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Original Article

DRUG UTILIZATION STUDY AND EVALUATION OF ANTI-HYPERTENSIVE PRESCRIPTIONS FROM MEDICAL REIMBURSEMENT APPLICATIONS AT UNIVERSITY HEALTH CARE FACILITY, BHU, VARANASI

DEV PRIYA, PUROHIT S., PANDEY B. L.

Department of Pharmacology, Institute of Medical Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh 221005, India
Email: suresh_purohit31@rediffmail.com

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ABSTRACT

Objective: Pharmacoeconomics evaluates the relationship between clinical, economic, and humanistic outcome for maximizing the value for each monetary unit spent on product and services. So the objective of the study was to provide the option of pharmacoeconomic medications to the hypertensive patients thus saving the cost to the university as well as to its staff of lower economic strata.

Methods: The prescriptions are generated at University Health Center along at the tertiary care center i.e. University hospital. Most often patients are prescribed medications of specific brands by the University hospital consultants, which are not available in the health center. The expenditure for self procured medication is subject to reimbursement by the University.

The personal characteristics of patients like age, sex, department of treatment, diagnosis, duration of therapy, change in therapy etc. were noted. The exact formulation and manufacturer's details were recorded. Retail cost of a particular drug available from different manufacturers in the same dose form, strength and quantity were also recorded wherever found appropriate.

Results: Majority of patients were old and evenly bearing co-morbidity with hypertension. Judicious choice of common medicines may maximize the economical use of Institutional financial resources for the healthcare and economical expenditure for the patients as well without compromising the treatment of the disease thus fulfilling the objective.

Conclusion: The therapy of hypertension with economical antihypertensive drugs or generic drugs may provide an economical option for the common people and reduced expenditure for the University.

Keywords: Reimbursement, Antihypertensive, Pharmacoeconomics, Prescription.

INTRODUCTION

Health care providers are under pressure to control the rapid acceleration of health care costs. The increase in expenditure of health care has prompted many governments, health insurance companies, and health providers throughout the world to adopt strategies to manage the high cost of medication, including formulary management and the use of pharmacoeconomics. Pharmacoeconomic data can support practice guidelines that promote the most cost-effective use of medications [1].

Hypertension is a highly prevalent chronic health condition with its devastating consequences on the heart and cardiovascular system. Blood pressure varies from person to person, and from time to time for individuals, however, if the blood pressure is constantly elevated above 140/90 mmHg at different times of measurement, it is regarded as high blood pressure (hypertension) [2]. In the year 2000 hypertension was estimated to affect almost one billion patients worldwide. Prevalence is predicted to increase by approximately 60% by 2025 [3]. Apart from unhealthy lifestyles, lack of awareness about hypertension, distorted public health systems, physicians treating hypertension also lag behind in treating hypertension according to standard guidelines. Non compliance to antihypertensive therapy is also a reason for uncontrolled hypertension [4]. A number of national and international guidelines for the treatment of hypertension have been published. The most recent JNC 7 guideline recommends diuretics as the first-line treatment in hypertension [5]. Due to high prevalence of hypertension and the requirement of medications for prolonged periods, the drug treatment cost poses a major issue in health economics. In developed countries, the expenditure on antihypertensive therapy has increased sharply in recent years due to increasing use of newer and more expensive drugs such as calcium-channel blocking agents, angiotensin-converting enzyme inhibitors and angiotensin-receptor antagonists [6]. Changes over time in terms of recommended guidelines and innovations in drug formulations have resulted in modifications to the prescription patterns of antihypertensive drugs. Availability of numerous antihypertensives gives physicians several options to individualize the therapy [7]. Due to this fact there is change in the prescribing pattern from patient to patient and physician to physician. The reason for this variation in the prescribing pattern is due to the conflict of interest of physicians [8].

The prices of the different antihypertensives vary, and price alone is only one factor to be taken into account when considering which drug is reimbursed. Several countries have chosen to use economic evaluation for reimbursement decisions and development of guidelines. This implies that health authorities issue guidelines for choice of drugs and may even deny reimbursement of drugs that are too expensive in relation to the effectiveness.

Elderly patients commonly have multiple pathologies leading to polypharmacy, altered pharmacokinetics and pharmacodynamics. They are prone to adverse drug reactions from inappropriate medications, finally resulting in increased cost of therapy [9]. Polypharmacy refers to the use of multiple medications. Generally the polypharmacy is the use of 5 or more drugs [10]. The financial impact of polypharmacy-related problems translates into elevated cost to the health systems having its financial bearing on patients as well as institutions [11]. These hurdles, in pharmacotherapy, can be overcome by periodic evaluation of drug utilization and optimizing prescribing pattern by forming prescription guidelines for geriatric patients [12].

