European Journal of Clinical Pharmacy
Print ISSN: 2385-409X **Online ISSN**: 3105-0409
Website: https://farmclin.com/

Original Research Article

Pharmacoeconomic Analysis of Treatment of Patients with Coronavirus Pneumonia

Article History:

Name of Author:
Akbarova Dilfuza S.[1], Komolova Feruza Dj[2], Yakubov Abdujalol V3, Zufarov Pulat S[4], Saidova Shaxnoza A[5] and Musayeva Lola J[6]

Affiliation: *[1]PhD of the Department of Clinical Pharmacology Tashkent Medical Academy Tashkent. Uzbekistan*
[2]Assistant of the Department of Clinical Pharmacology Tashkent Medical Academy Tashkent. Uzbekistan
[3]Professor of the Department of Clinical Pharmacology, MD Tashkent Medical Academy Tashkent. Uzbekistan
[4]Professor of the Department of Clinical Pharmacology, MD Tashkent Medical Academy Tashkent. Uzbekistan
[5]Assosiate professor of the Department of Clinical Pharmacology Tashkent Medical Academy Tashkent. Uzbekistan
[6]Assosiate professor of the Department of Clinical Pharmacology Tashkent Medical Academy Tashkent. Uzbekistan.

Corresponding Author:
Akbarova Dilfuza S

Received: 21-10-2025
Revised: 20-11-2025
Accepted: 28-11-2025
Published: 30-12-2025

Abstract: A retrospective examination of the treatment administered to individuals afflicted with coronavirus infection offers insights into the pharmacoeconomic aspects of managing this condition. Unlike other viral illnesses, antibiotics are not typically indicated for coronavirus infection. However, underlying health conditions in patients with coronavirus pneumonia, along with the potential for secondary bacterial infections, may necessitate judicious use of antimicrobial therapy. Evaluating the pharmacoeconomic costs associated with antibacterial treatment in coronavirus pneumonia patients allows for a comprehensive understanding of their utilization in this context. An analysis using the ABC/VEN method for 2020-2021 indicates a reduction in disparities concerning drug prescriptions compared to the previous year, suggesting enhanced proficiency among healthcare providers in managing coronavirus pneumonia cases.

Keywords: Covid-19, coronavirus pneumonia treatment, antibacterial therapy, pharmacoeconomics.

