



Fundamental Understanding of Pharmacoeconomics as an Innovative Concept within the Modern Clinical Pharmacy in Today's Healthcare System

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ABSTRACT

The objective of this article is to present the essential information regarding a novel concept of pharmacoeconomics with the purpose of enhancing today's young pharmacy students' understanding of the economic theory, terminology and its effect on the healthcare system. Furthermore, to assist the healthcare policy makers and providers in making decision for evaluating the affordability of medications and access to logical drug use. As the rapid changes in modern medicine is adding to the intricacy of drug therapy, the expansion of the role of pharmacists becomes extremely vital in healthcare. Therefore, the knowledge of pharmacoeconomics considered as the essential component of their profession. Pharmacoeconomics is a set of techniques to assess the Economic, Clinical and Humanistic Outcomes (ECHO) of pharmaceutical products and services. The two primary components of pharmacoeconomic studies are measures of costs and outcomes. It can be measured using the five methods such as, Cost minimization analysis (CMA), Cost of Illness (COI), Cost-effectiveness analysis (CEA), Cost-utility analysis (CUA), and Cost-benefit analysis (CBA). Pharmacoeconomics and Outcome Research have a significant function in the management of medication expenditure. The cost of medicines are constantly growing; therefore, the price of drugs do matter as many people in developing countries are living below-poverty-line. Consequently, countless poor individual families frequently face an option of purchasing medicines or buying groceries and perhaps other necessities due to limited resources and the high cost of the drugs. Presently pharmacoeconomics role in many developing countries is in early stages with a limited knowledge of the subject; hence, clear methodology, education, and initiative are required for its maturity.

Keywords: Benefit to cost ratio, direct medical cost, drug cost, intangible cost, pharmacoeconomic evaluation, quality-adjusted life year.

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INTRODUCTION

The aim of this paper is to offer the essential information regarding a novel concept of pharmacoeconomics. Furthermore, to enhance today's young pharmacy students' understanding of the economic theory, terminology and its effect on the healthcare system. It can also assist the healthcare policy makers and providers in decision-making for evaluating the affordability of and access to logical drug use. With ever growing healthcare expenditure, the cost has become the primary concern of the health care community. Consequently, assessment of goods and services in healthcare has added an extra burden of cost further than safety and effectiveness on the healthcare economy. Pharmacoeconomics having adapted the applied methodology of health economics with efficiency being the key concept would assist with developing a plan for purchasing the maximum amount of benefits for a given resource used. Furthermore, helping clinicians in choosing the most affordable options¹. Consequently, Judgments regarding the availability of various treatments within the health-care system have always been influenced by the resources available to pay for them². Significant challenges faced by healthcare professional in providing cost efficient quality patient care with the unlimited utilization of scarce medical resources allocated for healthcare. Known the limitations on medical resources boost increased attention in assessing the monetary value or economic efficiency of healthcare management and programs. Economic appraisal, examining costs and outcomes of numerous alternative therapies can also be a constructive approach; however, it may be extremely difficult to achieve³. Pharmacoeconomics identifies, measures, and compares the costs and consequences of pharmaceutical products and services⁴. It engages economic assessment of drug development, drug production, and drug marketing that is, the process of the time the medicine manufactured till it gets to the patient's hands⁵.

Short History

In the early 1960s pharmacy as a clinical discipline gained the recognition within the healthcare system. At this point, some subjects became part of pharmacy education such as clinical pharmacy, drug information, and pharmacokinetics. Pharmacoeconomics rooted in 1970s⁶. The first book on health economics published in 1973, and 1978, in the University of Minnesota, the concept of cost-benefit and cost-effectiveness analysis introduced through the works of McGhan, Rowland, and Bootman. Make use of the complicated pharmacokinetic procedure, Bootman *et al.*, published an early pharmacy research editorial in 1979 displaying cost-benefit analysis of aminoglycoside dosages.

