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## Evaluation of prescribing patterns of medical practitioners in the state of Goa, India

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### ABSTRACT

**Background:** According to WHO, worldwide more than 50% of all medicines are prescribed, dispensed, or sold inappropriately, while 50% of patients fail to take them correctly. Evaluating the prescribing patterns of the medical practitioners will throw light on the common types of irrational practices such as inappropriate use of antimicrobials, polypharmacy, over-use of injections, failure to prescribe according to clinical guidelines.

**Methods:** 600 prescriptions prescribed by medical practitioners from March to April 2016 were analyzed using WHO prescribing indicators.

**Results:** Out of the 1900 drugs prescribed, average number of drugs per prescription was 3.17. Total number of drugs prescribed by generic name was 11 (0.58%). An antibiotic was prescribed in 119 patients (19.83%). An injection was prescribed in 23 patients (3.8%). 567 drugs prescribed were from the essential drug list of India (29.8%).

**Conclusions:** Polypharmacy increases the risk of drug interactions, treatment cost, decreases the patient's compliance. Prescribing medicines by generic name avoids the confusion. By adhering to the national essential list of medicine, drugs will be available to the patients at all times and be cheaper.

**Keywords:** National list of essential medicine, Generic name, Prescribing pattern, Prescribing indicators, Polypharmacy, Rational drug use

### INTRODUCTION

WHO has defined the rational use of medicine as, "patients receiving medications appropriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community".<sup>1</sup> Unfortunately, in clinical practice, all the above criteria are not always adhered to. WHO has made an alarming statement that worldwide more than 50% of all medicines are prescribed, dispensed, or sold inappropriately, while 50% of patients fail to take them correctly.<sup>2</sup>

Some of the irrational practices include polypharmacy, self-medication, inappropriate or inadequate use of antimicrobials, over-use of injections, failure to prescribe

in accordance with clinical guidelines.<sup>2</sup> This leads to antimicrobial resistance, adverse drug reactions, poor patient compliance, increased health care expenditure borne by the patient as well as the government.<sup>3</sup>

In order to combat irrational use of medicines, it is vital to assess the prescribing practices adopted by physicians. World Health Organization (WHO) in collaboration with the International Network of Rational Use of Drugs (INRUD) have developed a set of prescribing indicators to measure the performance of healthcare providers in numerous crucial aspects related to appropriate use of drug.

The aim of this study was to create a baseline data on the drug prescribing patterns of medical practitioners in the

state of Goa and evaluate its rationality using WHO prescribing indicators.

**METHODS**

**Study area and period**

This study was carried out in various pharmacies in the state of Goa from March to April 2016.

**Sample size and study design**

This was a quantitative and cross sectional study. Photographs of 600 prescriptions prescribed by medical practitioners were taken randomly, to minimize bias. For a cross sectional study to evaluate prescribing practices, a minimum sample size of 600 is required, with a greater number if possible.<sup>4</sup> Legible prescriptions written by medical practitioners (MBBS, MD, MS, BDS, MDS) were included in this study. Prescriptions belonging to pediatric age groups and those prescribed by super specialists were excluded.

**Data analysis**

All data were first analyzed manually and then using Microsoft Excel 2010. Descriptive statistics were utilized. The ideal values for the prescribing indicators were adopted from previous studies.<sup>5</sup> The WHO prescribing indicators were calculated using the following formulae.<sup>4</sup>

**Indicator 1**

This is the average number of drugs per prescription, which helps to measure the degree of polypharmacy. It was obtained by dividing the total number of drugs prescribed by the number of prescriptions studied.

**Indicator 2**

It displays the percentage of drugs prescribed by generic name. This is to calculate the tendency to prescribe by generic name. It was achieved by dividing the number of drugs prescribed by generic name by the total number of drugs prescribed, multiplied by 100.

**Indicator 3**

It shows the percentage of prescriptions with an antibiotic prescribed. This helps to evaluate the extent of misuse of antibiotic. It was calculated by dividing the number of prescriptions in which antibiotics were prescribed by the total number of prescriptions surveyed, multiplied by 100.

**Indicator 4**

This was to determine the percentage of prescriptions with an injection prescribed. It measured the level of overuse of injectables. It was obtained by dividing the number of

prescriptions in which injections were prescribed by the total number of prescriptions studied, multiplied by 100.

**Indicator 5**

This determined percentage of drugs that were prescribed from the Essential Drug List. It measured the degree to which prescribing practices conformed with National List of Essential Medicine of India. It was calculated by dividing the number of drugs prescribed which are listed on the NLEM by the total number of drugs prescribed multiplied by 100.