INTRODUCTION

The epidemiological situation associated with the incidence of Covid-19 has had a significant impact on the entire pharmaceutical market, the purchase of medicines from medical organizations, including their cost. Despite the decrease in the incidence of the new coronavirus infection in medical organizations, the procurement of antibiotics for the treatment of this disease continues and occupies a sufficient share [20]. The pharmacoeconomics of coronavirus pneumonia has a wide range of aspects, which include the assessment of the cost of treatment, the effectiveness of various therapeutic approaches, the cost of preventive measures, the economic impact on health systems and society as a whole. One of the key pharmacoeconomic aspects of coronavirus pneumonia is the assessment of the effectiveness and cost of various drugs used to treat this disease. The use of antiviral drugs, glucocorticosteroids, antibiotics and other drugs can have a significant impact on the total cost of treatment of patients with coronavirus pneumonia. A comparative analysis of the cost and effectiveness of different treatment regimens can help optimize the choice of treatment, taking into account the balance between costs and results. The COVID 19 pandemic has led to a significant increase in the burden on the medical system, which may require large investments in infrastructure, medical equipment, personnel and other resources. Cost estimation and potential increase in health care costs in the context of coronavirus pneumonia is an important task for budget and resource planning. In August and September 2020, work was carried out in the regions of the Republic of Uzbekistan to organize activities to counteract the spread of the SARSCoV-2 virus. Main tasks: to assess the organization and effectiveness of anti-epidemic and therapeutic and diagnostic measures, to identify the causes leading to a large number of severe forms, to identify ways to reduce the intensity of the spread of a new coronavirus infection and improve the outcomes of the disease [11]. Pharmacoeconomic considerations related to coronavirus pneumonia encompass assessing economic ramifications such as labor loss, decreased productivity, and other societal impacts. Analyzing these effects aids in devising strategies to mitigate the pandemic's adverse effects on the economy and society. This information informs the optimization of treatment approaches, healthcare budget planning, vaccination policies, and other preventive measures against coronavirus pneumonia. Integrating pharmacoeconomic aspects into disease management strategies ensures a balanced approach between costs and outcomes. In summary, pharmacoeconomic analysis of coronavirus pneumonia is pivotal in guiding healthcare and public health decisions, facilitating optimal resource allocation, evaluating the cost-effectiveness of medical interventions, and informing strategies to combat coronavirus infection and enhance patient care quality. As coronavirus infection evolves and incidence rates decline, bacterial pathogens may regain significance in community-acquired pneumonia epidemiology. The presence of underlying conditions in coronavirus infected patients and the potential for secondary bacterial infections necessitate judicious antimicrobial therapy. Antibiotic selection and administration methods in community-acquired pneumonia are based on patient condition severity and risk factor analysis for microbial resistance. Safety assessment, patient competence, and medication availability are critical considerations. However, amidst frequent medication shortages, ensuring optimal medical service provision becomes challenging. Effective inventory management is crucial to align inventory values with medication demand, ensuring the availability of essential medicines at reasonable prices. Reliable data facilitates uninterrupted healthcare supply chains by planning and evaluating necessary medications and associated costs over time. Various inventory management methods, including ABC, VEN, FSN, HML, SOS, and ABC-VEN, are utilized to analyze pharmaceutical drug costs. Among these, ABC-VEN analysis is often preferred for its focus on medication value and cost to public health. Retrospective assessment of resource allocation through ABC/VEN analysis aids in calculating fund requirements, optimizing inventory levels, and predicting purchase needs. This method enhances pharmaceutical management efficiency, particularly in healthcare institutions, by comparing managed goods' costs and optimizing services through inventory level predictions and purchase planning. The ABC analysis is a management accounting method primarily utilized to scrutinize the cost distribution of medications within medical institutions or regions. It involves categorizing all medicines based on their costs over a specified period, typically a year, into three groups: "A," comprising the most expensive drugs that collectively account for 80% of the costs; "B," consisting of less expensive drugs covering 10% of the costs; and "C," encompassing the least expensive drugs, which account for the remaining 5%. The "A" group should ideally comprise medications with proven efficacy according to evidence-based medicine principles; inclusion of unproven drugs in this category signals inappropriate fund allocation. ABC analysis aids in assessing the structure of drug procurement costs by classifying medications into three groups based on their annual consumption volume, calculated by multiplying the cost per unit by the number of packages. This classification helps identify significant medications, particularly those in class A, for inclusion in drug utilization evaluation programs. Analyzing class A medications reveals high-cost drugs and detects those not aligned with

formulas, pharmacotherapy guidelines, or approved for use. Reduction in the prices of class A drugs can result in substantial budget savings, but careful monitoring is necessary to prevent unexpected supply failures leading to unplanned expenses. ABC analysis is often complemented by VEN analysis, which categorizes drugs based on their importance as vital (V), essential (E), or non essential (N). This analysis, proposed by WHO over two decades ago, employs two approaches: formal and expert. The formal approach involves classifying drugs based on their presence in regulatory documents, such as lists of vital and essential medicines, while the expert approach relies on expert evaluation of drugs' significance for diagnosing and treating specific pathologies. When used in conjunction, VEN ABC analysis yields superior outcomes for identifying high-priority drugs based on both their price and significance for public health [4,9,18]. This combined analysis offers insights into overall budget expenditures on medications as well as specific drug groups, aiding in cost minimization during procurement. It furnishes valuable data for policymakers and managers to strategize the requisite financing and distribution procedures for medications [7,9].

The purpose of the study is to conduct a pharmacoeconomic analysis of the cost of antibacterial therapy used for the treatment of coronavirus pneumonia and management of pharmaceutical stocks using ABC-VEN analysis.

Materials and methods. The study was conducted at the multidisciplinary clinic of the Tashkent Medical Academy. A retrospective analysis was performed on the medical records of 864 patients who received inpatient treatment between 2020 and 2022. Of these, 394 were men and 470 were women, with a mean age of 64.9±7.8 years. The treatment of patients was carried out according to the Practical Guidelines for the Treatment of COVID-19 Patients issued by the Ministry of Health of the Republic of Uzbekistan, including versions 6 and 7 (2020) and version 8 (2021) [6,9,12], in which clarithromycin, levofloxacin, and ceftriaxone were recommended as antibacterial agents. In our study, we applied a retrospective cross-sectional analysis to assess the annual expenditures on medicines and to evaluate the management of pharmaceutical inventory control. The analysis covered data from 2020 to 2021. Data entry and analysis were carried out using Microsoft Excel 2016. Descriptive statistics, including tabular and numerical methods, were used to describe the main characteristics. The pharmacoeconomic evaluation was performed using content analysis, comparative analysis, and ABC/VEN analysis. During the ABC analysis, the total expenditures for each item were calculated and arranged in descending order. Subsequently, the percentage share and cumulative cost were determined.The VEN analysis was conducted using evaluative methods by organizing the products based on existing references [3,4,16].

