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## Analysis of rational use of drugs in a tertiary care teaching hospital: A cross-sectional study

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### Abstract

**Introduction:** The World Health Organization defines rational use of a drug as the patients must receive medication that is appropriate to their clinical needs, in doses that meet their requirements for a sufficient amount of time, and at the lowest possible cost to them and their community.

**Materials and Methods:** Hospital-based prospective cross-sectional study design was conducted to evaluate rational drug use (RDU) based on WHO prescribing indicators in the G.S.V.M. Medical College, Kanpur and associated hospital. Data was collected between 15 February 2023 to 17 March 2023 by 3<sup>rd</sup> year M.B.B.S students during their scheduled elective posting.

**Results:** For a total of 500 prescriptions analyzed, 1561 drugs were prescribed in total, denoting the average number of drugs prescribed per prescription to be 3.12. The average was found to be highest (5.95) in the department of Skin and VD and lowest in the Paediatrics department (2.6). The "antibiotic" usage was high in Surgery department (28.48%) whereas it was found to be lowest in ophthalmology department (0%). Injectable prescribed were found to be highest in ENT department (5.08%). Maximum number of prescriptions (297) belonged to Medicine department. Out of the total of 1561 drugs, 1463 drugs were prescribed most commonly by oral route. Among them, 63.93% were prescribed by branded names, while the remaining 36.06% was prescribed by generic names. 83% of the total drugs prescribed were from the Essential Drug List (EDL).

**Conclusion:** The study revealed trends in outpatient department prescribing practices and the rationality of drug use in a tertiary care hospital with a focus on prescribing medications rationally, which can result in more cost-effective patient care. There is a need to increase the generic medications in the prescription and to increase the number of prescriptions from the essential drugs list.

**Keywords:** Prescription, prescribing indicators, hospital-based

### Introduction

The World Health Organization defines Rational use of a drug as the patients must receive medication that is appropriate to their clinical needs, in doses that meet their requirements for a sufficient amount of time, and at the lowest possible cost to them and their community<sup>[1]</sup>. It encompasses rational prescribing (good diagnosis practice and good prescribing practice, ie, the process of safe, effective, and economical ordering of drugs for the benefit of the patient), rational dispensing (the process of providing the right drug to the right patient in the right formulation or dosage, proper counselling, clear patient instructions, and good stock-management practice), and rational patient use (patient adherence/compliance)<sup>[2-4]</sup>.

The essential goal of rational drug use is to minimize the cost of drug therapy, avoid preventable adverse drug reactions and drug interactions, and enhance the quality of therapeutic care while promoting patient adherence<sup>[5-6]</sup>.

The World Health Organisation estimates that more than half of all medications are inappropriately prescribed, dispensed, or sold and half of all patients fail to take their medications properly. The majority of the time, multiple prescribing and dispensing errors result in irrational use<sup>[7]</sup>. Not only around one-third of the world's population having access to basic medications but also half of all prescriptions, sales, or dispensing of medications are improper, and half of all patients do not take their medications as directed<sup>[8-10]</sup>.

The use of drugs without a proper prescription is not only common, but it is also a very serious issue that affects patients, healthcare systems, and entire communities negatively.

According to estimates, over 60% of drugs are given and sold improperly in public health facilities and 70% in private institutions [11]. In addition, about a third of the world's population is unable to access essential drugs due to polypharmacy, inappropriate use of antimicrobials, use of injections, overuse of antibiotics, and inappropriate use of essential drugs [12]. Irrational use of drugs can also lead to wasted costs, especially antibiotic resistance, medication errors, and adverse drug reactions.

Rational drug use always begins with an appropriate prescription, so if the initial process is as per the standard parameters, it is hoped that the use of the drug will be correct. The correct use of drugs aims to achieve an economical, safe, and effective treatment [13]. As a result, sensible drug prescribing would be encouraged.

Constant prescription monitoring may assist in identifying the issues associated with treatment assessments [14]. There are two strategies for minimizing it, firstly, monitoring the types and amount of irrational use of drugs in the prescriptions, and secondly finding out the reasons behind this and proper learning of healthcare professionals [15]. Therefore, we conducted this study to analyze the rational use of drugs in a tertiary care teaching hospital to promote RDU by providing insights into overall prescribing practices among different clinical outpatient departments.

