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# A REVIEW ON PHARMACOECONOMICS

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**Abstract**

Drugs are the most important component of health care expenditures, and more attention is being drawn to the relation between the costs of medication and their benefits. Pharmacoeconomics is a sub-discipline of health economics which serve to guide optimal healthcare resource allocation, in a standardized and scientifically grounded manner. The pharmacoeconomic evaluation along with pharmacoepidemiology studies aims to bring together the various specialties of medicine, epidemiology, biostatistics, health services research, and the social sciences to evaluate the effectiveness of existing and new prescription drugs in relation to their risks and costs; to study how medications are used by physicians and patients; and to develop methods to optimize prescription drug use. Pharmacoeconomic evaluations compare both cost and consequences of at least two interventions which helps in establishing accountability that is claimed by a manufacturer. Proper application of pharmacoeconomics will allow the pharmacy practitioners and administrators to make better and more informed decisions regarding products and services they provide.

**Keywords**- Pharmacoeconmics, cost, evaluations, medicines, efficacy, quality-adjusted life.

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## INTRODUCTION

Pharmacoeconomics refers to the scientific discipline that compares the value of one pharmaceutical drug or drug therapy to another. Pharmacoeconomics study is primarily for the purpose of drug listing, competitiveness, pricing, and reimbursement. This type of evaluation encompasses all measurements against the disease being investigated. The judgment is based on quality-of-life benefit–risk balance, comparative effectiveness, comparators, or other available treatment options over an existing drug and affected population, clinical trial protocol design, therapeutic rationale and need, clinical outcomes, efficacy or effectiveness, safety, and tolerability.

The term Pharmacoeconomics was first time used in public forum was in 1986, at meeting of pharmacist in Toronto, Canada, when Ray Townsend from the Upjohn company, used the term in presentation. Ray and few other had been performing studies using the term pharmacoeconomics within the pharmaceutical industry since the early eighties. In 1983, Ohio State University College of Pharmacy initiated a specialized pharmacy academic program with the objective of providing an overview of the application of cost benefit and cost effective analysis in healthcare, with emphasis on their application to the

delivery of pharmaceutical care.[1]

Initially, defined as “analysis of the costs of drug therapy to healthcare systems and society”, the actual term “pharmacoeconomics” first appeared in the literature in 1986 when Townsend's work was published to highlight the need to develop research activities in this new discipline. In 1992, a journal named “Pharmacoeconomics” was launched.

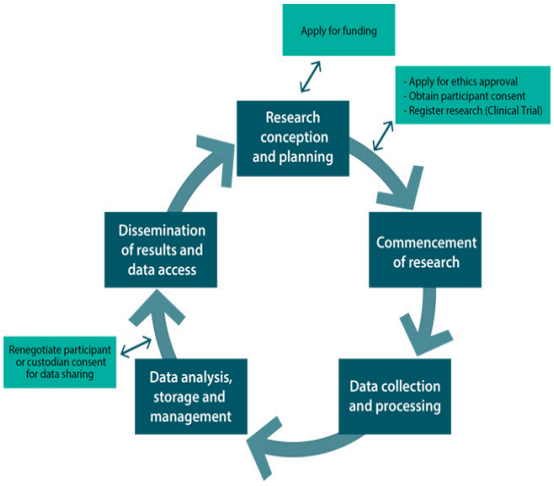


Figure 1- Steps in Drug Design

Pharmacoeconomicsrelevant endpoints such as cost and effectiveness are becoming increasingly popular. They are very accurate and correlated in many situations. Insurance companies, health care facilities, employers, and government agencies are concerned if they can pay for certain treatments, especially in this age of limited resources. In some cases, pharmacoeconomic measures may be superior to clinical measures in approximating disease severity (e.g., allergies, depression). A treatment may help reduce different measures of health care resource utilization (e.g., emergency room visits, hospitalizations, days in the intensive care unit, or number of procedures needed) or worker productivity (e.g., days of work missed or worker output), all potential surrogates for disease severity. Some trials are designed to measure the cost-benefit or cost-effectiveness of a treatment or intervention.[2] Similar rules that apply to clinical endpoints, apply for pharmacoeconomic endpoints. This is especially true when two interventions with equivalent clinical efficacy, but different costs are being compared.

