ANÁLISE DO IMPACTO ORÇAMENTÁRIO DE MEDICAMENTOS ANTIPSICÓTICOS NO TRATAMENTO HOSPITALAR DA ESQUIZOFRENIA

BUDGET IMPACT ANALYSIS OF ANTIPSYCHOTIC DRUGS IN THE HOSPITAL TREATMENT OF SCHIZOPHRENIA

АНАЛИЗ ВЛИЯНИЯ НА БЮДЖЕТ ПРИМЕНЕНИЯ В ГОСПИТАЛЬНОЙ ПРАКТИКЕ АПС ДЛЯ ЛЕЧЕНИЯ ШИЗОФРЕНИИ

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Received 02 April 2019; received in revised form 19 April 2019; accepted 24 April 2019

RESUMO

O objetivo do estudo foi realizar um complexo fármaco-epidemiológico (ATC/DDD método da OMS (*Anatomical Therapeutic Chemical/Defined Daily Dose*)) e análise farmacoeconômica da influência de APDs em um orçamento de internações psiquiátricas em pacientes. O presente estudo baseou-se na metodologia da OMS sobre estatísticas de medicamentos (análise ATC/DDD) e análise de impacto orçamental. Os autores desenvolveram a ferramenta de cálculo de custos através do custo de 1 DDD, que pode ser usado no planejamento do orçamento hospitalar de medicamentos. Os custos com medicamentos foram estimados a partir das fontes dos hospitais nacionais (2015). Inicialmente, 8,5% dos pacientes foram tratados com flufenazina injetável de ação prolongada atípica (FLU LAI (*Long-acting injectable fluphenazine*)) e 13% com clorpromazina oral (CHL). Os resultados do estudo mostraram que o IAF da FLU teve um custo de terapia menor, calculado pela dose de DDD, e foi mais eficaz na prevenção de recidiva em pacientes esquizofrênicos em comparação com o CHL (OR 0,31, IC 95% 0,11-0,88). Se a proporção de pacientes, recebendo FLU LAI aumentar em 1%, enquanto a proporção de pacientes recebendo CHL diminuir pelo mesmo 1%, o custo total dos medicamentos diminuirá em 0,1%. Se a proporção de pacientes tratados com IAF de FLU aumentar em 5% e 10% (e a CHL diminuir na mesma proporção), a economia orçamentária será de 0,5% e 1%, respectivamente. A abordagem proposta pode ser usada para análises farmacoeconômicas de impacto orçamentário durante o planejamento orçamentário em unidades psiquiátricas de pacientes internados.

Palavras-chave: *Análise DDD, consumo, farmacoeconomia, análise de impacto orçamentário, esquizofrenia.*

ABSTRACT

The aim of the study was to perform a complex pharmacoepidemiological (ATC/DDD method of the WHO) and pharmacoeconomic analysis of the influence of APDs on a budget of in-patient psychiatric facilities. The present study was based on the WHO methodology on drug statistics (ATC/DDD-analysis) and budget impact analysis. The authors developed the tool of cost calculation via the cost of 1 DDD, which can be used at planning hospital budget on drugs. Costs for drugs were estimated from the national hospitals' sources (2015). Initially, 8.5% of patients were treated with atypical long-acting injectable fluphenazine (FLU LAI) and 13% with oral chlorpromazine (CHL). The results of the study showed that FLU LAI had lower a cost of therapy, calculated per DDD dose, and was more effective in preventing relapse in schizophrenic patients in comparison with CHL (OR 0.31, CI 95% 0.11-0.88). If the proportion of patients, receiving FLU LAI increases by 1% while the proportion of patients, receiving CHL decreases by the same 1%, the total costs of medicines will decrease by 0.1%. If the proportion of patients treated with FLU LAI increases by 5% and 10% (and CHL decreases in the same proportion) the budget economy will be 0.5% and 1%, respectively. The proposed approach can be used for budget impact pharmacoeconomic analysis during budget planning at in-patient psychiatric facilities.