Results and discussion. According to the results of the study, the average duration of patient treatment was 8±0.30 days in 2020 and 8±0.06 days in 2021. Based on the procurement records of the medical institution, the prices of antimicrobial drugs were identified for the period between 2020 and 2022 [11,13,23]. The price analysis was conducted for the following medications: Ceftriaxone, Cefepime, Cefoperazone + Sulbactam, Meropenem, Amikacin, Levofloxacin, Moxifloxacin, Amoxicillin, Azithromycin, and Cefsulodin.

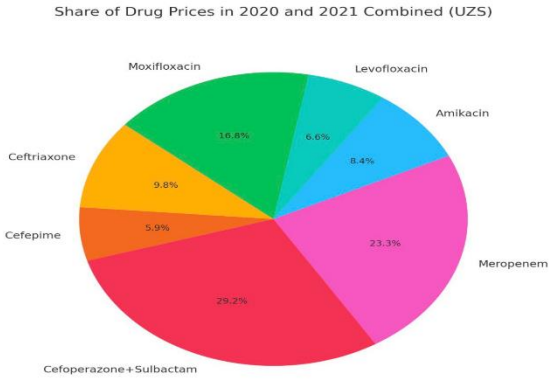
In 2020, the prices of these medications were as follows: Ceftriaxone – 143,706 UZS, Cefepime – 50,581 UZS, Cefoperazone + Sulbactam – 286,474 UZS, Meropenem – 194,626 UZS, Amikacin – 63,107 UZS, Levofloxacin – 49,837 UZS, Moxifloxacin – 129,493 UZS, Amoxicillin – 47,724 UZS, Azithromycin – 39,994 UZS, and Cefsulodin – 7,161 UZS.

In 2021, the prices of these drugs were as follows: Ceftriaxone – 3,909 UZS, Cefuroxime – 37,567 UZS, Cefsulan – 38,667 UZS, Meropenem – 154,567 UZS, Amikacin – 63,107 UZS, Cefoperazone + Sulbactam – 152,453 UZS, Levofloxacin – 52,884 UZS, and Moxifloxacin – 118,608 UZS.

	g	Price_2020 Jzbekistan currency	Price_2021 Uzbekistan currency	Change (sum) Uzbekistan currency	Change (%)
1.	Seftriakson	143 706	3 909	-139 797	-97.28
2.	Sefuroksim	50 581	37 567	-13 014	-25.73
3.	Sefaperazon+Sulbaktam	286 474	152 453	-134 021	-46.78
4.	Meropenem	194 626	154 567	-400 59	-20.58
5.	Amikatsin	63 107	63 107	0.0	0.0
6.	Levofloksatsin	49 837	52 884	3 047	6.11
7.	Moksifloksatsin	129 493	118 608	-10 885	-8.41
8.	Amoksatsillin	47 724			

9.	Azitsomitsin	39 994			
10.	Sefsulodin (Sefalosporin)	7 161			
11.	Sefsulan (Sefuroksim)		38 667		

The changes in drug prices between 2020 and 2021 were calculated both in absolute values (UZS) and as percentages.



Here is the graphical representation of drug prices for the years 2020 and 2021. Each drug is represented by two bars: the blue bar indicates the price in 2020, and the orange bar indicates the price in 2021.

The graph presents the percentage change in the prices of each drug between 2020 and 2021. Negative values indicate a price decrease, while positive values represent an increase.

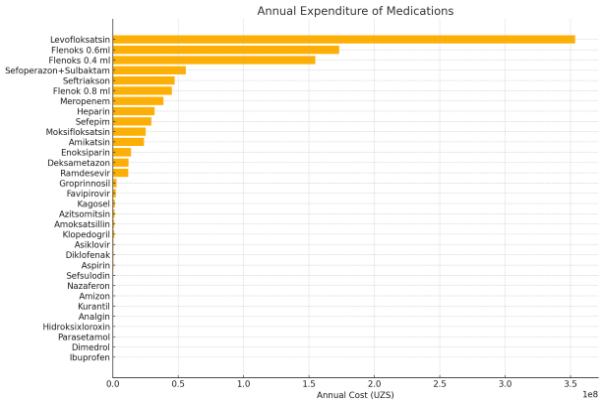
During the period of 2020–2021, the demand for pharmaceutical products sharply increased due to the COVID-19 pandemic. Cefoperazone + Sulbactam was the most expensive drug in 2020; although its price decreased to 152,453 UZS in 2021, it still remains among the high-cost medications. This situation led to significant fluctuations in the prices of various antibiotics. An economic analysis was conducted based on the price changes of 10 selected antibiotics.

