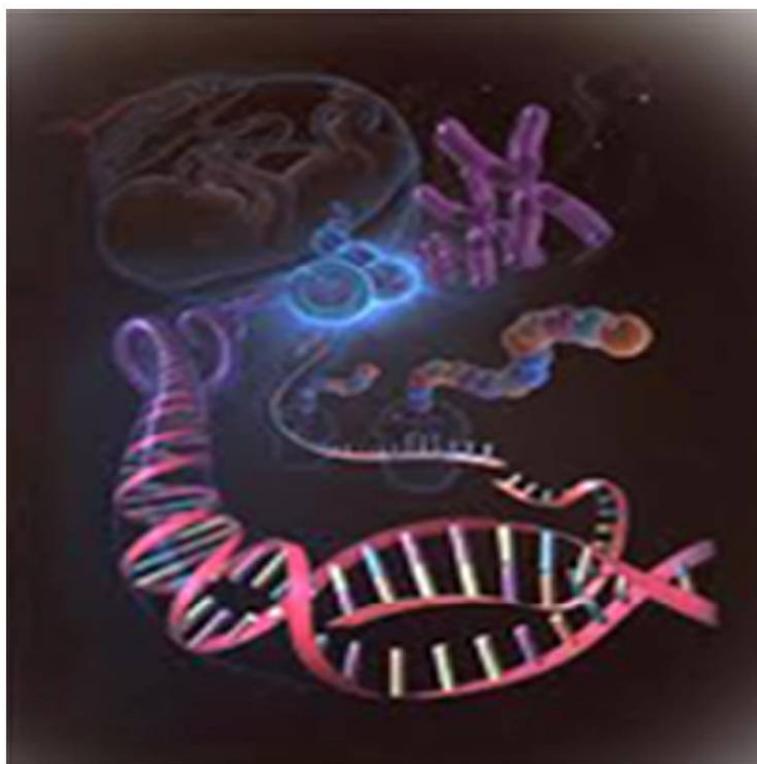




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Review Article

AN OVERVIEW OF PHARMACOECONOMICS AND OUTCOMES RESEARCH

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Application of economic evaluations to the pharmaceuticals is termed as pharmacoeconomics. There is a prolonged significance in the assessment of economic efficiency of health care programmes which is accomplished through economic evaluation where the costs, benefits and consequences of alternative new drugs, therapies and treatments are compared and contrasted. Various fundamental forms of evaluations such as COI, CBA, CMA, CEA etc are widely used and thereby estimates whether the enhanced significance in economic analysis is promising to the patients, clinicians and the society. Outcomes research deals with the identification, measurement and evaluation of the result of healthcare researches in general.

Keywords: Cost Effective Analysis, Cost Benefit Analysis, Cost Minimization Analysis.

INTRODUCTION

Healthcare stockers are making vigorous attempts to reduce the costs of the drugs, by price negotiations, budgets etc to meet the increasing costs. Spending on drugs and their therapy is a prime target to the government for savings in costs pertinent to health care. Reasons that constitute to this expenditure include the size of the drug bill, drug utilization, unnecessary prescribing of drugs, and prescription containing maximum number of expensive drugs. But this focuses on drug costs in isolation, when what should be of greater concern to decision makers, healthcare professionals and the public is the value of drug therapy, a function of both benefits and costs (Walley and Davey, 1995).

Health Economics

Health economics is basically defined as the science dealing with the assessment of costs and benefits. It does not make decisions about use of resources instead inform them. The objective is to recognize what is more efficient, so that largest amount of benefit can be obtained for a given sum of money. However in healthcare, efficiency and efficacy are not the prime targets since we might consider care for dying patients, hope of survival in patients suffering with serious diseases.

Pharmacoeconomics

Pharmacoeconomics is an important branch of health economics that mainly deals with drug therapy. It is the description and analysis of costs of drug therapy to health care systems and

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society. The research aims at identification, measurement and comparison of costs and consequences (humanistic, economic etc) of pharmaceutical products and services (Drummond *et al.*, 2005). Various types of methodologies used in this research such as cost-effectiveness, cost-benefits, cost-utility, cost-minimization, cost-of-illness, cost-consequences etc. The importance of Pharmacoeconomics can be found in

- Drugs to be included in formulary
- Drugs showing maximum efficacy for a particular individual/patient
- Better drug delivery system to a hospital
- Development of a best drug for the manufacturer
- Best drug for a particular disease
- Improvement of quality of life of the patient by a particular therapy.

Pharmacoeconomics compares a new drug with an already existing drug or a non-pharmacological intervention. If the new drug proves to be more efficient than the existing drug or therapy, savings can be made in healthcare costs (hospitalization) or if the new drug has least side effects relatively, only few drugs can be used to treat the adverse effects thereby reducing the cost and improving health.

Outcomes

On the other hand, outcomes are used to explain the results, value of healthcare intervention. Patients are now being informed about the decisions of their own healthcare and are looking forward for more information related to humanistic outcomes of their therapy. Quality of care along with cost containment was found to be the main

objective. Economic outcomes should be considered important along with clinical and humanistic outcomes in order to assess the true value of healthcare interventions.

