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Analysis of the Russian Market for Artificial Lung Ventilation Units

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ABSTRACT

The medical industry is strategically important for the national economy and healthcare. The COVID-19 pandemic has shown the importance of local MedTech capacity and production facilities to meet the needs of the healthcare market. **The purpose of the study** is to conduct the analysis of the Russian market of artificial lung ventilation devices (ventilators). **Materials and methods.** The analysis of customs statistics data was carried out by the Ministry of Foreign Economic Activity of the Russian Federation (RF), the Federal Customs Service of Russia (FCS Russia), Federal Tax Service of Russia (FTS Russia), Federal State Statistics Service (Rosstat), the Ministry of Economic Development of the Russian Federation, the Ministry of Health of the Russian Federation, Federal Service for Supervision in the Sphere of Health Care (Roszdravnadzor) as well as the Commodity Nomenclature of Foreign Economic Activity (FEACN RF). During the study, statistical methods were used, as well as analysis and synthesis. The author determined the number of ventilator models present on the Russian market, the dynamics of their import and export volumes (during and after the COVID-19 pandemic) in the country context. **Results.** Up to 200 ventilator models from 87 vendors are represented on the RF market. The volume of imports of ventilators in 2022 amounted to \$ 32.0 million (2.2 billion rubles). After a jump in imports during the COVID-19 pandemic in 2021, the volume of deliveries fell to 43 million (–23% by 2019), and in 2022 the decline was 25% (–44% by 2019). In 2020, the imports volume of value of ventilators increased 6.5 times. In 2021, the volume of imports and exports immediately fell below the indicators of the pre-crisis period. Deliveries from Germany decreased by 52%, the USA – by 86%, Korea – by 98%, France – by 29%, Slovakia – by 36%, and from Sweden stopped altogether. China has increased the volume of imports, adding 81% by 2021, and Switzerland to 41%. The volume of exports amounted to \$ 383 thousand (410 million rubles), including exports to the EAEU countries amounted to \$ 88 thousand, exports to non-CIS countries decreased by 95% (from \$ 6.7 million to \$ 0.3 million in 2021–2022). **Conclusion.** The results of this study can be applied by Russian ventilator manufacturers to assess the growth potential, as well as by government authorities to set priorities for strategic development by segments of the medical devices market.

Keywords: market analysis; medical device; MedTech; import substitution; medical products; competition; medical industry

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INTRODUCTION

The medical and pharmaceutical industries as components of the healthcare system of the Russian Federation are strategically important areas of the national economy. The share of imported medical devices, especially high-tech medical devices (HTMD), has always been very high, and until recently Russian medicine was largely dependent on the international market [1]. Back in 2020, more than 78% of medical equipment and components were supplied from countries that are now considered 'unfriendly' due to the current political situation in the world [2]. Understanding the volume of this market, its potentials and conjuncture is of practical interest, especially given the role of medicine in the life of society and its citizens. Researchers note 'the high importance of this sector of the economy, its investment attractiveness for both foreign and domestic producers' [3].

Medical products are "any instruments, apparatus, devices, equipment, materials and other products used for medical purposes separately or in combination with each other, as well as together with other accessories necessary for the intended use of these products, including special software, and intended by the manufacturer for the prevention, diagnosis, treatment and medical rehabilitation of diseases, monitoring the condition of the human body, conducting medical research, restoration, replacement, modification of the human body on anatomical or physiological level, and other medical products".¹

In terms of the degree of manufacturability, knowledge-intensive industries that produce medical products can be compared with defence industry enterprises, which often start working for medicine as a result of conversion [4]. Examples of this are Roselektronika Hold-

ing² and JSC KRET³ (part of "Rostech Group of Companies" State Corporation), JSC Shvabe,⁴ Avtomatika Concern,⁵ and other companies in the defence industry.

Experts have identified a number of factors contributing to the development of the medical industry in a particular region, such as state financing of medical device manufacturing plants, territorial concentration of labour resources and the quality of specialist training, high level of innovation and investment in science [5]. The insufficiency of the latter contributes to the high value of the HTMD import indicator [6]. For the successful implementation of the import substitution policy, it is important to provide 'cooperation between public and private structures, as well as strengthening the connection between the scientific community and the medical industry' [7].

At present, there is no legally approved definition of the concept of 'high-tech medical equipment' in the country, which makes it difficult to identify the specifics of this submarket. The criteria for classifying equipment as high-tech equipment are established by Order No. 1618 of the Ministry of Industry and Trade of the Russian Federation dated 01.11.2012 'On Approval of Criteria for Classifying Goods, Works and Services as Innovative Products and (or) High-Tech Products in the Fields related to the sphere of activity of the Ministry of Industry and Trade of the Russian Federation'⁶ (Order No.1618).

² Roselektronika Holding (official website). URL: <https://ruselectronics.ru/>

³ Concern Radioelectronic Technologies (JSC KRET) (official website). URL: <https://kret.devup.cc/ru/>

⁴ JSC Shvabe (official website). URL: <https://shvabe.com/about/>

⁵ Concern Avtomatika (official site). URL: <https://www.aotommatika.ru/about/>

⁶ Order of the Ministry of Industry and Trade of the Russian Federation No. 1618 dated 01.11.2012 'On Approval of the Criteria for Attributing Goods, Works and Services to Innovative Products and (or) High-Technology Products in the Fields related to the sphere of activity of the Ministry of Industry and Trade of the Russian Federation'. URL: <https://legalacts.ru/doc/prikaz-minpromtorga-rossii-ot-01112012-n-1618/>

¹ Federal Law of 21.11.2011 No. 323-FL 'On the Fundamentals of Health Protection of Citizens in the Russian Federation'. Art. 38. URL: https://www.consultant.ru/document/cons_doc_LAW_121895/ddcfddbdbb49e64f085b65473218611b4bb6cd65/

According to this document, HTMD includes medical products that meet the following criteria:

- ‘the goods, work and services are respectively manufactured, performed and rendered by the enterprises of knowledge-intensive industries;
- the goods, work and services are respectively produced, performed and rendered using the latest technological equipment, processes and technologies;
- the goods, work and services are respectively produced, performed and rendered with the participation of highly qualified, specially trained personnel’.