The pharmacoeconomic endpoint should be relevant, responsive, rich in information, etc. In addition, the endpoint should be relevant to the perspective, which should be specified prior to the trial.

The goal of a pharmacoeconomic study is to determine whether the expense incurred by the use of a new medication is justified in comparison with the cost of existing medication as well as potential savings resulting from a decrease in the number of physician visits, emergency room visits, length and number of hospitalizations, ancillary transportation costs, and the number of days of work lost by patients taking the new medication.[3]

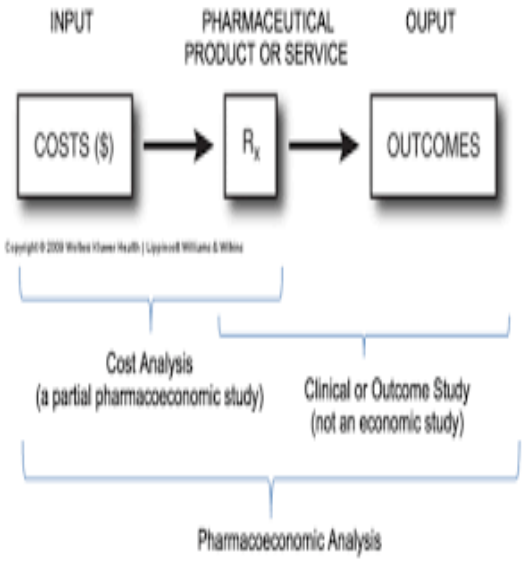


Figure 2- Flow Chart for Pharmacoeconomics

**PHARMACOECONOMIC EVALUATIONS**

There are at least four types of pharmacoeconomic analyses[4]

•CEA - Cost Effective Analysis

CEA involves comparing therapeutic programs or treatment alternatives with different safety and efficacy profiles. It is an approach used for identifying, measuring, and comparing the significant

costs and consequences of alternative interventions. A value measured in units of currenciess, and outcomes measured in terms of obtaining a particular therapeutic outcome. These results often expressed in physical units, natural units, or monetary units, for example lives saved, cases cured, life expectancy, or mm Hg drop in blood pressure. The outcome of CEA is expressed as a ratio as well. The two possible methods for the CEA quotient are an incremental cost-effectiveness ratio (ICER) and an average cost-effectiveness ratio (ACER).

•CUA - Cost-utility analysis

Cost-utility analysis (CUA) is an additional method for comparing treatment options. CUA incorporated patient preferences and health-related quality of life (QoL). The use of CUA is the most suitable method to utilize when comparing treatment alternatives that are life extending with serious adverse effects. For instance, treatment of cancer with chemotherapy, as well as those which produce a reduction in morbidity rather than mortality as treatment of arthritis. The

term 'quality-adjusted life year' (QALY) is a standard measure of health status used in CUA combining morbidity and mortality data. The number of QALYs lived by an individual in one year is simply:

QALYs lived in one year = 1 * Q with $Q \leq 1$

where Q is the health-related quality of life weight attached to the relevant year of life. The chosen treatment alternative is that with the lowest cost per QALY. Thus, QoL is the most important health outcome being examined as per patient preferences.

•CMA - Cost-minimization analysis

Cost-minimization analysis (CMA) involves the determination of the least costly alternative when comparing two or more treatment alternatives. With CMA, the alternatives must have an assumed or demonstrated equivalency in safety and efficacy (i.e., the two alternatives must be equivalent therapeutically). Once this equivalency in outcome is confirmed, the costs can be identified, measured, and compared in monetary units. CMA is a relatively straightforward and simple method for comparing competing programs or treatment alternatives as long as the therapeutic equivalence of the alternatives being compared has been established. If no evidence exists to support this, then a more comprehensive method such as cost-effectiveness analysis should be employed. Remember, CMA shows only a "cost savings" of one program or treatment over another. Employing CMA is appropriate when comparing two or more therapeutically equivalent agents or alternate dosing regimens of the same agent. This method has been used frequently, and its application could expand given the increasing number of "me too" products and generic competition in the pharmaceutical market.

•CBA - Cost-benefit analysis

Cost-benefit analysis (CBA) is a method that allows for the identification, measurement, and comparison of the benefits and costs of a program or treatment alternative. Both the costs and the benefits are measured and converted into equivalent monetary units in the year in which they will occur.