Perspectives

When patients were treated with Alteplase, it showed 1% decrease in mortality while administration of streptokinase showed similar outcomes with utilization of less money and investment.

These perspectives are broadly classified into 4 categories:

Patient perspectives: As per the patient.

Eg.: Insurance co-payments, Cost of the drugs, etc.

Provider perspectives: It can be either a government or a private hospital.

Eg.: Lab tests, Hospitalization, Electricity, etc.

Payer perspectives: These are the direct costs.

Eg.: Government, Insurance Company.

Societal perspectives: It considers the benefits of the society, includes both morbidity and mortality.

Generally speaking, societal perspective is seen as the most apt one however, a healthcare worker with confined budget tends to overlook the societal view and consider the expenses that come under his own budget.

For instance, study of migraine which took the health perspective only might recommend the sumatriptan was notably unsatisfactory and abominable. In contrast, a study taking societal perspective might come to an opposing conclusion (Cull and Wells, 1992).

Classification of Costs and Benefits

Costs

Category	Costs
Direct cost	Drugs, Lab data, Hospitalization, Health care professional time
Indirect cost	Morbidity, Mortality
Intangible cost	Pain, suffering, grief
Opportunity cost	Loss of opportunity, Revenue forgone

Benefits

The benefits are measured in terms of:

Natural units: Eg.: Number of years of life saved, strokes prevented etc

Utility units: State of well being. It is an effort to evaluate the quality of a health state (Walley, 1997; and Haycox, 1997).

Consequences

Consequences are mainly measured in the following 3 terms.

Clinical outcomes: Cure, comfort and survival.

Humanistic outcomes: Physical, emotional, social function, role performance

Economic outcomes: Expense, saving, Cost avoidance.

Positive consequences include increased life span, improvement in the quality of life while the negative consequences might be increased adverse effects and toxicity. Assessment of both the consequences is crucial.

Economic Evaluation

It is defined as identification, measurement, valuation and comparison of the costs and consequences of alternatives being considered.

Economic Evaluation is basically of two types:

- Full
- Partial

Partial	Full
Simple description of outcomes or resources	Same in cost but differ in measurement of outcomes.
Less time and Less effort Eg.: Simple	More time, Resources and efforts Eg.: CBA, CEA,
Cost Analysis	CMA, CUA.

Types of Pharmacoeconomic evaluations (Robinson, 1993).

1. Cost of Illness Evaluation
2. Cost Benefit Analysis
3. Cost Minimization Analysis
4. Cost Effective Analysis
5. Cost Utility Analysis

Cost of Illness Evaluation (COI)

It is also referred to as burden of illness. COIs are important in Pharmacoeconomic evaluations of new drug therapies. It identifies and estimates the overall cost of a particular disease for a defined population (Drummond M, 1992). Measurement of direct costs and indirect costs attribute to a particular disease. COI evaluation is not used to compare competing treatment alternatives.

Eg.: Alzheimer's disease.

Similar to other Pharmacoeconomic evaluations, it is also necessary in COI evaluations to completely consider the study and design of intent.

Cost Benefit Analysis (CBA)

CBA is a fundamental tool to improve the decision

making process in deciding the funds to healthcare programs (Boardman *et al.*, 2005). It is the broadest form of economic evaluation since all the costs and consequences are measured in terms of same unit, i.e., money. Therefore, assessment can be made on whether the total costs of an intervention are justified by its total benefits (Brown *et al.*, 2003). Cost Benefit Analysis mainly involves identification, measurement, comparison of the benefits and costs of the program or treatment alternatives. (Bootman JL *et al.*, 1979).

Cost Minimization Analysis

It is the most confined type of analysis and concentrates on costs related to health service and is applicable only where the outcomes are similar and need not be considered individually. Cost Minimization Analysis comes into play when two or more interventions have equal therapeutic outcomes. It involves the determination of least expensive alternative. As a rule of thumb, alternative must have assumed equivalency in safety and efficacy. It is a simple Pharmacoeconomic evaluation but outcomes must be equivalent for analysis.

Cost Effective Analysis

The term Cost Effective Analysis generally refers to the entire economic evaluation, but to be precise, it refers to a particular type of evaluation, in which the health benefits are defined and measured in natural units. It helps the decision-makers to opt the best possible alternative. It is used for the determination of a program or therapy that accomplishes a given objective at least cost (McGhan *et al.*, 1978; and Bootman *et al.*, 1979). In CEA, the effectiveness is expressed in terms of monetary units that describe the desired

objectives such as lives saved, disability days avoided and cases treated.

Results are expressed in ratio as:

- ACER: Average Cost Effective Ratio
- ICER: Incremental Cost Effective Ratio

ACER = healthcare costs/Clinical outcomes

$$ICER = \frac{\text{Cost of drug X} - \text{Cost of drug Y}}{\text{Effect of drug X} - \text{Effect of drug Y}}$$

This formula yields the additional costs required to obtain additional effects gained by switching from drug X to drug Y.