Also, according to Order No. 1618, HTMD refers to ‘robots and artificial intelligence technologies (surgical robotics, robot nannies, etc.), various electron microscopes, ultrasound scanners, laser scalpels, radiosurgery equipment, endoscopy equipment, genetic research equipment, resuscitation equipment,’ which [and especially artificial lung ventilation (ALV) machines] are of increased interest. Previously, experts made attempts to highlight the factors influencing supply and demand in the market of ventilators during the coronavirus pandemic, taking into account the development of in-house production, standardisation and optimisation of public procurement processes, and improvement of the quality of medical care [8–11]. However, a detailed analysis of the ventilator market with a description of the structure of imports and exports has not been conducted.

Medical devices are among the products that are characterised by complex ‘buying behaviour’. Their selection is in most cases technically complex and requires the involvement of expert decision-makers. These products imply certain conditions and methods of sales, as well as sales incentives.

Sanctions imposed on the Russian Federation by Western countries have led to the withdrawal of a number of foreign manufacturers from

the Russian market. The complexity of logistics chains and the sharp rise in exchange rates have affected a group of industries, jeopardising national security.

According to the Ministry of Industry and Trade, at the end of the first half of 2023, the volume of the medical devices market in Russia totalled RUB 381 billion, and the size of state purchases of medical devices reached RUB 320 billion, while the volume of the medical products market exceeded RUB 600 billion.⁷ By the end of 2023, the share of domestic medical equipment accounted for 29%.

The programme ‘Development of Industry and Enhancement of its Competitiveness’ sets tasks to create competitive industrial production in the field of medical devices, especially high-tech ones, to develop innovations and apply advanced technologies.⁸

A lung ventilator refers to an HTMD and is an automatic device designed to partially or completely replace a patient’s independent breathing pattern.

As part of the research objective, which is to analyse the Russian market for ventilators, the following tasks have been defined: to assess the significance of imports of these products for the Russian market in the interval from 2018 to 2022; to describe the dynamics of its imports and exports for the same period by month and the structure of its imports into Russia by brand; to identify the main foreign manufacturing companies represented in the domestic market, as well as countries — manufacturers and exporters of ventilators; to identify the largest suppliers in the domestic market; to determine the significance of export supplies for the Russian market (2018–2022).

⁷ Medical Equipment and Products Market 2023. Business Profile Group. URL: <https://delprof.ru/press-center/open-analytics/rynok-meditsinskogo-oborudovaniya-i-izdeliy-2023/?ysclid=lxuddslmke341471357>

⁸ Import substitution of medical products. Zdrav Expert (portal). URL: <https://zdrav.expert/index.php>

MATERIALS AND METHODS

The timeframe of the study is 2017–2022 for retrospective analysis and 2023–2027 for market forecast. The author of this article has studied statistical data from specialised agencies (Ministry of Health, Ministry of Industry and Trade), as well as literature on the topic of the study; the author conducted the content analysis of the information posted on the websites of companies participating in the Russian market of ventilators, as well as contained in publications and speeches of representatives of these companies at industry events; conducted the analysis of customs statistics, FEACN (Foreign Economic Activity Commodity Nomenclature) of the Russian Federation, processed information from Rosstat regarding the volume of production of ventilators in Russia; reviewed the data of the Ministry of Economic Development and Trade of the Russian Federation regarding the forecasts for the development of healthcare and the medical products market in Russia. The research was based on the materials of the Ministry of Economic Development of Russia, Ministry of Health of Russia, Roszdravnadzor and other ministries and agencies, expert assessments of market specialists; monitoring of data of the main industry players, mass media (in particular, industry publications).

RESULTS

Market size and approaches to calculating demand

There are up to 200 models of ventilators of various types from 87 companies on the Russian market, including 24 domestic and 63 foreign manufacturers.

The criteria for calculating the region's need for ventilators (for budgetary medical organisations) are based on the methodological recommendations of the Ministry of Health of the Russian Federation 3.1.2.0139–1.⁹

⁹ Criteria for calculating the stock of prophylactic and therapeutic drugs, equipment, personal protective equipment and disinfectants for the subjects of the Russian Federation

According to this document, the following factors are taken into account when calculating the stock of ventilators:

- “the size and age structure of the population in the regions;
- morbidity and hospitalisation rates (projected number of outpatients and inpatients);
- the age structure of those who are ill and hospitalised;
- the number of groups at risk of infection and at risk of developing severe and complicated forms; the order of priority for their protection;
- age thresholds for utilisation”.

Population size in the regions, age structure. In order to identify the needs of a constituent entity of the Federation for intensive care ward equipment, it is necessary to have information on the number and age structure of the population in the region, as local indicators may differ from the average for the Russian Federation.

The World Health Organisation (WHO), based on the results of analysis of the situation in different countries, determined the average percentage of hospitalisation to be 10%. At the same time, 25–30% of hospitalised patients needed intensive care and 12% needed to be connected to a ventilator.

According to data from infectious diseases hospitals in Russia, in 2009, 7–12% of hospitalised patients required artificial ventilation. The calculation of the number of ventilators (per 1 million people) is based on the assumption that 12% of hospitalised patients will need ventilators and each of them will be on a ventilator for an average of 10 days.

The need for ventilators depends on the number of intensive care beds in intensive care units — according to the Russian Ministry of Health regulations, their number should be at least 3% of the total bed stock in the country. As of the end of

for the period of influenza pandemic: Methodological Recommendations MR 3.1.2.0139–18. Moscow: Federal Service for Supervision of Consumer Rights Protection and Human Welfare; 2019. 30 p.

2022, there were 1,172,000 beds, i.e., based on the above ratio, there should be at least 35,000 re-animation beds among them (including intensive care units). According to the order of the Ministry of Health of Russia from 15.11.2012 № 919n, 6 beds of a standard intensive care ward should be provided with seven stationary ventilators and two transport ventilators — for moving patients around the hospital.¹⁰ In other words, all intensive care beds in the country should be equipped with 52,500 ventilators.

