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Variations in indicators of the health sector and the pharmaceutical market in Russia during 2020

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ABSTRACT

The study aimed to evaluate the influence of coronavirus on the functioning of the system of healthcare and the associated pharmaceutical industry in Russia. The study of the influence of coronavirus infection on the system of healthcare and pharmaceutical market in Russia was made using a statistical method of comparison of the parameters. The degree of influence on the system of healthcare was estimated by the monthly dynamic of the morbidity rate, which reflected the load on medical institutions of the budgetary system of healthcare of the RF. The changes on the pharmaceutical market were evaluated through quantitative and price factors: quantitative factor was defined by the dynamics of general volume of sales and price – by the changes of the average-weighted prices on the market. As a result, it was established that the dynamics of the morbidity rate with coronavirus in Russia varied wavelike, significantly increasing in the periods of pandemic peaks in May and December 2020. This indicates that the system of healthcare lacks mechanisms of fighting the infection spread in complicated epidemiologic conditions, the bed capacity is low, and there is a deficit in medical personnel. During pandemics, a significant increase in the drug cost was observed on the pharmaceutical market. Especially, it was evident for drugs used to limit the spread of coronavirus, which was confirmed by the shift of drugs sales to the group of antimicrobials. Coronavirus pandemic significantly affected the structure and tendencies in the development of healthcare and Russian pharmaceutical market.

KEY WORDS: healthcare; pharmaceutical market; coronavirus; morbidity, drug sales volume; weighted average drug prices; drug sales structure

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Variaciones en los indicadores del sector salud y el mercado farmacéutico en Rusia durante 2020

RESUMEN

El estudio tuvo como objetivo evaluar la influencia del coronavirus en el funcionamiento del sistema de salud y la industria farmacéutica asociada en Rusia. El estudio de la influencia de la infección por coronavirus en el sistema de mercado sanitario y farmacéutico en Rusia se realizó mediante un método estadístico de comparación de los parámetros. El grado de influencia sobre el sistema de salud se estimó mediante la dinámica mensual de la tasa de morbilidad, que reflejó la carga sobre las instituciones médicas del sistema presupuestario de salud de la RF. Los cambios en el mercado farmacéutico se evaluaron a través de factores cuantitativos y de precios: el factor cuantitativo se definió por la dinámica del volumen general de ventas y el precio, por los cambios de los precios promedio ponderados en el mercado. Como resultado, se estableció que la dinámica de la tasa de morbilidad por coronavirus en Rusia varió en forma de onda, aumentando significativamente en los períodos de picos pandémicos en mayo y diciembre de 2020. Esto indica que el sistema de salud carece de mecanismos de lucha contra la propagación de la infección en condiciones epidemiológicas complicadas, la capacidad de camas es baja y hay déficit de personal médico. Durante las pandemias, se observó un aumento significativo en el costo de los medicamentos en el mercado farmacéutico. Especialmente, fue evidente para los medicamentos utilizados para limitar la propagación del coronavirus, lo que fue confirmado por el cambio de las ventas de medicamentos al grupo de antimicrobianos. La pandemia de coronavirus afectó significativamente la estructura y las tendencias en el desarrollo de la atención médica y el mercado farmacéutico ruso.

PALABRAS CLAVE: atención médica; mercado farmacéutico; coronavirus; morbilidad; volumen de ventas de medicamentos; precios promedio ponderados de los medicamentos; estructura de ventas de medicamentos.

Introduction

The healthcare system and the pharmaceutical industry, which are inextricably linked with each other, are the most important in maintaining and strengthening the health of the population of Russia. It is impossible to carry out effective treatment without the availability of the necessary drugs, as well as recovery is often not possible with the availability of drugs without the appointment of appropriate correct treatment (Polbin et al., 2020). As a result,

it becomes obvious that health indicators and epidemiological well-being of the population largely depend on the effective functioning and interaction of these industries (Kudelina and Eremina, 2016).

