

Research Article



A Study on Drug Utilization and Pharmacoeconomic Analysis on the Common Ailments of the Medicine Indoor Wards in a Tertiary Care Teaching Hospital in Western Uttar Pradesh.

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ABSTRACT

Irrational prescribing remains a daunting task to deal with the menace of polypharmacy and adverse drug reactions. This prospective cross-sectional observational study aims to analyze the prescribing pattern among the physicians and to look forward to optimizing the cost of therapy by identifying its cost-effective substitute without compromising on the safety and efficacy. Patients fulfilling the criteria were enrolled and data was collected in the designed case report forms. The obtained data was analyzed using Microsoft excel 2016 software. It showed that out of the 165 patients 100 were females and the common ailments in the medicine IPD were hypertension, type 2 diabetes mellitus, COPD, anemia and UTI. The commonly used drugs were paracetamol, pantoprazole, ondansetron, ceftriaxone and multivitamins. The average number of drugs in a prescription was 10.40 and 64.84% of them contained antibiotics. The average injectables used per encounter was 3.88 and only 4.66% of total drugs were prescribed by their generic names. The drug prescribed from the essential medicine list was found to be 48.7%. The average cost per prescription was ₹ 2,887.68. There were only fewer cases of adverse drug reactions encountered and most of the prescribed daily doses of the drugs complied within the DDDs recommended by the WHO. The higher rates of drugs per prescription reflected the polypharmacy rates. The practice of prescribing generic and essential drugs would aid to decreased cost of therapy. The lesser number of ADRs and the compliance of prescribed daily dose with the DDDs showed good prescribing practice. The results might be utilized to improve upon the areas of concern and to take a stride towards better patient care.

Keywords: Drug utilization research, pharmacoeconomic analysis, medicine, indoor wards, Prescription analysis.

INTRODUCTION

Pharmacoepidemiology is defined as the “study of the utilization and effects (beneficial and adverse) of drugs in large numbers of people”.¹ It was recognized as a separate branch when drug surveillance, safety and unwanted effects were studied using epidemiological tools in early 1980s.² It works at the grass root level of the society and is concerned with optimizing health care, therefore it can be combined with techniques of Pharmacoeconomics. With the increasing number of drugs available for treating a clinical condition, the drugs are being explicitly prescribed in an irrational manner. This usually results in unsolicited therapeutic consequences by compromising on the beneficial effects of a therapy and increasing the risks associated with it. Since this trend of prescribing is being observed commonly, routine reviewing of prescriptions forms an integral part of quality assured health care services. Drug utilization studies, defined by World Health Organization (WHO) as the marketing, distribution, prescription, and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences”³ has evolved for fulfilling this purpose and has proven to be an efficient means for studying the pattern of drug use in a population. It serves its application in both pharmacoepidemiologic studies and hospital service

research. Such studies aim at describing the current prescribing trends in the hospital setting by analyzing various prescriptions by using a set of prescriber, patient and facilities related indicators, revised in 1991 and tested again in 1992 by WHO to be precise and specific so that it consumes less time and efforts to efficiently and successfully conduct a drug utilization research.^{4,5,6}

These studies are very essential, especially in developing countries where irrational prescribing is very common. Such studies help in determining prevalence and incidence rates of a disease in a population, trends like polypharmacy, inappropriate doses, unnecessary use of intravenous routes, use of branded over generic drugs, which then ignites the mind of health care personnel to implement preventive therapies and choose utmost safe, efficacious and economical therapy for the diseased patients. It also allows regulatory authorities to implement standard treatment guidelines, make appropriate changes in policies and procedures, formulation of formulary, addition or deletion of drugs to the formulary, etc.⁷ The outcomes of descriptive drug use studies can be broadly classified as medical, social and economic. Conducting periodic reviews will help in identifying areas of concern, potential hazards and unnecessary expenditure.⁸



Pharmacoeconomic analysis when used as a part of drug utilization review helps in determining the drug related out of pocket expenses and the subsequent economic burden. The medical indoor wards provide a general view of the common illnesses present in the population. Since, majority of the drug studies have been done in the outdoor settings and the data, therefore regarding drug usage patterns in indoor wards, is scarce. This research was undertaken in the light of same.

