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## ASSESSMENT OF CURRENT PRESCRIBING PRACTICES USING WORLD HEALTH ORGANIZATION PRESCRIBING INDICATORS AT A PRIVATE GENERAL HOSPITAL IN WESTERN INDIA– A CROSS-SECTIONAL STUDY

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### Keywords:

India, Essential drug list (EDL), WHO prescribing indicators, polypharmacy

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**ABSTRACT: Purpose:** Drug use studies are essential in health, as the research provides insight into drug use in communities. The current study aimed to evaluate the prescription pattern of drugs prescribed in a private general hospital's out-patient department (OPD), using prescribing indicators developed by the World Health Organization (WHO). **Methods:** The study was a prospective, observational, cross-sectional study performed at an OPD of a private general hospital located in the Western region of India from October 2020 to March 2021 for 6 months using WHO prescribing indicators. Microsoft Excel and SPSS Version 26.0 were used to capture and analyze the data of the study. **Results:** A total of 619 prescriptions were captured and evaluated in this study, and the total number of drugs prescribed was 2023 drugs. The average number of drugs prescribed per encounter was 3.3 (SD = 1.1). The percentage of drugs prescribed by using generic name of the drug was 2.8% and the percentage of encounters with an antibiotic and an injection prescribed was 42.3% and 5.3%, respectively. The percentage of drugs prescribed from the National Essential List of Medicine (NELM) was 37.9%. **Conclusion:** The study's findings show that, except for the percentage of injections prescribed per encounter, other drug use pattern indicators deviated from the WHO recommended values. Hence, effective interventions like awareness programs on rational prescribing of drugs are suggested to be undertaken at private hospitals.

**INTRODUCTION:** Medicines are essential in providing health care and contributing to the healing and alleviation of illnesses, symptoms, and patient suffering. However, a big problem for many healthcare systems worldwide is the irrational use of medicines<sup>1</sup>. The World Health Organization (WHO) suggests that about 50% of the drugs worldwide are inappropriately administered, dispensed, or marketed<sup>2</sup>. Irrational prescription of medicine is a critical issue, especially in developing nations.

These nations have inadequate healthcare infrastructure, and tools to assess drug use in different health facilities are either ill-structured, partially effective, or absent<sup>3</sup>. Encouraging fair medicinal usage needs efficient policies and practical cooperation between health practitioners, patients, and whole communities.

Addressing irrational drug use is deemed necessary for improved health care to ensure patient safety and the optimum use of resources<sup>4</sup>. The World Health Organization (WHO) defines drug utilization research as the "marketing, distribution, prescription and use of drugs in a society, with special emphasis on the resulting medical, social and economic consequences"<sup>5</sup>. One of the data sources for conducting a DUR study is analyzing prescribing pattern of the drug.

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While it is often considered a tedious duty, prescribing is a dynamic procedure that measures the prescriber's understanding and implementation of the concepts of sound therapy, communication skills, and approach to identifying uncertainties associated with the therapy<sup>6</sup>.

The prescription process can often be challenging for health professionals, especially if there is no evaluation of risks and benefits and the guideline are not explicit<sup>1</sup>. A prescription pattern monitoring studies (PPMS) review<sup>7</sup> conducted exclusively in India concluded that there is the ineffectiveness of PPMS in developing and facilitating rational use of medicines in India and suggested following stringent measures to rectify the ineffectiveness.

**DUR Studies in Private Hospitals:** The prescribing patterns in public hospitals and private hospitals vary to a high degree. The private sector dominates the largest share of the drug market in nearly all developing countries. Recent data on health provided by the National Sample Survey (NSS) 2017–2018 demonstrated that the public health system in India accommodates less than half of the population's needs while the remaining population depends on private hospitals for medical treatment<sup>8</sup>. Hereafter, underlining that the majority of the population in India depends on private healthcare providers. However, the studies on drug utilization in India are conducted primarily in government hospitals<sup>9-11</sup>. Few studies evaluating prescribing patterns at private clinics and hospitals are available from India's Western region.

The current study attempts to address this gap by carrying out drug utilization research by studying prescribing patterns at an OPD setting of a private general hospital located in the suburban area of the Pune region of Western India using prescribing indicators developed by the WHO.

**MATERIAL AND METHODS:** An observational, cross-sectional, prospective study was conducted from October 2020 to March 2021 for 6 months at an OPD setting of a private general hospital in the suburban region of the Pune district of Maharashtra, India. Ethical approval was obtained from an Independent Ethical Committee before starting the study, and informed consent was taken from patients before documenting the patient's prescription data. The study is registered on the Clinical Trials Registry of India (CTRI) - CTRI/2020/10/028303.