**Operational definitions**

Generic name: NLEM 2015, WHO 18<sup>th</sup> list of essential medicines, CIMS were used as a basis to confirm the generic name of a drug.

Antibiotics: Drugs such as antibacterial, anti-infective dermatological drugs, and anti-infective ophthalmological agents, from WHO 18<sup>th</sup> List of Essential Medicines, were considered as antibiotics in this study.

Combination of drugs that are prescribed for a given health condition was counted as one.

Polypharmacy: concurrent use of two or more drugs for a given patient.

**RESULTS**

600 prescriptions written by medical practitioners, obtained from the patients, from various private pharmacies in the state of Goa, were analysed prospectively from March to April 2016.

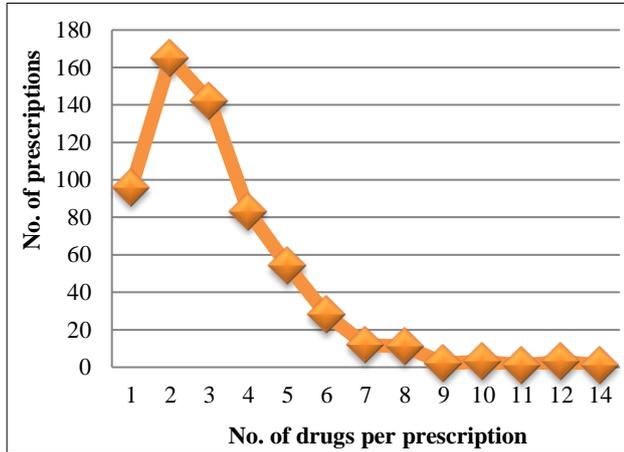
**Table 1: WHO prescribing indicators.**

WHO prescribing indicators	Number of drugs	Results	Ideal values
Average number of drugs per prescription	1903	3.17	1.6-1.8
Percentage of drugs prescribed by generic name	11	0.58%	100%
Percentage of antibiotics prescribed per prescription	119	19.83%	20-26.8%
Percentage of injections prescribed per prescription	23	3.8%	13.4-24.1%
Percentage of drugs prescribed from NLEM 2015	567	29.8%	100%

Out of the 1900 drugs prescribed, average number of drugs per prescription was 3.17. Total number of drugs prescribed by generic name was 11 (0.58%). An antibiotic

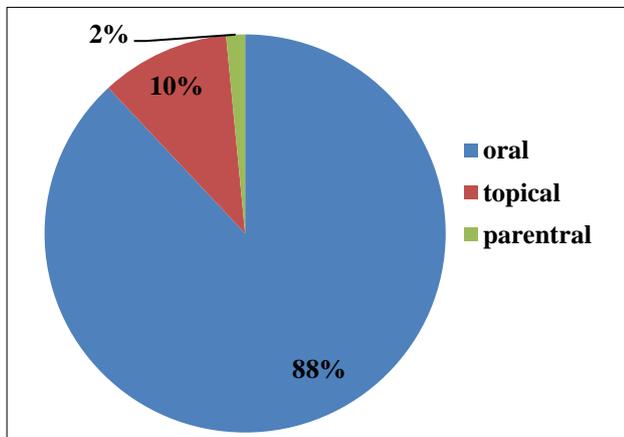
was prescribed in 119 patients (19.83%). An injection was prescribed in 23 patients (3.8%). 567 drugs prescribed were from the National List of Essential Medicines (29.8%) (Table 1).

Out of the 1903 drugs prescribed in this study, the percentages of drugs prescribed by oral, topical and parenteral route were 88%, 2% and 10% respectively (Figure 1).



**Figure 1: Number of drugs per prescriptions.**

Maximum number of prescriptions (165) contained 2 drugs. The number of drugs prescribed per prescription varied from 1 to 14 (Figure 2).



**Figure 2: Percentage of drugs prescribed by specific routes.**

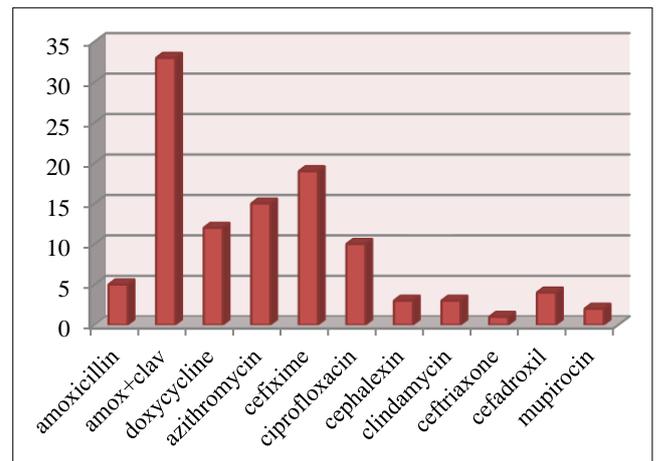
Among all the drugs prescribed, antimicrobials were most commonly prescribed (n=317, 17%) followed by vitamins/minerals/antioxidants (n= 307, 16%) and cardiovascular drugs (n=297, 15.6%). Drugs other than antibiotics for genitourinary system were prescribed the least (n=13, 1%) (Table 2).