In view of above, there is a need to study prescription patterns, comparison of the cost of antihypertensive drugs and then evaluate and adhere to treatment guidelines in hypertensive patients and thus then suggest the best pharmacoeconomic therapeutic option for patients at the University.

MATERIALS AND METHODS

Setting

A prospective, observational study was performed at the reimbursement section of University Health Center of Banaras Hindu University, Varanasi.

Data collection

The data was collected over a period of 3 months from January 2014 to March 2014. A total of 100 prescriptions were obtained from papers of prescriptions and purchase bills. The information in each prescription included in the health diary of patients were sex, age, diagnosis, generic and brand name of drugs, dosage, frequency, department of treatment and the physician's name. The exact formulation, price, manufacturer's details were recorded for specific antihypertensive medications. The retail cost of a particular drug being manufactured by different companies, in the same strength, number and dose form were analyzed and compared. The difference in the maximum and minimum price of the same drug manufactured by different pharmaceutical companies was calculated.

Persons who used an antihypertensive medication with only 1 active ingredient were defined as receiving monotherapy. Those taking more than 1 active ingredient (either in 1 combination pill or in 2 different single pills) were defined as receiving combination therapy. Pattern of use of antihypertensive drugs in patients treated with combination therapy i.e. two or more drug combinations were calculated.

Statistical analysis

All data was analyzed by using statistical methods like simple frequencies and percentage for representing the data.

RESULTS

A total of 100 prescriptions were evaluated. Table 1 summarizes that Out of 100 patients, 58(58%) were male and 42 (42%) were female respectively. Maximum number of patients belonged to age group of 61-70 years-63(63%) followed by 71-80 years-22(22%), 51-60 years-11(11%) and 81-90 years 4(4%). Only 20% patients were belonging to lower socio-economic category. 51% patients were diagnosed with only hypertension while 49% patients were associated with co-morbid conditions.

Table 2 summarizes, that total 48 antihypertensives were prescribed. Most commonly used drug was amlodipine (5 mg) 39 (39%), in which 32 (82.05%) patients were prescribed highest price branded amlodipine followed by hydrochlorothiazide (12.5 mg) 29 (29%), in which 22 (75.86%) patients were prescribed highest price branded hydrochlorothiazide.

Table 3 summarizes, that as monotherapy Beta-blockers (32.77%) were the most commonly prescribed antihypertensive, followed by Calcium channel blockers (28.57%), Angiotensin-2 antagonist (16.80%), and Diuretics (12.60%). Among combination therapy, the most commonly prescribed combination was Angiotensin antagonist+Diuretics followed by Calcium channel blocker+β-adrenergic blockers and ACE inhibitor+Diuretics, as summarized in table 4.

Table 5 summarizes, that total number of drugs prescribed in 100 prescriptions were 553. Therefore, average number of drugs per prescription was 5.53 which show poly pharmacy. Out of 100 prescriptions 66 prescriptions were prescribed maximum number of drugs that is five and more than five drugs (66%) followed by 14 prescriptions with three drugs (14%).

Table 1: Profile of patients with prescribed antihypertensives

• Total number of patients under study	100
• Duration of Treatment	More than 1 year
• Patient's Profile	
1) Gender-	
Male patients	58(58%)
Female patients	42(42%)
2) Age Range of patients (%)-	
• 51-60	11(11%)
• 61-70	63 (63%)
• 71-80	22 (22%)
• 81-90	4 (4%)
3) Socio-economic Status (%)	
Lower Socio-economic patients	20(20%)
Others	80 (80%)
• Morbidity (%)	
Hypertension alone	51(51%)
Hypertension with co-morbidity	49(49%)

