Research on hospital drug cost control based on the perspective of pharmaceutical economy

Yuanyuan Xiu[1], Lijing Jia[2], Jianbin Chen[1] and Wei Cui[1*]
[1]Business College of Beijing Union University, Beijing, China
[2]Department of Emergency, General Hospital of PLA, Beijing, China

Abstract: In recent years, the continuous growth of drug costs has become one of the hot issues of society. In this paper, by using principles and methods of pharmacoeconomics, we study on the management of drug cost control in hospital. Pharmacoeconomics involves the effective allocation and rational use of drug resources, and study the economic effect, that is to carry out the study of drug resources utilization efficiency. Through the analysis of the cost-benefit analysis of drug treatment, we could find the a more cost-effective treatment. Pharmacoeconomics can be applied to the clinical diagnosis and treatment, make reasonable prescription cost effect, it could provide patients with high economic efficiency of treatment, so that drug treatment to achieve the best results.

Keywords: Drug cost control, pharmaceutical economy, cost benefit analysis.

INTRODUCTION

In the past twenty years, the continuous growth of medical expenditure is one of the hot issues that many developed countries and developing countries in the world have to face (An *et al.,* 2016; Chen, 2016). Developed countries accounted for 10% of the total cost of medical expenses to the total cost of medicine, China's drug costs accounted for the proportion of 50% to 60%, China's high proportion of drug costs is particularly prominent problem (Chen *et al.,* 2012; Cahill *et al.,* 2015). In order to reduce drug costs, health administrative departments in our country were 20 times the price of the drug price, although to a certain extent to reduce the drug costs too fast growth, but did not solve the fundamental problem (Dindo *et al.,* 2014; Ghoneum *et al.,* 2015). The main place of drug use is the medical and health institutions at all levels, the reduction of the cost of medical institutions has important practical significance for the rapid growth of the medical costs of the whole society. In this paper, the principles and methods of pharmacoeconomics are used to study the management of hospital drug cost control.

Hospital is the main way of drug consumption in China, more than 85% of the drug consumption comes from all levels of medical institutions, from the medical staff. Therefore, the control of hospital drug costs will determine the overall cost of drug expenditure (Shim, 2010). Even so, the control of hospital drug costs can not be sacrificed at the expense of treatment, reduce the level of diagnosis and treatment services, therefore, how to choose an effective, safe and economical drug treatment program is particularly important (Hu, 2013; Liu, *et al.,*2013; Qin, *et al.,*2015). Pharmacoeconomic evaluation provides a means for us, in many therapeutic drugs, the selection of cost-effective drugs or treatment, so as to achieve both to ensure the clinical treatment effect, and can reduce the cost of medicine purpose (Tsiaras *et al.,* 2016; Liu, 2016). In order to reduce medical costs, especially the high drug costs, China has implemented many methods, such as in the production stage of drug, scientific measure of pharmaceutical production costs, standardize the drug pricing mechanism (Xuan, 2015); in circulation, the implementation of centralized bidding and purchasing; in the way of using drugs, drugs to implement zero profit management clearly, all levels of hospital drug cost ratio and so on, but these methods have also achieved a certain effect, but did not completely change the problem of high cost (Mellotte *et al.,*2015). Therefore, to find a way to achieve the best balance between the cost of drugs and drug effect, achieve efficiency based on the maximum is the most critical drug economics provides a possibility for us to achieve the above purpose.

MATERIALS AND METHODS

Pharmacoeconomics

Pharmacoeconomics is a science that provides the basis for economic decision making for medical and health related industries and health administrative departments. Pharmacoeconomics is in a variety of research methods of economics as the foundation, combined with the results of medical related disciplines, of various kinds of treatment plans or study the cost and effect, economic analysis of drug treatment, and economic evaluation of the differences between them, and provide reference for the selection of the best treatment (Zhu *et al.,* 2015). The core content of pharmacoeconomic evaluation is to study the costs and benefits of the recognition, measurement and comparison, the concern is simply not the lowest cost, nor the largest gains, but comprehensive comparisons

**Corresponding author:* e-mail: wei.cui@buu.edu.cn

between income and cost, that is to say the pharmacoeconomic evaluation of the most economical solution is not necessarily is the lowest cost solution. The purpose of the study is to improve the pharmacoeconomic effective allocation of resources and related drugs, drug resource use efficiency, so as to develop drugs and its utility related resources, with less resource consumption to achieve the maximum effect, as much as possible to satisfy people's demand for health services, improve the overall quality of the national implementation of the body and improve.