In 1983, the University of Ohio, College of Pharmacy, initiated a particular pharmacy educational curriculum. The intent of the University was to provide the idea of the utilization of cost-effective and cost-benefit analysis in the healthcare system, with emphasis on their application to the delivery of pharmaceutical care. The term pharmacoeconomics was used for the first time by Ray Townsend from the Upjohn company in a public forum at meeting of the pharmacist in Toronto, Canada in 1986. Currently, pharmacoeconomics research is a prosperous industry with numerous practitioners, an outsized study, and an application program. Additionally, there are a number of journals and successful professional societies including the International Society for Pharmacoeconomics and Outcomes Research⁷.

Statement of the problem

Pharmacoeconomics role in many developing countries is in early stages with a limited knowledge of the subject matter. Therefore, lack of education and understanding of the topic is limiting the decision making by the health providers and health authorities. Thereby, creating incapability in developing a plan for purchasing the maximum amount of benefits for a given resource use. Accordingly, unable to assist clinicians in choosing the most affordable options. Pharmacoeconomics and Outcome Research have a very significant function in medication expenditure management. The cost of medicines are constantly growing; therefore, the price of drugs do matter as many people in developing countries are living below-poverty-line. Thus, healthcare affordability has become a major issue in the lives of society and their wellbeing. For this reason, understanding pharmacoeconomics and the importance of its applications are vital in reducing healthcare wastage as explicit methodology, education, and initiative required for its progress.

Purpose of the Subject

The intent of this article is to provide the essential information regarding a novel concept of pharmacoeconomics. Furthermore, to enhance understanding of today's young pharmacy students, policy makers and health administrators regarding the economic theory, terminology and its effect on the healthcare system.

Objectives of the study

- To clarify the pharmacoeconomic term in the healthcare field
- To determine the relationship between pharmacoeconomic, pharmaceutical care and outcome research
- To identify the components of pharmacoeconomic and its effect on healthcare
- To comprehend healthcare cost and its implication for society

- To elucidate the pharmacoeconomic methods, applications, and evaluation

Importance of Pharmacoeconomic

It is imperative that policy-makers, Health administrators and health providers such as pharmacists well comprehend pharmacoeconomic model. Currently, too many options of various new drugs, typically of the same family with the identical properties and active ingredients are being marketed to the physicians by pharmaceutical industries. These options of similar drugs make it difficult for the physician to make informed decisions regarding which medications to use. In pharmacoeconomic concept, two queries must be kept in mind by the prescribing physicians prior to ordering any new drug therapy. One of those queries would be, whether the new treatment is equally or more effective in the particular disease as compared to the typical therapy. Secondly, does the new medication therapy have any financial advantage over the existing treatment? Globally patients are affected by the high price of medicines. In many developing countries a high percentage of total health expenditure is financed by household out-of-pocket expense. According to records from the United Nations Development Program, a large percentage of developing countries societies live below the national poverty line. Many poor people frequently face a bitter decision between purchasing medication or buying such necessities as grocery and clothing due to limited resources and the high price of the prescription. Therefore, medication and drug therapy are an important matter to the society mainly those in need of medical services with limited financial resources.⁸

Understanding Pharmacoeconomics Concept and Its Elements

According to the International Society for Pharmacoeconomics and Outcomes Research (ISPOR). Pharmacoeconomics is a study that assesses the behavior of individuals, firms, and markets relevant to the use of pharmaceutical products, services, and programs. Moreover, it frequently focuses on the costs (inputs) and consequences (outcomes) of that use⁹. Pharmacoeconomics also described as the explanation and examination of the costs and outcome of pharmaceutical goods and services and their effect on individuals, health care systems, and society¹⁰.

Pharmaceutical care

Pharmacists are responsible for safe preparation and distribution of medication as well as pharmaceutical care. As per Helper and Strand, Pharmaceutical care is defined as providing the drug therapy in a responsible manner for the intention of achieving advantageous outcomes that improve a patient's quality of life¹¹.

Outcome research

Outcome research described as the scientific design, data collection, and analysis of the end results of medical care in general¹². According to the defined terms, there is a distinct relationship between pharmacoeconomics, outcome research, and pharmaceutical care. Pharmacoeconomics is not one and the same with outcomes research. Outcomes research is defined more in a broad terms studies that attempt to recognize, measures and assess the outcome of health care services. On the other hand pharmacoeconomic is a dissection of outcomes research that can be utilized to quantify the value of pharmaceutical care goods and services. Conversely, pharmaceutical care has been described as the responsible provision of drug therapy for the purpose of achieving definite outcomes as explained above.