**Materials and Methods**

A hospital-based cross-sectional study was conducted to evaluate rational drug use based on WHO prescribing indicators in the G.S.V.M. Medical College-Kanpur and associated hospital. 500 prescriptions from different outpatient clinical departments were collected between 15 February to 17 March 2023 during the scheduled elective posting of 3<sup>rd</sup> year MBBS students in Pharmacology department.

**Prescriptions were analyzed for rationality by using WHO drug use indicators**

- Average number of drugs/prescriptions.
- Percentage of drugs prescribed by generic name.
- Percentage encounters with an antimicrobial-prescribed.
- Percentage encounters with an injectable prescribed.
- Percentage of drugs prescribed from essential drug list (EDL).

**Inclusion Criteria**

All outpatient prescriptions that included at least one medicine were considered.

**Exclusion Criteria**

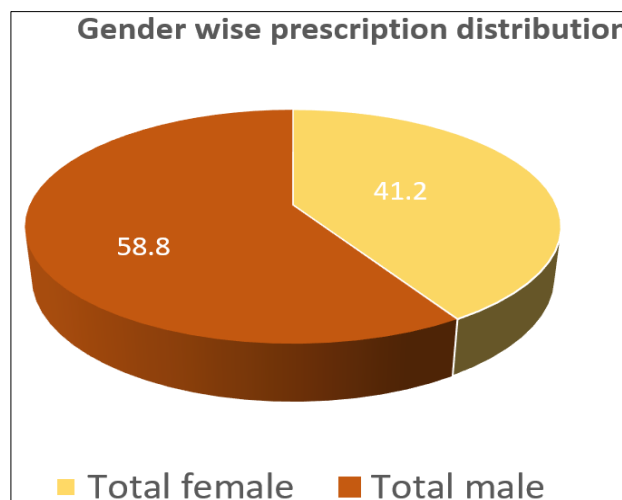
The study excludes prescriptions for routine vaccinations, contraception, and referral cases.

**Results**

A total of 500 patient prescriptions were collected and evaluated from different departments of G.S.V.M. Medical College Kanpur and associated hospital. Out of which, 206 (41.2%) belonged to female and 294 (58.8%) to male. The ages ranged from 8 to 87 years. They were classified into different age groups, the maximum was from the age group between 20 to 40 years (39.05%), whereas the minimum was from 0 to 20 years (6.37%). Below fig-1 shows the Gender-wise prescription distribution.

Table number 1 shows the department-wise distribution of prescriptions in which the maximum number of

prescriptions were from the medicine department followed by the orthopaedics department and the least number of prescriptions were from the paediatrics department.

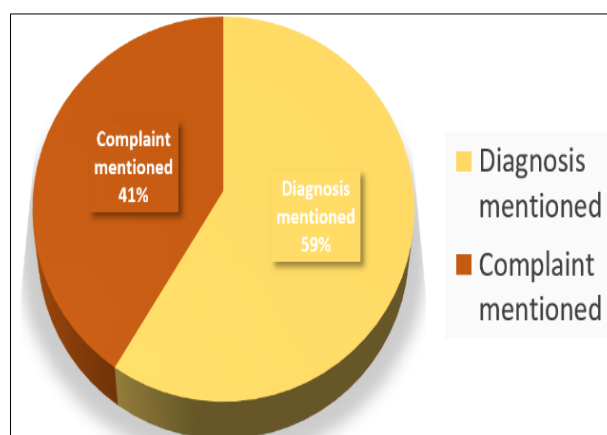


**Fig 1:** Shows the Gender-wise prescription distribution

**Table 1:** Department-wise Prescription distribution

Department Name	Total prescription
Medicine	297
Surgery	62
Skin & VD	20
ENT	39
Orthopaedics	67
Ophthalmology	6
Gynaecology	2
Paediatrics	7
Total	500

The above figure 2 demonstrate whether diagnosis and complaint are mentioned in prescriptions or not. We found out that only diagnosis is mentioned in 59 percent of the prescriptions and whereas only complaint is mentioned in 41 percent of the prescriptions and diagnosis was not mentioned.