**Eligibility Criteria:** Prescriptions of gender, age, and clinical diagnosis were included in the study. Patients visiting the OPD facility for follow-up (who may or may not be enrolled previously), referral patients, patients with an intellectual disability, and patients who are unwilling to provide informed consent were excluded from the study.

**Procedure:** The study investigator AG visited the OPD of the private general hospital (between 6 p.m. to 10 p.m.) and collected data on prescribing indicators prospectively by using prescriptions prescribed to the patients.

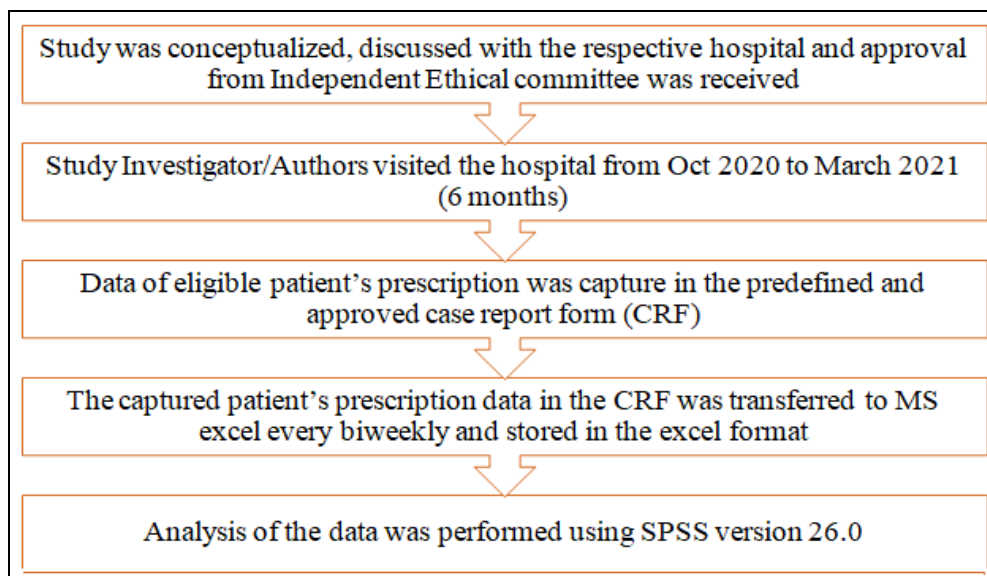


FIG. 1: METHODOLOGY USED FOR THE STUDY

All the patients' prescriptions that met the inclusion criteria were considered in the study. The information available on the prescription form (filled out by the physician) was captured by AG in a predefined format approved by the Independent Ethical Committee and designed as mentioned in the WHO document<sup>12</sup>. Patients were not asked any questions in the current study **Fig. 1**.

Each prescription was analyzed using WHO prescribing indicators<sup>13</sup>:

1. The average number of drugs per encounter.
2. The percentage of drugs prescribed by generic name.
3. The percentage of encounters with an antibiotic prescribed.
4. The percentage of encounters with an injection prescribed.
5. The percentage of drugs prescribed from the essential drugs list or formulary.

**Analysis of Data:** The collected data were tabulated, validated, and analyzed by descriptive analysis using Microsoft Excel and SPSS version

26.0 (SPSS for Windows, Version 26.0. Chicago, SPSS Inc.).

## RESULTS:

**Patient Characteristics:** Patients' information and drug-related information, like drug name, strength, frequency, date of prescription, diagnosis, and prescriber's name, were stated in all of the prescriptions reviewed. However, information like the age and weight of the patient was missing in most of the prescriptions. A total of 619 prescriptions were studied in the current study, out of which 359 (58.0%) were for female patients.

**WHO Prescribing Indicators:** A total of 2023 drugs were prescribed in 619 prescriptions. Drugs were prescribed in a range of 1 to 7 in the 619 prescriptions studied; out of these, 32 (5.2%) prescriptions had only 1 drug, while only 9 (1.5%) contained more than 7 drugs prescribed **Table 1**. The average number of drugs per prescription was 3.3 (SD=1.1). The percentage of drugs prescribed by the generic name was 2.8%. Whereas the percentage of encounters with an antibiotic and injection was 42.3% and 5.3%, respectively. The percentage of drugs prescribed from the National List of Essential Medicines (NELM) was 37.9% **Table 2**.

