An Observational Assessment of the Drug Utilization, Rationality, and Cost Analysis of Antimicrobial Medicines in Sri Krishna Medical College and Hospital, a Tertiary Care Teaching Hospital of Bihar

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Abstract

Aim: The current study aims at drug utilization, rationality, and cost analysis of antimicrobial medicines in a tertiary care teaching hospital of Bihar region.

Methods: The observation study was conducted by the Department of Pharmacology, Sri Krishna Medical College, Muzaffarpur, Bihar, India among 250 male and female patients admitted in respective indoor department and fulfilling inclusion criteria were included in the study. A standard socio demographic and clinical features data collection proforma was prepared and the characteristic like age, gender, occupation, income group, subject IP/OP number were recorded.

Results: 250 patients were prescribed one or more Anti-microbial agents were enrolled in the study. Among the 250 patients, 100 (40%) were female and 150 (60%) were male. The mean age was 42.5 years. Majority of the patients were in the age group of 18–25 years (n = 80, 32%). Diagnosis for which drugs were prescribed were Infectious disease (24%), Respiratory disorders (18.5%), CNS disorders (13%), CVS disorders (9.5%), GIT disorders (9.5%), Urinary tract disorders (6.5%), Endocrine disorders (5.5%), Poisoning (5%), Liver disorders (4.5%) and Anemia (4%).

Conclusion: There is a need for formulation and implementation of an Anti-microbial agents policy as a first step to improve use of Anti-microbial agents within the hospital. A baseline data of drug utilization pattern in indoor patients in medicine department is created by this study. Prescription by generic name and from essential list, preference of oral route, and free government supply are encouraging findings. Free health services are one of the major requirements for the developing countries because cost is considered one of the important factors in making therapeutic decision with poor financial resources.

Keywords: Drug Utilization, Antimicrobials, drug utilization, expenditure, prescription pattern, rationality

Introduction

Drug utilization research as defined by WHO in 1977 is 'the marketing, distribution, prescription, and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences'. [1,2] It provide information about pattern, quality and outcome of drug use. Pattern of drug utilization is studied to estimate the incidence and prevalence of drug use, to analyze that the recommended guidelines for prescription are being followed or not. The aim of drug utilization study is to promote rational and appropriate use of drugs at lowest possible dose and cost. [3-5] WHO has specified prescribing indicators, patient care indicators, facility indicators and complementary indicators for planning and conducting drug utilization studies.

The Problem of overuse of antibiotic is a global phenomenon. In India, the prevalence of use of antibiotics varies from 24% to 67%. According to recent study, acute respiratory infections are the reason for the 75% of the antibiotic prescriptions each year and are the most frequent reason for seeking medical attention. This occurs despite the fact that in most cases of URTIs, antibiotic confers little or no benefit. [6]

It is very essential to analyze and monitor the prescribing patterns of drugs from time to time. This

would enable the basic modification in prescribing practices to enhance the therapeutic benefit and decrease the side effects of drugs. Drug use evaluation is an ongoing, authorized and systemic quality improvement process, which will give right feed back to the clinician. [7] The usage of antibiotic is increasing nowadays in all types of patients, and there are very few studies available to help the physician to prescribe suitable antibiotic. The antibiotic resistance is emerging as a big threat to the society.

Inappropriate use of antimicrobial agents is an issue of global concern as it directly contributes to the development of antimicrobial resistance (AMR) and increased health-care costs. As much as 15%–30% of the health budget is attributed to antimicrobial resistance worldwide. [8]

Public health facilities in India are overburdened with a large number of patients. In such a scenario, patients are often prescribed medicines including antimicrobial agents without confirmation of diagnoses, as the laboratories may not have the capacity to determine the antimicrobial agents sensitivity of biological samples. [9]

The current study aims at drug utilization, rationality, and cost analysis of antimicrobial medicines in a tertiary care teaching hospital of Bihar region.

Materials and Methods

The observation study was conducted by the Department of Pharmacology, Sri Krishna Medical College, Muzaffarpur, Bihar, India among 250 patients admitted in respective indoor department of the hospital.

Inclusion Criteria:

Patients admitted in male and female medical wards

Exclusion Criteria:

1. Subjects with severe ailments, shifted to ICU from the indoor
2. Pregnant women.
3. Those who denied to participate

Standard socio-demographic data collection form, Subjects informed consent form, drug list and facility care indicator form of institution, WHO core drug use indicator guidelines, WHO anatomical therapeutic classification (ATC)/ defined daily dose (DDD) metric system were used as study instruments.

Data collection - 250 male and female patients admitted in respective indoor department and fulfilling inclusion criteria were included in the study. A standard socio demographic and clinical features data collection proforma was prepared and the characteristic like age, gender, occupation, income group, subject IP/OP number were recorded. Information regarding Diagnosis, patient's present/past medical history, number of days of hospitalization, treatment, any ADR, investigations, outcome, was collected from indoor ticket and patient's interview.

Drug utilization pattern among male and female patients was evaluated using following quality indicators of drug use, recommended by WHO:

1. Comparison of demographic data
2. Commonly used drugs in medical indoor
3. Common ailments for which drugs were used
4. Number of drugs used by injectable route
5. Average number of drugs per prescription
6. Percentage of prescription (encounters) with antibiotic prescribed
7. Percentage of drugs prescribed by generic name
8. Percentage of drugs prescribed from essential drug list
9. Total dose, duration and frequency of administration of each drug
10. Average dose per prescription of each drug
11. Adverse drug reactions in the included patients
12. Individual cost of drugs prescribed
13. Total burden on government
14. Average cost per Prescription (encounter)
15. Anatomical Therapeutic Chemical code of drugs
16. Comparison of Definitely Daily Dose and Prescribed Daily Dose of antibiotics and most commonly used drugs

Results

Table 1: Demographic details

Parameters	N
Number of patients (n)	250
Males	150
Females	100
Mean age of enrolled patients (years)	42.5
Mean age	
Males	44.6
Females	40.5

250 patients were prescribed one or more antimicrobial agents were enrolled in the study. Among the 250 patients, 100 (40%) were female and 150 (60%) were male. The mean age was 42.5 years. Majority of the patients were in the age group of 18–25 years (n = 80, 32%).