The CBA is also defined as a systematic process for calculating and comparing benefits and costs of a project, decision or government policy (hereafter, "project"). Broadly, CBA has two purposes:
1. To determine if it is a sound investment/decision (justification/feasibility),
2. To provide a basis for comparing projects. It involves comparing the total expected cost of each option against the total expected benefits, to see whether the benefits outweigh the costs, and by how much.

CBA is related to, but distinct from cost-effectiveness analysis. In CBA, benefits and costs are expressed in monetary terms, and are adjusted for the time value of money, so that all flows of benefits and flows of project costs over time (which tend to occur at different points in time) are expressed on a common basis in terms of their "net present value."

The main difference among these analyses is the unit of health outcomes measured and its implications. Many professionals consider that CUA and CMA are different types of CEA.

The CMA assumes that the outcomes are identical for an intervention or its comparator, so if there is a difference in cost, the cheapest intervention could be adopted. CEA is the prototype pharmacoeconomic evaluation that measures the outcomes in natural units, e.g., hemoglobin A1C levels for hypoglycemic agents, LDL-c levels for lipid-lowering agents, life years saved for any intervention affecting mortality rate, etc. The CUA measures health outcomes in a universal unit like the QALY or disability-adjusted life years. Even though technically QALY is used in CUA, some professionals use it as an outcome measure but call the study CEA. The CBA is quite different in the sense that the health outcomes are converted into a currency unit, which is clearly an unnatural unit and sometimes unethical (Table 1).

| Type of Pharmacoeconomic Analysis | Cost | Outcomes |
|---|---|---|
| Cost-minimization analysis | Monetary value | – |
| Cost-effectiveness analysis | Monetary value | Health outcomes in a natural unit (i.e., hemoglobin A1C, low-density lipoprotein cholesterol) |
| Cost-utility analysis | Monetary value | Outcome in a common unit (i.e., quality-adjusted life year) |
| Cost-benefit analysis | Monetary value | Monetary value |

Table 1- Types of Pharmacoeconomic Analysis

Because pharmacoeconomic analyses estimate both cost and health outcome and compare such cost and outcome of one intervention with others, there is a specific way to report their findings. In general, pharmacoeconomic analysts report their findings in one common measure "Incremental cost-effectiveness ratio (ICER)."

ICER is calculated by the difference in cost between an intervention of interest and a comparator divided by the difference in health outcomes between the intervention of interest and the comparator (Eq. 19.1). CEA and CUA use the same formula for ICER. When quality-adjusted life years is used as the outcome measure, it could be called CUA or CEA. When natural units such as A1C or LDL-c are used as an outcome measure, it is called CEA.

$$\text{ICER} = \frac{(\text{cost of A} - \text{cost of B})}{(\text{effectiveness of A} - \text{effectiveness of B})}$$

## PERSPECTIVES OF PHARMACO-ECONOMICS [5]

• Patient Perspective--Patient perspective is paramount because patients are the ultimate consumers of healthcare services. Costs from the viewpoint of patients are basically what patients pay for an item or administration—that is, the segment not secured by protection.
• Provider Perspective--Costs from the provider's perspective are the actual expense of providing a product or service, regardless of what the provider charges. Providers can be hospitals, MCOs, or private-practice physicians. From this perspective, direct costs such as drugs, hospitalization, laboratory tests, supplies, and salaries of healthcare professionals can be identified, measured, and compared.

• Payer Perspective--Payers include insurance companies, employers, or the government. From this perspective, costs represent the charges for healthcare products and services allowed or reimbursed by the payer. The primary cost for a payer is of a direct nature. However, indirect costs, such as lost workdays (absenteeism), being at work but not feeling well and therefore having lower productivity (presenteeism), also can contribute to the total cost of healthcare to the payer.

• Societal Perspective--Theoretically, all direct and indirect costs are included in an economic evaluation performed from a societal perspective. Costs from this perspective include patient morbidity and mortality and the overall costs of giving and receiving medical care. An evaluation from this perspective also would include all the important consequences an individual could experience. In countries with nationalized medicine, society is the predominant perspective.