These HTMDs are manufactured in accordance with GOST 20790–93, GOST 24264–80 standards. Their average guaranteed service life is 6 years. In the Russian Federation, the HTMDs are supplied under FEACN code 901920 ‘Apparatus for ozone,

oxygen, aerosol therapy, artificial respiration or other therapeutic breathing apparatus’.

FOREIGN TRADE BALANCE. SUMMARY INDICATORS

The volume of import of ventilators to our country in 2022 is estimated at USD 32 million (about RUB 2.2 billion). Of these, the products worth USD 481 thousand (1.5%) came from EAEU countries, and the products worth USD 31.5 million (100%) — from non-CIS, far-away countries. The size of supplies in 2022 decreased by 25% (*Table 1*).

The volume of exports totalled USD 383 thousand (RUB 410 million), including USD 88 thousand to the EAEU countries. Exports to other countries (non-CIS countries) for the period 2021–2022 decreased by 95% (from USD 6.7 million to USD 0.3 million). In 2022, the share of EAEU countries accounted for 23% of total exports (*Table 1*).

¹⁰ Order of the Ministry of Health of the Russian Federation of 15.11.2012 No. 919n ‘On Approval of the Procedure for the Provision of Medical Care to the Adult Population in the Profile of Anaesthesiology and Reanimatology’. URL: <https://minzdrav.gov.ru/documents/9128>

Table 1

Russian import and export of lung ventilators for the period 2017–2022

Index	2017	2018	2019	2020	2021	2022
Cost, million USD						
Import	24.6	54.9	55.3	364.5	42.8	32.0
Exports	0.3	1.2	5.2	16.9	6.7	0.4
Trade balance	–24.3	–53.6	–50.1	–347.6	–36.1	–31.7
Share of exports.%	1%	2%	9%	5%	16%	1%
Cost, RUB million						
Import	1441	3524	3526	26 166	3145	2129
Export	3	63	301	1192	410	24
Share of exports,%	0%	2%	9%	5%	13%	1%

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCf_90bs0Sg7O/view?usp=sharing

Exports account for 1–2 per cent of the country's total foreign trade in value terms.

To calculate the volume of imports in rouble terms, the customs value [includes invoice value, logistics and insurance costs, excluding VAT — in practice it is used to calculate customs payments (duties, customs fees, excise duties, VAT)] was used; to determine the value of exports in rouble terms, the actual value (invoice value) was used.

Some decrease in imports and exports in 2021–2022 was also due to incomplete description of goods in the customs database — some declara-

tions could not be attributed to ventilators or other devices.

IMPORT OF LUNG VENTILATORS

The volume of visible import of ventilators in 2022 was USD 32 million (RUB 2.1 billion) (*Table 2*). After its sharp increase during the COVID-19 pandemic, already in 2021 supplies decreased to USD 43 million (i.e., by 23% as compared to the pre-COVID 2019 level), and in 2022, it fell by another 25 per cent (or 44 per cent compared to 2019). Customs value (declared val-

Table 2

Growth rate of Russian imports of lung ventilators, 2017–2022

Index	Unit of measurement	2017	2018	2019	2020	2021	2022
Cost	USD million	24.6	54.9	55.3	364.5	42.8	32.0
	RUB million	1.4	3.5	3.5	26.2	3.1	2.1
Growth rate to the previous year	% of the amount in USD		123%	1%	559%	–88%	–25%
	% of the amount in RUB		144%	0%	642%	–88%	–32%

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCf_90bs0Sg7O/view?usp=sharing

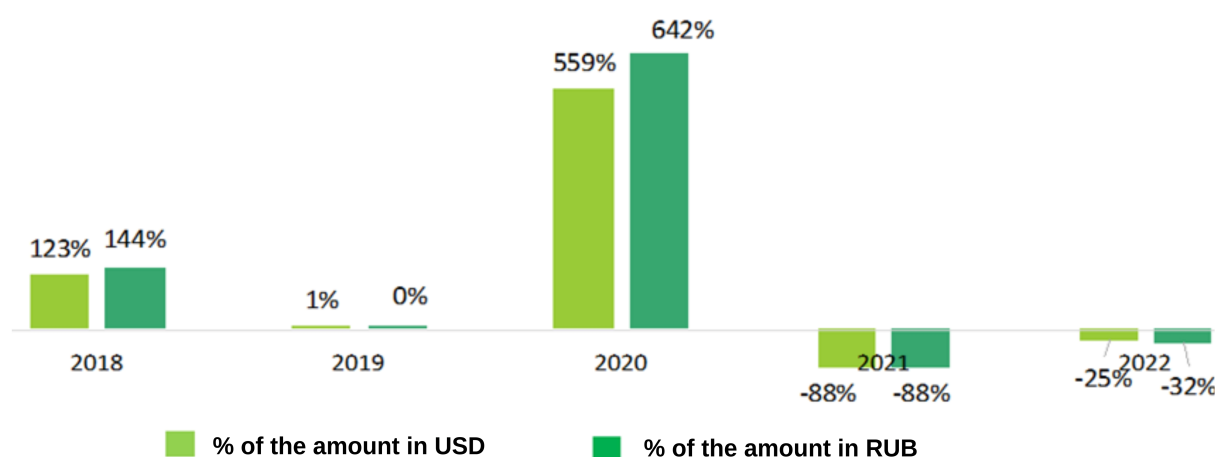


Fig 1. Dynamics of changes in import supplies of lung ventilators as a percentage to the previous period, 2018–2022

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCf_90bs0Sg7O/view?usp=sharing