The research content of pharmacoeconomics is very extensive, it involves the effective allocation and rational use of drug resources, and thus to achieve the greatest degree of improvement in health aspects. In general, the specific research contents are as follows: the research on economic effect that is to carry out research on drug utilization efficiency of resources, which is related to the degree of assessment, namely the pharmacoeconomic evaluation we often refer to the. For example, the methods of diagnosis and treatment of a disease or treatment program, there are many drugs can be selected, then what kind of patients. For a certain class of drugs, what drugs should enter the Medicare reimbursement list, which can not be included, for certain drugs, what kind of dosage form or route of administration is the most economic. Research on the utilization efficiency, that is, to improve the efficiency of the use of drug resources to carry out specific research methods, but also how to configure these resources. Of course, this kind of research will involve all aspects of the process of drugs, including drug production, drug circulation, drug use and research and development, etc. Study the relationship between each other, that is, to explore the relationship between the relevant subjects in the field of medicine, to provide a scientific basis for the coordinated development of the pharmaceutical industry as a whole. For example, a country of drug production, should reach large scale to adapt to the current situation of demand; national fiscal health expenditure is to use support supply with or supply service providers of medical and health institutions.

Research contents

This paper intends to study the law of drug expenditure in hospital. In recent years, the proportion and characteristics of hospital drug expenses in the total medical expenses in hospitals, and the main factors affecting the cost of hospital drugs. To the hospital oral hypoglycemic drugs as the research object, the WHO recommended daily defined dose (DDD) as drug use objective indicators of dynamic analysis, a certain period of time, DDDs and sales of the drugs, and provide scientific basis for clinical rational drug use. The hospitalized diabetic insulin pump commonly used in the treatment of subcutaneous injection and strengthening treatment as control, cost-effectiveness analysis of pharmacoeconomics of pharmacoeconomic evaluation of two therapeutic regimens, prompt medical personnel in the clinical course of treatment should pay more attention to drug economic attribute, so as to reduce drug costs. Pharmacoeconomic evaluation of three drugs in the treatment of cerebral infarction, comparative study of the economy of the three drugs. Each of the medical institutions have their own drug directory, hospital drug catalog is the scope of the hospital's medication, it is in a state of constant adjustment and change, need to constantly update the revised. In the process of revising and updating, we introduce the method of pharmacoeconomics evaluation, in consideration of the effectiveness of the treatment, we should pay attention to the economy of the drug, so that the drug catalogue of the hospital is more scientific, reasonable and economic. Bed path management is the development trend of hospital quality management, payment mode reform and the combination of clinical pathway, it can not only reduce the no treatment effect, and can reduce the medical cost, so the effect is bound to produce medical institutions and medical personnel administration. The application of pharmacoeconomics and the management of clinical pathway is to select the best quality drugs in the specific path, so as to reduce the cost of medical treatment.

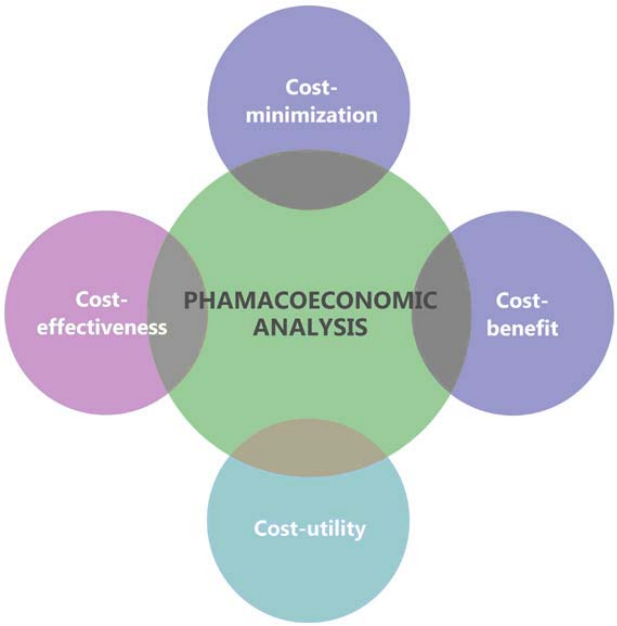

Fig. 1: Pharmacoeconomics

Pharmacoeconomic evaluation method

The most commonly used research methods of pharmacoeconomics are 4 kinds of analysis methods, such as minimum cost, cost effect, cost utility and cost benefit. In the actual application process, no matter what kind of pharmacoeconomic evaluation methods, we can not do without the cost of measurement, therefore, it is necessary to elaborate on the cost measurement. The measurement and determination of the cost, is one of the most fundamental indicators to carry out pharmacoeconomic evaluation and research related to economy, it is also the 4

