European Journal of Innovation in Nonformal Education (EJINE)
Volume 3 | Issue 3 | Mar - 2023 ISSN: 2795-8612

Metabolic Syndrome and Pharmacoeconomy (Review)

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A B S T R A C T
The improvement of the pharmacological industry has led to the development of "pharmacoeconomics". One of the main problems of the healthcare system is the optimization of financing. According to WHO, no country in the world has sufficient financial resources to meet national health needs. In the context of the rise in the cost of drug addiction treatment, it is important for both the patient and society to know how the cost of treatment with a particular drug justified is. The purpose of the study: to study the pharmacoeconomics of metabolic syndrome. The calculation of economic efficiency in medicine is not done in the traditional sense to save costs, but is a way to optimize the process of allocating financial resources through economic analysis of the results of controlled clinical trials of specially developed clinical significance.

A R T I C L E I N F O
Article history:
Received 13 Jan 2022
Received in revised form
15 Feb 2023
Accepted 15 Mar 2023

Keywords: healthcare, treatment, population, efficiency.

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Introduction. The term "syndrome" usually refers to a series of symptoms that make it a nosological concept. However, in the scientific literature, the metabolic syndrome is not considered as a set of symptoms, but as a combination of various diseases united by common pathogenetic mechanisms, which are often found in certain metabolic diseases. Metabolic syndrome (MS) is a complex disease with high socioeconomic costs that is considered a worldwide epidemic. According to WHO, many people on the planet suffer from this disease. In 2014, 39% of adults aged 18 and older (38% of men and 40% of women) were found to be overweight. In 2003, WHO experts assessed the prevalence of MS: "We are facing a new pandemic of the 21st century, which will affect industrialized countries. This could be a demographic disaster for developing countries. The prevalence of MS is twice that of diabetes and the rate of increase in the next 25 years is 50 percent is expected to grow" [14,16]. The concept of MS, otherwise known as "X" syndrome, refers to an increase in the amount of visceral fat in the subcutaneous tissue and a decrease in the sensitivity of peripheral tissue receptors to insulin, which is accompanied by the phenomenon of hyperinsulinemia. The above mechanisms lead to all kinds of metabolic imbalances and increased blood pressure [14,17]. The reason for the prevalence of metabolic syndrome is, of course, our modern lifestyle - eating disorders and a sedentary lifestyle.

According to recent data, there has been a significant increase in the number of people suffering from metabolic syndrome. According to the latest information, syndrome "X" has become one of the urgent medical, social and economic problems of modern society. Due to its prevalence, which leads to a reduction in life expectancy, disability and quality of life, this pathology cannot be ignored by world scientists [15, 16, and 18].

The question of the true prevalence of metabolic syndrome is very controversial, because the epidemiology of the complex syndrome depends on the diagnostic criteria used to assess it, the ethnic characteristics of the studied patient population (genetic predisposition to obesity, arterial hypertension, lipid metabolism disorders, lifestyle characteristics, national nutritional characteristics, etc.) [16, 18].

The purpose of the study: to study the pharmacoeconomics of metabolic syndrome.

Results and analysis: Pharmacoeconomic calculations of the use of drugs or the identification of the most effective alternative treatments should take into account all costs over time, because the use of any seemingly expensive drugs or screening methods will save money for something else in time. : shorten the bed day. Health costs are divided into direct and indirect; reducing the costs of hospitalization of patients, reducing the frequency and severity of "expensive" complications (for example, myocardial infarction, heart failure, sepsis), reducing the appointment of a doctor in the clinic. Clinical and economic analysis (CITA) proposes a relationship between clinical treatment outcomes and the cost of medical interventions. KIT has main and auxiliary methods. Basic methods reduce the calculation of the relationship between the value of the obtained results and the effectiveness. Maternal methods are reduced in calculating the relationship between the cost and effectiveness of the results obtained. The main methods of calculation: "cost and efficiency" analysis, "cost minimization" analysis, "cost and profit" analysis, cost and profit analysis. When conducting a "cost-benefit" analysis, the results are evaluated in units of "benefit" from the perspective of the user of medical services. As an indirect benefit measure, the patient's quality of life measure (HS) and "HS-adjusted recorded life years (QEHY)" are most commonly used.

Ancillary types of KIT include cost-of-illness analysis. This analysis does not compare the effectiveness of medical technologies and is used to study the usual practice of managing patients with any disease [1]. Some of the pharmacoeconomic studies that have been conducted face the situation where the available clinical data are insufficient to directly compare the medical technologies being evaluated. In such cases, the lack of clinical data can be filled by modeling. Modeling is the study of objects of knowledge in their models; is to create and study models of real objects, processes or phenomena and to predict events of interest to the researcher [2]. According to the plan, the most common models in pharmacology can be divided into Markov model and decision tree. A "decision tree" is a graph showing all possible outcomes for a given condition, typically used to describe the course of treatment for an acute illness. Markov describes several common states and transitions between them over time. These models have become widely used in pharmacoeconomics due to their more flexible structure than the "decision tree".