Pharmacoeconomic studies categorize costs into four types: direct medical, direct nonmedical,indirect, and intangible.[6]

| *Parameter* | *Advantages* | *Disadvantages* |
|---|---|---|
| Economic evaluation alongside clinical trials | Randomization (internal validity) Low cost of economic data collection Economic results are available before reimbursement decisions | Selected patient population Protocol-induced costs Limited time horizon Monitoring of economic data is less strict than of clinical variables Calculation of statistical power is based on efficacy end points Economically meaningful events after clinical end point and study drug discontinuation |
| Naturalistic pharmacoeconomic studies | Non-selected ordinary patients in routine care settings (external validity) Real-world resource utilization and costs independent from the study protocol Easy monitoring if individual patient records in payers or managed care database can be linked based upon individual patient ID Large patient population | Unpredictable data collection, complicated study administration, lack of data monitoring Selection bias (if no randomization) Limited time horizon Economic results available only after reimbursement decisions |
| Economic modelling on the basis of prospectively collected clinical trial data | Economic modelling results available before major decisions (e.g. reimbursement) Generalizable results, adjusted to local medical practice and patient population | Results depend on appropriateness of modelling assumptions (e.g. model structure) Known uncertainty in input parameters reduces the clarity of conclusions |

## LIMITING FACTORS FOR PHARMACOECONOMIC EVALUATION

a) Choice of the drugs is given according to the marketed pressure. Pharmacists give drugs as per their will (alternative drugs for prescribed medicine).

b) Drugs are prescribed under promotional pressurizing activities of marketing executives of pharmaceutical firms. Incentives and gifts offered by these firms to doctors have a major impact on prescribing brands.

c) For chronic diseases, bio-availability consideration can have an upper- hand over pharmacoeconomics.[8]

To overcome these limitations, the following steps should be taken:
1) State associations should buy medicines directly from the firm/industry and sell to retailers who are associated members. These drugs would cost 30 - 40% lesser than current prices.

2) Retailers should lower their profit margins. There are three layers between drug makers and purchasers; super stockiest, authorized stockiest and semi-wholesalers. Dealing directly with the drug firm and availability of drugs through affiliated drug retailers would lower prices by 10 -12%.

3) Hospitals can buy expensive drugs for cancer and HIV directly from drug firms and sell through their pharmacies. To purchase the drug, select the firm having good marketing practices (GMP) and invite technical bids from them. Avoid the firm selling drugs with very low prices as this does not mean cost -effective drugs.
4) Sensitization of students of health sciences on pharmacoeconomics during their formative years is needed as they are future prescribers. The revised undergraduate medical curriculum stresses on the importance of the essential drug concept and to prescribe a drug tailored to individual needs based on safety, tolerability/suitability, efficacy and price (STEP). The students should be sensitized during their undergraduate course to consider the cost of the medicine they would be prescribing (Jana, 2005).
5) Creating awareness of concepts and

principles of pharmacoeconomics in existing physicians should also be done. Whether this carries implications for day-to day clinical decision making directly or through clinical practice guidelines formulated by a panel of experts, requires for clinician to understand various methods of evaluations and also to develop skills to interpret and critique results.

## METHODOLOGY: FOUR STEP MODEL BASED

The four steps in pharmacoeconomic research approach are-[9]

1. problem identification
2. clinical management analysis
3. pharmacoeconomic analysis
4. rank order stability analysis (ROSA).

This Four-Step Pharmacoeconomic Model, developed newly, has proven to be the state-of-the-art prototype for pharmacoeconomic research. It has been successfully utilized in numerous cost-effectiveness studies worldwide. The flexibility and versatility of this model has enabled researchers to apply it to several diverse clinical areas, including chemotherapy, dermatology, psychology, anesthesiology, neuromuscular blockade, imaging (contrast media utilization), and contraceptives.

### Step 1: Problem Identification

The problem identification segment of the study model dictates the key research issues associated with the pharmacoeconomic comparison of competing therapeutic interventions. The following issues must be explicitly addressed before beginning pharmacoeconomic evaluations:

**Research Question-** As in any scientific research project, the research question must be stated initially. Inherent in the research question are study objectives to map the path for future methodology decisions.

**Research Perspective-** The perspectives of a pharmacoeconomic study will prescribe the definition and valuation of cost and outcomes for the remaining analyses. All studies should begin with the society perspective and then be clearly subdivided for all relevant decision-making parties.

**Analytic Time Horizon-** The analytic time horizon should also be explicitly delineated during this phase. This time frame ideally extends far enough into the future to capture the major clinical and economic outcomes.

**Treatment Comparators-** The drug treatment should be compared with existing practice, relevant historical comparators, and minimum practice.