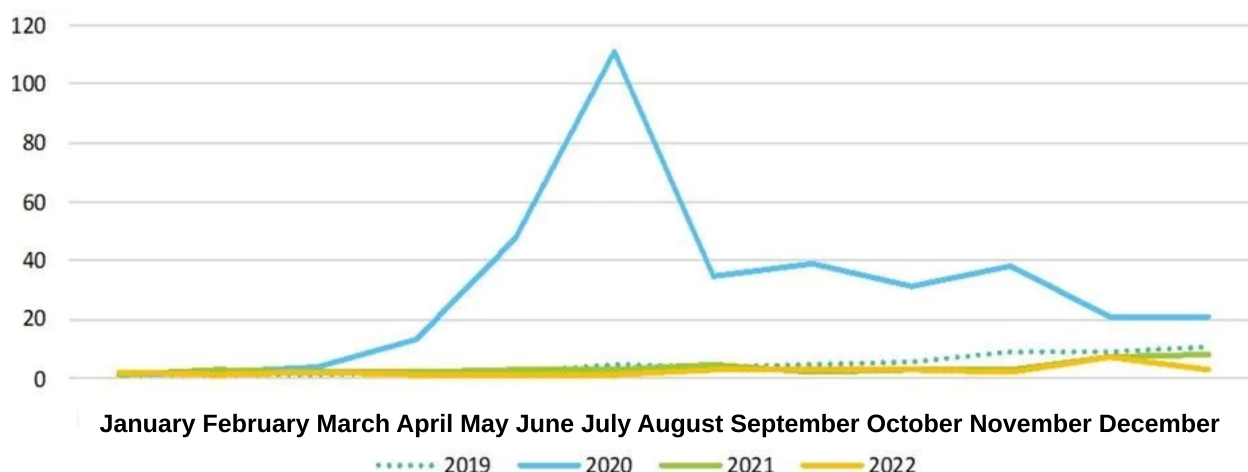


Fig 2. Dynamics of imports of lung ventilators to Russia by month, 2019–2022, million USD

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCf_90bs0Sg7O/view?usp=sharing

ue of products) was used to calculate the value of imports in roubles, and invoice value (without duties and taxes) was used to calculate the value of exports.

In 2020, ventilators became the most demanded medical product along with protective equipment — their value imports to Russia increased by 6.5 times (from USD 55 million to USD 365 million); and by 7.5 times in rouble terms. In 2021, the volume of imports and exports fell below the indicators of the pre-Covid period (Fig. 1).

If we consider deliveries over 3 years by month, then at the very beginning of the COVID-19 pandemic (April 2020), artificial ventilation devices worth \$ 13.6 million were imported to Russia (against the previous monthly import volume of \$ 5 million); in May — already \$ 47 million. The peak occurred in June 2020, when imports of ventilators to Russia reached \$ 111 million. From the following year, there was a sharp drop in deliveries (Fig. 2).

MANUFACTURING COUNTRIES

Until the beginning of 2022 (with the exception of 2020), Germany was the constant leader in the supply of ventilators to the Russian market.

In the pandemic year 2020, the maximum volume was provided by China (USD 189 million), although imports from all countries increased by a significant margin (Table 3).

In 2022, Switzerland takes the lead in shipments (\$ 12.8 million), followed by Germany and China; imports from France, Israel and Slovakia are not so significant (\$ 0.6–1.4 million per year each). Supplies from the USA, Ireland, Sweden, and the Republic of Korea were discontinued (Fig. 3).

The dynamics of import of ventilators to Russia from 2017 to 2022 in the context of manufacturing and importing countries¹¹ is shown in Fig. 4 and 5.

The author of the study found that one third of the ventilation equipment imported into Russia is manufactured in Switzerland, and half of it is manufactured in Switzerland and Germany. This picture was broken only in the pandemic year 2020, when the maximum volume of supplies was provided by Chinese manufacturers (Fig. 5).

¹¹ Devices may be manufactured in one country, but imported to Russia through other countries. This has become especially characteristic during the sanctions period, when foreign manufacturers are not always able to supply ventilators directly.

Table 3

**The volume of lung ventilators deliveries to Russia by importing countries
in the period 2017–2022, million USD**

Country	2017	2018	2019	2020	2021	2022	Total in 2022 compared to 2021, %
China	0.3	1.5	2.8	189.0	2.1	3.8	81%
Germany	9.9	19.0	19.3	39.0	20.8	9.7	–53%
USA	5.4	10.2	9.6	52.8	2.2	0.3	–86%
Switzerland	4.3	12.4	9.3	25.2	9.1	12.8	41%
Ireland	0.8	2.6	6.6	13.2	0	0	–
Sweden	0.6	4.9	3.8	5.4	1.8	0.0	–100%
Republic of Korea	0.0	0.0	0.2	13.0	0.9	0.1	–89%
France	0.9	1.1	0.8	5.5	1.4	1.0	–29%
Israel	0.1	0.6	0.5	7.9	0.6	0.6	0%
Slovakia	1.4	0.5	0.6	2.5	2.2	1.4	–36%
Argentina	0.1	0.9	0.6	6.7	0	0.3	–
Others	0.8	1.1	1.2	4.3	1.7	2.0	18%
Total, USD million	24.6	54.9	55.3	364.5	42.8	32.0	–25%

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCF_90bs0Sg70/view?usp=sharing