At the same time, the current level of development of both healthcare and the pharmaceutical industry in Russia is characterized by a number of systemic problems, the solution of which is included in the list of strategically important tasks (Kolodko, 2020; Pinkovetskaia et al, 2020). In the healthcare sector, the main problem areas are the low level of material and technical support, the shortage of personnel and the consequent low quality and availability of medical care (Reprintseva, 2020a). In the pharmaceutical industry, the main problem is considered to be its high import dependence due to the low internal scientific and production potential of the pharmaceutical industry. In conditions of political and economic instability, this can lead to a total shortage of a large list of vital drugs, which cannot be compensated by internal resources today (Ovod, 2020).

The coronavirus pandemic, as a threat to national security, has had a significant impact on the development trends and structure of both the healthcare industry and the pharmaceutical market in Russia (Zyukin et al., 2020b). Despite all the negative consequences of the coronavirus, the current situation revealed the country's problems in the field of preserving and strengthening the health of the population, since it became obvious that the existing reserves and mobilization resources are insufficient (Dynkin and Telegina, 2020). Thus, the study aimed to evaluate the influence of coronavirus on the functioning of the system of healthcare and pharmaceutical market in Russia.

1. Theoretical basis

Coronavirus infection, the fight against which became the main event and strategic goal of the whole 2020, had a significant impact on the working conditions of the country's socio-economic system. First of all, this affected healthcare, which experienced a significant increase in the burden due to an increase in the incidence of the population, including infectious and otolaryngological diseases. The need to receive medical care in a number of cases in inpatient conditions contributed to an increase in the load on the hospital bed fund, which, after optimization processes in the industry, has a weak margin of safety (Sergeeva, 2020). So, at the beginning of 2020, there were about 1.17 million beds in the country, among

which there were only 58.5 thousand beds for the infectious profile, which is half the 2000 level. At the beginning of 2020, there were on average about 80 beds per 10 thousand of the population, and only 4 beds for infectious diseases per 10 thousand people, which is a catastrophically low value in a pandemic (Krivenko and Tsvetkov, 2018). As a result, during the peak of the population's morbidity, the health care system did not have the necessary resources for the rapid deployment of additional capacities, which led to a significant decrease in the availability of inpatient medical care for the population, thereby contributing to an increase in mortality (Zyukin et al., 2020a).

Along with the optimization of the bed fund, as part of the modernization of the industry, there was a corresponding reduction in medical personnel, the number of which is determined in proportion to the number of beds. So, at the beginning of 2020, the total number of doctors was 714.6 thousand people, and the nursing staff was 1.5 million people. At the same time, per 10 thousand people there were about 48.7 doctors and 101.6 nurses. It is also necessary to note the fact that today the sector of paid medicine is actively spreading. In this connection, a significant part of the medical personnel carries out their labor activity only in private medical centers and they were not actually involved in the fight against the pandemic (Krivenko et al., 2019).

The pharmaceutical market, which is inextricably linked to the healthcare industry, has also undergone a number of structural transformations. First of all, there was a change in the structure of demand towards antibiotics, antiviral and immunomodulatory drugs, drugs for the treatment of respiratory diseases, as well as pharmaceutical products such as medical masks, gloves, sanitizers, thermometers, pulse oximeters, etc. (Dubois and Sæthre, 2020). As a result of the rapid growth in demand for these types of pharmaceutical products, at least, there was a significant increase in their cost, and in some cases there was a shortage. The impulsive behavior of the population and the desire to buy up scarce goods for future use due to fear of the coronavirus can also be attributed to the factors of the current situation, in addition to the increased burden on pharmaceutical manufacturers (Mensa Sorato et al., 2020).

In turn, one of the main reasons for this behavior of the population is the influence of the mass media (mass media). The phenomenon of coronavirus has a serious dependence on the degree of coverage of the current situation in the media (Finol Romero, 2021): during

periods of time when information about the dangers and consequences of coronavirus, as well as about methods of treatment and prevention was most actively disseminated, there were massive purchases of certain groups of pharmaceutical products, which is confirmed by the dynamics of sales in the market (Zhang et al., 2011). At the same time, attempts by state regulation of the current situation were not crowned with success, the deficit and multiple growth in prices for goods relevant in the context of the coronavirus remained. The situation was aggravated by the high import dependence of the domestic pharmaceutical market on foreign manufacturers, which, in the context of economic sanctions and a pandemic, had a negative impact on the availability of certain types of medicines for the population (Dubois et al., 2015).

