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ON THE OPTIMIZATION OF PUBLIC PROCUREMENT OF MEDICINES FOR HOSPITALS

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Abstract

Adequate drug provision is critically important for maintaining and strengthening the health of the population as the main socio-economic value of the state. External and internal challenges outlined by the Strategy for drug provision of the population of the Russian Federation for the period up to 2025 create the prerequisites for improving the state policy in the field of the system of drug provision for hospitals, which is an integral part of the treatment process. This article analyzes the range of drugs intended for the treatment of rheumatoid arthritis in the inpatient phase of treatment of patients with comorbid conditions, and provides a rationale for their cost in order to optimize public procurement of medicines and create a formulary system for medical institutions of Veliky Novgorod. When studying the case histories of patients with rheumatoid arthritis, it was revealed that such comorbid conditions as cardiovascular diseases and diseases of the gastrointestinal tract are most common. According to estimates, and taking into account the medications prescribed for comorbid conditions, the cost of drug treatment of rheumatoid arthritis amounted to 66526.00 rubles in the advanced stage of the disease and 65199.60 rubles in its early stage. The results of the ABC / XYZ analysis of the assortment showed the rationality of the use of drugs included in the group and confirmed its significance for the treatment of concomitant diseases. It is recommended to include these drugs in the formulary list of hospitals in Veliky Novgorod for procurement using regional budget funds.

Keywords: ABC / XYZ analysis, assortment of medicines, hospital formulary, hospital segment of the pharmaceutical market, public procurement.

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1. Introduction

The hospital segment of the pharmaceutical market is traditionally given much attention (Lin, Sokolova, & Orlov, 2014; Kjos, Binh, Robertson, & Rovers, 2016; Damuzzo et al., 2018; Huang, 2019), because the main sources of financing the procurement of medicines for hospitals are limited funds from the state budget and the state extra-budgetary fund for compulsory medical insurance, which raises the problem of their effective use. In recent years, in Russia there has been an increase in the size of government procurement of medicines for hospitals in monetary terms, and its decrease in physical terms, which is associated, on the one hand, with an increase in funding volumes, and on the other, with a significant increase in the prices of medicines , despite the tightening of state regulation of prices for vital and essential drugs, as well as the expansion of the practice of acquiring generics (AlphaRM, 2017; Jacobson, 2017). In this regard, the problem of assessing the clinical effectiveness of drugs intended for the hospital segment and included in the assortment of public procurement, as well as the problem of analyzing the very completeness of this assortment are gaining particular relevance today.

Rheumatoid arthritis is a chronic autoimmune disease; its average prevalence in developed countries ranges from 0.5% to 1.0% (Balabanova & Erdes, 2015; Shaw, Collins, Ho, & Raghu, 2015). Long-term and expensive treatment is required to combat this disease (Smolen & Aletaha, 2015). In the drug therapy of rheumatoid arthritis, basic anti-inflammatory drugs, genetically engineered biological drugs (limited, due to the high cost of course treatment), glucocorticosteroids, non-steroidal anti-inflammatory drugs are used (Arts et al., 2016; Kolbin, Kurylev, Proskurin, & Balykina, 2016). The cost of medical care for patients who have several chronic diseases at the same time (comorbid conditions) significantly exceeds the cost of treating patients who do not have them (Baser, Burkan, Baser, Koselerli, Ertugay, & Altinbas, 2013; Kers, Urozhayeva, & Steffen, 2015).

The relevance of this study is due to the lack of information on the cost of complex drug therapy for patients with rheumatoid arthritis depending on the stage of the disease in the Novgorod region, as well as the lack of a formulary list of drugs in the inpatient departments of medical organizations in Veliky Novgorod.

2. Problem Statement

The main research problem is the development of a strategy for the procurement of medicines for hospitals of medical institutions of the Novgorod region with the aim of optimizing and rational use of regional budget.

3. Research Questions

In this study, the authors intended to answer a number of questions:

3.1 What is the optimal range of drugs for the treatment of patients with rheumatoid arthritis, for inclusion in the form?