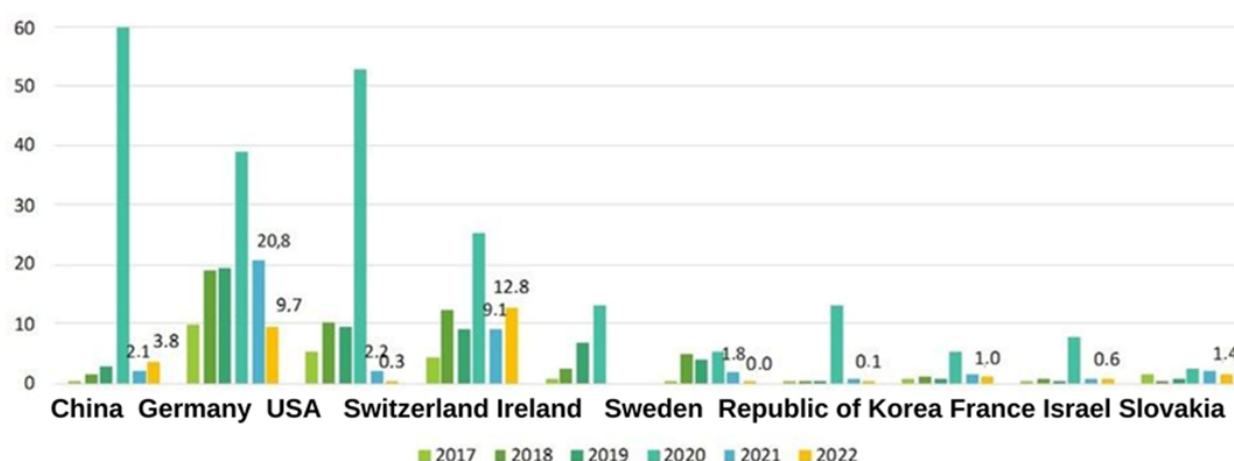


Fig. 3. Import of lung ventilators to Russia by country, 2017–2022, million USD

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCF_90bs0Sg70/view?usp=sharing

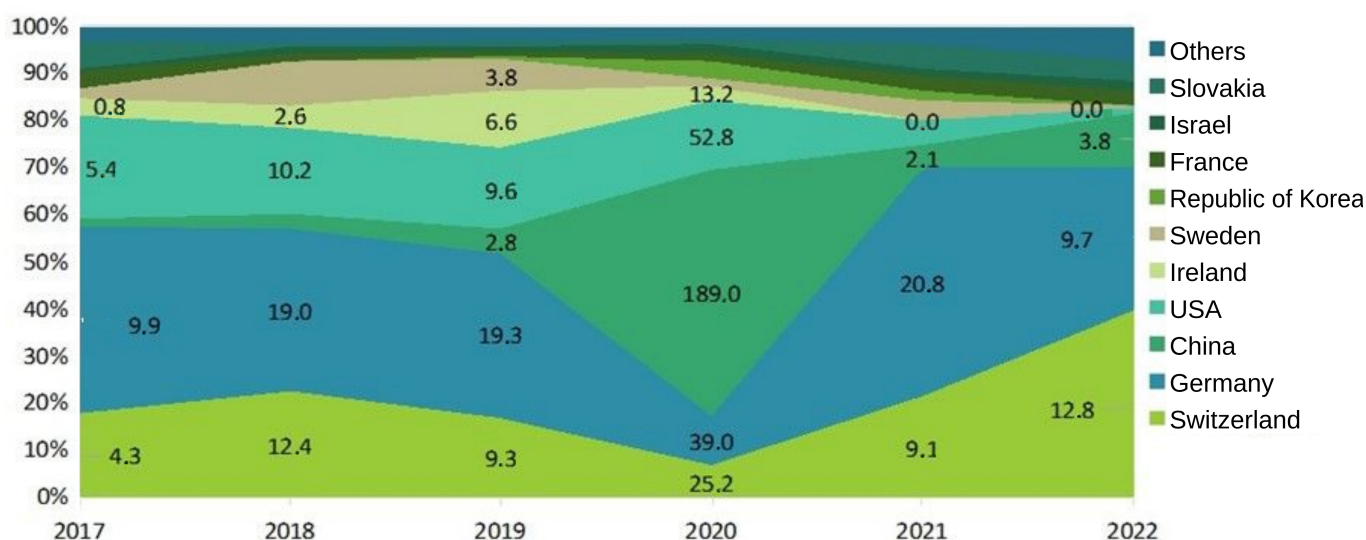


Fig. 4. Dynamics of imports of ventilators to Russia in the context of manufacturing countries 2017–2022, %

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCF_90bs0Sg7O/view?usp=sharing

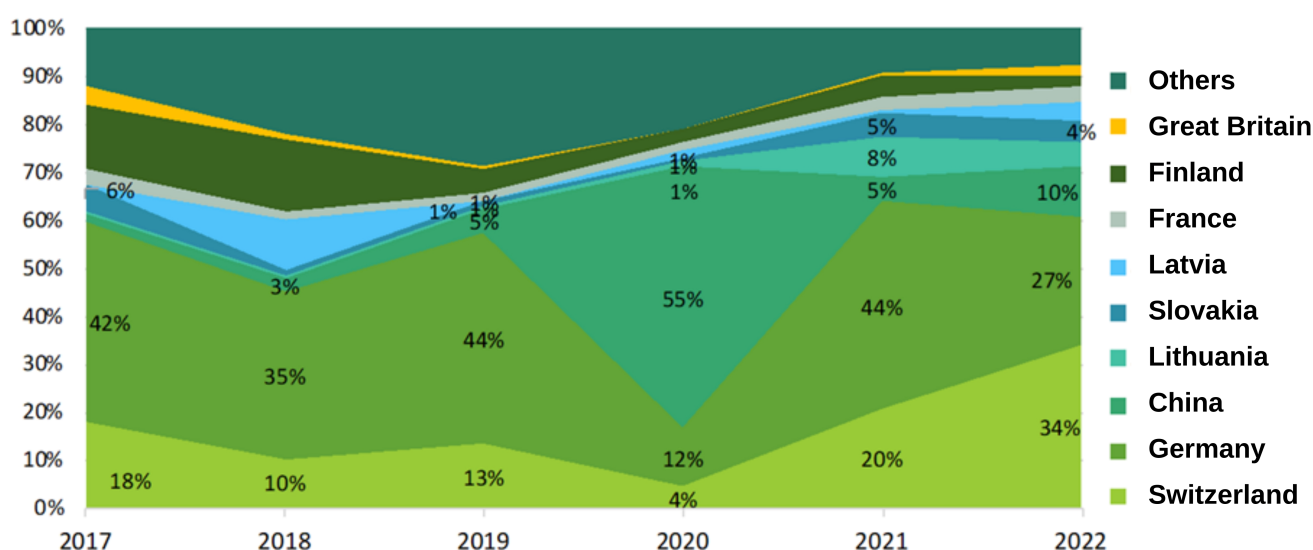


Fig. 5. Dynamics of imports of ventilators to Russia by importing countries 2017–2022, %