Table 2: Drug in order of used frequency and Pharmacoeconomical prudence

Contain	Total	OD	BD	TDS	Highest price branded medicines	Least price branded medicines
Amlodipine (5 mg)	39(39%)	30(76.92%)	9(23.07%)	0(0%)	32(82.05%)	7(17.94%)
Hydrochlorothiazide (12.5 mg)	29(29%)	28(96.55%)	1(3.44%)	0(0%)	22(75.86%)	7(24.14%)
Metoprolol (50 mg)	23(23%)	18(78.26%)	5(21.73%)	0(0%)	23(100%)	0(0%)
Telmisartan (40 mg)	20(20%)	19(95%)	1(5%)	0(0%)	15(75%)	5(25%)
Olmesartan (40 mg)	13(13%)	12(92.30%)	1(7.69%)	0(0%)	12(92.30%)	1(7.69%)
Olmesartan (20 mg)	10(10%)	10(100%)	0(0%)	0(0%)	6(60%)	4(40%)
Atenolol (50 mg)	6(6%)	4(66.67%)	2(33.33%)	0(0%)	4(66.67%)	2(33.33%)
Cilnidipine (10 mg)	6(6%)	3(50%)	3(50%)	0(0%)	1(16.67%)	5(83.33%)
Ramipril (5 mg)	6(6%)	5(83.33%)	1(16.67%)	0(0%)	6(100%)	0(0%)
Temisartan (80 mg)	6(6%)	6(100%)	0(0%)	0(0%)	5(83.33%)	1(16.67%)
Metoprolol (25 mg)	5(5%)	4(80%)	1(20%)	0(0%)	5(100%)	0(0%)
Nebivolol (2.5 mg)	5(5%)	4(80%)	1(20%)	0(0%)	5(100%)	0(0%)
Chlorthalidone (12.5 mg)	4(4%)	4(100%	0(0%)	0(0%)	2(50%)	2(50%)
Nebivolol (5 mg)	4(4%)	4(100%)	0(0%)	0(0%)	4(100%)	0(0%)

Torasemide (10 mg)	4(4%)	4(100%)	0(0%)	0(0%)	4(100%)	0(0%)
Amlodipine (10 mg)	3(3%)	3(100%)	0(0%)	0(0%)	3(100%)	0(0%)
Amlodipine (2.5 mg)	3(3%)	3(100%)	0(0%)	0(0%)	2(66.66%)	1(33.33%)
Chlorthalidone (6.25 mg)	3(3%)	3(100%)	0(0%)	0(0%)	0(0%)	3(100%)
Losartan potassium (50 mg)	3(3%)	3(100%)	0(0%)	0(0%)	3(100%)	0(0%)
Prazosin hydrochloride (5 mg)	3(3%)	3(100%)	0(0%)	0(0%)	3(100%)	0(0%)
Ramipril (2.5 mg)	3(3%)	3(100%)	0(0%)	0(0%)	3(100%)	0(0%)
Torasemide (20 mg)	3(3%)	2(66.67%)	1(33.33%)	0(0%)	3(100%)	0(0%)
Clonidine hydrochloride (0.1 mg)	2(2%)	0(0%)	0(0%)	2(100%)	2(100%)	0(0%)
Furosemide (20 mg)	2(2%)	2(100%)	0(0%)	0(0%)	1(50%)	1(50%)
Indapamide SR (20 mg)	2(2%)	2(100%)	0(0%)	0(0%)	0(0%)	2(100%)
Indapamide (1.25 mg)	2(2%)	2(100%)	0(0%)	0(0%)	0(0%)	2(100%)
Indapamide (2.5 mg)	2(2%)	2(100%)	0(0%)	0(0%)	0(0%)	2(100%)
Metoprolol tartrate (12.5 mg)	2(2%)	2(100%)	0(0%)	0(0%)	2(100%)	0(0%)
Moxonidine (0.3 mg)	2(2%)	1(50%)	1(50%)	0(0%)	0(0%)	2(100%)
Nifedipine (20 mg)	2(2%)	0(0%)	0(0%)	2(100%)	2(100%)	0(0%)
Perindopril erbumine (4 mg)	2(2%)	2(100%)	0(0%)	0(0%)	0(0%)	2(100%)
Spironolactone (50 mg)	2(2%)	2(100%)	0(0%)	0(0%)	1(50%)	1(50%)
Telmisartan (20 mg)	2(2%)	2(100%)	0(0%)	0(0%)	2(100%)	0(0%)
Amiloride hydrochloride (5 mg)	1(100%)	1(100%)	0(0%)	0(0%)	0(0%)	1(100%)
Atenolol (25 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)
Bisoprolol fumarate (5 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)
Carvedilol phosphate (20 mg)	1(100%)	1(100%)	0(0%)	0(0%)	0(0%)	1(100%)
Carvedilol (12.5 mg)	1(100%)	0(0%)	1(100%)	0(0%)	1(100%)	0(0%)
Carvedilol (3.125 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)
Cilnidipine (5 mg)	1(100%)	1(100%)	0(0%)	0(0%)	0(0%)	1(100%)
Furosemide (40 mg)	1(100%)	1(100%)	0(0%)	0(0%)	0(0%)	1(100%)
Indapamide (1.5 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)
Losartan (25 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)
Metoprolol (100 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)
Perindopril erbumine (8 mg)	1(100%)	1(100%)	0(0%)	0(0%)	0(0%)	1(100%)
Prazosin hydrochloride (2.5 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)
Propranolol (40 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)
Ramipril (10 mg)	1(100%)	1(100%)	0(0%)	0(0%)	1(100%)	0(0%)