Among antimicrobials, amoxicillin and clavulanic acid fixed dose combination was the most commonly

prescribed followed by cefixime, azithromycin, doxycycline, ciprofloxacin (Figure 3).

**Table 2: Category-wise prescribing frequency.**

Drug Categories	Number of drugs prescribed (1903)	% of drugs prescribed
Antimicrobials	317	17%
vitamins/minerals/antioxidants	307	16%
Cardiovascular drugs	297	15.6%
CNS drugs	188	10%
Gastrointestinal drugs	177	9%
Analgesics	170	9%
Respiratory drugs and antihistaminics	156	8%
Endocrine	142	7%
Musculoskeletal drugs	44	2%
Steroids	40	2%
Genitourinary other than antibiotics	13	1%
Others	60	3%



**Figure 3: Commonly prescribed antibiotics.**

**DISCUSSION**

This study revealed that the average number of drugs prescribed per encounter was 3.17, with a maximum of 14 drugs prescribed per prescription. This value is higher than the ideal (1.6-1.8) values. However, this study value was found to be lower when compared to similar studies carried out in Chennai, Tamil Nadu (4.38), Shimoga, Karnataka (5.3), Chandigarh, Punjab (3.6), Maharashtra (3.62), North India (4.02) and higher in the areas of Bhopal, Madhya Pradesh (2.35), Jalna, Maharashtra (2.82).<sup>6-12</sup>

This study demonstrated that prescribing by generic name was at a disappointing level of 0.58%, when the ideal value was 100%. Similar domestic research findings also showed unsatisfactory results.<sup>6-8,12</sup> A study in North India revealed that not even a single drug was prescribed by

generic name.<sup>10</sup> However a few other studies showed promising results.<sup>11,13,14</sup> Similar studies in Pakistan (83.1%), Nepal (84%), Northern Ethiopia (93.3%), Brazil (86.1%), China (96.12%) noted better results.<sup>15-19</sup> The WHO endorses prescribing medication by its generic name. It enables easy identification of medication and better communication between health care providers.<sup>20</sup>

In this study, the percentage of antibiotics prescribed per prescription was 19.83%. According to WHO, in developing countries where infectious diseases are more prevalent, 15-25% of prescriptions with antibiotics is expected.<sup>4</sup> Cautious use of antibiotics is warranted in the present era, where antibiotic resistance have become rampant.

Only 3.8% of prescriptions prescribed were of injectables. This is a good sign, as one of the key factors for the irrational use of medicines is the injudicious use of injections, when oral formulations would have been more appropriate.<sup>2</sup>

In this study, only 29.8% medicines were prescribed from the National Essential List of Medicine (100% being the ideal value). In contrast to the present study, medicines prescribed from the National Essential List of Medicine were higher in the states of Karnataka (90.18%), Maharashtra (81.6%), Madhya Pradesh (73.54%) in India, and countries like Ethiopia (96.6%), Sudan (72.83%), Nigeria (94%), Sri Lanka, Brazil (80%), Pakistan (98.8%).<sup>7,9,11,21-26</sup> Adopting the NELM in clinical practice promotes rational, safe and cost effective utilization of medicines.<sup>27</sup>

## CONCLUSION

The medical practitioners in Goa did not adhere to all the prescribing indicators formulated by WHO. This study revealed the irrational practice of polypharmacy, which is an important risk factor for drug-drug interactions and adverse drug reactions. This study also showed the failure of medical practitioners to prescribe drugs by their generic names and from the national essential list of medicines. This study finding, will contribute to national and international literature, which can be used by policymakers to implement policies to improve rational prescribing pattern. Problem-based pharmacotherapy training in undergraduate curricula, continued medical education for medical practitioners, establishment of drug information centers and drug bulletins, public awareness about medicines, appropriate and enforced regulations by competent authorities are some of the core policies suggested by WHO to promote rational use of medicines.<sup>2</sup>

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*Ethical approval: The study was approved by the Institutional Ethics Committee of Goa Medical College, Bambolim-Goa, India*

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