**Fig 2:** Distribution of Diagnosis & complaint in prescription

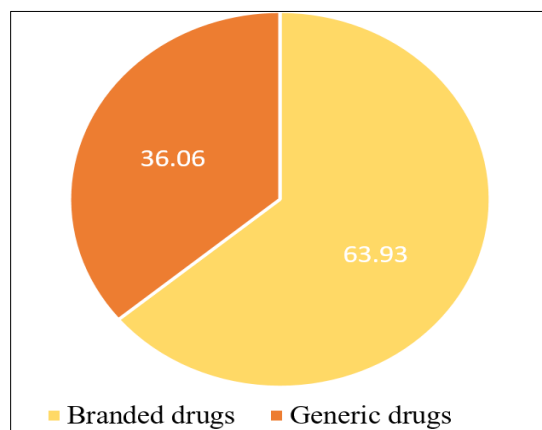
Department-wise drug distribution is represented in Table 2 below. It shows the maximum number of prescriptions, 297 out of 500 belonging to the medicine department. Out of a total of 1561 drugs, 1463 drugs were prescribed by the oral route followed by topical, inhalational, and least by the injectable route.

**Table 2:** Department-wise drug distribution

Department Name	Total Oral drugs	Total Inhalational drugs	Total Antibiotics	Total Injectable drugs	Total topical drugs	Total no of drugs	Average no. of drugs
Medicine	824	13(1.54%)	30 (3.5%)	2 (25%)	0	839	2.8
Surgery	160	0	47 (28.48%)	0	5 (3.03%)	165	2.7
Skin & VD	65	0	2 (1.68%)	0	54(45.37%)	119	5.95
ENT	108	0	12 (10.16%)	6 (75%)	4(3.38%)	118	3.02
Orthopaedics	267	0	1 (16.66%)	0	13(4.64%)	280	4.2
Ophthalmology	15	0	0	0	1(6.25%)	16	2.7
Gynaecology	6	0	1 (16.66%)	0	0	6	3
Paediatrics	18	0	1 (5.55%)	0	0	18	2.6
Total	1463	13	94	8	77	1561	3.12

The average number of drugs prescribed per patient was found to be 3.12 and was found to be highest (5.95) in the Department of Skin and VD and lowest in the Paediatrics department (2.6). Total number of Injectables prescribed was 8 out of which the maximum was prescribed in the ENT department (75%) and the lowest in the medicine department (25%). Total no of Inhalational drug prescribed was 13 and all of those were prescribed in medicine department. Total number of topical drugs were 77, and maximum prescription were from Skin & VD followed by Orthopaedics.

The majority of these prescriptions, 63.93%, are prescribed by brand names, and the remaining 36.06% by generic names. Furthermore, 83% of drugs prescribed were from the Essential Drug List (EDL) as depicted in Table 3 below.

**Fig 3:** Percentage of Branded and Generic drugs**Table 3:** Percentage of drugs prescribed were from the essential drug list (EDL)

Prescribing indicators	Standard reference range/optimal value	Frequency/percentage
Average number of drugs per prescription	1.6-1.8	3.12
Percentage of drugs prescribed by generic name	100%	36.06%
Percentage of drugs prescribed from EDL	100%	83%
Percentage of Antibiotics drugs prescribed	20.0-26.0%	6.02%
Percentage of Injectable drugs prescribed	13.4-24.1%	0.51%

## Discussion

Our study analyzed the rational use of drugs in 500 prescriptions from OPD of various departments of GSVM Medical College Kanpur. Out of the total 500 prescriptions, 41.2% belonged to females and 58.8% to males, showing male preponderance, which is similar to the findings of the study conducted by Kushwaha V, *et al.* [16] which showed 56.52% male preponderance compared to Females. The maximum number of prescriptions was from the age group 20-40 years (39.05%), whereas the minimum belonged to 0 to 20 years (6.37%). The result of our study showed that the percentage of encounters with antibiotic prescribing and prescription of injectable medications was 6.02% and 0.51% respectively, which is in line with the study conducted by Agrawal P, *et al.* [17].