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCF_90bs0Sg7O/view?usp=sharing

LEADERS OF THE RUSSIAN MARKET OF LUNG VENTILATORS

The leaders in the Russian market of ventilators are the German brand Draeger and the Swiss brand Hamilton Medical. In the interval from

2017 to 2022, which is considered by the author of the study, Draeger was the leader (excluding 2020, when the Chinese trademark Yuwell prevailed). However, in 2022, the share of German devices decreased sharply (from 43% to 17%),

Table 4

Trademarks: the dynamics of imports of ventilators to Russia, 2017–2022, % of the total cost

Trademark	2017	2018	2019	2020	2021	2022
Draeger	35%	27%	27%	6%	43%	17%
Hamilton Medical	11%	19%	15%	6%	21%	40%
Mindray	0%	1%	3%	7%	3%	7%
GE	6%	2%	9%	6%	3%	2%
Covidien	3%	5%	13%	3%	0%	0%
Lowenstein	2%	3%	4%	3%	5%	10%
Maquet	2%	9%	7%	1%	4%	0%
Superstar	0%	0%	0%	6%	0%	0%
Chirana	6%	1%	1%	1%	5%	4%
Carefusion	9%	3%	3%	2%	0%	0%
Air Liquide	4%	2%	1%	1%	3%	3%
Yuwell	0%	0%	0%	20%	0%	0%
non-branded	4%	6%	1%	9%	3%	5%
others	18%	22%	16%	30%	10%	12%
Total, million USD	24.6	54.9	55.3	364.5	42.8	32.0

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwslRDuCF_90bs0Sg70/view?usp=sharing

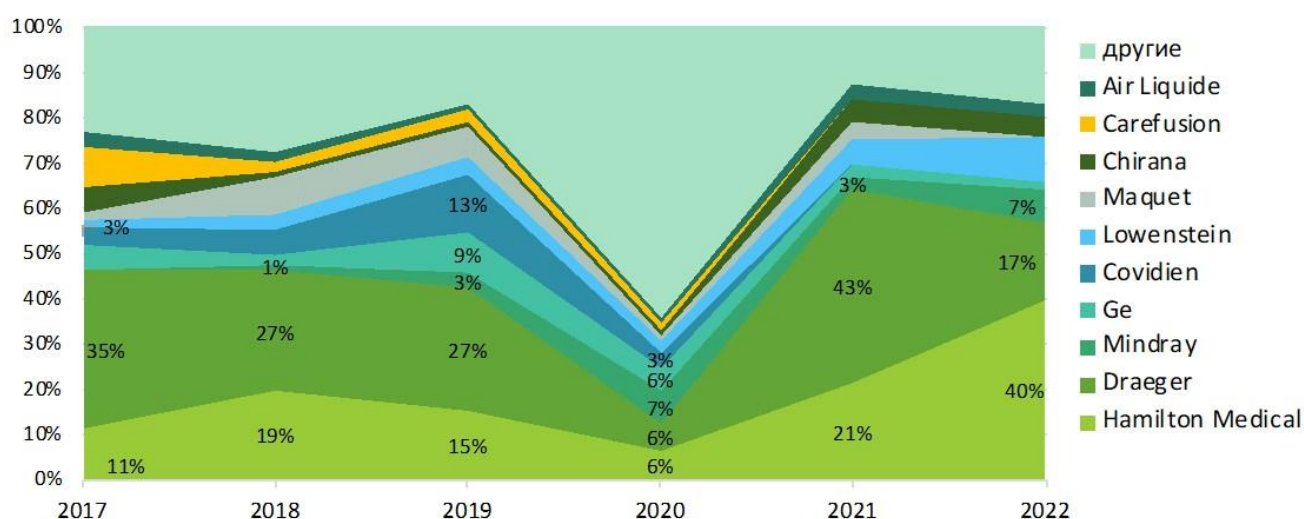


Fig. 6. Trademarks: dynamics of import shares to Russia, 2017–2022, % of value

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwslRDuCF_90bs0Sg70/view?usp=sharing

and the leadership went to the Swiss company Hamilton Medical.

In addition to the two leading manufacturers, we can mention about 10 foreign manufacturers that supply medical equipment for lung ventilation to our country almost every year. Among them are Mindray, GE, Covidien, Maquet, Chirana.

In 2022, the share of Lowenstein brand doubled (up to 10%) (Table 4, Fig. 6, 7).

Table 5 shows import indicators by TOP-30 trademarks and manufacturing companies.

In addition to the brands already mentioned, which came to Russia from Germany, other brands were also imported — Carefusion, Datex and Philips (Fig. 7).

Table 5

The volume of deliveries of ventilators to Russia in 2019–2022 by manufacturers, countries of origin and brands, million USD

Manufacturer	Country	Trademark	2019	2020	2021	2022
Hamilton Medical Ag	Switzerland	Hamilton	8.5	23.5	9.1	12.7
Draegerwerk. Kga.	Germany	Draeger	14.8	21.1	18.6	5.5
Loewenstein GmbH	Germany	Lowenstein	2.9	11.5	2.4	3.1
Shenzhen Mindray Ltd	China	Mindray	1.8	25.7	1.3	2.4
Chirana A.S.	Slovakia	Chirana	0.6	2.5	2.2	1.4
Air Liquide S.A.	France	Air Liquide	0.7	5.1	1.4	1.0
Tse Systems GmbH.	Germany	Tse	-	-	-	0.6
Flight Medical Ltd	Israel	Flight Medical	0.5	1.9	0.6	0.6
Datex-Ohmeda Inc	USA	Ge	5.2	20.1	1.1	0.6
Modul Grup	Turkey	Modul Grup	-	-	1.3	0.5
Tecme S.A.	Argentina	Tecme	0.5	6.5	-	0.3
Resvent Medical Technology Co. Ltd	China	Resvent	-	1.0	0.3	0.3
Vyaire Medical Inc.	USA	Vyaire		2.2		0.2
Sle Limited	UK	Sle	-	-	-	0.1
Plasti-Med Plastik Ltd	Turkey	Plasti-Med	-	-	-	0.1