Keywords: *DDD analysis, consumption, pharmacoeconomics, budget impact analysis, schizophrenia.*

АННОТАЦИЯ

Целью данного исследования было проведение комплексного фармакоэпидемиологического (методология ATC/DDD ВОЗ) и фармакоэкономического анализа влияния на бюджет применения антипсихотических средств в стационаре. Настоящее исследование основано на методологии ВОЗ по лекарственной статистике (ATC/DDD-анализ и анализе влияния на бюджет. Авторы разработали инструмент для расчета затрат через стоимость 1 DDD, который может быть использован при планировании госпитального бюджета на лекарственные препараты. Затраты на ЛП были оценены на основании информационной базы стационара (по данным 2015 г). Первоначально 8,5% пациентов получали АПС длительного действия флуфеназина деканоат, 13% - перорально хлорпромазин. Результаты настоящего исследования показали, что флуфеназина деканоат имеет меньшую стоимость терапии (рассчитанную через DDD дозы), и является более эффективным ЛП с точки зрения предотвращения обострений у пациентов с шизофренией в сравнении с хлорпромазином (OR 0.31, CI 95% 0.11-0.88). Если доля пациентов, получающих флуфеназина деканоат увеличится на 1% в то время как доля пациентов, получающих хлорпромазин снизится на тот же 1%, общие затраты на лекарственную терапию снизятся на 0.1%. В том случае, если доля пациентов, получающих флуфеназина деканоат увеличится на 5 и 10% (при одновременном снижении потребления хлорпромазина) то экономия бюджета составит 0.5 и 1% соответственно. Предложенный подход может быть использован для проведения фармакоэкономического анализа влияние на бюджет для планирования бюджета стационара психиатрического профиля.

Ключевые слова: DDD анализ, потребление, фармакоэкономика, анализ влияния на бюджет, шизофрения.

1. INTRODUCTION

Nowadays, in the majority of countries, the development of the healthcare system tends to switch the focus from cost-cutting on medical care and pharmacotherapy delivery to the implementation of more efficient methods of resource distribution. Thus, the search for new effective scientific-methodical and organizational approaches to drugs management at the outpatient and inpatient stages of pharmacological care is an acute issue. Complex pharmacoeconomic and pharmacoepidemiological analysis allows the specialists to give scientific grounds to the management of the drug in an in-patient facility.

Global planning strategy of the WHO for the period of 2013-2020 acknowledges an essential role of the administration and management efficiency increase in the sphere of mental health care and treatment and prevention efficiency increase in regards to psychiatric disorders that are considered to be the most expensive in terms of treatment. Psychiatric disorders occupy the 2nd place by the amount of direct and indirect costs, giving place to cardiovascular diseases (Yastrebov, 2009). The total number of handicapped people due to psychiatric disorders in Russia is estimated at 1 million people, more than 60% of them are working-age population (Gurovitch, 2012).

According to the official state statistical data, the number of patients with schizophrenia, who applied for medical help to psychoneurological institutions in 2015, was equal to 562,852 (Alexandrova *et al.*, 2016). According to the published data, the expenses on the treatment of schizophrenia in the Russian Federation can reach up to 40% of the budget intended for the treatment of mental diseases (Lyubov, 2012). It was noted that social costs could be 2.6 times higher than medical costs for schizophrenia treatment (Lyubov, 2002; Lyubov *et al.*, 2012). During the past years, a significant reduction of the financing of psychiatric service is observed, and 80-90% of the financing is intended for the in-patient medical care (2015; Lyubov, 2012). Thus, the present level of financing of psychiatric care is insufficient and requires the increase in the financing of psychiatric service by the subjects of the Russian Federation (2016).