METHODOLOGY

After procuring the approval of the Institutional Ethics Committee, the prospective, cross-sectional study was initiated at Teerthanker Mahaveer Medical College and Research Centre, Bagarpur, Moradabad. The designated time interval for the study was 6 months. After sample size calculation using n Master 2.0 software, the study enrolled 165 patients, according to the inclusion and exclusion criteria.

Inclusion criteria

1. Patients admitted in the medicine indoor wards of either sex in the allotted time for the study.

Exclusion criteria

1. People presented with severe illnesses and subsequently relocated from general medicine to special care requiring intensive monitoring.
2. OPD patients and women in their gestation period.
3. Patients who left the hospital against medical advice.

The designed case report form was filled from the medical records of the patients and analyzed according to the drug use indicators mentioned below.

1. Comparison of demographic data
2. Common ailments for which drugs were used
3. Commonly used drugs in medical indoors
4. Average number of drugs per prescription
5. Percentage of prescriptions with injectable route
6. Percentage of prescription (encounters) with antibiotics prescribed
7. Percentage of drugs prescribed by generic name
8. Percentage of drugs prescribed from essential drug list
9. Average number of fixed drug combinations per encounter
10. Adverse drug reactions, if any, in the included patients
11. Individual cost of drugs prescribed
12. Average cost per prescription (encounter)

13. ATC code of drugs

14. Comparison of DDD and PDD of commonly used drugs

The collected data was entered into the datasheet for analysis in MS Excel 2016. The results were expressed in percentages.

RESULTS

Out of 165 prescriptions analysed from the indoor wards of medicine department 61 % of the patients admitted were females (i.e. 100 patients) and 39 % of the patients were males (65 patients). Among the admitted patients most of them belonged to the group of 41-50 years succeeded by 51-60 years. The least admitted patients were from the age group of 81-90, 71-80 and 10-20 years.

(Table 1)

Table 1: Age group of the admitted patients

Age group	Number of patients
10 to 20	10
21 to 30	22
31 to 40	27
41 to 50	38
51 to 60	35
61 to 70	24
71 to 80	8

The most common ailments encountered in the medicine indoor wards included hypertension in 42 patients, Type 2 diabetes mellitus in 35 patients, anaemia in 21 patients, COPD in 20 patients and UTI in 19 patients accounting for 31%, 25%, 15%, 15%, and 14% respectively. Hypertension and COPD was maximum in people aged between 51 and 60 years and diabetes mellitus was maximum in the age group of 61-70 years. Anaemia was seen maximum in the age group of 21-40 years while UTI was found maximum in the 31-40 years aged patients. (Table 2)

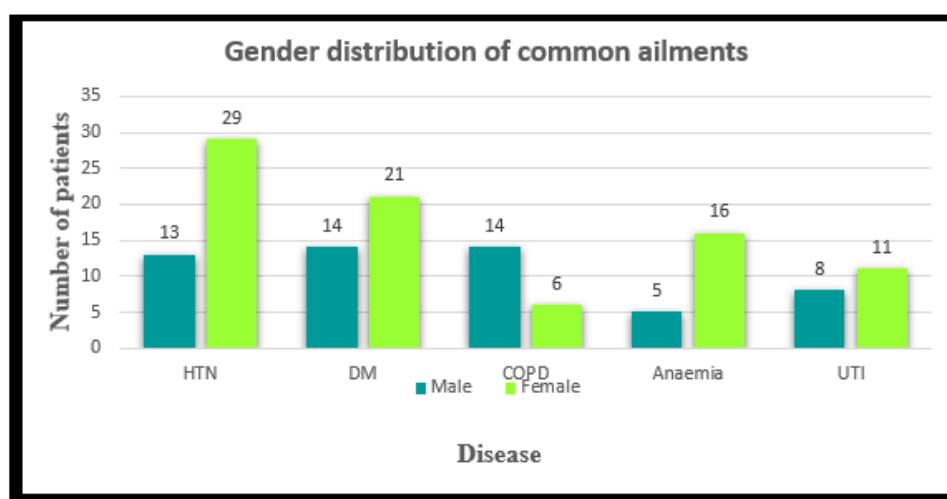
The results obtained showed that hypertension, diabetes mellitus, anaemia and UTI was maximum in females and COPD was seen majorly in males. (Figure 1).