evaluation, research, analysis of the premise and basis of the method, also carry out related research on economic burden of disease. The recognition and measurement of the cost is the basis and prerequisite, pharmacoeconomics therefore, identification and measurement of cost must be scientific, accurate and reasonable, for example, if we spend more than the actual cost, the economic evaluation results may lead to decreased, conversely, is caused by increased economic evaluation results, misleading on the basis of the decision.

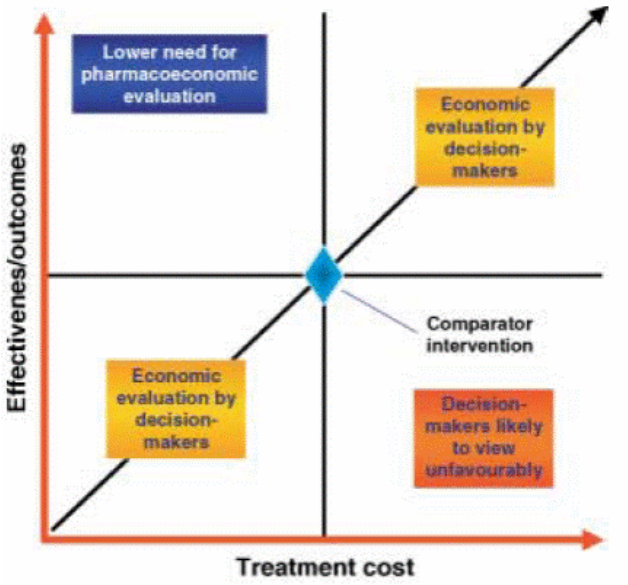

Fig. 2: Pharmacoeconomic evaluation

1) Minimum cost analysis: The minimum cost analysis is to compare the cost of the alternatives, and select the least cost solution, when the benefits of each alternative (specifically the benefit, the effect, or the utility) are the same or equivalent. The minimum cost analysis method determines the conditions of use in the actual process, the application is very limited, because in practice, different treatment benefits is usually not possible is identical or equivalent, therefore, theoretically, this method is very limited, in fact, examples were evaluated by this method less.
2) Cost effectiveness analysis: Cost effectiveness analysis is a method to compare and analyze the costs and results of different health plans or treatment programs, and then to evaluate the economic effects of programs or programs. Compared with the cost-benefit analysis, the two have their similarities, the common point is that both of the cost measurement units are completed and reflected in the form of currency, and the difference between the two is the unit of measurement of earnings.
3) Cost Utility Analysis: Cost utility analysis is the development of cost effectiveness analysis, both of which are used to measure the cost of money, this is the common point, the main difference between the two is to measure the outcome indicators on cost effectiveness analysis to measure the effect of the use of biomarkers in clinical, cost utility analysis with preference, which is used to measure the effect. Therefore, cost utility analysis is more consideration to the quality of life of patients, can be said that the fundamental purpose of closer to the clinical treatment.
4) Cost benefit analysis: The method is different from the characteristics of measurement is the treatment or care project cost and effect, will be in the form of money to be reflected and measured, and then a method of comparison and research between cost and benefit, so that the currency is characteristic of the main difference from other methods. Specifically, the drug economics benefit refers to the implementation of a drug treatment or intervention program obtained favorable results, and the results in the form of money to be measured, or that the benefit is the currency measurement and reflect income.