Table 5 (continued)

Manufacturer	Country	Trademark	2019	2020	2021	2022
Mekics Co, Ltd.	Korea	Mekics	0.2	13.0	0.9	0.1
Bmc Medical Co. Ltd	China	Bmc	0.1	8.4	0.2	0.1
Acutronic Medical	Switzerland	Acutronic	0.9	1.7	-	0.0
Maquet Critical Care	Sweden	Maquet	3.6	4.8	1.7	0.0
Inovytec Medical Solutions Ltd	Israel	Ventway, Inovytec.	-	3.0	-	0.0
Beijing Aeonmed Ltd	China	Aeonmed	-	3.9	-	-
Covidien Ltd	Ireland	Covidien	7.0	13.2	-	-
Beijing Aeonmed Ltd	China	Dixon	0.4	5.7	-	-
Carl Reiner Gmbh	Austria	Carl Reiner	0.2	1.5	-	-
Respironics Inc.	USA	Respironics	-	1.5	-	-
Mederen Neotech Ltd	China	Mederen	0.5	1.2	-	-
Imtmedical AG	Switzerland	Bellavista	-	-	-	-
Nanjing Superstar Ltd	China	Superstar	-	21.6	-	-
Datex-Ohmeda Inc.	USA	Datex	1.4	3.0	0.5	-
Ms Westfalia Gmbh	Germany	Ms Westfalia	0.0	4.7	-	-
Event Medical Ltd	USA	Event Medical	0.3	4.1	-	-
Suzhou Yuyue Ltd	China	Yuwell	-	71.6	0.0	-
Shenzhen Prunus Ltd	China	Prunus	-	10.8	-	-
Carefusion Inc.	USA	Carefusion	1.4	5.7	-	-
Total, million USD			55.3	364.5	42.8	32.0

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwslRDuCF_90bs0Sg70/view?usp=sharing



Puc. 7 / Fig. 7. Trademarks: import of ventilators to Russia, 2017–2022, million dollars

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCf_90bs0Sg7O/view?usp=sharing

Table 6

Dynamics of exports of ventilators from Russia in the period from 2017 to 2022

Index	2017	2018	2019	2020	2021	2022
Cost, thousand USD	256	1217	5156	16 871	6663	383
Cost, RUR million	15	63	301	1192	410	24
Ratio of exports to imports volumes in USD, %	1%	2%	9%	5%	16%	1%
Export growth in USD compared to the previous year, %	-	375%	324%	227%	-61%	-94%
Export growth in RUB compared to the previous year, %	-	323%	375%	296%	-66%	-94%

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwsIRDuCf_90bs0Sg7O/view?usp=sharing

EXPORT OF LUNG VENTILATION DEVICES

The volume of export of ventilators from Russia in 2022 totalled only USD 383 thousand (RUB 24 million). This is almost 20 times (by 94%) lower than the previous year (Table 6).

Such a sharp decline was caused primarily by the temporary ban on the export of foreign medical devices from Russia,¹² which prevented

¹² Resolution of the Government of the Russian Federation of 06.03.2022 No. 302 'On the introduction of a temporary ban on the export outside the Russian Federation of medical devices previously imported into the Russian Federation from

their deficit against the background of sanctions imposed by unfriendly states.

The share of Russian-made products in the total volume of exports of ventilators in the 2017–2021 period averages 90%. In 2022, all exported devices were manufactured in our country.

Most of them were manufactured by the enterprises JSC Ural Instrument-Making Plant and Firm Triton-Electronics LLC. The volumes of export deliveries of ventilators from other Russian

the territory of foreign states that have decided to impose restrictive economic measures against the Russian Federation'. URL: <https://www.alt.ru/tamdoc/22ps0302/>

Table 7

Destination countries: Dynamics of exports of ventilators from Russia, 2017–2022, thousand USD

Destination country	2017	2018	2019	2020	2021	2022
Peru	-	-	33	99	1670	197
Indonesia	-	11	152	786	742	58
Kazakhstan	-	-	-	-	-	43
Belarus	-	-	—	-	-	33
Moldova	-	-	43	187	23	27
Kyrgyzstan	-	-	-	-	-	13
Pakistan	-	-	-	-	-	9
Uzbekistan	162	378	3933	5202	32	3
Serbia	-	-	-	6658	-	-
Ukraine	-	22	33	65	1977	-
India	-	398	18	13	558	-
Lithuania	17	13	-	-	849	-
China	-	-	-	682	-	-
Malaysia	-	11	28	205	413	-
United Kingdom	-	-	13	414	-	-
Azerbaijan	-	59	298	9	15	-
Latvia	-	4	-	300	-	-
Switzerland	-	-	-	285	-	-
Bangladesh	-	-	51	89	43	-
South Ossetia	-	-	74	18	73	-
Tajikistan	28	58	51	8	-	-
Others	49	262	205	406	261	-
Unspecified	-	-	226	1444	-	-
Total, thousand USD	255	1216	5156	16 871	6657	383

Source: compiled by the author based on data from the Federal Customs Service of Russia (2012–2022) and the Federal Customs Service of the EAEU (2022). URL: https://drive.google.com/file/d/11fwcs-1yniVzCXwslRDuCF_90bs0Sg70/view?usp=sharing

manufacturers [(JSC PO UOMZ (Urals Optical and Mechanical Plant)], TMT LLC (TMT Production Enterprise),¹⁵ Medprom LLC, Krasnogvardeets

OJSC, Dixon LLC, Aksion Concern LLC, etc.) are noticeably smaller.