2. Methodology

It is proposed to study the impact of the new coronavirus infection (COVID-19) on the healthcare system in Russia and the pharmaceutical market accompanying it on the basis of a statistical assessment of the incidence rates of the country's population in comparison with the main indicators of the functioning of healthcare and pharmaceuticals in this economically and socially difficult period. The work used the statistics of Rospotrebnadzor of the Russian Federation on the dynamics of the spread of coronavirus infection in Russia, as well as analytical data from DSM Group on the development of the Russian pharmaceutical market and changes in the structure of demand for drugs in the context of the main ATC (Anatomical Therapeutic Chemical) groups (Rospotrebnadzor RF; DSM Group). The study period is determined by the beginning of the active phase of the spread of coronavirus infection in the country in March 2020 (first wave) and covers the beginning of the second wave in October 2020.

The impact of the coronavirus on the functioning of the health care system and the pharmaceutical market can be traced through the use of a statistical method of comparing indicators. The degree of influence on the healthcare industry is proposed to be estimated by the dynamics of the number of sick people by months, which reflects the level of load on medical institutions of the budgetary healthcare system of the Russian Federation.

It is possible to assess the impact of coronavirus on the pharmaceutical market through the dynamics of the main market indicators by months, the change in which is

determined by the level of morbidity of the population and the corresponding increase in demand for certain groups of pharmaceutical products. Changes in the pharmaceutical market can be determined through quantitative and price factors. The quantitative factor is determined by the dynamics of the total sales volume, and the price factor is determined by the change in the weighted average prices in the market. Therefore, the study analyzes not only the general fluctuations in sales in the pharmaceutical market of the Russian Federation, but also provides an assessment of changes in the average price level as a criterion for the dynamics of market processes. A statistical assessment of changes in the structure of sales is also important, in connection with which a comparative analysis of sales by the main ATC groups during the first and second waves of coronavirus is carried out in order to identify the impact of the pandemic on the demand for certain types of drugs.

3. Results

An assessment of the spread of coronavirus infection in Russia by months showed that the lowest number of cases was observed in March 2020, which is associated with the difficulties of statistically reflecting the actual state of affairs in this period. However, already in April 2020, more than 104 thousand cases of infection were registered. The peak is noted in May 2020, when the number of cases exceeded 299 thousand people. In the following months, up to September 2020, there was a decrease in the number of cases of coronavirus infection to 155 thousand people. In the fall, the second wave of coronavirus intensified, which turned out to be more serious in scale compared to the first: 441 thousand cases of infection were registered in October 2020, already 677 thousand in November, and 863 thousand cases in December, which is the highest value for the study period. In January 2021, there was a decrease in the spread of coronavirus infection, which led to a decrease in the number of cases to 691 thousand people. (picture 1).