Table 3: Percentage of prescribed monotherapy antihypertensives

S. No.	Drug Class	No. in Prescriptions (%)
1	Beta-blockers	39 (32.77%)
2	Calcium channel blockers	34 (28.57%)
3	Angiotensin-2 antagonist	20 (16.80%)
4	Diuretics	15 (12.60%)
5	Other Antihypertensives	6 (5.04%)
6	ACE-Inhibitors	5 (4.20%)

Table 4: Drugs combinations used in treatment of hypertension

Drugs	Total no. in Prescription
Angiotensin antagonist+Diuretics	23
Calcium channel blocker+β-adrenergic blockers	8
ACE inhibitor+Diuretics	7
Angiotensin antagonist+Calcium channel blocker	6
β-adrenergic blockers+Diuretics	3
Angiotensin antagonist+Calcium channel blocker+Diuretics	3
Calcium channel blocker+Diuretics	2
ACE inhibitor+Calcium channel blocker	1
β-adrenergic blockers+Angiotensin antagonist	1

Table 5: Number of drugs prescribed per prescription (Poly Pharmacy)

Prescription containing number of drugs	Number of Prescription (%)
One	3(3%)
Two	9(9%)
Three	14(14%)
Four	8(8%)
>Five	66(66%)

DISCUSSION

Prevalence of hypertension has remained stable or has decreased in developed countries during the past decade; it has dramatically increased in developing countries like India [13]. Prescription surveys are one of the pharmacoepidemiological methods that provide a relatively unbiased picture of prescribing habits [14]. Our finding shows that the prescribing pattern of anti-hypertensive drugs was found to be higher in men 58% than in women 42%. High blood pressure is more common in men than women [15]. Study conducted by Pai *et al.* reported 50.5% male and 40.5% female [16]. Other study by Sandozi and Emani has found 47% male and 53% female [17].

Most common age group involved in our study was 61-70 years (63%), followed by 71-80 years (22%) and 51-60 years (11%). Pai *et al.* also found most common age group 60-69 years (34%) followed by 70-79 years (23%) and 40-49 years (22%) [16].

The result depicted amlodipine and hydrochlorothiazide were the commonest medication followed by metoprolol and angiotensin receptor blockers. ACE inhibitors and other antihypertensive medications were relatively used less frequently.

Total numbers of drugs prescribed in 100 prescriptions were 553. Therefore, average number of drugs per prescription was 5.53 [18]. Reference values of 1.6–1.8 drugs per encounter were recommended by the WHO guidelines on rational use of drugs [19]. The risk of drug interactions may increase with increase in the number of average drugs per prescription which finally leads to the prescribing and dispensing errors. Prescribing drugs with generic name, avoiding irrational use of drugs and avoiding poly pharmacy can help in reducing the cost of treatment [20]. The profile suggests need for careful choice of medicines to avoid adverse reactions and treatment failure. The patient group under study received reimbursement of medication cost when drugs were purchased from outside. The doctors generally did not consider about purchasing power of patients and hence, there is frequent incidence of prescribing costly brands of medicines rather than economic options. This practice may have been the result of marketing endeavors of the companies. In general, drug choices were not concentrated. Only about one third patients received the common prescription of amlodipine, hydrochlorothiazide, metoprolol and telmisartan. The reason for diversified choices of antihypertensive drugs is difficult to convince as based on a firm rationale.

The major limitation of the study is the fact that it was limited to only one centre and hence, the result cannot be generalized. Patient prescriptions were not examined to determine severity of disease and to assess whether appropriate therapy was administered to control disease. We did not examine patients' drug history to determine whether appropriate changes and/or adjustments to drug therapy were made to adequately control disease. We did not record laboratory results, such as serum creatinine or albuminuria, which could have given insight into disease progression.

CONCLUSION

It is warranted that prudent prescription behavior leading to economy of expenditure of University funds ought to be judicious to maximize availability of medicines within the resources. Scope for improved prescription practices significantly exist which includes aspects of efficacy, safety, compliance and economical management.

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CONFLICT OF INTERESTS

Declared None

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