**Analytic Technique-** Researchers should identify the relevant and applicable pharmacoeconomic tools to be employed when analyzing the competing therapies.

**Outcome and Cost Measures-** Outcome measures should be identifiable, quantifiable, and consistent with current medical practice. Cost measures should be identifiable, quantifiable, and consistent with current hospital accounting practice. Both of these utility measures must be consistent and applicable to the defined perspective; that is, certain cost and outcome measures will be included or excluded, depending on the perspective. One traditional paradigm is to include measures that will influence the target audience's decision in choosing between therapies. Intuitively, this is a subjective decision, thus warranting a sensitivity analysis of alternative measures.

**Data Sources-** Clinical and economic data sources are defined after appropriate analytic techniques, costs, and outcomes are delineated. Data sources may range from retrospective analysis of government databases and the literature to prospective economic clinical trials and "time and motion" studies.

**Potential Limitations-** Potential limitations of the research study should be discussed during the problem identification segment of the analysis. The analytic environment described above already represents one limitation of data generalizability. Pharmacoeconomic studies are encouraged to investigate local and global cost effectiveness (ie, all relevant comparators, analytic perspectives, and health care systems) of the drug therapy in question [10].

**Step 2: Clinical Management Analysis**

The clinical management analysis involves three steps: clinical appraisal, decision-analytic model construction, and the application of a clinical input (eg, metaanalysis) for clinical safety and efficacy outcomes. The objective of this step in our research approach is to develop a clinical and economic profile of the standards of practice for the disease management topic of interest in various health care environments (eg, a managed care setting).

**Clinical Appraisal-** A clinical appraisal is performed by interviewing clinicians with structured instruments to establish patient profiles and to define health care resources consumed in the implementation of therapy and in the management of adverse events.

**Decision-Analytic Model-** A decision-analytic model is constructed to reflect standards of care and project uncertainty for competing treatment modalities. The decision-analytic model accounts for all therapeutic pathways and outcomes, probability data for obtaining each outcome, and the cost of each outcome. This chronologic arrangement of therapy events and outcomes will actuate the subsequent pharmacoeconomic analyses.

This model should then be programmed in a spreadsheet format to accommodate user-specific inputs. An expert panel of clinicians, economists, and pharmacists will be instrumental in developing and reviewing this model. The model that will be developed during clinical management analysis may be adapted to a particular institutional setting. For example, to study
14 aspect of health care delivery-variations ın practice patterns-would require data on the following parameters: physician procedures, drug therapy, ancillary services, adverse events management, inpatient services, and outpatient services. To review variations in provider environments of a health care system, the model would consider the providers' payer mix, reimbursement schedules, prescription fees, and treatment restrictions.

**Metanalysis-** After appraising clinical algorithms and then customizing them to specific health care providers and systems, the clinical input(s) must be identified. To capture this clinical data initially, and simulate real-world practice patterns, we recommend the use of metanalysis.

Metanalysis is a systematic method for finding, evaluating, and combining results from different scientific studies. It mathematically aggregates therapeutic success rates and provides summary statistics based on weighted averages. It considers sample size in each study, as well as between-study differences, in providing an overall summary estimate. The results be combined using the method of DerSimonian and Laird, modified for single group analysis, as presented by Velanovich (1991). This method produces a sample-size weighted-average value for each rate for each comparator, along with a standard error so that a 95% confidence interval may be constructed (95% CI = the mean ± 1.96 × SE). Einarson and colleagues state that metanalysis is useful for integrating independent research results, but they also emphasize the importance of proper application.

An expert panel of clinicians should be assembled to assess and critique all ensuing phases of the analysis. Both the

protocol and results of the metanalysis should be compared with the opinions of the clinical experts.

**Step 3: Pharmacoeconomic Analyses**

The pharmacoeconomic analysis section of our research approach determines the expected cost and benefits of competing therapeutic interventions. In doing so, costs and probabilities of desired and undesired outcomes are considered. We first identify the cost inputs (ie, parameters that influence an economic analysis associated with the drug therapy) and outcomes (ie, therapy consequences identified in the clinical management analysis). We routinely employ the following pharmacoeconomic analyses: cost consequence, expected cost, and cost effectiveness.