**TABLE 1: SUMMARY REPORT OF THE NUMBER OF DRUGS PER ENCOUNTER**

Sr. no.	Number of drugs per encounter	Frequency	Percentage
1	One	32	3.8
2	Two	104	2.5
3	Three	228	10.0
4	Four	194	21.2
5	Five	52	29.4
6	≥Six	9	33.2

**TABLE 2: SUMMARY OF WHO PRESCRIBING INDICATORS RESULTS**

Sr. no.	WHO prescribing indicators	Total drugs/encounters	Average/percent	WHO recommended standard <sup>14</sup>
1	The average number of drugs per encounter	2018	3.3 ± 1.1	1.6-1.8
2	Percentage of encounter with antibiotics	262	42.3	20.0-26.8%
3	Percentage of encounters with injection	33	5.33	13.4%-24.1%
4	Percentage of drugs prescribed by generic	56	2.8	100%
5	Percentage of drugs from essential drug list/ NELM	767	37.9	100%

NELM; national essential list of medicines; WHO, World health organization.

Of the total of 2023 drugs prescribed, antacids drugs 398 (19.6%) were the highly prescribed drugs, followed by analgesics 359 (17.6%) and vitamins and supplements 330 (16.2%) **Fig. 2**. A total of 262 (13.0%) antibiotic drugs were prescribed in the current study, and the most commonly prescribed antibiotics were

Azithromycin (3.1%) and the most commonly prescribed drug was Domperidone + Omeprazole (8.3%) **Tables 3 and 4**. Of the 2023 drugs prescribed, the percentage of fixed-dose drug combinations (FDCs) prescribed was 73.0%. NSAIDs were the most commonly prescribed FDCs (23.0%) in the study, followed by vitamins,

minerals, and dietary supplements (21.4%), antacids (21%), antibiotics (7.3%), and antihistaminics (5.1%). Tablets were the most prescribed dosage form 1079 (53.3%) followed by capsules 477 (23.6%), Syrup 253 (12.5), and Suspensions 49 (2.0%). Most of the prescriptions

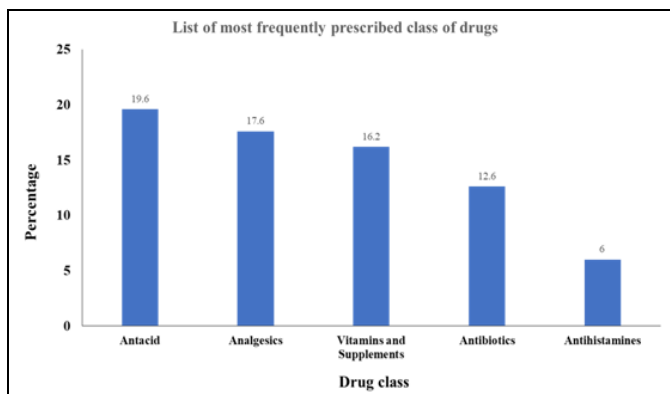
were presented with information about the frequency of administration (99.7%), Duration of treatment (99.6%), and route of administration (100%); however, information related to the dose of the drug was presented in very few of the prescriptions (6.4%) **Fig. 3**.

**TABLE 3: SUMMARY OF FREQUENTLY PRESCRIBED DRUGS (N = 2023) IN THE STUDY**

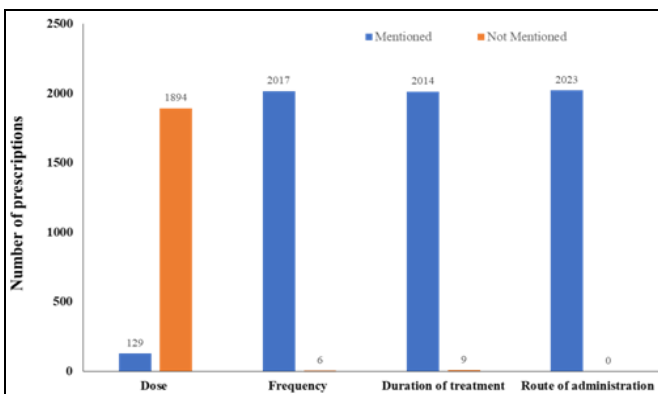
Sr. no.	Frequently prescribed medicine	Frequency (Percentage)
1	Domperidone + Omeprazole	169 (8.3%)
2	Aceclofenac + Paracetamol + Chlorzoxazone	119 (5.8%)
3	Vitamin B complex + Calcium supplements	93 (4.6%)
4	Aceclofenac + Paracetamol	86 (4.2%)
5	Pantoprazole + Domperidone	84 (4.1%)
6	Levocetirizine +Montelukast	69 (3.4%)