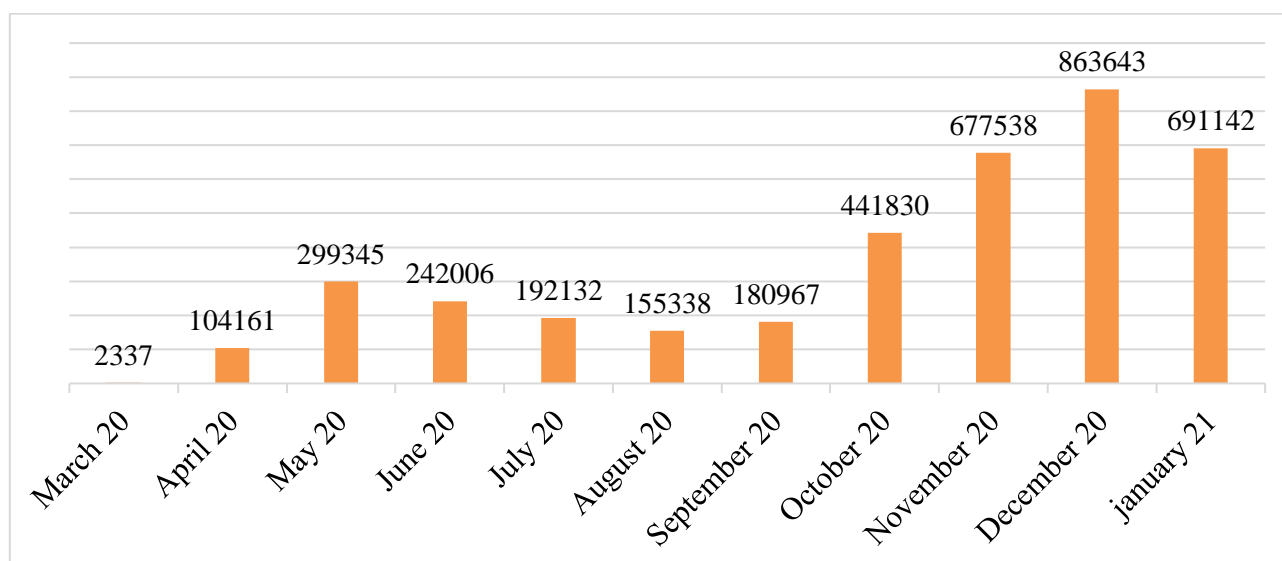


Figure 1. Dynamics of the number of cases of coronavirus infection in Russia in March 2020 - January 2021, people

At the same time, the total sales in the commercial segment of the pharmaceutical market of the Russian Federation in the period from October 2019 to October 2020 varied in waves, increasing from October 2019 to March 2020 to 127.1 billion rubles, which is the highest value for the period under study. Also, the peak of growth is in October 2020, when the volume of sales increased to 99.1 billion rubles, which corresponds to the beginning of the second wave of coronavirus. The smallest value is noted in May-June 2020, when the volume of drug sales amounted to 75.3 billion rubles, which is associated with a decline in the spread of coronavirus infection and seasonality.

The weighted average cost of medicines also has a wave-like dynamics. The lowest value is noted in October 2019, when the cost of one package was 206.7 rubles, and the weighted average price of a package increased to 220.1 rubles by February 2020. In April 2020, there was a decrease in the weighted average cost of medicines in the pharmaceutical market to 209.8 rubles, and, starting in May 2020, another increase in average prices in the market was outlined, as a result of which by October 2020 the average cost of a package of medicines reached 239.2 rubles, which is 16% higher than the level of the previous year (Figure 2).