Due to the limitations in the budget financing of psychiatric facilities and system of healthcare in general, one of the main directions in this sphere is the development of scientific approaches to the drug resources management in psychiatric facilities based on complex pharmacoeconomic and pharmacoepidemiological analysis (Vaskova *et al.*, 2012; Yagudina, 2009).

Schizophrenic patients' treatment standard at outpatient and inpatient facilities is

based on long-term therapy by antipsychotic drugs (APD) (2012). APDs include such drugs as typical antipsychotic drugs (TAD) or traditional neuroleptics (first generation) and atypical antipsychotic drugs (AAD), which are called second generation AAD, as well as APDs of the prolonged effect. The choice of the drug is determined by a number of factors, in particular, its clinical efficiency, tolerance, and economic effectiveness. One of the criteria for treatment long-term efficiency is the occurrence rate of readmissions during the treatment. Thus, patients who often have readmissions (annual) or very often readmissions (two or more times during the year) are considered as a group of patients with ineffective therapy. Hence, one of the purposes of modern psychiatric care is to decrease the rate of acute condition reoccurrence and readmissions to the hospital (Volgina *et al.*, 2010; 2016).

The aim of the study is to develop a tool for budget impact evaluation of AAD fluphenazine decanoate (solution for injections of prolonged effect) therapy in comparison with TAD chlorpromazine therapy.

2. MATERIALS AND METHODS

The authors analyzed the meta-analysis Jiao Zhao *et al.* (2016) on the evaluation of the efficiency and safety of a long-term application of APDs in schizophrenic patients. The meta-analysis included 56 Randomized Controlled Trials (RCTs) and 18 APDs, 2 of them were selected for the pharmacoeconomic "budget impact analysis": fluphenazine decanoate (fluphenazine solution for injections of prolonged effect) and chlorpromazine (peroral form), which had statistically significant differences in the odds ratio (OR) for the primary endpoints (relapse rate) (evaluated in the studied cohort). Fluphenazine had some benefits in comparison with chlorpromazine by the rate of relapse (OR = 0.31, 95% CI 0.11-0.88) (Eq. 3).

$$OR = \frac{Odds\ 1}{Odds\ 2} = 0.31 [CI\ 0.11; 0.88] \quad (Eq. 3)$$

Odds 1 - odds ratio of relapse (fluphenazine decanoate)

Odds 2 - odds ratio of relapse (chlorpromazine)

The authors developed a tool for costs modeling and evaluation of the influence of APDs indication rate change (on the example of fluphenazine solution for injections of prolonged

effect) in schizophrenic patients on the budget. The studied cohort included 198 patients who were diagnosed with schizophrenia (ICD-10, F20.0) and received in-patients treatment in a psychiatric clinic in Moscow in January-December 2015 (consecutive cohort of patients). For the budget impact analysis, we assumed that mean drugs consumption (estimated in NDDD) per 1 treated patient did not change, while the patients share that received fluphenazine or chlorpromazine changed in regards to the initial values.

At the facility level, the data on drugs consumptions in the hospital segment was expressed as DDD/100 bed days parameter. The sources of the data were medical records of patients. The calculations were done by the following formulas (Vaskova *et al.*, 2012; Spasokukotskiy, 2004; Kozhanova, 2006) (Eq. 1, Eq. 2):

$$DDD/100\ bed\ days = \frac{DDD_s}{Number\ of\ bed\ days} \times 100\%, \quad (Eq. 1),$$

$$DDD_s = \frac{Amount\ of\ drug}{DDD}, \quad (Eq. 2),\ where:$$

DDDs — total number of DDD doses, Q (amount of the drug) – the total amount of the active ingredient in mg in regards to the course of inpatient treatment.

The authors performed a pharmacoeconomic evaluation of the budget impact. Costs for drugs were taken from the national hospital's sources (2015). The exchange rate in the analyzed period was €1 = 68 RUB.

