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Importance of Pharmacoeconomics in Modern Healthcare

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Abstract: Pharmacoeconomics is an important field in healthcare that evaluates the economic impact of pharmaceutical interventions, aiming to optimize resource allocation while ensuring that best health outcomes can be achieved.

There are different types of pharmacoeconomic studies being employed like cost-benefit, cost-effectiveness, cost minimization, cost-utility analysis so that the different pharmaceutical products and treatment strategies can be compared. The main aim of strategies is to choose the least expensive alternative but without compromising the quality of patient care.

Keywords: *Pharmacoeconomics, Cost-Minimization Analysis, Cost-Effectiveness Analysis, Cost-Benefit Analysis, Cost-Utility Analysis.*

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I. INTRODUCTION

Pharmacoeconomics has been defined as the study of the economics of drugs and their impact on health care system, focusing on cost analysis and outcomes. Pharmacoeconomics is the branch of economics that compares the benefits of various pharmaceutical products[1]

A pharmacoeconomic study evaluates the cost (expressed in monetary terms) and effects (expressed in terms of monetary value, efficacy or enhanced quality of life) of a pharmaceutical product. Pharmacoeconomic studies provide an important guidance for the management of healthcare resources and medical practice[2]

The primary objective of health economics is making choices when resources are few.

In simple terms, it is a comparative analysis to compare the costs and benefits of two treatment alternatives so that we can make the best use of our limited resources that we have. For example, the comparison of benefits of a new medication and the previous best therapy being used in the past.[3]

➢ *Cost*

Costs can be classified as :

- Direct : Direct Costs in healthcare includes costs for cost of medications, diagnostic tests, cost of hospital stay, medical equipment, and other healthcare services or treatments that are billed directly to patients or their insurance providers
- Indirect : Indirect costs are measured when a person misses work as a result of a medical condition; for example, these might include loss of productivity, job absenteeism, lost income of family members, cost of travel to hospital.[4]
- Intangible: the suffering that a patient or their family may experience, including pain, anxiety, or trouble.
- Opportunity costs: It is the " the benefit foregone when selecting one therapeutic option alternative over the next best one."

➢ *Benefits*

The expected benefits of an intervention can be quantified by using :

- Natural units e.g., Cases cured, years of live saved, hospitalization prevented.
- Utility units -Economists use the term "utility" to refer to contentment or a sense of wellbeing. It is used to assess the quality of a health condition and not just its quantity.[5]

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➢ *Types of Study*

- Cost-minimization analysis (CMA) – It is the comparison of the cost of two or more treatment alternatives such that their therapeutic outcome is demonstrated to be equivalent.
  Examples, comparison of Brand vs Generic products
  Comparison of different antibiotic therapies.

- Cost effectiveness analysis (CEA) – This kind of evaluation uses natural units (years of life saved or diseases treated or healed) to indicate the health benefit and monetary terms to express the expenses.[6]

Result expressed as ratio of cost and effectiveness of that particular intervention.
CER = cost/effectiveness
Choice is that of lower ratio.

- Cost-Benefit Analysis (CBA)-It is a method to compare the costs and outcomes of treatment alternatives where both are expressed in monetary terms. For example, comparison of a surgical procedure with a pharmaceutical intervention.

- Cost-Utility Analysis (CUA) :It is a technique for comparing programs or treatment options when outcomes are defined in terms of patient preferences or quality of life and expenses are expressed in monetary terms.[7]

CUR=Cost/QALY

Least cost preferred

CUA has been successfully used to help in decision making regarding healthcare programs e.g. surgery vs chemotherapy

➢ *Examples of Analysis of Different Drug Therapies,*

- A randomized controlled study to evaluate the effects of fluticasone nasal spray with oral bilastine versus mometasone nasal spray with oral bilastine in patients of moderate to severe rhinitis was conducted in the Department of Pharmacology and Otorhinolaryngology, at BRD Medical College, Gorakhpur over a period of 12 months.[8] 156 patients diagnosed with rhinitis in the Department of Otorhinolaryngology of BRD Medical College were included in the study and divided into two groups of 78 patients .

Table 1: Comparison of cost-effectiveness of Group A (Mometasone +Bilastine combination) with Group B (Fluticasone + Bilastine combination)

	Cost per Bottle (Mometasone/Fluticasone)	Cost of a Strip of Bilastine Tablets	Total cost of Three Months Treatment
Group A	333.20	107.95	1971.15
Group B	312.88	107.95	1910.19

	Change In Total Symptom Score (Effectiveness)	Cost/Effectiveness
Group A	7.75	254.34
Group B	8.02	238.17

In comparison to fluticasone furoate and Bilastine nasal sprays, the average cost of mometasone furoate and Bilastine nasal sprays was about 3.14% higher. The cost-effectiveness ratio was calculated to be Rs 238.17 for fluticasone furoate and bilastine combination and it was Rs 254.34 for mometasone furoate and bilastine combination. Therefore, the study shows that Fluticasone + Bilastine combination is more cost-effective.

2.A study was conducted to evaluate pharmacoeconomics of antihypertensive drugs in a tertiary care teaching hospital at Raichur, Karnataka.[9]

A total of 120 hypertensive patients were prescribed with monotherapy of Amlodipine and combination therapy of Telmisartan and hydrochlorothiazide (Telma H) and assessed for their economic burden on the basis of the cost per tablet for an year.Cost effectiveness ratio was also calculated for the patients whose blood pressure was controlled by using a particular drug .