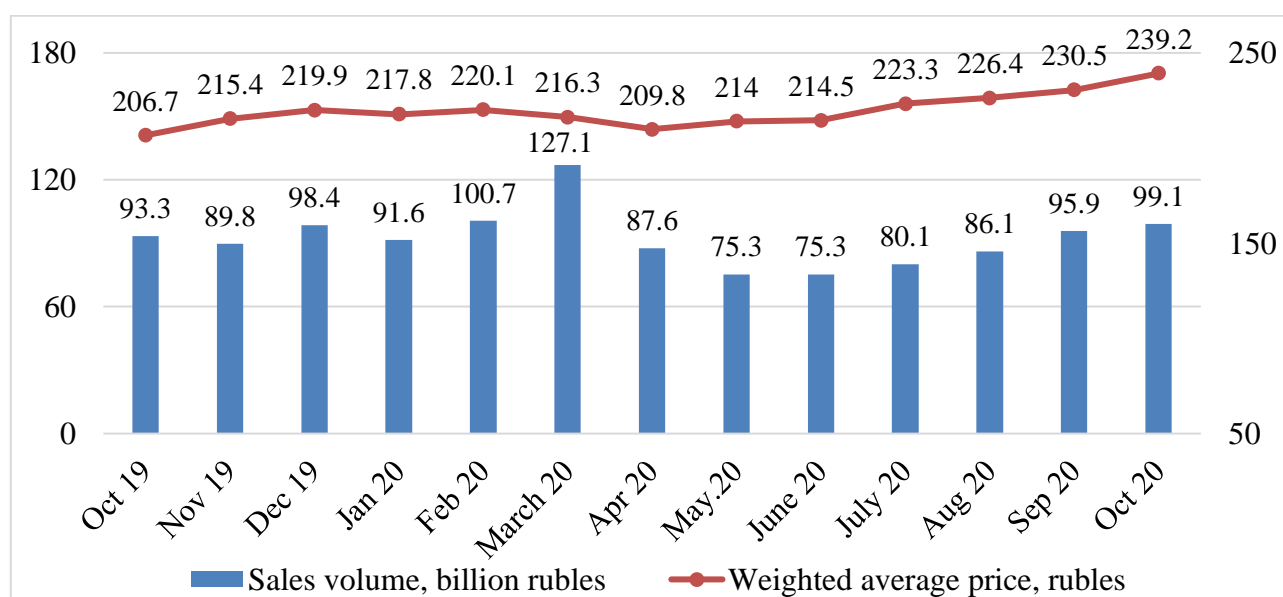


Figure 2. Dynamics of sales volume and weighted average price in the commercial segment of the pharmaceutical market in Russia in October 2019 - October 2020

Therefore, we can say that simultaneously with the activation of the first and second waves of coronavirus infection, transformations took place in the pharmaceutical market of the Russian Federation. During the first wave, trends were chaotic due to general instability and a lack of understanding of how to act. However, the time of the second situation is more obvious; with an increase in the incidence of the population, there was an increase in sales and the cost of drugs. The Russian pharmaceutical market has reacted classically for a market economy; the growth in demand immediately led to an increase in prices.

A comparative analysis of the structure of sales of medicines in March 2019 and 2020 showed that in the value of sales for the year there was an increase in the share of antimicrobials for systemic use, which include, among other things, antibiotics, by 2.2%, as a result of which in March 2020, the share of this group of drugs in the total sales volume amounted to 9.7%. There is also an increase in sales of anticancer drugs and immunomodulators by 1%, and in March 2020 their share reached 3.7%. A slight increase in the value of sales is noted for such groups as drugs for the treatment of diseases of the respiratory (+ 0.6%) and cardiovascular (+ 0.1%) systems, which occupy the 3rd and 2nd positions in terms of share, respectively. These drugs are inferior to drugs for the digestive tract and metabolism, the share of sales of which in March 2020 amounted to 17.4%. The assessment of the natural sales volume showed similar trends, however, in terms of the

number of packs sold in March 2020, the group of drugs for the treatment of diseases of the nervous (16.1%) and respiratory systems (15.5%) is in the lead (Table 1).

Table 1. Structure of drug sales by major ATC groups on the Russian pharmaceutical market in March 2019 and March 2020

ATC groups	Share of sales value (RUB),%		Share change,%	Share of natural sales volume (pack),%		Share change,%
	2019	2020		2019	2020	
Digestive tract and metabolism	18,9	17,4	-1,5	17	15,2	-1,8
Drugs for the treatment of diseases of the cardiovascular system	14,4	14,5	0,1	13,3	12,5	-0,8
Drugs for the treatment of diseases of the respiratory system	12,5	13,1	0,6	15,4	15,5	0,1
Drugs for the treatment of diseases of the nervous system	11,5	11	-0,5	15,3	16,1	0,8
Antimicrobials for systemic use	7,5	9,7	2,2	6,7	7,9	1,2
Drugs for the treatment of diseases of the musculoskeletal system	8,1	7,5	-0,6	7,3	7,1	-0,2
Drugs for the treatment of diseases of the urogenital organs and sex hormones	7,7	6,7	-1	2,1	1,9	-0,2
Drugs for the treatment of skin diseases	5,8	6,5	0,7	11,1	12,7	1,6
Drugs affecting hematopoiesis and blood	4,9	4,6	-0,3	3,2	2,8	-0,4
Antineoplastic and immunomodulating agents	2,7	3,7	1	1,1	1,7	0,6
Medicines for the treatment of diseases of the sense organs	2,8	2,6	-0,2	2,5	2,3	-0,2
Preparations without ATC group indication	1,5	1,2	-0,3	3	2,5	-0,5
Other drugs	0,8	0,7	-0,1	0,8	0,8	-
Hormonal drugs for systemic use (excluding sex hormones)	0,5	0,6	0,1	0,6	0,7	0,1
Antiparasitic drugs, insecticides and repellents	0,2	0,2	-	0,5	0,4	-0,1