Among all the prescriptions analysed, the total number of drugs prescribed was found to be 1,715. Paracetamol ranked the first by accounting for 5.30% of the total drugs. It was followed by Pantoprazole (4.86%), Ondansetron (3.67%), Ceftriaxone (3.03%), Multivitamin (2.97%) and salbutamol (2.62%). Budesonide, tramadol and folic acid were prescribed in 2.21%, 2.04%, 1.92% populations respectively. (Table 3)



Table 2: Age distribution of affected patients

Age group	HTN	DM	COPD	Anaemia	UTI
10 to 20	0	0	0	3	1
21 to 30	1	0	0	4	1
31 to 40	5	5	1	4	7
41 to 50	10	8	2	2	3
51 to 60	13	7	7	3	2
61 to 70	9	11	4	3	4
71 to 80	3	4	5	2	1
81 to 90	1	1	0	0	0

**Figure 1:** Gender wise distribution of patients affected with common ailments.**Table 3:** Number and Percentage of commonly used drugs

Drugs	Number	Percentage
Paracetamol	91	5.30%
Pantoprazole	84	4.86%
Ondansetron	63	3.67%
Ceftriaxone	52	3.03%
Multivitamin	51	2.97%
Salbutamol	45	2.62%
Budesonide	38	2.21%
Tramadol	35	2.04%
Folic acid	33	1.92%
Ipratropium Bromide	33	1.92%
Furosemide	32	1.86%

An average of 10.40 drugs were prescribed in the total of 165 prescriptions analysed. The total number of drugs in the 165 prescriptions was found to be 1,715. The percentage of prescriptions with injectables included 26.06 % and the average number of injectables per encounter was found to be 3.38. 64.84% prescriptions contained antibiotics and its average number per encounter was found to be 1.2.

Only 80 among the 1,715 drugs were prescribed by their generic name and this accounted for 4.66 % of the total drugs. The average number of the generic drugs prescribed was found to be as low as 0.48.

The National List of Essential Medicines, 2015 was considered for estimating the number of drugs prescribed from essential drug list. 835 drugs in total were prescribed from NLEM accounting for 48.7%. Average number of essential drugs per encounter was found to be 5.06.

Fixed dose combinations were found to be 562 in number from the overall 1,715 drugs prescribed and it accounted for 32.76%. The average number of FDCs per encounter was found to be 3.40.

For 165 prescriptions issued, total cost was found to be ₹4,76,466.58. The average cost per encounter was found to be ₹2,887.68. (Table 4).

Only 21 patients out of 165 patients developed adverse drug reactions which were very mild to moderate in extent of severity. The most common reaction was constipation in 9 patients. The various other observed reactions are tabulated below. (Table 5).

Table 4: Drug use indicators of the study

S. No.	Drug use indicator	Result
1.	Average number of drugs per prescription	10.40
2.	Percentage of prescriptions with injectable route	26.06%
3.	Percentage of prescription (encounters) with antibiotics prescribed	64.84%
4.	Percentage of drugs prescribed by generic name	4.66%
5.	Percentage of drugs prescribed from essential drug list	48.7%.
6.	Average number of Fixed Drug Combinations (FDCs) per encounter	3.40
7.	Average cost per prescription (encounter)	₹2,887.68

The cost of each drug in every prescription was analysed and documented in the data collection form. It was found that prescribing branded drugs over generic ones and the use of intravenous routes for drug administration, where oral routes could have been the choice, have resulted in

the increased cost of prescriptions and would have been an economical burden to the patient. Examples of four drugs incurred from the study were as shown in the table below. (Table 6).

Table 5 : Frequency of adverse drug reactions

Adverse drug reaction	Number of patients
Constipation	9
Dry cough	1
Headache	1
Itching	1
Nausea	2
Nausea and Vomiting	1
Oral mucosa irritation	3
Shivering	1
Steroid modified tinea	1
Thrombophlebitis	1
None	144
Total	165

Table 6 : Cost comparison of different drug formulations

S.No	Brand Name (Drug)	Dose	Formulation (Unit)	Price (₹)
1	Pansec (Pantoprazole)	40 mg	Injection (100 mL/1)	46.8
			Tablet (10/strip)	103
2	Emeset (Ondansetron)	4 mg	Injection (2mL/1)	31
			Tablet (10/strip)	49.28
3	Dolo (Paracetamol)	1 gm	Injection (100mL/1)	268
			Tablet (10/strip)	20
4	Gramocef (Ceftriaxone)	1 gm	Injection (1)	50
			Tablet (10/strip)	295

The commonly used drugs were evaluated for their daily prescribed doses and then compared to the daily defined

doses established by WHO which were easily identified with the help of the ATC codes. (Table 7).