Components of Pharmacoeconomics

The two primary components of pharmacoeconomic studies are measures of costs and outcomes that are joint into a quantitative measure or ratio.

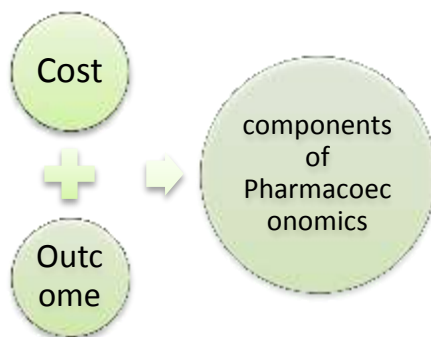


Figure 1: Components of pharmacoeconomics

Healthcare and medications costs

Cost described as the value of the consuming resources by a program or drug therapy of interest. It is the amount paid to the suppliers. The consequence is the effects, outputs, or outcomes of the program or drug therapy of interest. Consideration of costs and consequences distinguishes most pharmacoeconomic evaluation methods from traditional cost containment strategies drug use evaluations¹³. Costs concerned in pharmacoeconomic assessment mainly separated into the financial cost and economic cost that is a resource without obligatory payment. Additionally, Opportunity cost is the benefit predetermined when selecting one therapy substituted over the subsequently best option. In measuring value, several expenses can be estimated when computing the cost of any intervention.

The cost can be deliberated as follow:

- Cost per unit (cost/tab, cost/vial)

- Cost per person
- Cost per case prevented
- Cost per person/year
- Cost per treatment
- Cost per DALY (disability-adjusted life year)
- Cost per life saved

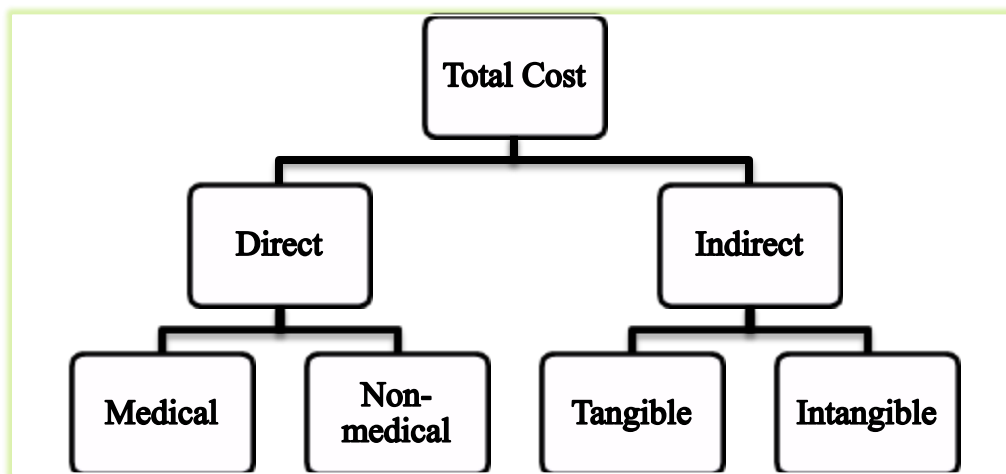


Figure 2: Cost model

Cost may be

Direct which paid by the health service including staff costs, capital costs, and drug acquisition costs and indirect cost experienced by patient's family and friends¹⁴. Cost model above illustrates the cost categories to evaluate the economics of drug therapy. The cost divided into:

- Direct cost such as Medical and Non- medical cost.
- Indirect cost such as Tangible and Intangible cost.

Direct medical costs

These types of expenses are the funds compensated for particular therapy and services. It consists of the payment to physicians, the acquisition cost of medication; and costs related to drug administration. Additionally, direct medical costs relate to the time spent by employees in preparation and administration of medicines; as well as, laboratory expenses of monitoring for effectiveness and adverse drug reactions.