Table 2 : Persistence Pattern for Class of Drugs Prescribed

Sl No.	Persistance Pattern	Amlong (n %)	Telma H (n %)	P value
1.	Continuers	28 (23.3%)	7 (5.83%)	
2.	Switchers	5 (4.2%)	6 (5%)	0.029
3.	Discontinuers	6 (5%)	6 (5%)	

Table 2 shows the significance levels for the classes of drugs prescribed (Amlong, Telma H). According to this data, the medications taken by continuers, switchers, and discontinuers appear to have changed significantly. The majority of patients continued taking amlodipine (23.3%) as compared to Telma H (5.83%) as a part of their treatment.

Table 3 :Cost Effectiveness of Antihypertensive Treatment

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Sl no.	Antihypertensive Treatment	N=120	Cost per Tablet	Patients with Controlled BP	Probability (Effect)	CER
1.	Amlong 5 mg	43 (35.8%)	2.77	35	81.40%	29.38
2.	Amlong 10 mg	17 (14.2%)	5.33	14	82.35%	15.45
3.	Telma H 40/12.5 mg	48 (40%)	14.73	30	62.5%	4.24
4.	Telma H 80 /12.5 mg	12 (10%)	22.36	5	41.67%	1.84

Table 3 shows that 35.8% of patients used Amlong 5 mg tablets, with probability effect of 81.40% which tells the percentage of patients whose blood pressure was controlled after taking this medication. The C/E ratio is 29.38 followed with Amlong 10 mg (CER=15.45) so Amlong 10 mg is more cost-effective as compared to Amlong 5 mg.The C/E ratio is 4.24 for Telma H 40/12.5 mg followed by Telma H 80/12.5 mg (CER=1.84).

The data shows that the cost of amlong 5 mg tablet is rupees 2.77 per tablet and for amlong 10 mg costs is rupees 5.33 and for telma H 40/12.5 mg, telma H 80/12.5mg costs is 14.73 and 22.36 rupees respectively.

The research indicates that most patients continued to take amlong 5 mg because of its low yearly average cost of 48.41. Following that, these patients continued taking amlong 10 mg, which has an average yearly cost of 277.85. Due to the increased pharmaceutical burden, very few patients continued to take telma H medications.

According to the results of the study, amlodipine monotherapy is more cost-effective as compared to Telma H combination therapy with regard to their controlling of blood pressure, reducing their complications and also their economic burden.

➢ *Humanistic Evaluation Methods*

Pharmacoeconomic evaluations may also emphasize humanistic considerations.

Methods for assessing the impact of disease and its treatment on a patient's health-related quality of life, preferences, and satisfaction are increasingly popular and relevant in pharmacological decision-making.[10]Human Evaluation Methods can also help clinicians in quantifying the value of pharmaceuticals. HRQOL is defined as the evaluation of the functional impacts of illness and its subsequent treatment as experienced by the patient.

These impacts are frequently manifested as physical, emotional, and social consequences for the patient.[11]
Patient –competed questionnaires for the measurement of HRQOL.These questionnaires are either disease-related or universal indicators of health status.

➢ *Types of Pharmacoeconomic Studies :*

There are three types of pharmacoeconomic studies :

- Prospective studies : A prospective study is an experimental study that tracks a cohort across time, commencing prior to the occurrence of any outcomes, to identify who develops a condition and correlate it with the initial response.
- Retrospective studies : These are analyses of data from previously conducted clinical trials or cohort studies. This study entails a comparison between treatment users and non-users, tracked from a specific time in the past to the present. Retrospective studies are the ideal study method.
- Model studies : Model studies are conducted to provide data acquired from diverse sources when previously analyzed data is inaccessible.

II. APPLICATIONS OF PHARMACOECONOMICS

- Pharmacoeconomic analysis helps achieve maximum benefit with limited cost, therefore pharmacoeconomic techniques are used in formulary management, framing medication policies, patient treatment, and resource allocation.[12]
- Clinicians want to provide best cost effective treatment to their patients, while the patients wants decrease financial burden of medications, hence pharmacoeconomics combines both the objectives of clinician as well as the patients and the best outcome is achieved.
- Healthcare administrators and providers use the notion of pharmacoeconomics to make better judgments about the products and services they deliver to patients.[13]
- Pharmacoeconomics is important for drafting clinical and decision-making health policies.
- Physicians can make a variety of clinical decisions using pharmacoeconomics data, while affecting the whole healthcare system.
- Pharmacoeconomics is also an important tool required for framing the list of essential medicines, which would be cost-effective for the patient.
- Pharmacoeconomics is needed for choosing of pharmaceuticals and medical devices which would be more cost-effective for the patients.
- Healthcare professionals can benefit from applying pharmacoeconomics techniques to their daily practice settings.
- Pharmacoeconomic analysis plays an important role in determining the reimbursement of a claim, which involves third-party payers or government/private health sectors.[14]

III. DISCUSSION

In the past , various pharmacoeconomics studies have been conducted to analyze and compare the costs and consequences of the various treatment alternatives.[15]This article discusses about how pharmacoeconomics is an

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important tool of comparing the costs and outcomes of different drug therapies, the different methods of assessment of pharmacoeconomic studies has been explained, various examples have been given for the analysis of different drug therapies, its applications and overall role in healthcare sector has been provided.

IV. CONCLUSION

This study contributes to the body of knowledge in terms of evaluating costs and benefits of pharmacological interventions and also shape the future of healthcare practices, policies, and drug development by providing evidence-based insights that promote more effective and efficient healthcare decision-making.

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