Table 7 : DDD and PDD comparison using ATC code

Drugs	ATC code	DDD	PDD (per day)
Paracetamol	N02BE01	3 g	1.5 g - 2 g
Pantoprazole	A02BC02	40 mg	40 mg
Ondansetron	A04AA01	16 mg	16 mg
Ceftriaxone	J01DD04	2 g	2 g
Salbutamol	R03CC02	12 mg	6 mg - 12 mg
Budesonide	R01AD05	0.2 mg	1 mg - 2 mg
Tramadol	N02AX02	0.3 mg	75 mg
Folic Acid	B03BB01	0.5 mg	5 mg
Ipratropium Bromide	R03BB01	0.3 mg	0.75 mg - 3 mg
Furosemide	C03CA01	40 mg	40 mg - 80 mg



DISCUSSION

This study which focused on the drug utilisation pattern and pharmaco-economic analysis for minimising the cost of the treatment carried out in the indoor wards of the medicine department of a tertiary care teaching hospital concluded that the common ailments for which the patients were hospitalised were hypertension, type 2 diabetes mellitus, COPD, anaemia and UTI. The diabetic prevalence rates for women was 60 % and for men, it was 40%. Similar results were reported by ^{9,10} which reported higher cases in women. A study ¹¹ concluded that 66.19% of the patients with COPD were males which is relatable to the present study's findings which accounted for 70 % males. The most commonly used drugs in the medicine IPD were found to be paracetamol (5.30%) and pantoprazole (4.86%) approximately similar to that reported by ¹² followed by ondansetron, ceftriaxone and multivitamins. Ceftriaxone and multivitamin, being commonly used as antibiotic and FDC respectively in our study, were parallel findings to that reported by ¹³. It was also observed that "ondansetron and pantoprazole were prescribed without any approved indication" similar to that reported by ¹⁴ in their study. An average number of 10.40 drugs had been prescribed per encounter as compared to the findings by ¹⁵ and ¹² which reported 4.05 and 4.02 respectively. This was major indicator for polypharmacy.

There were higher rates of number of injectables while lower rates of generic and essential drugs per encounter which would aid to the increased cost of prescription and subsequent financial burden on the patients. Average number of antibiotics per prescription was 1.2 in our study which is higher than reported by ¹³ (0.91) but lower than reported ¹² (1.97). This variation might be attributable to differences in size of population, preferences in drugs and health care requirements. 32.76 % of drugs had been prescribed as FDC which is higher as compared to reported by ¹² which demonstrated no use of FDCs. ADRs were seen of mild to moderate intensity, constipation being the most common. (5.45%). Headache, nausea, itching, steroid modified tinea all occurred in frequency as low as 0.6 % which was very little as compared to rates reported by ¹² in their study of headache, nausea, itching in 26%, 26% and 5% of patients respectively. The total cost for 165 prescriptions was found to be ₹4,76,466.588 and average cost per prescription was found to be ₹2,887.68, comparatively low to \$119.23 reported by ¹⁶. The later study was done in an emergency medicine setting and the gravity of illness could be the reason for the high cost prescriptions.

Study limitations

The data is not the true representation of the population as patients admitted in the indoor wards of the general medicine department were randomly selected and enrolled. The data collected on the prescribing trends might exhibit variations according to the treating physician and the study did not provide a means of

evaluating them differently. The study only focussed on the cost of drug acquisition from the pharmacy and did not include the indirect and intangible costs involved.

Strengths of the study

Less incidences of ADRs were reported as compared to other studies which suggested prescribing of safe medication therapy by the physicians. The prescribed daily doses were in compliance with World Health Organization's assigned daily defined doses indicating rational dosing of drugs.

The results obtained from this study can be compared with various other health facilities in the state of Uttar Pradesh to draw a conclusion of the general prescribing pattern and the differences seen in it within the state.

The areas of concern identified shall support in the making of appropriate policies to take a stride towards better patient care.

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