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Review

Pharmacoeconomics

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Abstract

Aim: The aim of this review was to provide an overview of the terminology, technology and methodology of pharmacoeconomic evaluations. The choice is made because there is small number of reviews on this subject in Macedonia, and also because of the subject actuality.

Methods: There are four common types of methods of cost-outcomes economic evaluations: Cost-minimisation analysis, Cost-effectiveness analysis, Cost-utility analysis and Cost-benefit analysis.

Results: There are 4 possible results arising in Cost-effectiveness analysis: the costs are lower and health benefits higher for one drug relative to another, the new drug is more expensive and less effective, the drug is more expensive and more effective and the drug is cheaper but less effective.

Conclusion: Pharmacoeconomic methods are used to assist physicians, hospitals, insurers, patients and healthcare professionals in making proper decisions what drug therapies should be chosen. The goal is to find the most efficient and effective treatment for the lowest cost, optimising the patient outcomes and decreasing costs to society.

Introduction

The roots of pharmacoeconomics are in health economics - a specialised aspect of economics developed in the 1960s. Pharmacoeconomics emerged in the late 1980s as independent among other specialised economic methods.

The evaluation of pharmaceutical and biological products was traditionally based on their safety and efficacy.

Over the past 20 years, the requested informations for drugs safety and efficacy are expanded with data about patient results, cost and cost-effectiveness, which increased significantly the costs of pharmaceutical companies. Direct comparisons must be carried out with other drug product and these pharmacoeconomic comparisons are called Phase IV or post-marketing studies. Cost analysis focuses on costs of providing healthcare products or services. Outcomes research focuses on the effect of therapeutic treatments such as quality of life, survival, satisfaction with care and costs. Pharmacoeconomic studies include the total costs connected with the disease - direct and indirect costs.

Rising health expenditures have led the necessity to find the optimal therapy for the lowest price. Primary goal of pharmacoeconomics is to determine which healthcare alternatives provide best outcome per spent money. It aims to improve the allocation of resources for pharmaceutical drugs and services. Pharmacoeconomics is innovative method with aim to decrease the health expenditures, optimising healthcare results.

Pharmaceutical expenditures, constituting large part of healthcare expenditures, have been increasing much faster than total healthcare expenditures. This escalation is due to longer life, new technologies, increased expectations, increased standards of living and increased demands in healthcare quality and services. Healthcare financiers (government, fund for healthcare insurance, insurers) are fighting with the rising expenditures. They are

doing that with price negotiations, patients participation or dedicated budgets for specific medicines.

Healthcare policies are focused on increasing efficiency at a lower cost without reducing the quality of healthcare or access to it. Pharmacoeconomics strives to guide the optimal utilisation of healthcare resources [1-3].

Table 1: Methods of economic evaluation (reproduced from Ref. 2 with permission).

Method of economic evaluation	Measurement of outcome (health benefits)	Synthesis of costs and benefits
Cost minimisation analysis	Assumed to be equivalent and can take any form (e.g. number of cases detected, reductions in cholesterol levels, years of life saved)	Additional costs of therapy A relative to B
Cost effectiveness analysis	Health benefits across therapies are measured in similar natural units	Cost per life year gained, Cost per patient cured, Cost per life saved, etc.
Cost utility analysis	Health benefits across therapies are valued in similar units based on individual preferences	Cost per QALY gained Cost per HYE gained
Cost benefit analysis	Measured in similar or different units and are always valued in monetary units (e.g. amount willing to pay to reduce exposure to a hazard)	Net benefits = Benefits minus costs Benefit-cost ratio = benefits/costs

Methods of Economic Evaluations

Pharmacoeconomics utilises two major methodologies for health economics analysis: cost analysis and cost outcomes. Cost-outcomes analysis is the most commonly used. There are four common types of methods of cost-outcomes economic evaluations (Table 1):

1. Cost-minimisation analysis (CMA)

Involves measuring only costs, usually only of the health service, applicable only when the outcomes are identical. For ex. Prescribing generic instead of brand medicine (lower cost, but same health outcomes).

CM = costs difference (A - B)

2. Cost-effectiveness analysis (CEA)

Should refer to particular type of evaluation, in which the health benefit can be defined and measured in natural units (e.g. years of life saved, lowering of blood cholesterol) and the costs are measured in money. It compares therapies with qualitatively similar results in particular therapeutic area. This analysis is the most frequently used in the literature, especially in pharmacotherapy.

C/E ratio = costs/therapeutic effect (in measurable units)

3. Cost-utility analysis (CUA)

This analysis is similar to cost effectiveness analysis, the costs are measured in money, but here the outcome is a unit of utility (e.g. QALY - Quality adjusted life year). In theory can be compared more than one area of medicine, but it isn't so simple to compare between therapies.

Ex. Calculating QALY:

With treatment X	Without treatment X
Estimated survival = 10 years	Estimated survival = 5 years
Estimated quality of life (relative to "perfect health") = 0.7	Estimated quality of life (relative to "perfect health") = 0.5
QALYs = (10 x 0.7) = 7.0	QALYs = (5 x 0.5) = 2.5

QALY gain from treatment X = 7 - 2.5 = 4.5 QALYs

If the cost of treatment X is 18.000 EUR, then the cost per QALY is 4.000 EUR per QALY (18.000 EUR divided between 4.5 additional QALY's). (Reproduced from Ref. 2 with permission.)