**Cost-Consequence Analysis-** This analysis is comprised of two distinct research assessments: cost identification and outcome identification. Cost identification entails delineating all treatment parameters and then measuring the respective cost of each input. The definition of "cost" is sometimes ambiguous and will depend on the perspective defined in the clinical management analysis. For example, the allocated portion of cost may be of interest to the provider but not the third-party payer. The cost identification or cost of regimen analysis includes a calculation of the cost of drug therapy, medical care, facility use, and management of adverse events.

Drug therapy cost should not be misinterpreted as acquisition cost only (ie, the purchase cost of a drug to an institution, pharmacy, or patient). This parameter may also include the cost of labor time, overhead, supplies, equipment, and wastage associated with the preparation and administration of a drug regimen.

The cost of medical care is determined by calculating all costs concerning routine procedures and tests administered to the patient. It includes physician services and any ancillary service expended in treating the patient. Capital, overhead, labor, and related operating costs may all be considered.

Inpatient and outpatient services are also considered in this full costing approach. Time spent in routine care units, intensive care units, intermediate care units, rehabilitation units, outpatient clinics, etc, must be tracked and costed accordingly. Ideally, these costs are disaggregated into variable, fixed, and mixed classifications, to more precisely account for volume or service mix changes.

Adverse event management costs are calculated on a component basis for each adverse effect. Total management costs, inclusive of physician and hospital costs, are multiplied by percent incidence and percent treated.

After identifying cost parameters, outcomes and consequences must then be defined and measured. These definitions should be consistent with present standards of care, quantifiable, and valuable to the medical decision maker who is allocating health care resources.

Cost-consequence analysis aggregates these cost and outcome data but does not weigh the parameters for the end-user of the analysis. The decision maker must interpret the data and infer any interrelationships. All costs and outcomes identified should be calculated as increments and totals, to be used in the subsequent pharmacoeconomic analysis.

**Expected-Cost Analysis-** This pharmacoeconomic calculation represents a hybrid analysis of competing therapies that incorporates efficacy and cost data defined in the above-mentioned analyses. Decision analytic principles form the underlying methodologic structure. Decision analysis is an explicit quantitative approach for choosing among competing strategies under conditions of

uncertainty. The process involves calculating and summing expected utilities for each therapy. To do so, all patient outcomes are identified, valued, and classified for relevance to each analytic perspective.

A decision tree that depicts the information is used in the analysis. Each branch represents an outcome to which a probability is assigned. Probabilities may be success rates, failure rates, or adverse event incidence rates. This prescriptive tool provides a structure for depicting relationships between actions (therapeutic interventions) and their possible consequences (outcomes).

Future outcomes and costs should both be discounted, preferably at equivalent rates, as a baseline to be varied in sensitivity analyses. The result of this systematic approach to manage uncertainty is an expected cost of competing therapies.

**Cost-Effectiveness Analysis-** This type of pharmacoeconomic analysis compares therapeutic interventions that generate common health outcomes. Cost-effectiveness analysis expresses outcomes as physical units, such as life-years saved. Cost-identification and cost-consequence analyses financially quantify the care rendered to the patient and the resulting treatment consequences. The patient perspective has yet to be considered in either the cost-consequence or expected-cost analysis. In a retrospective analysis, it is difficult to assess patient desirability of a specified health outcome. As a proxy, we have applied event-free days as our effectiveness measure in our oncology studies.

Certain situations will merit an incremental cost-effectiveness analysis in which marginal effectiveness must be weighed against incremental or decremental cost associated with an extra unit of health outcome achieved. In this case, the willingness of a provider or third-party payer to pay must be approximated as some threshold value. A contingent valuation may be employed to evaluate the appreciated benefit of a therapy to the decision maker. This debated calculation represents a component of cost-benefit analysis.

Health-related quality of life (HRQOL) or quality adjusted life-years (QALYs) represent a better gauge of patient preferences and are most commonly determined prospectively. Cost-utility analysis measures benefits in these utility units and utility-adjusted life-years.