**TABLE 4: SUMMARY OF FREQUENTLY PRESCRIBED ANTIBIOTICS DRUGS (N = 262) IN THE STUDY**

Sr. no.	Frequently prescribed antibiotics	Frequency (Percentage)
1	Azithromycin	65 (3.1%)
2	Cefixime+ Ofloxacin	34 (1.7%)
3	Ofloxacin	31 (1.5%)
4	Amoxycillin+ Clavulanic Acid	26 (1.2%)
5	Cefixime	26 (1.2%)



**FIG. 2: MOST FREQUENTLY PRESCRIBED CLASS OF DRUGS**



**FIG. 3 QUALITATIVE ANALYSIS OF PRESCRIPTIONS**

**DISCUSSION:** The problem of irrational prescribing is known worldwide and in some cases, may also lead to adverse effects in patients<sup>14</sup>. Similar drug utilization studies have been performed in other developing countries. The WHO indicators assess a healthcare provider's success concerning the appropriate use of medications. In the present study, WHO prescribing indicators were utilized to describe the current treatment practices, which help identify problem conditions, detect if a facility exceeds or meet a given practice standard and act as baseline data for continuing hospital monitoring. In the present, the average number of drugs per prescription was 3.3 (SD=1.1) drugs; which is higher than the WHO recommended value,

highlighting polypharmacy in practice<sup>14</sup>. But compared to studies conducted in Indian in similar settings by Ahsan *et al.* and Gopalakrishnan S *et al.*, this value was much less, which had reported 4.02 and 4.54 drugs as the average number of drugs per prescription<sup>15, 16</sup>. Furthermore, a study conducted in Bahrain reported average drugs prescribed as 3.3 drugs, similar to our study finding<sup>17</sup>. However, a higher number of drugs per prescription were reported by a study conducted in Ghana (4.8)<sup>18</sup>. On the contrary, studies conducted in countries like Ethiopia (1.83), Nepal (2.29) and United Arab Emirates (2.49) reported a much lower average number of drugs prescribed compared to the current study<sup>19-21</sup>. Polypharmacy can lead to adverse drug reactions due to drug-drug interaction

due to increases in the number of drugs consumed by the patient, and further need special attention by the physician to avoid such conditions; also, the likelihood of non-compliance for a treatment increase as the number of drugs increases, both of these scenarios cause an increase in the healthcare cost<sup>14</sup>. The percentage of drugs prescribed using the generic name was very low in our study. Out of the 2023 drugs prescribed, only 56 (2.8%) drugs were prescribed using the generic name. The value is lower than that of the WHO recommendation (100%)<sup>14</sup>. Other studies conducted in India also showed very poor adherence to the generic prescription of drugs; a study conducted by Jain A *et al.*, Ragam AS *et al.* and Kumari R *et al.* reported 0.0%, 1.5% and 3.1%, respectively<sup>8, 22-23</sup>. On the contrary, a study by Singh UR *et al.* reported that 96.9% of drugs were prescribed using generic names<sup>24</sup>. Internationally, a study conducted in Ghana reported that 65% of drugs prescribed using the generic name<sup>14</sup>. However, better practices with respect to prescribing generic drugs were reported from studies conducted in Ethiopia (97.4%)<sup>19</sup> and UAE (100%)<sup>21</sup>. Generic prescribing of drugs avoids patient confusion and can also reduce treatment costs. In addition, the generic prescribing of the drug is an indicator of prescribing quality<sup>19</sup>.

In the worldwide population, the rates of antibiotic drug resistance are rising. The prevalence of antibiotic drug resistance is linked to the proportion of the population receiving the antibiotic drug and overall exposure to antibiotic drugs. The higher the use of antibiotics, the increased is the resistance risk<sup>25</sup>. In the present study, 262 (42.3%) of the total prescriptions were prescribed antibiotics, which is much higher than the WHO recommendation (20-26.8%)<sup>14</sup>. Other studies conducted in India also reported higher prescription of antibiotic drugs. For example, a study conducted in the Northern part of India by Rehan HS reported 72.7% of antibiotics prescribed<sup>26</sup>; similarly, studies conducted by Jain S *et al.*, Singh T *et al.* and Bharti SS *et al.* in other parts of India reported high usage of antibiotics (63.3%, 52.5% and 60.9% respectively)<sup>27-29</sup>. Internationally, a study performed in Kenya demonstrated that most prescriptions (74%) had antibiotics prescribed<sup>30</sup>. Also, a higher percentage of antibiotics prescribed was reported in studies conducted in Bahrain,