The study of the situation in October 2019 and 2020 revealed that in the period under review there was a significant increase in the share (+ 6.3%) of antimicrobial drugs for systemic use in the total sales in the pharmaceutical market, whose share reached 13.4%. At the same time, the share of sold packages of drugs in this group increased by 5.2% over the year and amounted to 11.9% in the total sales volume. There is also an increase in the share of sales of anticancer drugs and immunomodulators by 1.9% in the value of sales and by 0.9% in volume. Despite this, as before, the bulk of sales (over 17%) on the pharmaceutical market are drugs for the digestive tract and metabolism, which is due to their high cost and high demand (Table 2).

The share of drugs for the treatment of diseases of the respiratory system, although it tends to decrease in October 2020 compared to October 2019, is still at a higher level compared to the data in March 2019 and 2020, respectively, which may be due to seasonal factors morbidity. Thus, in October 2020, the share of drugs for the treatment of respiratory diseases amounted to 11.9% of total sales and 15.7% of the number of packages sold.

4. Discussions

The coronavirus has become a challenge for the domestic health care system. Despite the constant modernization that the industry has undergone in recent years, the onset of the pandemic clearly showed that the current state and level of development of healthcare are not able to ensure the full implementation of the functions assigned to the industry in difficult epidemiological conditions. Despite the fact that the Ministry of Health of the Russian Federation and the Government of the Russian Federation argued that the situation with the coronavirus is under control, and the health care system is coping with the load, in reality, there was an understatement of statistical data, especially during the first wave of coronavirus; numerous complaints and appeals from the population about the impossibility of obtaining medical care indicate the opposite (Ushkalova, 2020).

Table 2. Structure of drug sales by major ATC groups on the Russian pharmaceutical market in October 2019 and October 2020

ATC groups	Share of sales value (RUB),%		Share change ,%	Share of natural sales volume (pack),%		Share change ,%
	2019	2020		2019	2020	
Digestive tract and metabolism	18	17	-1	16,4	15,1	-1,3
Antimicrobials for systemic use	7,1	13,4	6,3	6,7	11,9	5,2
Drugs for the treatment of diseases of the cardiovascular system	14,5	12,7	-1,8	13	12	-1
Drugs for the treatment of diseases of the respiratory system	13	11,9	-1,1	16,3	15,7	-0,6
Drugs for the treatment of diseases of the nervous system	11,9	10,8	-1,1	15,8	15	-0,8
Preparations for the treatment of diseases of the musculoskeletal system	8,6	7,8	-0,8	7,6	7,5	-0,1
Drugs for the treatment of diseases of the musculoskeletal system	7,5	6,2	-1,3	2,1	1,9	-0,2
Drugs for the treatment of skin diseases	5,7	5,3	-0,4	10,5	9,2	-1,3
Drugs affecting hematopoiesis and blood	5,1	5,2	0,1	3,3	3,2	-0,1
Antineoplastic and immunomodulating agents	2,6	4,5	1,9	1,1	2	0,9
Medicines for the treatment of diseases of the sense organs	2,9	2,4	-0,5	2,6	2,3	-0,3
Preparations without ATC group indication	1,4	1,2	-0,2	2,7	2,3	-0,4
Other drugs	0,8	0,8	-	0,8	0,9	0,1
Hormonal drugs for systemic use (excluding sex hormones)	0,6	0,6	-	0,6	0,6	-
Antiparasitic drugs, insecticides and repellents	0,3	0,2	-0,1	0,5	0,4	-0,1

The situation was similar in the pharmaceutical market. Changes in market conditions, along with a significant increase in the role of pharmaceuticals in this period, led first to a significant increase in prices, and later, during the second wave of coronavirus, to a shortage of a whole list of drugs, primarily antibiotics and antivirals (Reprintseva, 2020b). The rise in prices for pharmaceutical products may be a natural consequence of natural market processes. The resulting shortage of drugs raises a number of questions, given the fact that the second wave of coronavirus in October 2020 was predicted in the summer, respectively, domestic pharmaceutical manufacturers had enough time to prepare for its onset (Margaret, 2020).