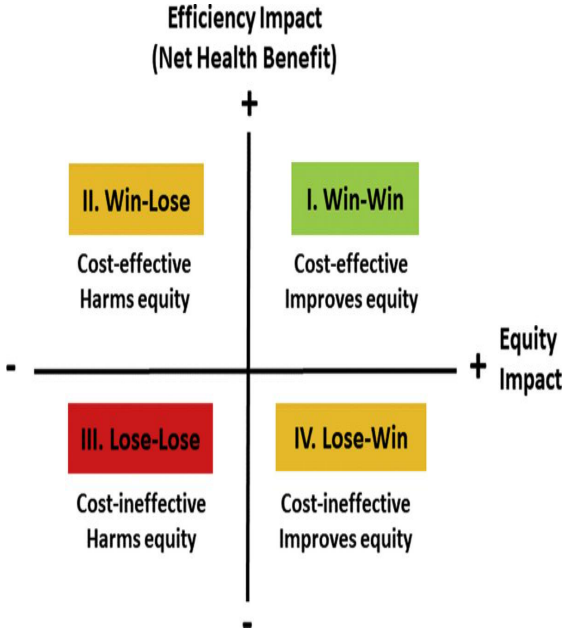


Figure 4- Distributional Cost effectiveness analysis

## Step 4: Rank Order Stability Analysis (ROSA)

Pharmacoeconomic analyses routinely conclude with some type of variability measure. This calculation is necessary to ensure the validity of the data in question. We recommend a comprehensive sensitivity analysis to identify "cost drivers" and specific points of model instability.

Rank order stability analysis (ROSA) is an approach for examining the sensitivity of pharmacoeconomic analyses. It is a comprehensive and clear method for validating results based on estimates and, in effect, a break-even analysis that

identifies the specific point of insensitivity for all parameters in the pharmacoeconomic model. ROSA includes the following steps:

1. Identification of outcome of interest

2. Identification of input parameters to use as variables

3. Calculation of upper and lower limits of robustness

4. Calculation of parameter elasticities

5. Calculation of 95% confidence intervals for clinical rates

Substantial alteration in the analytic results should induce further examination of relevant data to ascertain the actual value of the uncertain variable. If study conclusions are upheld or remain stable with ROSA, a higher degree of validity is assigned to the analysis. However, these results do not represent impregnable conclusions and should not be construed in such a fashion. Regardless of the amplitude of instability, the relevant range of all parameter values should be stated explicitly in the study report. Only then may the decision maker interpret and utilize the information to more efficiently allocate health care resources.

**Pharmacoeconomic studies find value in**

- Fixing the price of a new drug and re-fixing the price of an existing drug
- Finalizing a drug formulary
- Creating data for promotional materials of medicines.
- Compliance of requirement for drug license.
- Including a drug in the medical/insurance reimbursement schemes.

## CONCLUSION AND FUTURE PERSPECTIVES

The effectiveness of the treatment under the influence of all the confounding variables in real life depend on outcomes. Therefore, costs have to be measured under real-life conditions. Sothe outcome parameter chosen should have high everyday relevance.[11]

Costs are the resources consumed by the illness and by its treatment. Direct costs are those directly related to diagnosis and treatment of side effects and complications of the initial therapy. Indirect or future costs are those related to lost productivity due to illness as well as those related to health care consumption during the years of life gained owing to the intervention.

The economic impact of treatment extends into the future. If costs and benefits accrue during different periods, costs and savings have to be discounted for the remaining life spam of the patient sample in question. Discount rates are supposed to reflect the rates of return on private-sector investments and are generally set at 3–5 percent.If the costs are low and the outcomes excellent the decision in favor of the treatment is obvious as is its rejection if the costs for poor outcomes are high. [12]

Therefore, pharmacoeconomic analyses make sense only when both the costs and the quality of treatment are high or low. The economic efficiency then is the ratio of costs divided by the outcomes. When allocating resources, the drug yielding the most favorable outcomes at the lowest cost will be favored.

Thus, the pharmacoeconomic evaluation is essential to obtain optimal therapy at lowest price, alternative treatment plans, which help the poor and middle-class people to obtain well health care services. Many households are below poverty line and those are unaffordable for private health care.[13] Costs of the medicines are growing constantly. In a country like India with scarce resources and an ever growing population with diverse health care needs, health economics (pharmacoeconomic evaluation)plays a pivotal role in

determining the delivery of equitable and cost-effective health services.

Although there is a need for more research, the pharmacoeconomic analyses available suggest that the new drugs may at least be cost neutral or even cost saving despite their higher acquisition costs, essentially by reducing institutionalization. Nevertheless, the access of patients to the new therapeutic chances is restricted on economic grounds although this varies internationally.[14]

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