a doctor sends a request to the Center from anywhere in the country (if the internet is available). The request form includes both a free-form request and the patient's depersonalised input parameters. The request is processed via online services, and each request is automatically assigned with a number to which the response will be linked. Then the request is processed by the Expert of the Center No. 1, who independently makes a response and, if necessary, directly requests additional information about the clinical aspects from the doctor. Then the answer is referred to the Expert of the Center No. 2, who assesses the answer and adds information or makes changes if necessary. In case of insurmountable disagreements between Experts No. 1 and No. 2 in the response to the request, the expert manager's advice is requested. His/Her opinion is decisive. The final response is sent to the email address specified in the request.

The analysis of the request and the available literature is based on the principles of evidence-based medicine. The search for the answer to the question is carried out in the PICO format (Patient, Intervention, Comparison, Outcome) using all available scientific information (resources PubMed, Google Scholar, Medline, clinicaltrials.gov, etc.). Each response is drawn up according to a uniform scheme: wording of the request, an expert description of the available scientific data, recommendations, a brief summary, and links. The response is prepared in accordance with the ethics of collegial communication, deontology, and compliance with healthcare legislation: no names, medical records, and geographical names should be mentioned, as well as any data that identifies the patient or doctor in the response text to the maximum extent possible. Urgent requests are met within 6-12 hours, other questions - up to 72 hours.

All responses of the Center are published in open access on the *PharmaCOVID* project website, and in a special free mobile application. In addition, the results of processing requests led to clarification of temporary guidelines of the Ministry of Health of the Russian Federation for the diagnosis and treatment of COVID-19, and are also used in educational projects and programs at all levels.

Analysis: The above-mentioned system of organisation of the Center demonstrates the opportunity for workload reallocation, as a result of which the quality of medical services is improved due to opinion of two independent experts. The remote format of the Center also allows to expand the geographic coverage of services and to resolve problems related to the lack of pharmacologists in rural areas. Similar initiatives are described in a number of EU countries, the United States, Canada, etc. However, the majority of these centers have a number of limitations: they are rather a static resource, which contains basic guidelines, databases and sources of information aimed at the general public, and do not give operational science-based answers to doctors, nor do they have detailed descriptions of responding process and quality control system. In this regard, Russia decided not to adopt foreign experience and developed its own structure for organising the Center.

The universality of the proposed structure and minimal resources needed for its operation facilitates the possible transfer of this project to healthcare systems of any country without significant adaptation. Moreover, small countries with similar healthcare systems can create transnational centers that could significantly save their resources. International organisations, in particular the World Health Organization, could consider using our model on a global scale and provide the necessary guidance and coordination for similar projects. At the same time, this scheme can be used not only in the use of medications, but also in relation to other medical conditions, as well as situations beyond the pandemic shock.

However, the specific complexity in Russia, in comparison with other countries that have experience in implementing similar systems, is the lack of a professional group of clinical pharmacists, which puts all the burden and responsibility of the audit, control, correction, analysis and advisory support of pharmacotherapy on the clinical pharmacologist.

This could bring complications from overusing the capacity of the Center in order to pass on the responsibility of decision-making process. Our suggestion is: as soon as the Center gets nationto wide spread, introduce a very small fee for each request (possibly covered by the medical organisations) in order to motivate medical workers to take more responsibility on requests of low- and middle-complexity and to address to the center experts only the most complicated ones. This option is proposed as a control element, not a source of funding.

Key Findings/ Recommendations: For the six months of system's operation, the number of requests to the Center have exceeded 54 000. A sample survey of clinical pharmacologists and doctors of other specialties working in clinics that have been converted to receive patients with COVID-19 confirms the actual application of the Center's responses in making decisions regarding the pharmacotherapy (only 2.3% of respondents indicated that they did not use any of the Center's responses). These statistics allow us to hope for a high degree of utility of the Center in all aspects: reducing the burden on doctors and pharmacologists; increasing the accuracy, effectiveness and safety of prescribed medications; reducing the cost of medicines and general treatment costs; increasing the quality of medical and educational services provided. At the same time, it is necessary to carry out further development and improvement of the project in a given area by regularly assessing the satisfaction of doctors with the quality, timeliness and completeness of the responses provided by the Center. Such an assessment can be carried out in a routine and selective mode, and its implementation requires accurate registration of contact details of doctors who have sent a request to the Center, as well as regular monitoring of timeliness throughout the chain: doctors request → response from the experts → doctor's assessment of the Center's response.

Limitations: The experience of implementing the Center project did not involve a systematic quantitative assessment of its impact on the quality of medical services. In this regard, it is very difficult to conduct a systematic analysis of the economic or social benefits of the project. Thus, one of the directions for further research is to identify indicators and build models for evaluating the usefulness of the Center within individual healthcare systems.

9. Appendix 1

9.1 Stakeholders consulted

Interviews were held in November and December 2020 to inform ongoing analysis within the domains and to test emerging recommendations. All participants agreed to being named here.

Michail Diachenko	Deputy Director of the Department of Project Activities of the Ministry of Health of the Russian Federation
Valeriy Vechorko	Chief Medical Officer in Municipal Clinical Hospital №15
Grigoriy Novikov	Head of the National Insurance Group
Alexander Lindenbraten	Head of scientific direction of the National Research Institute of Public Health named after N.A. Semashko
Ignat Bogdan	Main sociologist of Research Institute for Healthcare Organization and Medical Management of Moscow Healthcare Department

10. Appendix 2

10.1 The list of the most complex issues (according to healthcare personnel of the Moscow clinical center for infectious diseases “Voronovskoe”)

1. Advanced cardiovascular life support during mechanical ventilation (including COVID-19 cases);
2. Difficult intubation;
3. Difficult airway management;
4. Shock management;
5. Extracorporeal membrane oxygenation (ECMO);
6. Peripheral venous catheter insertion;
7. Use of infusion pumps;
8. Tracheostomy technique;
9. Percutaneous dilational tracheostomy (PDT);
10. Cricothyrotomy;
11. Video laryngoscopy;
12. Diagnostic ultrasound in patients with COVID-19;
13. Focused cardiac ultrasound (FOCUS) in patients with various cardiac scenarios, etc.

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