Direct non-medical costs

These are needed costs to allow an individual receive healthcare such as lodging, special diet, and transportation. It also includes lost work time that is valuable to employers; for example an ill child of professional parents with an acute ear infection that results in lost work time during

the treatment.

Indirect Tangible Costs

These are expenses incurred by the patient, family, friends or society. Many of these expenditures are not easy to compute, but should be of concern to society as a whole. Examples of this type of costs include productivity loss in the society; unpaid caregivers; missing wages. Additional examples include expenses of illness bear by patients, family, friends, employers and the government as well as loss of leisure time.

Indirect Intangible Costs

Such expenditures associated with the patient's ache and pain and anguish; as well as worry and related agony of the family members of a patient. It has an effect on the quality of life and health perceptions. For instance, patients with rheumatoid arthritis, cancer or having terminal illnesses in which quality of life suffered due to adverse reactions to the drug treatment. These are not easy to measure in monetary terms but represent a substantial distress for doctors and patients. QALY Quality adjusted life year is one method by which intangible costs can be incorporated into PE analysis^{13, 15, 16,17,18,19}.



Figure 3: Resources leading to outcomes

Outcomes

The subsequent elemental of a pharmacoeconomic is outcomes. The fundamental questions to ask are: 1. What is the consequence of alternative therapies on disease progression? 2. What is the effect of alternative drug therapy on survival and quality of life? The answer to such questions leads to the outcome. Consequently, in assessing outcomes, it is also essential to allow for both positive and negative consequences. A positive result is a measure of the drug's efficacy. On the other hand, negative or adverse outcomes include side effects, treatment failure, and the development of drug resistance.

The Need for Pharmacoeconomics

Pharmacoeconomics is essential in several sectors such as healthcare industry in order to decide amongst precise research and development options. Second, it is needed in government to determine program benefits and its operating expense. The third area of need is in the private

sector to facilitate the formulation of insurance benefits coverage. As per definition, pharmacoeconomics identifies measures and compares the cost and consequences of pharmaceutical goods and services. Additionally, It describes the economic relationship involving drug research, drug production, distribution, storage, pricing and its use by the society. It runs on the thread of our socioeconomic system, which regulates and influences all the sectors involved in pharmaceuticals²⁰.

Pharmacoeconomic challenges

The major challenges for Pharmacoeconomics are to

- Develop a plan and procedure for standards of practice.
- Build a framework for well-skilled producers and clients of pharmacoeconomics evaluations
- Continuing education on the pertinent features of this discipline for practitioners, government officials, private sector executives.
- Stable funding to support applied pharmacoeconomic research²⁰.

Methods of Pharmacoeconomic

Pharmacoeconomics evaluation compares economic, clinical, and humanistic outcomes associated with different therapies. The evaluation mechanisms as described are frequently helpful in representing the cost impact of innovative treatments, yielding superior acceptance by healthcare providers, administrators, and the public.

The pharmacoeconomic methods divided into two separate classes:

1. An economic evaluation, such as Cost of Illness, Cost Benefit, Cost Effectiveness, Cost Minimization, and Cost Utility.
2. Humanistic evaluation similar to Quality of life, Patient preferences, Patient satisfaction.

These techniques used in a variety of fields and are applied increasingly to healthcare and pharmaceuticals. . The most frequently practiced pharmacoeconomics methods by pharmacists are discussed in the following segments and summarized in Table2.

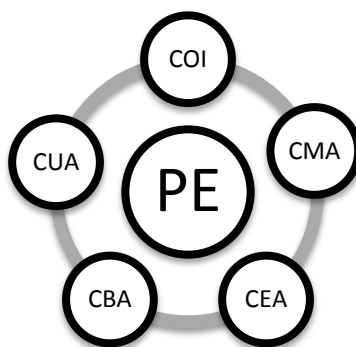


Figure 4: PE Methods

COI (Cost of Illness Evaluation)

A cost of illness is the evaluation of overall economic impact of a disease on a population. Such evaluation process is referred to as the burden of a disease as it measures Sum of all costs and all consequences related to the particular illness. COI also has the advantage of defining the disease, its epidemiology, outcomes, and consequences. COI assessment is to present an estimation of the economic burden of a disease. Therefore, it is not utilized to compare opposing treatment alternatives. Accordingly, the benefit of prevention and treatment strategies can be measured against the cost of illness^{4,21,22,23}.