Ghana and Uzbekistan (45.8%, 60% and 57%, respectively)<sup>17, 18, 31</sup>. On the contrary, studies from the UAE and Jordan reported 17.7% and 9.8% of the antibiotics prescribed in the study, which is a positive factor and much less than the recommended values<sup>21, 32</sup>. Irrational prescribing of injections may cause some severe health issues due to the improper techniques which can lead to nerve damage or paralysis or risk linked with blood-borne disease, hence to administer injections a specialized and trained staff is required, moreover injection as dosage form should be preferred in emergency case or non-availability of other dosage forms. Additionally, injection therapy is costly and increases the total treatment cost. In our study, injections were prescribed in 5.3% of the total prescriptions. The finding was much lower than the WHO recommendation (13.4-24.1)<sup>14</sup>. Similarly, studies conducted in India also demonstrated minimal use of injections in OPD settings. For example, the study conducted in India by Rehan HS *et al.*<sup>26</sup>, Jain S *et al.*<sup>27</sup>, Singh T *et al.*<sup>28</sup> and Bharti SS *et al.*<sup>29</sup> reported 0.9%, 13.6%, 10.8% and 13.6% of injection prescribed. Internationally, studies conducted in Nepal, UAE, Kenya and Nigeria had also shown lower prescribing of injections, *i.e.*, 3.14%, 3%, 13.2% and 4%, respectively<sup>20-21, 30, 33</sup> that are in line with the recommendation<sup>14</sup>. On the contrary, as high as 80% of injections were prescribed in a study conducted in Ghana<sup>18</sup>.

The drugs present in the NELM are older, tested, and inexpensive drugs that have proven clinically effective and have an acceptable safety profile. In the current study, 37.9% of the prescribed drugs were listed in NELM. The low percentage of drugs prescribed from NELM was observed in other studies conducted in India by Abidi A *et al.*, Hussain S *et al.*, and Mandal P *et al.*, in Indian settings (53.3%, 22.6% and 29.4%, respectively)<sup>34-36</sup>. However, encouraging results were seen in other studies conducted in India like Singh P *et al.*, and Nautiyal *et al.* study reported 100% and 98.0% of drugs prescribed from NELM<sup>37-38</sup>. A higher percentage of drug use from essential medicine list was reported in studies done in Nepal, 85.19%<sup>20</sup>, UAE, 100%<sup>21</sup>, Jordan, 99.8%<sup>32</sup> and Pakistan, 93.4%<sup>39</sup>. Though the outcomes reported by these studies are encouraging these studies fail to fulfil the WHO recommended percentage (100%) of

prescribing from NELM, except UAE. In the current study, FDCs are one of the highly prescribed drugs in OPD.

The advantage of prescribing FDCs is that they provide the effectiveness of individual drug content, reduce the risk of drug resistance, minimize the number of single medications, increase patient compliance to the drug treatment, and minimize the drug cost. Nevertheless, lately, the irrational use of FDCs has increased enormously<sup>40</sup>. Several FDCs are available over the counter, and these dosage types have very dubious rationality. In addition, in our study, FDCs, like vitamins and analgesics, were one of the highly prescribed drug classes. Similar findings were reported by studies done in India and Pakistan settings demonstrating irrational and wide use of FDCs<sup>41-42</sup>. The current drug utilization study using the WHO-recommended prescribing indicators had some limitations. It is beyond this study's scope to appraise the standard of prescribing, dispensing practices and identifying the reasons for choosing a patient's medication. Nevertheless, the study results lead to many important findings.

**CONCLUSION:** This study highlighted deviations in prescribing practices from the WHO recommended values and underlined that considerable work is required to be carried out to rationalize antibiotics and generic drug usage. Additionally, adherence to the guidelines by practitioners with effective monitoring is required to improve rational prescribing. The data presented by our study offers relevant and valuable baseline information that can be useful for future comparisons.

**Author Contributions:** All named authors contributed to the study design, data analysis, and interpretation, as well as the drafting, review, and editing of the manuscript.

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**Ethical Approval:** The Independent Ethical committee approved the study, which was performed in accordance with the 1964 Declaration of Helsinki and its later amendments.

**Consent:** Informed consent was received from all the patients included in the study.

**CONFLICTS OF INTEREST:** Authors have no conflicts of interest.

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