We conducted an ABC analysis to classify medicines based on their budgetary expenditures and their value to public health. The ABC analysis data of the pharmaceuticals used in 2020 are presented in Table 1.

Table 1.

№		Drug Name	Price per Unit	Annual Expenditure (UZS)	Cost Share (%)	Cumulativ (%)	ABC	VEN
1	26	Levofloksatsin	49 837	353 475 101	34.3	34.3	A	V
2	9	Flenoks 0.6ml	565 675	173 096 550	16.8	51.1	A	V
3	10	Flenoks 0.4 ml	949 145	154 955 025	15.05	66.14	A	V
4	23	Sefoperazon+ Sulbaktam	286 474	55 862 430	5.42	71.56	B	V
5	21	Seftriakson	143 706	47 265 750	4.59	76.15	B	V
6	8	Flenok 0.8 ml	170 892	45 115 488	4.38	80,53	B	V
7	24	Meropenem	194 626	38 728 774	3.76	84.29	B	V
8	7	Heparin	385 858	32 026 214	3.11	87.4	B	E
9	22	Sefepim	50 581	29 488 723	2.86	90.26	C	V
10	27	Moksifloksatsin	129 493	25 251 135	2.45	92.71	C	V
11	25	Amikatsin	63 107	23 854 446	2.31	95.02	C	V
12	6	Enoksiparin	59 666	13 890 942	1.35	96.37	C	V
13	31	Deksametazon	22 528	12 101 506	1.17	97.54	C	V
14	15	Ramdesevir	476 488	11 907 000	1.06	98.7	C	V

15	19	Groprinnosil	161 345	2 904 210	0.28	98.98	C	E
16	14	Favipirovir	418 927	2 304 098	0.22	99.2	C	V
17	20	Kagosel	69 467	1 597 741	0.16	99.36	C	N
18	29	Azitsomitsin	39 994	1 279 808	0.12	99.48	C	E
19	28	Amoksatsillin	47 724	1 240 824	0.12	99.6	C	E
20	11	Klopedogril	99 312	1 191 744	0.12	99.72	C	E
21	18	Asiklovir	12 960	583 200	0.06	99.78	C	E
22	4	Diklofenak	29 783	536 094	0.05	99.83	C	V
23	13	Aspirin	34 383	515 745	0.05	99.88	C	E
24	30	Sefsulodin	7 161	372 372	0.04	99.92	C	N
25	16	Nazaferon	34 813	278 504	0.03	99.95	C	N
26	17	Amizon	26 152	278 504	0.03	99.98	C	N
27	12	Kurantil	80 415	160 830	0.02	100.0	C	N
28	0	Analgin	11 714	128 854	0.01	100.01	C	E
29	5	Hidroksixloroxin	23 390	58 475	0.01	100.02	C	N
30	2	Parasetamol	2 119	57 213	0.01	100.03	C	V
31	1	Dimedrol	2 968	54 106	0.01	100.04	C	E
32	3	Ibuprofen	17 990	53 970	0.01	100.05	C	V



CONCLUSION BASED ON THE OVERALL ABC/VEN ANALYSIS:

The majority of expenditures were accounted for by five drugs classified under category A, with the largest contributors being Levofloxacin, Flenox preparations, Meropenem, and Cefoperazone+Sulbactam. These medications were the main choices for managing severe cases during the pandemic.

Medications classified as Vital (V) played a crucial role in COVID-19 treatment, representing life-saving drugs. Among them were anticoagulants (Heparin, Enoxaparin), antibiotics (Ceftriaxone, Meropenem), and anti-inflammatory agents such as Dexamethasone.

Although the number of drugs in categories B and C was higher, their share in total expenditures was comparatively low. These groups mainly included symptomatic and supportive therapy agents.