CMA (Cost Minimization Analysis)

Cost minimization analysis involves evaluation that compares two or more alternative treatments that produce clinically equivalent outcomes. After a demonstration of therapeutic equivalence in safety and efficacy then the focus is on choosing the one with the least total costs that identified, measured and compared in monetary units. CMA is comparatively basic and simple method for evaluating competing treatment alternatives providing the establishment of the therapeutic equivalence of the alternative therapies²³.

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 dollars, and outcomes measured in terms of obtaining a particular therapeutic outcome. These results often expressed in physical units, natural units, or non-dollar units for example lives saved, cases cured, life expectancy, or mm Hg drop in blood pressure^{17,24}. The outcome of CEA 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). CEA is mainly practical in balancing cost with patient outcome, determining which treatment alternatives represent the best health outcome per dollar spent. It is also valuable in indicating when it is appropriate to measure outcome in terms of obtaining a particular therapeutic intention. For example, in comparing antiemetic agent for improvement of guidelines for the deterrence of emesis induced by chemotherapy, the Cost-effective analysis implemented. Natural units are terms expressed by the cost effectiveness of a therapeutic intervention for instance Life Years Gained (LYG) or infection avoided (COST / LYG)²⁵. Accordingly, It possibly expressed in utility expressions that are inclinations that individuals or society may have meant for a set of health outcomes. The effects of treatment on both the patient quality of life and survival are determined as COST /

QALY²⁵. Where, (QALY) Quality-Adjusted-Life-Years of one's treatment gains superiority over another's QALYs. The QALY is constructive when changes in quality of life are being traded with modification in survival. For example, a new medication for cancer may be more toxic than existing treatment. Thereby reducing the patient's quality of life during treatment, but may produce gains in additional survival.

ICEA (Incremental Cost Effectiveness) presented as follow:

Cost (drug A) – Cost (drug B) / Effect (drug A) – Effect (drug B)

CBA (Cost- Benefits Analysis)

A cost-benefit analysis (CBA) is a pharmacoeconomics methodology that identifies, measures and compares the benefits and costs of a therapeutic alternative. Consequently, The benefits realized from a program or treatment option compared with the costs, changed into comparable dollars amount, in the year in which they will occur. Thereby, future costs and benefits are discounted or reduced to their present value^{21,22,23,24}. These costs and benefits expressed as a ratio (benefit to cost ratio), as a net benefit or net cost. An authoritative healthcare provider would select the program or treatment option with the maximum net benefit or the ultimate benefit to cost (B/C) ratio¹⁶. Guidelines for the interpretation of this ratio are indicated in Table 1^{11, 12,18,21,22}.

Table 1: CBA interpretation ratio

B/C Ratio > 1	The ratio > 1 indicates the treatment is economically of significant. The benefits attained by the alternative program prevail over the cost of providing it.
B/C Ratio = 1	The benefits equal the cost. The benefits achieved by the program or treatment alternative are equivalent to the cost of providing it.
B/C Ratio <1	The ratio < 1 shows the treatment is not economically beneficial. The cost of providing the program or treatment alternative outweighs the benefits realized by it.

CBA engaged when

- costs and benefits of desired therapeutic choices do not occur concurrently.
- paralleling treatment plans with different objectives, because all benefits changed into dollar units
- Evaluating a particular program or relating multiple programs. Nevertheless, treasuring health benefits in monetary terms can be confusing and controversial.

CUA (Cost-Utility Analysis and Quality-Adjusted Life Years)

Cost-utility analysis (CUA) is an additional method for comparing treatment options. CUA incorporated patient preferences and health-related quality of life (QoL). Cost measured in dollars and therapeutic outcome is calculated in patient-weighted utilities rather than in physical units. Frequently the utility measure used is a quality-adjusted life year (QALY) gained.