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Table 2: Common diagnosis among patients

Diagnosis	No. of cases	Percentage
Infectious Disease	50	20
Respiratory Disorder	40	16
CNS Disorder	30	12
CVS Disorder	25	10
GI Disorder	23	9.2
UTI	22	8.8
Endocrine Disorder	20	8
Poisoning	15	6
Liver Disorder	13	5.2
Anaemia	12	4.8
Total	250	100

Diagnosis for which drugs were prescribed were Infectious disease (24%), Respiratory disorders (18.5%), CNS disorders (13%), CVS disorders (9.5%), GIT disorders (9.5%), Urinary tract disorders (6.5%), Endocrine disorders (5.5%), Poisoning (5%), Liver disorders (4.5%) and Anemia (4%).

Table 3: Criteria for initial antimicrobial agent selection

Criteria	Male (n=150), n (%)	Female (n=100), n (%)	Total (n=250),n (%)
Empirical	130 (86.66%)	85 (85%)	215 (86%)
Definitive	8 (5.34%)	7 (7%)	15 (6%)
Mixed	12 (8%)	8 (8%)	20 (8%)

The intended purpose of Anti-Microbial Agents use was prophylactic in 59% of patients followed by therapeutic in 192 patients. The criteria for initial selection of antimicrobial agents have been depicted in Table 3.

Table 4: Antibiotics prescribed among patients

Antibiotics Prescribed	No. of Patient (250)	number of patients %
Cephalosporin	75	30
Antimalarial	55	22
Penicillin	45	18
Fluroquinolones	30	12
Antiprotozoal	15	6
Tetracycline	7	2.8
Clindamycin	5	2
Aminoglycoside	8	3.2
Macrolide	5	2
Vancomycin	5	2

In our study Cephalosporins were the most commonly used antimicrobial drug (30%), followed by Antimalarial drugs (22%), Penicilllins (18%), Fluroquinolones(12%), Antiprotozoal drugs (6%), Tetracyclines (2.8%), Clindamycin (2%), Aminoglycosides (3.2%), Macrolides (2%) and Vancomycin (2%). (Table 4)

Discussion

The findings of the drug‑utilization study conducted at a tertiary care hospital, Bihar, provide information about the demographic data, prescribing patterns of use, reason for their use, criteria for selection, susceptibility/resistance pattern based on clinical response of the patients and culture with sensitivity report. Majority of the patients were male and the age of onset was middle age. A study conducted by Biswal et al. in India has reported male predominance, in agreement with our study. [10]

Drug utilization studies are conducted to monitor and evaluate prescribing pattern. They also suggest modification and improvement in prescribing practices and promote rational prescribing practices. [11] Study of prescription patterns is an important tool to determine and improvise rational drug therapy. Rational prescribing optimizes benefits and safety, and maximizes utilization of resources.

A total of 250 patients were included, out of them 150 (60%) were male and 100 (40%) were female, with age range between 15-80 years. Age and gender distribution is approximately similar to that reported by Meher et al and Choudhary et al. Mean age in our study was 46.6±17.7, while mean age reported by Chaudhary et al was 32.5 years and by Meher et al was 48.12 years. [12,13]

86 percent of the antimicrobial agents were used empirically based on the site and severity of infection, comorbid conditions, anticipated pathogens, and the prevalent trends rather than using broad spectrum antimicrobial agents as the only criteria. Definitive therapy was possible only in 3% of patients based on culture and sensitivity, in accordance to a study where 93% of cases [14] and contrary to study where 64% of cases were treated empirically. [15] Thus, it may be suggested that selection of specific antimicrobial agents for definitive therapy may not be possible unless the causative pathogen is isolated.

Antibiotics are important category of drugs and its improper use can result in antibiotic resistance which may contribute in enhanced cost, patient morbidity and mortality. [16,17] Therefore monitoring and evaluation of prescribing patterns of antimicrobial agents and recommendations to improve and modify the prescribing pattern are one of the recommended strategies to control resistance and also to improve the prescribing practices. [18]

Conclusion

Doctors are prescribing antimicrobial agents empirically based on their clinical acumen rather than availability of microbiological sensitivity data. A large expenditure is being incurred on a few antimicrobial agents prescribed to small percentage of patients. A baseline data of drug utilization pattern in indoor patients in medicine department is created by this study. Prescription by generic name and from essential list, preference of oral route, and free government supply are encouraging findings. Free health services are one of the major requirements for the developing countries because cost is considered one of the important factors in making therapeutic decision with poor financial resources. However poly-pharmacy, over use of proton-pump inhibitors and over dosing of some antibiotics are areas of concern. There is a need of more of such studies including larger number of patients and other departments.

Limitations

Relatively less number of patients was studied and they were not followed after their discharge from the ward. Choice of treatment also varies from physician to physician and the study provides no data for the same. Drugs were supplied free of cost as government supply, so the costs of different brands could not be calculated and compared. However, it identified certain lacunae in prescribing pattern, need for the guidelines, and further studies for drug utilization in medicine indoor. The study can be expanded in future including other departments to evaluate generalized pattern of drug utilization as well as drug utilization in vulnerable groups like children and pregnant women.

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