Unlike the common alternatives of "decision trees", Markov models are built over a period of time based on transition states and probabilities between them [2]. The exact choice between the types of economic analysis presented depends on the goals and objectives of the research, the medical technology under study and the distribution of the results of its use. Obesity represents a major economic cost to the health care system. In a 1998 UK study, the direct cost of treating obesity was £0.5 million and the indirect cost was £2 million per year. Indirect costs are associated with reduced morbidity and disability. In developed countries, the direct costs of treating obesity represent 3–5% of health care costs, and the costs of treating comorbidities in obese patients are directly related to TVI [3].

A meta-analysis from the UK National Institutes of Health found only 2 studies that included an economic evaluation of the results of clinical improvement of the effectiveness of orlistat use. One study showed that a group of 100 patients treated with orlistat for 1 year had 1,601 additional quality-adjusted life years compared to placebo (quality-adjusted life-years, QEHY) and the cost of one additional QEHY was £45,881. The cost of additional QEHY when taking sibutramine was 29,351 euros, if the effect of sibutramine only on body weight was taken into account, and if, in addition to reducing body weight, it reduced the risk of developing cardiovascular diseases and QD 2, it was 13,706 euros. The results of the sensitivity analysis showed that even if the input parameters vary according to the maximum cost and minimum efficiency, the price of 1 QEHY for 1 year of treatment does not exceed 50,000 euros, which indicates the profitability of the treatment [4].

According to the NICE meta-analysis simulations, which studied the effect of sibutramine on body weight and the risk of developing SCC and QD 2, the cost of 1 additional QEHY on the background of therapy was 38,674 pounds, which slightly exceeded the payment limits of a certain country. At the same time, the results of the study of the Australian population J.L.Veerman et al. the risk reduction for obesity-related diseases was 0.2% for sibutramine and 0.1% for orlistat.

The ineffectiveness of drug therapy explains the "modest" effect on body weight (according to a meta-analysis conducted by researchers, the average weight loss during 12 months when taking sibutramine was 4.45 kg compared to orlistat and 2.89 kg) and rapid weight loss after the end of therapy is explained

by the increase. A comparative cost-effectiveness study of the use of orlistat, sibutramine and rimonabant was conducted by the National Institute for Medical Research (NIHR) (HTA programe) of Great Britain as part of the Health Technology Assessment programme. Most of the published models were sensitive to the method of assessing quality of life with weight loss and the discount rate used.

According to the NIHR, among the three possible options of drug therapy for obesity (orlistat, sibutramine and rimonabant), the most effective strategy, compared to non-drug therapy, turned out to be 15 mg sibutramine therapy, characterized by a combination of maximum effectiveness and 33 minimum costs, a value of 1 QEHY 557 However, based on data on the number of patients who died as a result of the model's prescribed treatment, sibutramine and rimonabant were removed from the list of recommended drugs for the treatment of obesity in recent years because of serious side effects that could increase mortality among patients. The willingness-to-pay threshold was £20,000 per 1 QEHY. A sensitivity analysis showed that treatment with sibutramine at a dose of 15 mg was no longer economically feasible, with the incidence of fatal side effects exceeding 1.8%. sligi was determined. To maintain the profitability of sibutramine 10 mg and rimonabant, the frequency of fatal side effects should not exceed 1.5% and 1.0%, respectively. As a result of these results, sibutramine and rimonabant were excluded from further sensitivity analysis. When comparing orlistat and placebo, orlistat was found to be the most cost-effective, and the model did not respond to changes in all the main parameters except the original TVI in the study population cohort [5]. Research data from M. Gillett et al. suggests that preventing type 2 diabetes in people with prediabetes is cost-effective. Based on simulations, lifestyle changes combined with metformin administration resulted in a 13-year reduction in the incidence of type 2 diabetes over 20 years [6]. According to scientists A. J. Herman et al. (2005) and W. H. Palmer et al. (2004), in the DPP34 study, the cost of 1 additional QEHY is US$1124 and 1 LYG is €6381 compared to placebo for suggested lifestyle changes [7]. Pharmacoeconomic studies are important to comprehensively evaluate new drugs or treatments, which are sometimes more expensive than existing drugs, to justify their use from a health care system perspective. Metformin is the main drug for the treatment of type 2 diabetes, but the number of studies investigating the pharmacoeconomic aspects of its use in MS is very limited.