3.2 What is the cost of an optimal range of drugs for the treatment of patients with rheumatoid arthritis?

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4. Purpose of the Study

This article analyzes the drug range for the treatment of early and advanced stages of rheumatoid arthritis, taking into account comorbid conditions at the inpatient stage of treatment of patients, and justifies its cost to optimize the procurement of medicines and create a formulary system for medical institutions.

5. Research Methods

In the study, 62 medical histories of patients with rheumatoid arthritis who were treated in a hospital in Veliky Novgorod in 2014, as well as the presence of concomitant pathologies were analyzed, the demographic characteristics of patients were revealed, the range of drugs used by doctors for inpatient therapy of early and advanced stages of rheumatoid arthritis with concomitant diseases was examined.

It was revealed that the most frequent comorbid conditions for rheumatic diseases are cardiovascular diseases, lung diseases and malignant diseases. The data obtained are consistent with the information presented in the scientific literature (Iaremenko & Mykytenko, 2015; Turesson, 2016). Comorbid conditions at an early stage of rheumatoid arthritis were detected in 85.7% of patients, at an advanced stage – in 87.6%. The study included patients aged 56.6 to 67.2 years; 86.7% of them are women, 13.3% are men. It was also noted that in the medical organizations of the town there is no formulary list on the basis of which the procurement of medicines is carried out.

Based on the medical documentation, an assortment of the main demand for drugs for the treatment of patients with rheumatoid arthritis in the early and advanced stages was compiled.

To formulate a forecast of the demand for basic drugs, and consumption standards, the average consumption of drugs per treatment course ($\overline{X}$) and coefficient of variation (α) were calculated to prove the possibility of using this value as a standard, according to (Tolkacheva & Dremova, 2009).

The coefficient of variation (α) was calculated for each heading according to (1):

$$\alpha = \frac{\sum(\mathrm{X}n - \overline{\mathrm{X}}^2)}{\overline{\mathrm{X}}^2 n} \quad (1)$$

where: $\overline{X}$ – average drug consumption per course of treatment, Xn – case-specific drug consumption, n – the number of patients receiving the drug.

To determine the conditional norm of consumption of drugs for the treatment of rheumatoid arthritis, the number of patients was taken as 100 (Tovsultanov & Gacan, 2014).

To assess the nature of the consumption of certain types of drugs, the results of the ABC / XYZ analysis obtained on the basis of the generated integrated analysis matrix were used.

6. Findings

The results of calculating the average consumption of drugs per treatment course for patients with rheumatoid arthritis aggravated by comorbid conditions ($\overline{X}$) and indicators of variation (α) (at an early stage – (1), at an advanced stage – (2)) are shown in Table 01.

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Table 01. The cost of drug treatment of patients with rheumatoid arthritis aggravated by comorbid conditions