RESULTS

Cost effectiveness analysis of type 2 diabetes

Type 2 diabetes mellitus (type 2 diabetes, T2DM) is a progressive disorder due to insulin resistance and insulin secretion caused by defects, is after tumor, cardiovascular disease and a hazard to human health disease. It is reported that in 2015 about 7% of the population in the United States suffer from diabetes, and 20.9% of patients with diabetes. According to statistics, people over the age of 45 in China 7-8% diabetes, diabetes is the biggest harm can cause multi system complications, China's annual treatment costs reached 25 billion yuan, 70% for the treatment of chronic complications. Type 2 diabetes from 2016 Beijing level 3 first-class hospital of endocrinology diagnosis and treatment of 124 cases of patients, hospitalized patients were randomly divided into two groups, one group were used during the insulin pump therapy group (A group) 61 cases, another group of intensive subcutaneous insulin injection group (B group) 63 cases. After statistical test, the two groups were comparable. The basic data of the two groups of patients

On the basis of guidelines for the treatment of diabetes, has been diagnosed with type 2 diabetes mellitus; no disturbance; patients had received insulin injections, at the same time the application of metformin treatment; patients has not appeared or only a slight complication of diabetes. Two groups of patients in the hospital during the period of consumption of the Department of nutrition provided by the diabetes diet, while the use of metformin 0.5g oral, three times a day.

Cost effectiveness analysis

The cost of pharmacoeconomics includes the cost of drugs, treatment costs, equipment wastage, laboratory

testing, labor costs, etc. In this study, two groups of hospitalization, daily blood glucose monitoring expenses, nursing expenses, oral hypoglycemic drugs were consistent, so the cost spent in hospital, nursing, examination, oral medicine and other expenses, including only reduce the direct medical costs generated glucose treatment and indirect costs, omitting the direct non-medical cost and intangible cost. In view of the low cost of correcting hypoglycemia events and the low incidence of hypoglycemia in the two groups, the cost of correcting hypoglycemia events was not included. The cost of the insulin pump group includes the cost of insulin pump treatment and the cost of insulin. The intensive group included the cost of insulin, the cost of treatment and the cost of the materials used for the injection.

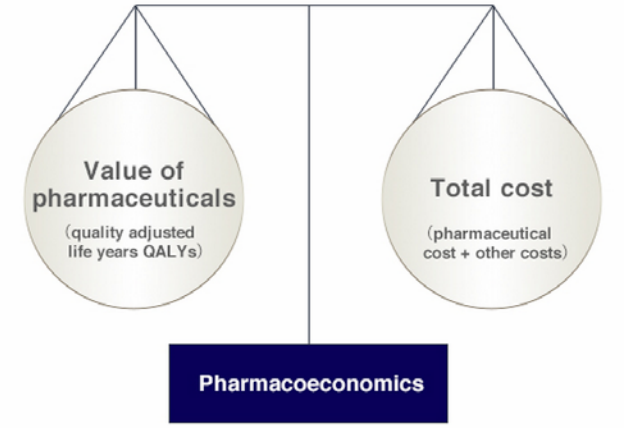

Fig. 3: Cost benefit analysis.

With national health care reform, drug expenses and treatment costs will continue to reduce medical cost can be decreased, so we assume that the treatment cost of two groups will be reduced by 10%, again comparing the cost-effectiveness ratio of two kinds of treatment methods, so as to judge the influence of. In this study, the sensitivity analysis of table 4 shows that the CSII treatment is in accordance with the normal physiological model of insulin secretion. The principle of CSII treatment is the simulation model of human physiological insulin secretion, insulin infusion via continuous subcutaneous insulin every day, continuous input trace, but in patients before eating according to the input load, which can reduce the blood sugar treatment effect, also can reduce subcutaneous injection pain of patients, improve the quality of life of patients. According to the principle of pharmacoeconomics, the ratio of cost and effect of the smaller mean unit effectiveness cost is low, the scheme is more economical, the results of this study showed that insulin pump group was significantly higher than the cost intensive injection group, the ratio of the cost effect of insulin pump in the treatment group than the intensive injection group, indicating enhanced injection group has better absolute economic efficiency. But comparing the incremental cost effect of the two groups, found that each additional unit efficiency, the need to increase the cost of 1810.25 yuan.

DISCUSSION

The use of the reasonable evaluation is a difficult problem in hospital pharmacy management, individual differences, etc. based on the complexity of the case, evaluate the rationality of drug use has no uniform standard, such as the current society's prescription is often mentioned, what is also not a conclusion where the party is determined by the prescription the amount or the prescription issued to determine the types of drugs, and not conclusive. The research on the rationality of drug use is mainly based on the limited daily dose recommended by WHO. Defined daily dose is the current drug dose measurement unit, refers to each kind of drugs every adult dosage, the index provides a tool for the rational use of drugs. To investigate the use of drug management system from 2014 to 2016, a computer grade three hospital oral hypoglycemic hospital database the medicine, the medication frequency and the order of amount ranking method for analysis of oral hypoglycemic drugs in total, each year the amount of such drugs is shown in table 5.