Drugs categorized as Non-essential (N) — such as Hydroxychloroquine, Kagocel, Amizon, and Curantil — were initially used experimentally in the early stages of the pandemic; however, their effectiveness was later found to be either unproven or unreliable according to scientific evidence.

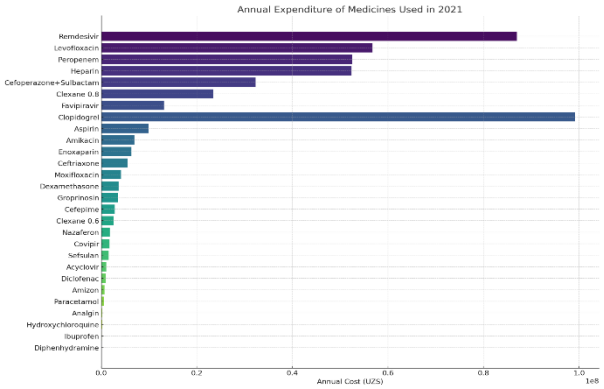
As can be seen from the presented data, in 2020, five drugs were classified into group A. They accounted for 76.13% in quantity and 80% of the total product value.

Group B included five drugs, representing 16.55% in quantity and 15% of the total value, whereas group C comprised 22 medicinal products, accounting for 7.31% in quantity and only 5% of the total value.
The results of the ABC analysis of the medicines used in 2021 are presented in table 2.

Table 2.

№		Drug Name	Quantity	Price per Unit	Annual Expenditure	Cost Share	Cumulativ (%)	VEN	ABC

					(UZS)	(%)			
1	25	Ramdesevir	227	383 155	86 976 185	22.8	22.8	V	A
2	12	Levofloksatsin	174	52 884	56 797 460	14.9	37.7	E	A
3	9	Peropenem	340	154 567	52 552 780	13.8	51.4	V	A
4	0	Heparin	166	315 595	52 388 770	13.8	65.1	V	A
5	11	Sefoperazon+ Sulbaktam	212	152 453	32 320 036	8.46	73.6	V	B
6	1	Kleksan 0.8	32	733 625	23 476 000	6.1	79.7	V	B
7	23	Favipirovir	38	345 927	13 145 226	3.4	83.1	V	B
8	4	Klopedogril	96	103 315	99 182 040	2.6	85.7	E	B
9	5	Aspirin	32	31 900	9 918 240	2.6	88.4	E	B
10	10	Amikatsin	110	63 107	6 941 770	1.8	90.1	E	C
11	3	Enksiparin	148	42 917	6 351 716	1.66	91.8	V	C
12	6	Seftriakson	234	3 909	5 566 416	1.45	93.9	E	C
13	13	Moksifloksatsin	172	118 608	4 151 208	1.08	94.37	E	C
14	20	Deksametazon	214	17 095	3 658 336	1.95	95.3	V	C
15	27	Groprinnosil	22	157 856	3 472 832	0.9	96.2	N	C
16	7	Sefepim	76	37 567	2 855 092	0.74	97	V	C
17	2	Kleksan 0.6 ml	22	115 615	2 544 850	0.66	97.6	V	C
18	21	Nazaferon	45	39 981	1 779 145	0.46	98.1	N	C
19	24	Kovipir	26	67 008	1 742 208	0.45	98.6	N	C
20	8	Sefsulan	40	38 667	1 546 668	0.4	98.98	N	C
21	26	Asiklovir	104	10 410	1 082 640	0.28	99.27	E	C
22	17	Diklofenak	27	39 783	954 792	0.25	99.5	E	C
23	22	Amizon	12	56 572	678 864	0.18	99.7	N	C
24	14	Parasetamol	357	1 578	563 346	0.15	99.8	E	C
25	15	Analgin	60	3 726	219 834	0.05	99.9	E	C
26	19	Gidroksixloroxin	1	184 428	184 428	0.05	99.94	N	C
27	18	Ibuprofen	17	6 741	114 597	0.03	99.98	E	C
28	16	Dimedrol	16	4 862	80 388	0.02	99.99	N	C



As can be seen from the data presented in Table 2, four drugs were classified into Group A. They accounted for 14.29% of the total number of products and represented 80% of the total cost. Group B included five drugs, accounting for 17.86% of the total number and 15% of the total cost, whereas Group C contained 19 drugs, making up 67.86% of the total number, but only 5% of the total cost. The ABC analysis data allowed for the classification of medicines into ABC categories, which is illustrated in the following chart (Figure 1):