4. Cost-benefit analysis (CBA)

Cost benefit analysis involves identifying and measuring all the costs for providing a program or therapy and comparing these costs with the benefits that result.

B/C ratio = benefits (money)/costs (money)

If number greater than 1 yield, the benefits exceed the costs, and the program or treatment is considered beneficial [2,4].

Results of Economic Evaluations

There are 4 possible results arising in CEA (Figure 1). If costs are lower and health benefits higher for one drug relative to another, it would be preferred treatment (quadrant II). Opposite, if the new drug is more expensive and less effective, it is inferior and not recommended (quadrant IV). The most common case is when the drug is more expensive and more effective (quadrant I). On the basis of CEA, judgement should be made whether the additional benefits are worth the extra costs for the new drug. The last case is similar to the preceding, just the roles of the new therapy and the standard are reversed (quadrant III). Now the question is whether the extra benefits from the standard justify the additional costs of retaining it as preferred therapy, when new, cheaper but less effective drug exists.

To define what is minimum acceptable value is difficult, how much is an extra QALY worth? This is value judgement, can be explored to some extent via techniques as for ex. identifying how much the patient or the public are willing to pay in order to avoid unfavourable outcome. In UK, National Institute for Health and Clinical Excellence, NICE, operates with minimum of 30.000 pounds/QALY, although this isn't formally declared and its existence has been denied .

There are suspicions, because biggest number of studies are conducted or funded by pharmaceutical companies, who are very interested in the results, that these studies are at payers side. The same may arise also in studies funded by health care payers [2].

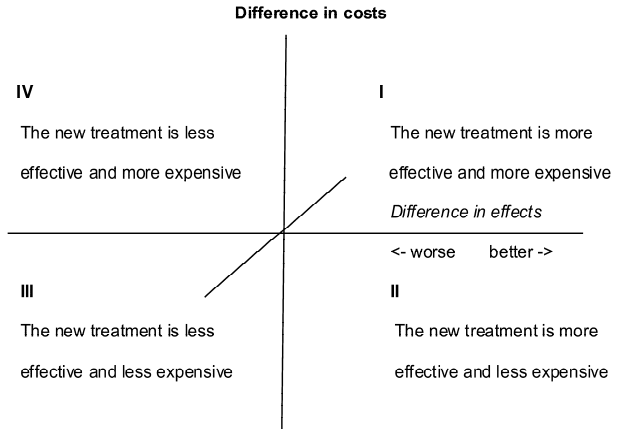

Figure 1: Diagram of difference in cost (reproduced from Ref. 2 with permission).

Conclusion

Pharmacoeconomic methods are used to assist physicians, hospitals, insurers, patients and healthcare professionals in making proper decisions what drug therapies should be chosen. After drug registration approval and sales release, there are numerous drugs on the market which can be interchangeably used. This makes difficulties in creating formularies from both hospitals and insurance companies. For example, it can be conducted pharmacoeconomic study comparing hospitalisation rates of asthma patients using corticosteroids versus beta-agonists, which can assist in choosing proper drug.

Doctors may equate pharmacoeconomics with rationing or cost cutting; many therefore reject this principle as unethical process. Because resources in healthcare are limited, wasting them by inefficiency is wrong, as it reduces clinician's ability to give the best possible care for patients. There are so called waiting lists of patients for difficult and expensive to treat diseases because of limited budgets. Therefore seems unethical also not considering the economics of medical intervention [2, 5].

Pharmacoeconomics is used to determine for which drugs the expenses should be covered by health insurance funds, by choosing the most effective treatment for the lowest price. By research it has been found that 86% of hospital pharmacists use the pharmacoeconomic data in creating formularies. Except for decision between two drugs, additionally pharmacoeconomics helps to make decision between drug versus surgical intervention and drugs versus watchful waiting, based on the treatment effectiveness and the cost [1].

Drugs can be assessed by pharmacoeconomics after receiving marketing authorization - Phase IV - postmarketing research. To include the drug in the reimbursement list, specially for the new drugs, pharmacoeconomic studies must be carried out and submitted to relevant institutions by the pharmaceutical companies [1, 5].

Pharmacoeconomic studies include the total costs connected with the disease - direct and indirect costs. Direct costs consist of drugs, medical devices, doctor visits, emergency room visits, diagnostic services, education and research. Indirect costs comprise lost school or working days, productivity lost, travelling and waiting time. Direct costs exceed indirect costs. Many costs aren't visible, for ex. education and non-compliance costs. Education will help for bigger adherence, without education there will be lower rate of adherence, which obviously leads to increasing costs. Therefor education programme should be included for the lowest cost.

Physicians should be aware of effective treatments that minimise costs. Pharmacoeconomic analysis should be utilised for creating clinical guidelines that will assist physicians for prescribing the most efficient drug.

Pharmacoeconomic evaluations are important tool utilised in the healthcare field that optimise healthcare expenditures, and we can expect to see their impact increase in the future.

Pharmacoeconomics is essential tool for therapeutic decision making. Using databases of funds for health insurance or other insurers or payers, the pharmacoeconomist can directly compare different drugs. The goal is to find the most efficient and effective treatment for the lowest cost, optimising the patient outcomes and decreasing costs to society [1].

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