According to the results of a study conducted by G. T. Glembocca and his associates, prescribing metformin to patients with MS for six months reduced the costs of antihypertensive therapy by an average of 16.7%, and the need for lipid-lowering drugs was reduced by 10%. According to G. T. Glembok, the assessment of the quality of life of patients receiving metabolic syndrome therapy increased by an average of 18% [8].

According to the results of pharmacoeconomic studies A. L. Khokhlov and the staff dedicated to atorvastatin therapy, patients with MS, do not exclude the role of the introduction of HMG-CoA-reductase inhibitors in reducing the high atherogenic potential of blood serum, normalizing carbohydrate metabolism and SRO indicators, which prevents the risk of developing CKD. According to "cost-effectiveness" and "cost-benefit" pharmacoeconomic analysis, the addition of atorvastatin to MS therapy is economically feasible [9]. The American Heart Association (ANA) has developed an online calculator to calculate the 10-year risk. For patients with a 10-year risk greater than 5%, statins have a good cost-benefit ratio. According to a multicenter study, in a hypothetical cohort of 1000 people, the additional QEHY in 5 years of therapy was 51.5 for sibutramine therapy, with 14 cases of cardiovascular death compared with placebo, 28 cases of nonfatal MI, and QD is estimated to decrease from -2 to 26 cases.

If only the effect of sibutramine on body weight was taken into account, the cost of one additional QEHY with the use of sibutramine was 29,351 euros, and if, in addition to the reduction of body weight, the reduction of the risk of development of SCC and QD 2 was taken into account, it was 13,706 euros. The sensitivity analysis showed that even if the input parameters change towards maximum cost and minimum efficiency, the cost of 1 QEHY does not exceed 50,000 euros for 1 year of therapy, which indicates the profitability of therapy. A pharmacoeconomic study was conducted in Sweden to investigate the effect of acarbose on the prevention of QD, compared with placebo, the cost-effectiveness was SEK 28,009 to prevent 1 QD-2 case and SEK 101,375 to prevent 1 UQTK. The author of the study interprets the results as an indicator of the economic feasibility of the therapy. There is also evidence of the benefits of primary prevention of CKD in MS with statin drugs. According to an American study, which included

8.2 million patients with dyslipidemia and QD 2, the addition of statins to therapy reduces the number of cardiovascular complications requiring hospitalization by 71,000 cases annually, which significantly reduces the costs of treating this category of patients [11]. Based on the results of international studies, they concluded that the best indicator of the potential benefit of statin therapy is the overall risk of CHD. Total statin therapy costing no more than $1 per day not only has good cost-benefit ratios, but also preserves the health budget [12]. In patients with high triglycerides, fibrates monotherapy is clinically and cost-effective for the primary and secondary prevention of CKD, as statins are the first-line therapy, and the question of whether the combination of fibrates and statins is beneficial is not resolved. Addressing this issue requires modeling the additional benefit of modifying the lipid profile when using combination therapy with fibrates and statins compared to statin monotherapy in patients with IUD [12]. To date, a number of studies have been conducted that support the special role of primary prevention of AG, dyslipidemia and QD-2 to increase life expectancy and improve its quality [13]. A study using dynamic modeling showed that patients aged 51-52 years lived 0.85 more years and achieved a clinically significant reduction in body weight; AG patients who reached the target blood pressure - 2.05 years; Carbohydrate metabolism compensation in patients with QD-2 increases life expectancy by 3.17 years. Despite longer life expectancy, those with more clinically effective treatments have lower lifetime health care costs. Achieving clinically significant weight loss in obese patients reduces treatment costs by up to $7,168 per patient, compared to $13,702 for successful treatment of hypertension, and up to $34,483 in compensation for type 2 diabetes [13].

Conclusion: The issues related to the correction of metabolic syndrome are urgent, because its treatment schemes have not been developed. Undoubtedly, an important condition of treatment should be a combination of groups of drugs aimed at achieving the target levels of glucose, lipid metabolism and blood pressure. In addition to their therapeutic effectiveness, the drugs taken should have good tolerance and an appropriate dosage regimen. Taking multiple medications with multiple mechanisms of action may affect adherence to treatment and quality of life in patients with metabolic syndrome, but may not. Usually, doctors are not always ready to assess patients' quality of life and satisfaction with treatment. In such conditions, the economic aspects of the rational use of health care resources are becoming more and more important, and the pharmacoeconomic parameters are of decisive importance in the selection of patient treatment tactics. Often, the use of cheap, but ineffective drugs leads to a real increase in the cost of treating patients, as well as the substitution of more effective and significantly more expensive drugs. The study of pharmacoeconomic aspects of metabolic syndrome is an important component of providing quality medical care to patients with metabolic diseases and is of increasing interest in modern medicine.

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