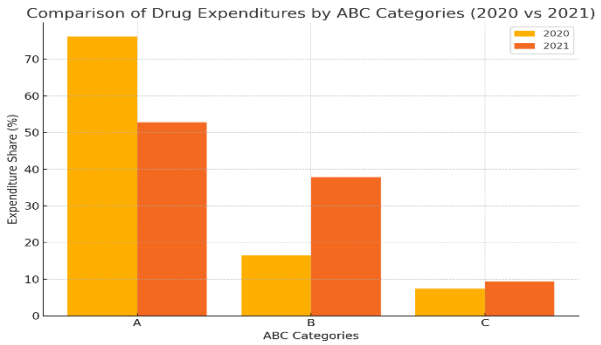


Figure 1. ABC analysis of the medications used for the treatment of coronavirus pneumonia during the years 2020 and 2021.

In 2020, out of 32 medicines, 17 were classified as V (Vital), indicating life-saving importance, accounting for 53.13% of the total. 8 medicines were classified as E (Essential), representing 25.0%, while 6 medicines fell into the N (Non-essential) category, making up 18.75%.

In 2021, out of 28 medicines, 10 were considered V (Vital) and constituted 35.71% of the total. 11 medicines were classified as E (Essential), representing 39.29%, and 7 were N (Non-essential), accounting for 25.0%. The distribution of the 60 medicines used in 2020 and 2021 according to the ABC/VEN analysis across I, II, and III categories is as follows:

- Class I (most strategic): 14 medicines → 23.33%
- Class II (secondary level of control): 16 medicines → 26.67%
- Class III (minimal level of control): 29 medicines → 48.33%

Other (uncategorized cases): 1 medicine → 1.67%
In the 6th version of the Temporary Practical Guidelines for the Management of Patients Infected with COVID-19, issued by the Ministry of Health of the Republic of Uzbekistan in 2020, the following medications were recommended for use in varying degrees of coronavirus pneumonia (moderate, moderately severe, ARDS): Favipiravir, Remdesivir, anticoagulant drugs (Heparin, Enoxaparin), Acetylsalicylic acid, Dexamethasone, Ibuprofen, Paracetamol, Cephalosporins, and Macrolides, Fluoroquinolones, Acetylcysteine, and Tocilizumab.

n the 7th version of these guidelines, the following medications were recommended: Paracetamol, Ibuprofen, Favipiravir, Remdesivir, Enoxaparin, Heparin, Acetylsalicylic acid, Dexamethasone, Amoxicillin/Clavulanic acid, first- and second-generation cephalosporins, Levofloxacin, Acetylcysteine, Zinc, Tocilizumab.

The ABC analysis of the medications used in 2020 showed that, during the treatment of patients with coronavirus pneumonia at the multidisciplinary clinic of Tashkent Medical Academy (TMA), some drugs not listed in the 6th and 7th versions of the Temporary Practical Guidelines were used.
In category A, Levofloxacin and Flenox were administered, accounting for 14.29% of the drugs in this category.
In category B, Cefoperazone+Sulbactam, Ceftriaxone, Meropenem, and Heparin were used, representing 16.55% of the medications in this category.

In category C, the share of the used medications amounted to 7.31%.
In the 8th version of the Temporary Practical Guidelines for the Treatment of Patients Infected with COVID-19, the medications recommended for use at various stages of coronavirus pneumonia severity include: Favipiravir, Remdesivir, Rivaroxaban, Enoxaparin, Heparin, Acetylsalicylic acid, Paracetamol, Acetylcysteine, Ambroxol, Vitamin C, Zinc, Amoxicillin/Clavulanic acid, Ampicillin/Sulbactam, Piperacillin/Tazobactam, Imipenem, Levofloxacin, third-generation cephalosporins (Ceftriaxone, Cefotaxime, Ceftazidime, Cefoperazone, Cefixime), fourth-generation cephalosporins (Cefepime), Azithromycin, macrolides, Linezolid, Vancomycin, Dexamethasone, Methylprednisolone, Tocilizumab or IL-6 inhibitors (Sarilumab), and IL-1β inhibitor (Canakinumab).

The ABC analysis of the use of medications in 2021 showed that among the drugs not included in the standard treatment protocol according to the 8th version of the Temporary Clinical Guidelines.

CONCLUSION

When the pandemic began, there were no established treatment methods for COVID-19. The Temporary Practical Guidelines were continuously improved each year based on the results obtained from ongoing studies on the management of this pathology. A retrospective analysis of the treatment

of patients with coronavirus infection has allowed us to reflect and assess the pharmacoeconomic aspects of this issue.