Name of drug (manufacturer)	$\bar{X}$, natural indicator		α, %		Consumption per 100 people, natural indicator		Unit price (tablet, ampoule), in	Cost in rubles	
	(1)	(2)	(1)	(2)	(1)	(2)		(1)	(2)
L-thyroxine, 100 mcg tablets (Berlin-Chemie AG)	11.0	–	0	–	143.0	–	2.0	286.0	–
Aceclofenac, 100 mg tablets (CJSC BFZ)	11.0	11.0	0	13.5	143.0	390.1	11.4	1630.2	4446.7
Aertal, 100 mg tablets (Almiral S.A.)	21.0	21.0	0.2	7.4	525.0	498.0	12.0	6294.7	5971.0
Bisoprolol, 5 mg tablets (JSC "Rafarma")	6.0	–	0	–	78.0	–	1.6	122.5	–
Valsartan tablets 160 mg (LLC "OZON")	–	12.3	–	9.5	–	147.0	9.2	–	1349.5
Hypothiazide tablets 25 mg (Khinoin ZF and Khimproduktov CJSC)	–	6.9	–	8.0	–	82.6	4.8	–	393.0
Indapamide Retard, 1.5 mg tablets (Izvarino Pharma LLC)	–	8.7	–	7.4	–	78.0	3.7	–	287.2
Oki granules, 80 mg (Dompe Pharma-cheutichi S.p.A.)	–	23.5	–	10.3	–	282.0	26.2	–	7380.0
Ketoprofen, tablets 100 mg (JSC "VERTEX")	–	28.7	–	2.1	–	258.0	7.5	–	1922.3
Courantil, 75 mg tablets (Berlin-Chemie AG)	–	14.3	–	15.1	–	129.0	14.2	–	1831.4
Leflunomide, 20 mg tablets (CJSC BFZ)	–	15.3	–	0.4	–	138.0	70.9	–	9782.1
Diclofenac, 25 mg tablets (PJSC "Biosynthesis")	36.0	–	0	–	468.0	–	0.4	173.2	–
Lisinopril, 10 mg tablets (LLC PRANAFARM)	12.0	–	0	–	156.0	–	2.2	343.2	–
Losartan, 12.5 mg tablets (JSC "Tatkhimfarm-preparaty")	6.0	–	0	–	78.0	–	1.7	130.3	–
Losartan, 50 mg tablets (JSC "Tatkhimfarm-preparaty")	–	14.9	–	28.8	–	357.1	3.6	–	1274.9
Methotrexate, 10 mg / ml ampoules (FarmasintezNord JSC)	1.67	2.3	2.0	7.8	63.46	40.5	102.0	6472.9	4131.0
Methotrexate, 2.5 mg tablets (LLC "Ozon")	8.4	11.0	5.4	19.9	529.2	836.0	3.2	1677.6	2650.1
Niacin, 10 mg / ml ampoules (OJSC "Farm Standart UfaVITA")	24.0	7.0	1.4	0	600.0	84.0	10.9	6540.0	915.60
Nimesulide, 100 mg tablets (JSC "ABBA RUS")	23.0	19.9	9.3	12.9	575.0	477.1	24.0	13800.0	11450.9
Omeprazole, 20 mg tablets (LLC "Barnaulsky ZMP")	12.3	14.6	22.1	22.0	468.5	993.5	0.9	407.6	864.3
Pentoxiphylline 2%, 5 ml ampoules (CJSC Binnopharm)	7.5	6.7	11.1	12.5	187.5	60.03	3.7	693.7	222.1
Prednisolone, 5 mg tablets (JSC "PFK Obnovlenie")	18.0	18.3	0.5	23.9	684.0	165.0	0.7	444.6	107.2
Sulfasalazine, 500 mg tablets (JSC KRKA)	22.0	30.3	0	7.89	286.0	545.9	5.5	1584.4	3024.5
Trental, 20 mg / ml No. 5 ampoules, (Sanofi)	5.0	–	0	–	125.0	–	6.2	770.0	–
Folic acid, 1 mg tablets (JSC Valenta Farm)	9.2	10.4	4.1	4.9	687.7	849.5	0.5	350.7	433.3
Celebrex, 200 mg capsules (Pfizer)	24.0	33.0	1.3	0.1	600.0	198.0	39.1	23478.0	7747.7
Meloxicam, 15 mg tablets (CJSC Canonpharma Production)	-	10.7	-	21.3	-	256.6	1.3	-	341.2
Total:								65199.6	66526.0

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The high cost of genetically engineered biological drugs leads to their limited use; in the studied hospital, these drugs were not used. In the early and advanced stages of rheumatoid arthritis, the most frequently prescribed INN from the basic drugs is Methotrexate (CN Methotrexate, Russia) in tablets and ampoules, as well as INN Sulfasalazine (CN Sulfasalazin, Russia) in tablets. In the expanded stage, the INN Leflunomide (CN Leflunomide, Russia) from the basic drugs was also used. In both the early and advanced stages of rheumatoid arthritis, a wide range of non-steroidal anti-inflammatory drugs was prescribed. According to calculations and taking into account the medications prescribed for comorbid conditions, the cost of drug therapy of rheumatoid arthritis amounted to 66526.00 rubles in the advanced stage of the disease, and 65199.60 rubles in its early stage.

Considering the fact that the medicines purchased on the basis of the tender are delivered to the pharmacy of the medical organization and, on the basis of the requirements, are dispensed to the departments, an ABC / XYZ analysis of the prescriptions was carried out, the results of which are shown in Table 02.