QALY is a standard measure of health status used in CUA combining morbidity and mortality data. The outcome of CUA also expressed in a cost –utility ratio (C/U ratio), this ratio often is interpreted as the cost per QALY gained. The chosen treatment alternative is that with the lowest cost per QALY. The use of CUA is the most suitable method to utilize when comparing programs and 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. Thus, QoL is the most important health outcome being examined as per patient preferences.

Table 2: Summary of PE Methods

COI	Provides baseline to compare treatment options by estimating the cost of a disease on a defined population
CMA	An evaluation that compares two or more alternative therapies in which produce identical outcomes, but differ in costs.
CEA	Different therapies resulting in clinically different patient outcomes. outcome measured in natural clinical units and interpreted as lowest cost per unit of effectiveness.
CBA	Comparison of different programs with different outcomes for resource allocation decisions. Outcome measured in dollar amount and ratio of B/C >1.
CUA	Similar therapies affecting quality of life or patient preference for treatment. Outcome measured in QALYs and the result interpreted as the cost per QALY relative to other treatments.

Pharmacoeconomics Application

According to Sanchez L.A., PE utilizes for inform decision-making; moreover. This decision making in pharmacy perspective divided into two fundamental points: one is the evaluation of drug therapy and second, evaluation of clinical pharmacy²⁶. Traditionally, pharmacoeconomics methods were applied in the field of hospital pharmacy activities. The cost-effectiveness data were used to support the addition or deletion of a drug to or from a hospital formulary. However, currently, the pharmacoeconomic measurement of formulary procedures became a standardized part of numerous pharmacies and therapeutic team. In the past PE was mostly applied to drug therapy evaluations; however, different studies reveal a shift over the years in using PE for the justification of pharmacy services decision-making. Possible barriers to application of PE for drug decision-making identified as follows:

- The inadequacy of pharmacoeconomics sophistication by hospital administrators and pharmacy directors.
- Incompetency of PE sophistication by pharmacy practitioners that create and interpret PE data.
- Deficiency of organizational resources in the application of PE such as time and financials.

- Financial plan and budgetary responsibilities.

Pharmacoeconomic Evaluation Steps

The need for conducting pharmacoeconomic evaluations is subject to insufficient literature; the inability to extrapolate published results to clinical practice, also if constructing a model is inapplicable. Prior to piloting a Pharmacoeconomic assessment, providers should be acquainted with the resemblances, differences, and proper use of its methodology. Pharmacoeconomic evaluation process contained several necessary steps useful in the health care system and nearly any therapeutic area or healthcare service^{12, 18, 27, 28, 29}.

- **Define the problem**

A general question might be, "which antiemetic regimen represents the best value for the prevention of chemotherapy-induced emesis (CIE)?" However, a more succinct and measurable the problem would be "which regimen is the best value for preventing acute CIE patients receiving highly emetogenic chemotherapy?"²⁹

- **Gather various functional team members**

Team members differ contingent on the analysis but may include members from medicine, nursing, pharmacy, hospital administration, and information technology and systems.

- **Define the perspective**

Choose a study perception typically pertinent to the problem. For example, if the problem is similar as given in Step 1, then the institution or health care system perspective is a most appropriate chosen alternative.

- **Identify therapeutic preferences and outcomes**

Treatment options include pharmacologic and non-pharmacologic choices. However, it should comprise all clinically relevant options. The identified outcomes should consist of both positive and negative clinical outcomes.

- **Determine the applicable pharmacoeconomic method**

The methods of Pharmacoeconomic to choose from are CMA, CBA, CEA, and CUA. Employing the incorrect method can adversely affect medication decisions influencing both costs Moreover, quality of care.

- **Set a financial value on treatment alternatives and outcomes**

Employing a financial value on treatment options and outcomes for drug administration and cost of purchase as well as the cost of positive and negative medical results.

- **Pinpoint resources to implement evaluation in a proficient method**

Depending on the study, the necessary resources will fluctuate. However, it possibly will comprise entrance to medical or computerized records, regular medical personnel salaries specifically medical staff.

- **Detect possibilities that outcomes can transpire in the population under study**

What are the likelihoods of the results recognized in step 4 (e.g. identifying therapeutic preferences and outcome) in fact to occur practically? By means of principal literature and professional selection, these probabilities can be acquired and perhaps expressed by way of efficacy rates and occurrence of ADRs.