Based on the ABC/VEN analysis for 2020, the majority of expenditures were accounted for by 3–5 medicines from category A, with the largest contributions coming from Levofloxacin, Flenox preparations, Meropenem, and Cefoperazone+Sulbactam. These drugs were the primary choices for managing severe cases during the pandemic.
Preparations classified as V (Vital) were essential for the treatment of COVID-19 and included anticoagulants (Heparin, Enoxaparin), antibiotics (Ceftriaxone, Meropenem), and anti-inflammatory agents such as Dexamethasone.
Although the number of drugs in categories B and C was higher, their share in overall expenditures was comparatively lower, as they mostly included symptomatic or supportive therapy agents.

Drugs classified as N (Non-essential) — such as Hydroxychloroquine, Kagocel, Amizon, and Curantil — were used experimentally in the early stages of the pandemic; however, their effectiveness was later found to be scientifically unproven or unreliable.

According to the results of the ABC analysis of medicines used in 2021:
Group A (medications accounting for more than 70% of the budget) included critical drugs such as Remdesivir, Levofloxacin, Meropenem, and Heparin. These medications constituted a significant portion of total expenditures and require strict procurement control.
Among the drugs in Group B were Cefoperazone+Sulbactam, Favipiravir, and Clopidogrel, which also required considerable expenditure, although at relatively more manageable levels.

In Group C, low-cost symptomatic drugs such as Diphenhydramine, Paracetamol, and Amizon were included.

Regarding the VEN classification:
Medications classified as Vital (V) (e.g., Remdesivir, Meropenem, Dexamethasone, and Heparin) played a crucial role in life-saving therapy and must always be maintained in reserve.
Essential (E) drugs (Levofloxacin, Clopidogrel, Amikacin, Aspirin) are widely used but have available alternatives. Substituting them with high-quality generics could enhance economic efficiency.
Non-essential (N) drugs (Amizon, Diphenhydramine, Hydroxychloroquine) are mainly symptomatic or of limited clinical value; therefore, it is recommended to monitor and limit their stock to conserve resources.

The 2021 expenditure analysis showed that Remdesivir accounted for the largest share of costs (22.7%) and, along with other critical medications, formed part of Group A.
All of the most heavily used drugs played a significant role in the COVID-19 treatment protocols.

The ABC/VEN analysis conducted for 2020–2021 revealed the rational use of financial resources allocated for pharmaceutical supply, despite some discrepancies between prescribed medications and the practical guidelines.

The study showed that these discrepancies were less pronounced in 2021 compared to 2020, indicating an improvement in physicians' experience in managing patients with coronavirus pneumonia.

REFERENCES

1. Avksentyeva M.V., Sura M.V. Clinical and economic analysis of the activities of a medical organization. Chief Physician, 2011; 2:28.
2. Temporary clinical guidelines for managing patients with a mild form of COVID-19 at home. June 30, 2020.
3. Temporary clinical guidelines for managing patients infected with coronavirus infection (version 8). Tashkent, "UZBEKISTAN", 2021.
4. Temporary recommendations for managing patients infected with COVID-19, 2020 (version 5).
5. Temporary recommendations for managing patients infected with COVID-19 (sixth version). Tashkent, "UZBEKISTAN", July 31, 2020.
6. Dedyushko A.G., Panov V.G. Severe coronavirus pneumonia: prospects for predicting death and methods of its prevention.
7. Karnaushenko L.V. The state mechanism under emergency regimes: theoretical and legal aspects of functioning during COVID-19 in 2020. In: State. Law. War (To the 75th Anniversary of the Victory of the Soviet People in the Great Patriotic War): Materials of the International Scientific Conference. St. Petersburg, April 28–29, 2020. In 2 parts. Edited by N.S. Nizhnik. St. Petersburg: Ministry of Internal Affairs University of the Russian Federation, 2020. Pp. 98–108.
8. Nazarova S.K., Eshdavlatov B.M., Odilova M.A., Mirdadaeva D.D., Mamarasulov Soli. Lessons from the COVID-19 pandemic, conclusions, and