Table 02. Matrix of ABC / XYZ analysis of drugs for the treatment of rheumatoid arthritis in two stages

Expanded stage		
AX Methotrexate, ampoules 10 mg / ml, Aertal, 100 mg tablets, Celebrex, 200 mg tablets, Leflunomide, 20 mg tablets, Oki granules, 80 mg	BX Sulfasalazine, 500 mg tablets, Ketoprofen, 100 mg tablets, Valsartan, 160 mg tablets	CX Indapamide Retard, 1.5 mg tablets, Folic acid, 1 mg tablets, Hypothiazide, 25 mg tablets, Nicotinic acid, ampoules 10 mg / ml
AY Aceclofenac, 100 mg tablets, Nimesulide, 100 mg tablets	BY Methotrexate, 2.5 mg tablets, Curantil, 75 mg tablets	CY Omeprazole, 20 mg tablets, Pentoxiphylline 2%, 5 ml ampoules, Prednisolone, 5 mg tablets, Meloxicam, 15 mg tablets
AZ –	BZ Losartan, 12.5 mg tablets	CZ –
Early stage		
AX Methotrexate, 10 mg/ml ampoules, Nimesulide, 100 mg tablets, Nicotinic acid, 10 mg/ml ampoules, Celebrex, 200 mg tablets	BX Aertal, 100 mg tablets, Aceclofenac, 100 mg tablets, Methotrexate, 2.5 mg tablets, Sulfasalazine, 500 mg tablets	CX Bisoprolol, 5 mg tablets, Diclofenac, 25 mg tablets, Lisinopril, 10 mg tablets, Losartan, 12.5 mg tablets, L-thyroxine, 100 μg tablets, Prednisolone, 5 mg tablets, Trental, No. 5 20 mg / ml ampoules, Folic acid 1 mg tablets
AY –	BY –	CY Omeprazole, 20 mg tablets, Pentoxifylline 2%, 5 ml ampoules
AZ –	BZ –	CZ –

At the early stage of treatment, the basic, hormonal and nonspecific anti-inflammatory drugs fell into the groups of AX and BX; CX group consisted of non-steroidal anti-inflammatory drugs, hormonal drugs, as well as drugs for the treatment of concomitant diseases. Similar data were obtained, when analyzing the appointments of the expanded stage.

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It should be noted that of the eighteen drugs included in the main list of drugs for the treatment of patients with rheumatoid arthritis (early stage), only four are imported. In the expanded stage, five imported drugs were noted. Since 2014, in the hospital segment, the share of domestic drugs in monetary and physical terms has begun to grow, which is associated with government programs aimed at import substitution in the pharmaceutical industry (Sannikova, 2017). In addition, domestic drugs are much cheaper than imported ones (Lin, Sokolova, & Orlov, 2014). Generics (analogues) predominate in the assortment of medicinal medicines, which helps to reduce the cost of drug therapy.

The data obtained indicate that a significant share in the structure of prescribed drugs falls on drugs for the treatment of comorbid conditions of patients with rheumatoid arthritis, which leads to an increase in the cost of treatment; other researchers confirm this, in particular (Osiri & Sattayasomboon, 2013).

7. Conclusion

An analysis of the case histories of patients suffering from rheumatoid arthritis showed that, when treating in a hospital, rheumatologists prescribe drugs that are included in the lists of drugs presented in the basic regulatory documents of the Russian Federation and the Novgorod region. In the early stage of the disease, 8885.70 rubles (or 13.63% of the total cost of the course treatment) is the cost of medicines prescribed for concomitant diseases, in the advanced stage - 6051.49 rubles (or 9.43%). From an economic point of view it seems to be inadvisable to use several trade names of medicines for one international non-proprietary name (INN). For example, with the same administration coefficient, the monetary costs for the course of treatment with INN Petoxyphylline will be: when using Pentoxiphylline 2%, ampoules 5 ml (Russia) – 693.70 rubles, Trental, ampoules 20 mg / ml 5 ml (India) – 770.00 rubles. Similar savings can be noted for INN Acelofenak: Acelofenak (Russia) and Aertal (Spain).

The results of ABC / XYZ analysis showed the rationality of the use of drugs included in the range of drugs for the treatment of patients with rheumatoid arthritis, and confirmed the significance of the group of drugs for the treatment of concomitant diseases. Based on the results and taking into account the identified shortcomings, these drugs can be included in the formulary of a medical institution for their purchase from the regional budget.

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