In our study, the average number of drugs prescribed per encounter was 3.12, which exceeded the recommended standard range of 1.6-1.8. Another study conducted by Chakraborty D, *et al.* found it to be 4.38, whereas in the study by Agrawal P, *et al.*, the average number of drugs prescribed per encounter was 1.68, which was lower than our findings. The higher number of drugs prescribed in our study may enhance the chance of adverse drug reactions, antimicrobial resistance, and interfere with prescription adherence.

In our study, 36.06% of drugs were prescribed by their generic names, which is significantly below the

recommended standard of 100%. In the study conducted by Chakraborty D, *et al.* 23.3% of drugs were prescribed by generic names, lower than our findings, whereas in the study by Mamo D, *et al.*, 90.53% of drugs were prescribed by generic names, which is higher than our study. The low percentage of generic prescribing could be attributed to repeated and effective promotion of branded products by pharmaceutical companies.

In our study, the percentage of antibiotics and Injectables prescribed was 6.02% and 0.51% respectively, falling below the recommended standard range of 20.0-26.0% for antibiotics and 13.4-24.1% for injectables. In contrast, the study conducted by Mamo D, *et al.* showed that 55.2% of prescriptions included antibiotics and 7.45% included injectables, indicating higher usage than our study. The variation could be due to differences in the study population and prescribing practices.

In our study 83% of drugs were prescribed from the essential drug list, aligning with the recommended standard of 100%, while the study conducted by Chakraborty, *et al.* reported only 23.3% adherence to the essential drug list. Essential medicines, as defined by WHO, satisfy the priority healthcare needs of the majority of the population, promote rational use of drugs, and increase economic advantages by lowering the cost of therapy.

In our study, the highest number of Injectables was prescribed in the ENT department (75%), followed by 25%

in the medicine department. No Injectables were prescribed in Pediatrics, Gynecology, Orthopedics, Ophthalmology, Skin, and Surgery departments. Another study by Saeed S, *et al.* reported the highest percentage of injectables in the Medicine department (43.6%) and the lowest in the Ophthalmology department (9.9%), which is higher than our findings. Similarly, in the study by Galappathy P, *et al.*, the highest number of injectables were prescribed in the Medicine department (43.4%) and the lowest in the Gynecology department (20.9%).

Regarding antibiotic prescriptions, our study found the highest percentage in the Surgery department (28.48%) and the lowest in the Skin & VD department (1.68%). Overall, the antibiotic usage in our study (26.4%) was within the WHO recommended standard (20-26.0%). In contrast, the study by Galappathy P, *et al.* reported the highest antibiotic prescriptions in the Surgery department (39.1%) and the lowest in the Gynecology department (21.2%), which is higher than our study.

In our study, the total number of drugs prescribed in the medicine department was 839, 118 in the ENT department, 16 in the ophthalmology department, and 6 in the Gynecology department respectively, while in the study conducted by Saeed S, *et al.* [20], the total no of drugs prescribed in the medicine department was 826 which was lower than our study but the total number of drugs prescribed in the ENT department was 461, 358 in the ophthalmology and 829 in Gynecology department which is much higher than our study. In our study, out of total injectables prescribed, the highest number of injectables were prescribed in the ENT department 75% followed by 25% in the medicine department and no injectables were found to be prescribed in Pediatrics, Gynecology, Orthopedics, Ophthalmology skin, and Surgery department. In another study conducted by Saeed S, *et al.* [20], the highest no of injectables was prescribed in the Medicine department (43.6%), and the lowest in the Ophthalmology department (9.9%), which is higher than the findings in our study. Also in the study conducted by Galappathy P, *et al.* [21], the highest number of injectables were prescribed in the Medicine department (43.4%) and lowest in the Gynecology department (20.9%). In our study, the highest No of antibiotics were prescribed in the Surgery department (28.48%) and the lowest in the Skin & VD department (1.68%), while in the study conducted by Galappathy P, *et al.* [21], the highest percentage of antibiotic prescriptions were found to be in Surgery department 39.1% and lowest in 21.2% in Gynecology department, which is much higher than in our study,

### Conclusion

Our study revealed the trends in outpatient prescribing practices and the rationality of drug use in a tertiary care hospital with a focus on prescribing medications rationally, which can result in more cost-effective patient care. There is a need to increase generic medications in the prescription and to increase the adherence of prescriptions of the essential drugs.

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