recommendations. Eurasian Bulletin of Pediatrics, 2021; 3(10):25–33.
9. Pavlishchuk S.A., Labintseva N.V., Shulzhenko L.V., Zaburdyayeva Yu.G. ABC/VEN analysis of pharmaceutical supply in a pulmonology department of a multidisciplinary hospital. Pulmonology, Issue 2, 2013.
10. Popova A.Yu., Ruzhentsova T.A., Khavkina D.A., Tuychiev L.N., Akhmedova M.D., Madazimov M.M., Kholmatova K.Sh., Kedrova O.V., Smelyansky V.P., Skryabina S.V., Akhmedov U.B., Sharova I.N., Eraliev U.E., Abdukhalilova G.K., Chukhlyaev P.V., Garbuzov A.A., Akimkin V.G., Akbarov T.Yu., Rakhmatullaeva Sh.B., Zhanibekov Zh.Zh. Experience of international cooperation in organizing anti-epidemic measures by healthcare institutions during the COVID-19 pandemic in the Republic of Uzbekistan.
11. Practical recommendations for managing patients infected with COVID-19 (version 7). Tashkent, "UZBEKISTAN", August 15, 2020.
12. Reference prices.
13. Filippova V.V., Egorov O.N. The new coronavirus infection: a review of materials and certain aspects of the observance of human and civil rights and freedoms.
14. Chereshneva N.D., Chernykh T.F., Bataeva Kh.M. Pharmacoeconomic analysis of antimicrobial therapy of COVID-19 in geriatric patients in a hospital setting.
15. Akbarova D.S., Komolova F.Dj., Yakubov A.V., Zufarov P.S., Musayeva L.J., Abdusamatova D.Z. The role of pharmacoeconomic analysis in the modern healthcare system. New Day in Medicine (NDM), November 11, 2022, (49).
16. Beeta T., Alireza Kh., Najafi M. Simulation and in vitro evaluations of microfluidically-fabricated clarithromycin-poly(ε-caprolactone) nanoparticles. Journal of Industrial and Engineering Chemistry, April 25, 2023.
17. Hongyan Gu, Lulu Sun, Wei Chen. Benefits of pharmacist intervention in critical care patients with infectious diseases: A propensity score matching retrospective cohort study. Australian Critical Care, February 19, 2023.
18. Kamal M.D., Hemat M.D., Ayman Nafady. Design, assessment, and antibacterial potency of novel pseudopolyrotaxanes based on cyclodextrin as drug carriers for amoxicillin and ceftriaxone. Journal of Molecular Structure, October 20, 2023.
19. Khirmanov V.N. COVID-19 as a systemic disease. Clinical Pharmacology and Therapy, 2021; 30(1). DOI: 10.32756/0869-5490-2021-1-5-15.
20. Li-Zhe Liu, Shu-Juan Fan, Xiao-Hui Xian. Ceftriaxone ameliorates hippocampal synapse loss by inhibiting microglial/macrophages activation in a glial glutamate transporter-1 dependent manner in the APP/PS1 mouse model of Alzheimer's disease. Brain Research Bulletin, June 8, 2023.
21. Management Sciences for Health. MDS-3: Managing Access to Medicines and Health Technologies. Management Sciences for Health, 2012.
22. Mfzi E., Niragire F., Bizimana T., Mukanyangezi F.M. Analysis of pharmaceutical inventory management based on ABC-VEN analysis in Rwanda: a case study of Nyamagabe district. Journal of Pharmaceutical Policy and Practice, 2023; 16(1):30.
23. (duplicate number). Murkamilov I.T., Aitbaev K.A., Murkamilova Zh.A., Kudaibergenova I.O., Manaev T.I., Sabirov I.S., Yusupov F.A. Coronavirus disease-2019 (COVID-19): course and long-term consequences. Bulletin of Science and Practice, 2021; 7(9):271–291.
24. Popovich Y.G., Rakhimova R.Zh., Akhmetzhanova D.O. COVID-19 — a new infection of the 21st century. Science and Health Care, 2020; 22(4):15–23. DOI:10.34689/SH.2020.22.4.002.
25. Shelkanov M.Y., Popova A.Y., Dedkov V.G., Akimkin V.G., Maleev V.V. History of study and modern classification of coronaviruses (Nidovirales: Coronaviridae). Infection and Immunity, 2020; 10(2):221–246.
26. Timothy Arthur Ch.S., Alessia L., Nishkantha A. Beneficial ex vivo immunomodulatory and clinical effects of clarithromycin in COVID-19. Journal of Infection and Chemotherapy, April 14, 2022.
27. Yusupova O.A., Erigova Y.V. Cost analysis of certain antiviral drugs for the treatment of the new coronavirus infection.