- **Implement decision analysis**

Numerous economic evaluations can be conducted by utilizing decision analysis, including CEA. Even though, Decision analysis and decision tree may not require for ever evaluations in pharmacoeconomics. However, they provide firm support for the verdict at hand. Using a decision tree, treatment options, results, and probabilities presented explicitly. Additionally, it can reduce algebraically to a single value for comparison (i.e., CEA ratio)²⁹.

- **Discount costs, sensitivity, incremental cost analysis**

Prospecting costs and consequences discounted back to their present value. Furthermore, sensitive variables tested over a clinically related range, and outcomes recalculated. If applicable, an incremental analysis of the costs and consequences should be made.

- **Present the outcome of study**

The study results presented to the cross-functional team and the proper committees.

- **Cultivate a policy and procedure for intervention**

Exploit the study outcomes and develop a policy and an intervention for the enhancement of healthcare quality and maintain efficiency.

- **Implement policy and educate professionals**

Devote sufficient time and resources are cleverly executing the policy or intervention. Moreover, the healthcare professionals affected by the policy must be educated using different strategies such as verbal, written and online communication technology.

- **Follow-up documentation**

Monitoring collected data after the implementation of policy and intervention for a practical period as this information will offer a responseto the achievement and quality of the policy or intervention.

Pharmacoeconomic Doctrine

- Pharmacoeconomics search to define and analyze the costs of medication therapy to the healthcare system and society.
- Principles employed on different ECHO(economic, humanistic, and clinical outcomes) using the methodology of pharmacoeconomics.
- Health care costs categorized as direct medical, direct nonmedical, indirect nonmedical, intangible, and opportunity costs.
- In comparing various health care choices, economic valuation methods used, including cost-minimization, cost-benefit, cost-effectiveness, and cost-utility analyzes.
- Comparisons expressed in monetary units, ratios, or mixed units such as dollars per quality - adjusted life-year).
- The cost of illness assessments classifies and estimates the inclusive cost of a particular illness for a distinct population. Nevertheless, COI is not utilized to relate alternative choices.
- In pharmacy practice, Pharmacoeconomic methods employed for effective management of formulary, treatment of individual patient, termination of medication program, and resource distribution.
- Several factors should be measured when evaluating published pharmacoeconomic studies. Such factors are 1. research objective, 2. education perspective, 3. pharmacoeconomic method, 4. study design, 5. choice of interventions, 6. costs and consequences, 7. discounting, 8. Study results, 9. sensitivity analysis, 10. research conclusions, and 11. sponsorship.

CONCLUSION

Pharmacoeconomics evaluation has become an important area of interest to find the optimal therapy at the lowest price as healthcare resources are not easily accessible and affordable to many patients. Numerous drug alternatives and empowered consumers also fuel the need for economic evaluations of pharmaceutical products. In developing countries, the PE can help the poor and middle class to obtain well health care services because many households are below poverty line, unaffordable for private health care. Costs of the medicines are constantly growing. In countries with scarce resources and an ever growing population with diverse health care needs, an innovative method called, pharmacoeconomic evaluation plays an essential role in determining the delivery of reasonable and cost-effective health services. Applied PE has been lacking as the most vital practice of pharmacy. Understanding the principles, methods, and

application of pharmacoeconomics, enables pharmacists to make healthier, more informed judgments concerning the use of pharmaceutical goods and services. Specifically, decisions that ultimately represent the best welfares of the patient, the healthcare system, and society. PE applied to any therapeutic area like hospital pharmacy, using a variety of application plans.

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Table 3 Abbreviation

Abbreviations	Description
ACER	Average Cost Effective Ratio
ADR	Adverse Drug Reaction
B/C Ratio	Benefit to cost Ratio
CBA	Cost Benefit Analysis
CEA	Cost Effective Analysis
COI	Cost of Illness
CMA	Cost Minimization analysis
CUA	Cost Utility Analysis
ECHO	Economic, Clinical, Humanistic Outcomes
ICER	Incremental Cost Effective Ratio
PE	Pharmacoeconomic
QALY	Quality Adjusted Life Year

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