3. RESULTS AND DISCUSSION

The cost of the primary treatment and the therapy of the adverse effects (Extrapyramidal Symptoms) were calculated for the studied cohort (n=198) by two methods: method of the microcalculation of the expenses and via the cost of 1 DDD dose. The cost of concomitant therapy was not estimated, because its share was less than 1% of the total and the DDD for many drugs is not established. The conducted analysis showed that summarized costs on the main therapy and correction of extrapyramidal disorders (more than 99% of the total) calculated via 1 DDD (arithmetical mean) were equal to 1,447,601.17 rub, which was by 4.4% higher than pharmacoepidemiological analysis showed (microcirculation of costs). Thus, the method of costs calculation via 1 DDD can be used for the

calculation of costs on pharmacotherapy and at planning and cost predicting for the following year based on the trends in drugs consumption due to a low margin of error (Vaskova *et al.*, 2016; Vaskova *et al.*, 2016; Vaskova and Tyapkina, 2014).

The proposed method of the complex analysis and approach to the calculation of costs via 1 DDD is based on the modeling of costs at inpatient facilities on the pharmacotherapy of schizophrenic patients by means of changing of some drugs indication rate and maintaining the average level of consumption per 1 patient (NDDD). For this purpose, the authors analyzed national and foreign comparative studies on the efficiency of APDs. The proposed model was based on the data of international meta-analysis performed by Zhao YJ (2016). The authors selected two drugs for the analysis: fluphenazine decanoate and chlorpromazine (peroral preparation) because for this pair, the statistically significant difference in therapy efficiency was obtained. OR value for relapse rate for fluphenazine decanoate in comparison with chlorpromazine was 0.31 (CI 0.11-0.88). Hence, fluphenazine decanoate is a more efficient therapeutic agent in comparison with per oral chlorpromazine.

Total annual budget on drugs (for 198 patients) was 1,447,601.17 rub. (equal to €21,288). Among all the patients, 8.5% (17 patients) initially received fluphenazine therapy, and 13% (26 patients) received chlorpromazine. It is assumed that during pharmacoeconomic modeling, the share of patients receiving fluphenazine therapy (solution for injections of prolonged effect) gradually increases by 1%, 5% and 10% due to a simultaneous decrease in patients share receiving chlorpromazine (per oral preparation), while the total consumption of drugs per 1 patient remains unchanged. The results of the analysis of the influence on the budget for the scenarios 1-3 are presented in Figures 1, 2, 3.

If the proportion of patients, receiving FLU LAI, increases by 1% while the proportion of patients, receiving CHL decreases by the same 1%, the total costs of medicines will decrease by 0.1% (€21.5) (fig 1). If the proportion of patients treated with FLU LAI increases by 5% and 10% (as an alternative CHL decreases in the same proportion), the budget economy will be 0.5% (€107.5) and 1% (€215) (fig 2 and fig 3 respectively).

The proposed method allows the specialists to evaluate the consumption of drugs at inpatient facilities that provide medical care to schizophrenic patients, to estimate the facility

costs and the impact of the changes in the ADPs indication rate on the budget. However, the present method does not include the difference in the cost of drugs from different manufacturers and in different dosage forms.

4. CONCLUSIONS

The performed studies showed that fluphenazine solution for injections of prolonged effect had a lower cost of treatment per 1 DDD dose and was more efficient in the prevention of relapse in schizophrenic patients in comparison with chlorpromazine. The increase in the portion of patients, who receive fluphenazine, by 10% allows the inpatient facility to save up to 1% of the annual budget, intended for the drug for the treatment of schizophrenic patients. The proposed approach can be used for budget impact pharmacoeconomic analysis during the budget planning for an inpatient psychiatric facility.

5. ACKNOWLEDGMENT

Supported by the "Russian Academic Excellence Project 5-100"

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Figure 1. Budget impact analysis - scenario 1

Figure 2. Budget impact analysis - scenario 2

Figure 3. Budget impact analysis - scenario 3