Conclusion

The importance of the healthcare industry and the pharmaceutical market for ensuring public health cannot be overestimated, as became apparent in the midst of the coronavirus pandemic. Today, the country still has not managed to achieve fundamental transformations in the field of strengthening and preserving the health of the population, as evidenced by the statistics of mortality and complications in the incidence of coronavirus infection. The performed study showed that the dynamics of the rate of morbidity with coronavirus in Russia varied wavelike. It significantly increased during the pandemic peaks in May and December 2020, when the number of registered cases was 299.3 thousand and 863.6 thousand. Along with that, separately, it is worth highlighting the tendency to hush up the real state of affairs and underestimate the real numbers in order to maintain peace among the population and maintain an image in the international arena. The study of the dynamics of the indicators of the functioning of the healthcare in this period clearly showed all the existing problems: the healthcare system does not have established mechanisms to combat the spread of infections in difficult epidemiological circumstances, the bed capacity has a low reserve of capacity, and there are not enough medical personnel.

The pharmaceutical market, whose role in the context of the pandemic has ~~also~~ significantly increased, at this time also showed itself not on the best side: there was a significant shortage of important medicines. The dynamics of the market sales volume confirm a significant increase in the demand on pharmaceutical products. In March 2020, the drug sales were 127.1 billion rubles, in October 2020, 99.1 billion rubles. And there was also a

significant increase in the cost of pharmaceutical products, especially relevant in the fight against the spread of coronavirus, which is confirmed by the shift of the structure of sales towards antimicrobial drugs. Their share increased to 9.7% during the first wave and to 13.4% during the second wave of coronavirus. Besides, an increase in the average cost of drugs by more than 16% was observed. As a result, in October 2020, the average-weighted cost per pack exceeded 239 rubles.

Considering the long period of forced self-isolation, which resulted in a significant decrease in the income of the population, the rise in prices on the pharmaceutical market turned out to be fatal, since it deprived part of the population of financial opportunities to preserve and strengthen their own health. It also became a negative factor contributing to the growth of morbidity and mortality in the population. In these conditions, government regulation and support of the population, which did not happen, should have played a large role. The government followed only a physical restriction of the population and calls for self-isolation, in order to prevent the spread of infection, but the financial aspects of such a decision were not worked out. As a result, by the summer of 2020, it was possible to achieve a decline in the pandemic, however, in the fall, the spread of coronavirus began with renewed vigor, as evidenced by the incidence statistics. In proportion to this, there was an increase in demand on the pharmaceutical market and, accordingly, an increase in average prices, as well as a shortage of medicines.

Therefore, we can say that the coronavirus pandemic has had a significant impact on the structure and development trends of both healthcare and the pharmaceutical market in Russia. However, the difficult epidemiological situation did not become an impetus for their mobilization, growth and development, but only revealed systemic problems and true priorities. It became obvious that preserving the health and life of the population is not a key task; as before, profit-making is paramount. This was clearly shown by the situation with the dynamics of prices for simple personal protective equipment for the respiratory organs, which, instead of the usual 3-5 rubles per piece of steel, costs 150 rubles or more.

References

DSM Group. Analytical reviews of the Russian pharmaceutical market. Available at: <https://dsm.ru/marketing/free-information/analytic-reports/>.

Dubois, P. and Sæthre, M. (2020). On the Effect of Parallel Trade on Manufacturers' and Retailers' Profits in the Pharmaceutical Sector. *Econometrica*, 88, 2503-2545.