The results show that in the past 3 years, the total amount of drug sales increased year by year, and the amount of oral hypoglycemic drugs also showed a rapid growth. Analysis of the reasons, the prevalence of diabetes increased with age, the growth of hypoglycemic drugs in line with the improvement of living standards and the national conditions of life expectancy. Comprehensive hospital because of its complete range of drugs, the doctor's professional and technical level is high, but also to attract more patients to seek medical treatment. The application of pharmacoeconomic evaluation and the adjustment of the hospital drug list is in line with the requirements of the development of the new pharmaceutical care practice. The catalogue of drugs is the adjustment of the hospitals to standardize clinical drug purchase and use, the key to reduce the cost of drug use, its purpose is to adjust the drug curative effect is reliable, economical and practical, accord with the demand of professional medical institutions into the hospital drug purchase and use range, which is usually one of the main work in the management of medical service at all levels of organization. Pharmacoeconomics is a science that studies the efficiency of the allocation of limited drug resources. Therefore, its starting point is in line with the characteristics of medical service demand, which is in line with the general requirements of the new medical and health system reform in china.

CONCLUSION

The ideas and methods of pharmacoeconomics, in the current hospital pharmacy management become more and

Table 1: Basic data of insulin pump group and intensive injection group

variable	A group	B group	Statistics (t)	Pvalue
Gender	Male 25	male 28		
	Female 36	female35		
Age	57±5.4	59±4.8	0.54	0.13
Course of disease	14.2±3.2	13.5±4.2	0.37	0.56
Fasting blood glucose	10.1±2.45mmol.L-1	12.3±2.10mmol.L-1	1.54	0.05
Postprandial 2h blood glucose	14.3±3.11mmol.L-1	15.7±3.28mmol.L-1	1.72	0.06

Table 2: Comparison before and after treatment

group	Total number of cases	Effective cases	effective rate	Occurrence time
A group	61	51	83.6	3
B group	63	55	87.4	5

Table 3: Cost effectiveness analysis

group	Total number	cost	effective rate	C/E	ΔC/ΔE
A group	61	1806.5	94.2	19.17	1810.25
B group	63	1573.1	90.6	17.36	

Table 4: Sensitivity analysis

group	Total number	cost	effective rate	C/E	ΔC/ΔE
A group	61	1625.85	94.2	17.26	1630.17
B group	63	1415.79	90.6	15.63	

Table 5: Proportion of total sales

Amount of money	2014	2015	2016
Total sales amount	24031.5	35214.7	49345.2
Sales amount of oral hypoglycemic drugs	1510.6	2781.3	5031.5
Proportion	6.3	7.9	10.2
growth rate	17.5	25.4	29.1

more attention of hospital managers. Our hospital pharmacy administration compared with western developed countries has been in a relatively backward state, most just assume the primary function of drug procurement and supply, the current hospital pharmacy more began to pay attention to the quality of drugs, attention to patient safety, clinical pharmacists have to not participate in or from passive to active participation in clinical work. Now the development of clinical pharmacy services, and actively participate in clinical work, safety and effectiveness in attention to drug at the same time also began to focus on its economy. Pharmacoeconomics can be applied to the clinical diagnosis and treatment plan, plan evaluation and selection, formulate reasonable prescription cost effect, provide the basis for the choice of doctors, with relatively high economic means of treatment for patients, the drug treatment to achieve the best effect, so as to reduce costs, reduce the economic burden.

At present our country pharmacoeconomic evaluation carried out, the vast majority are using cost effectiveness analysis method, analysis of cost effectiveness is less, while in a foreign country, the application of cost utility analysis is more and more, the method of cost utility analysis application has reached more than 40%, more and more scholars have proposed that cost utility analysis should be as the gold standard of pharmacoeconomics, because it can reflect the benefits of treatment. Therefore, in carrying out the pharmacoeconomic research process, we should according to the treatment advice, drug characteristics, reasonable choice of evaluation methods of pharmacoeconomics, which makes the evaluation results more scientific and reasonable.

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