The countries — recipients of products are presented in *Table 7*. In 2022, the largest volume of ventilators was supplied to Peru (almost USD 200 thousand and USD 100 thousand and USD 1.7 mil-

¹⁵ TMT Production Company (official website). URL: <https://www.tmt-medtech.com/>

lion in previous years). In 2021, the largest buyer was Ukraine (and now the new Russian territories of LNR and DNR) — for USD 2 million. The largest destination countries in the pandemic 2020 were Serbia (for USD 6.5 million), Uzbekistan (USD 5.2 million), Indonesia (USD 0.7 million).

CONCLUSIONS

The current decrease in the volume of imports of ventilators is due to the end of the pandemic and, as a consequence, the reduced need for this equipment. Thus, shipments from Germany decreased by 52%, USA — by 86%, Korea — by 98%, France — by 29%, Slovakia — by 36%, and from Sweden stopped altogether. In contrast, the scale of shipments from China increased significantly (by 81% compared to 2021). Switzerland also increased its shipments to 41%, which can be explained by the high degree of commitment of the Russian medical community to the brands belonging to this country, whose products are characterised by a wide range and high quality.

The volume of exports to non-CIS countries decreased by 95% due to low demand for Russian

ventilators and the introduction of a temporary export ban.¹⁴ The share of EAEU countries in the market in 2022 was 23%.

The obtained results of the analysis of the market of ventilators correlate with the indicators of other segments of the high-tech medical equipment market, where there is a gradual reduction in the volume of supplies from Europe and the USA and an increase in the share of manufacturers from Asian countries [12].

The results of this study can be applied by Russian manufacturers of artificial ventilation equipment to assess the growth potential, as well as by authorities to set priorities for strategic development by market segments. In order to fully understand the priority areas for further work, a number of similar studies on other strategically important segments are required.

¹⁴ Resolution of the Government of the Russian Federation of 06.03.2022 No. 302 'On the introduction of a temporary ban on the export outside the Russian Federation of medical devices previously imported into the Russian Federation from the territory of foreign states that have decided to impose restrictive economic measures against the Russian Federation'. URL: <https://www.alta.ru/tamdoc/22ps0302/>

REFERENCES

1. Kornienko D.A. The Russian medical equipment market during the period of economic sanctions. In: Modernization of Russian society and education: New economic guidelines, management strategies, issues of law enforcement and personnel training. Proceedings of the 24th National scientific and practical conference (with international participation). (Taganrog, April 21–22, 2023). Vol. I. Taganrog: Taganrog Institute of Management and Economics; 2023:426–429. URL: https://www.tmei.ru/images/sampled_data/nauka/Konferenc/sbornik_xxiv_konfer_1_2023.pdf (In Russ.).
2. Kopylov M.A. Ensuring sustainable development of Russian medical equipment manufacturers in the context of external economic sanctions. In: Digitalization of the Technosphere: A scientific approach. Proceedings of the National scientific and practical conference (Moscow: May 24 — June 22, 2022). Moscow: MIREA — Russian Technological University; 2022:110–113. (In Russ.).
3. Rudenko M.N., Okulova O.V. Analysis of the Russian medical device market in order to develop an effective business model and market entry strategy. *Moskovskii ekonomicheskii zhurnal = Moscow Economic Journal*. 2020;(10):33. (In Russ.). DOI: 10.24411/2413-046X-2020-10671
4. Omelyanovsky V.V. The main differences between medical devices and pharmaceuticals and distinctive features of their research. *Meditsinskii tekhnologii. Otsenka i vybor = Medical Technologies. Assessment and Choice*. 2013;(2):42–52. URL: <https://cyberleninka.ru/article/n/osnovnye-otlichiya-meditsinskih-izdeliy-ot-lekarstvennyh-preparatov-i-osobennosti-ih-issledovaniya> (accessed on 05.01.2024). (In Russ.).

5. Asryan M. G., Oganyan A. A. Place of Russia in the world market of medical equipment. *Izvestiya Instituta sistem upravleniya SGEU = Bulletin of the Institute of Management Systems of Samara State University of Economics*. 2019;(2):117–120. (In Russ.).
6. Antokhin Yu. N., Sosnin V. V. Innovative activity in the field of production of healthcare goods: Trends, problems, prospects. *Obshchestvo: politika, ekonomika, pravo = Society: Politics, Economics, Law*. 2017;(7):32–38. (In Russ.).
7. Malukhina T. Yu. Problems of introducing entrepreneurial innovations in the medical goods market. In: Problems and prospects for the development of scientific and technological space. Proceedings of the 4th International scientific Internet- conference (Vologda, June 15–19, 2020). In 2 pts. Pt. 1. Vologda: Vologda Scientific Center of the Russian Academy of Sciences; 2020:302–308. (In Russ.).
8. Sychev A., Nikishin V. A. Trends and problems in the medical equipment market in Russia. In: Current aspects of modernization of the Russian economy. Proceedings of the 8th All-Russian scientific and practical conference of students, postgraduates, and young scientists (St. Petersburg, December 22, 2021). St. Petersburg: St. Petersburg Electrotechnical University “LETI”; 2021:306–311. (In Russ.).
9. Netland T., Baev G., Vugovskiy S. A new economic reality: A challenge for production systems. *Standarty i kachestvo = Standards and Quality*. 2020;(6):106–107. (In Russ.).
10. Galiullin B. A., Zhukova I. V. Market analysis of main types of equipment of department of surgery. *Vestnik nauki = Scientific bulletin*. 2024;3(5):1436–1441. (In Russ.).
11. Vatyutova A. Yu., Valeev I. A. Comparative analysis of ventilators by functional characteristics. *Vestnik nauki = Scientific bulletin*. 2024;4(5):1862–1868. (In Russ.).
12. Kazakova O. B., Kuz'minykh N. A. Indicators of development of innovative activities in the field of medical industry and healthcare. In: Grishin K. E., ed. Prospects for the development of health economics. Proceedings of the 4th International scientific and practical conference (Ufa, December 06–07, 2022). Ufa: Ufa University of Science and Technology; 2022:103–106. (In Russ.). DOI: 10.33184/prez2022–2022–12–06.24

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