Drug	Cost	Life Years Gained	Cost to Outcomes Ratio	Life Years Gained per unit currency
X	A	P	A/P	P/A
Y	B	Q	B/Q	Q/B

Note: Cost or The additional life years saved =
(B-A)/(Q-P)(ICER)

Cost Utility Analysis

Cost Utility Analysis measures the consequences in terms of quantity and quality of life. It is similar to cost effective analysis but has an additional aspect of certain point of view, most likely that of a patient. CUA has gained its importance by assisting in making decisions related to healthcare programs such as surgery verses chemotherapy, however, instruments that are reliable and sensitive enough to detect changes with drug treatments like one antihypertensive agent verses other are still required (Lyle Bootman *et al.*, 1991).

In CUA, health states are given importance pertinent to one another by using health utilities. Then the better treatment between the two is measured in terms of Quality Adjusted Life Years (QALY) gained. (McGregor M, 2003).

1.0 QALY = disease free year

0.5 QALY = year spent with a particular disease

An Eg.: to demonstrate the QALY Calculations:

Under treatment	No Treatment
Estimated years of life = 5yrs	Estimated years of life = 1 year
Quality of life in relevance to	Quality of life in relevance to
Perfect health = 0.8	perfect health = 0.4
QALY's = $5 \times 0.8 = 4.0$	QALY's = $1 \times 0.4 = 0.4$

QALY gained from treatment = $4 - 0.4$

= 3.6 QALY's

If the cost of the treatment is \$9000, then the cost per QALY is \$2500 ($9000/3.6$).

CUA is more appropriate to treatments having greater adverse effects and those which are life extending like cancer chemotherapy. It is also effective for programs that bring about a decrease in morbidity rather than mortality as in case of arthritis.

CONCLUSION

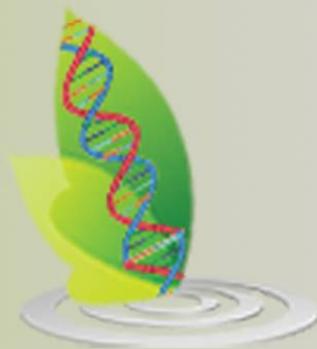
Pharmacoeconomics is a means to quantify the value of pharmacotherapy by balancing costs and outcomes. It provides quality care and life with minimum resources and costs. It has gained its importance in decision making for clinicians. Today, most of the jurisdictions are using Pharmacoeconomic analysis as a part of their

evaluations and decision making. Therefore, it is crucial to understand pharmacoeconomic methods when seeking to use new costly drugs.

REFERENCES

1. Boardman Anthony E, David H Greenberg, Aidan R Vining and David Leo Weimer (2005), *Cost Benefit Analysis: Concepts and Practice*, FT Prentice Hall.
2. Bootman J L, Wertheimer A, Zaske D, Rowland C (1979), "Individualizing Gentamicin Dosage Regimens on Burn Patients With Gram Negative Septicemia: A Cost Benefit Analysis", *J. Pharm. Sci.*, Vol. 68; pp. 267-272.
3. Brown Richard P C and Harry F Campbell (2003), *Benefit-Cost Analysis: Financial and Economic Appraisal Using Spreadsheets*, Cambridge University Press.
4. Cull R and Wells N (1992), "Economic Costs of Migraine", *Br J. Med. Econ.*, Vol. 5, pp. 103-115.
5. Drummond M F (1992), Economic Evaluation of Pharmaceuticals: Marketing or Science?", *Pharmaco Economics*, Vol. 1, pp. 8-13.
6. Drummond M, Stoddard G and Torrance G (1988), *Methods for the Economic Evaluation of Healthcare Programmes*. Oxford Medical Publications, Oxford.
7. Drummond M (1994), *Economic Analysis Alongside Controlled Trials: An Introduction for Clinical Researchers*.
8. Lyle Bootman J, Raymond J Townsend, William F McGhan (1991), *Introduction to Pharmacoeconomic*.

9. McGhan W, Rowland C, Bootman J L (1978), "Cost Benefit and Cost Effectiveness: Methodologies for Evaluating Innovative Pharmaceutical Services", *Am J Hosp Pharm*, Vol. 35, pp. 133-140.
10. McGregor M (2003), "Cost-Utility Analysis: Use QALYs Only with Great Caution", *Can Med Ass J*, Vol. 168, pp. 433-434.
11. Robinson R (1993), "Economic Evaluation and Health Care", *Br Med J*.
12. Roger Walker and E Clive (2003), *Clinical Pharmacy and Therapeutics 3rd Edition 2003* Churchill Livingstone Publication, pp. 85-94.
13. Walley T and Davey P (1995), "Pharmacoeconomics: A Challenge For Clinical Npharmacologists", *Br J Clin Pharmacol*, Vol. 40, pp. 199-202.
14. Walley T, Haycox A and Boland A (2004), *Pharmacoeconomics*, Churchill Livingstone, London.



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