Dubois, P., de Mouzon, O., Scott-Morton, F. and Seabright, P. (2015). Market size and pharmaceutical innovation. *The RAND Journal of Economics*, 46, 844-871. DOI: <https://doi.org/10.1111/1756-2171.12113>

Dynkin, A. A. and Telegina, E. A. (2020). Pandemic shock and post-crisis world. *World Economy and International Relations*, 64 (8), 5-16.

Finol Romero, L. (2021). Transparencia y Gobernanza en la Gestión de la Crisis de COVID-19. *Cuestiones Políticas*, 39 (68), 23-50. <https://produccioncientificaluz.org/index.php/cuestiones/article/view/35390>

Kolodko, G. V. (2020). Effects, economics and politics in the post-pandemic world. *Problems of Economics*, 5, 25-44.

Krivenko, N. V., Elishev, V. G. and Kriventsova, L. A. (2019). The influence of innovations on the effectiveness of health care in the system of economic security of the region. *Economy of the region*, 15 (1), 164-177.

Krivenko, N. V. and Tsvetkov, A. I. (2018). The effectiveness of health care financing to ensure the economic security of the region. *Economy of the region*, 14 (3), 970-986.

Kudelina, O. V. and Eremina, S. L. (2016). Regional healthcare effectiveness. *Economy of Region*, 12 (1), 211-225.

Margaret, K. K. (2020). The Alignment of Innovation Policy and Social Welfare: Evidence from Pharmaceuticals. *Innovation Policy and the Economy*, 20 (1), 95-123. DOI: 10.1086/705640

Mensa Sorato, M., Davari, M., Abdollahi Asl, A., Soleymani, F. and Kebriaeezadeh, A. (2020). Why healthcare market needs government intervention to improve access to essential medicines and healthcare efficiency: a scoping review from pharmaceutical price regulation perspective. *Journal of Pharmaceutical Health Services Research*, 11, 321-333.

Ovod, A. I. (2020). On the development of the pharmaceutical market of the Russian Federation under sanctions. *Azimuth of scientific research: economics and management*, 9, 1 (30), 252-255.

Pinkovetskaia, I., Lyubovtseva, E., Arbeláez-Campillo, D., & Rojas-Bahamón, M. (2020). Small and medium enterprises in Russia and other countries. *Amazonia Investiga* 9 (25), 99-106. Retrieved from <https://amazoniainvestiga.info/index.php/amazonia/article/view/1034>

Polbin, A. V., Sinelnikov-Murylev, S. G., Trunin, P. V. (2020). Economic crisis of 2020: causes and measures to overcome it and further development of Russia. *Economic Issues*, 6, 5-21.

Reprintseva, E. V. (2020a). Analysis of the indicators of the hospital network of the healthcare system of the Russian Federation. *Azimuth of scientific research: economics and management*, 9, 2 (31), 281-284.

Reprintseva, E. V. (2020b). Import dependence of the Russian pharmaceutical market as a threat to drug safety. *Azimuth of scientific research: economics and management*, 9, 1 (30), 292-294.

Rospotrebnadzor RF. Actual epidemic situation in Russia and the world. Available at: https://www.rospotrebnadzor.ru/region/korono_virus/epid.php.

Sergeeva, N. M. (2020). The growth of healthcare financing in the budget structure as a guarantee of improving the quality of medical services. *Azimuth of scientific research: economics and management*, 9, 1 (30), 305-308.

Ushkalova, D. I. (2020). Foreign trade of Russia in new conditions. *Journal of a new economic association*, 1 (45), 199-207.

Zhang, H., Zaric, G. S. and Huang, T. (2011). Optimal Design of a Pharmaceutical Price-Volume Agreement Under Asymmetric Information About Expected Market Size. *Production and Operations Management*, 20, 334-346.

Zyukin, D. A., Bystritskaya, A. B., Golovin, A. A. and Vlasova, O. V. (2020a). The share of health care spending in the structure of GDP as a criterion for the healthcare system effectiveness, *11* (30), 352-363.

Zyukin, D., Golovin, A., Pshenichnikova, O. and Nadzhafova, M. (2020b). Assessing the functionality of models for predicting pharmaceutical companies. *Amazonia Investiga*, 9 (28), 272-280.