A Prospective Study On Evaluation Of Prescription Patterns Using Who Prescribing Indicators In Out Patient Department Of Tertiary Care Teaching Hospital

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DOI: 10.47750/pnr.2022.13.S08.681

Abstract

BACKGROUND: The impact of essential drugs programs has been quantified during early studies in Yemen and Uganda. INRUD members developed a systematic program to refine drug use indicators. The techniques for using the indicators have been well tested and can assess current treatment practices, compare the performance of various health facilities or prescribers or monitor/supervise drug use behaviours in a reproducible manner.

OBJECTIVE: This study is conducted to analyse prescription patterns according to WHO/INRUD prescribing indicators and identify drug use problems like polypharmacy or overuse of antibiotics etc. Patient care indicators measured in the study help evaluate the healthcare from the provider's and patient's perspectives.

MATERIALS AND METHODOLOGY: The study was conducted by collecting the pictures of prescriptions presented at the Pharmacy store of Tertiary Care Teaching Hospital. The prescribed drugs were then analysed according to WHO indicators.

RESULT: The number of drugs per encounter (3.19± 1.59) was found to be higher than WHO optimal standards. Only 24.29% of drugs were prescribed by generic name and % were from the Essential Drug List. Encounters with injections (1.7%) were found to be low. The average consultation time (5 min 31 sec) was less than prescribed standards (>10mins). The majority of drugs were actually dispensed and adequately labelled (91.2% and 97.2%) resp. 44.3% of prescriptions had illegible handwriting.

INTRODUCTION

Medicines are vital to the health and wellbeing of society. However, they must be administered rationally; any deviation from this could result in either unsafe or ineffective treatment. Prescription pattern monitoring studies (PPMS) include tools for assessing the prescribing, dispensing, and distribution of medicines prevailing in a particular area.(1)
The standard of healthcare depends on quality-of-care provided to the patients. Evaluating drug prescription patterns is a crucial role of a clinical pharmacist.

According to WHO, more than 50% of all medicines worldwide are prescribed, dispensed, or sold inappropriately and 50% of patients failed to take them correctly.(2)

Various studies performed in India and abroad observed that more often than not, adherence to guidelines made by regulatory authorities is not being followed resulting in the irrational use of drugs.(1)

Irrational use of medicines encompasses polypharmacy, antibiotic use for non-bacterial infection, using incorrect doses of antibiotics, unreasonable use of injections where oral medicine should suffice, patient self-medication; and prescribing drugs that contravene standard clinical guidelines.(3)

For childhood infections or chronic diseases lack of access to medicines or inappropriate doses results in severe morbidity and mortality. Inappropriate or overuse of medicine causes significant patient harm in terms of poor patient outcomes, ADRs, or increased risk of drug-drug interactions in addition to wastage of resources. Overuse of antimicrobials has resulted in antimicrobial resistance.(2)

Hence measures must be taken to monitor drug use at a given time or assess changes over time.
In 1985, WHO assembled a conference in Nairobi, Kenya on the Rational use of drugs. (3)

The rational use of medicine is defined by WHO as "patients receive medications appropriate to their clinical needs, in doses that meet their requirements, for an adequate period, and at the lowest cost to them and their community.(3)

Indicators of prescribing practices measure the performance of health care providers in several key dimensions related to the rational use of drugs. (4)

The WHO has established three highly standardized core elements to analyse the rational use of drugs worldwide. It includes prescribing indicators, patient care indicators, and healthcare facility-specific indicators.(3)
The drug use indicators set out by WHO are intended to measure specific aspects of the behaviour of health providers in health facilities in a reproducible manner.(3)

A brief list of core drug use indicators is described below:

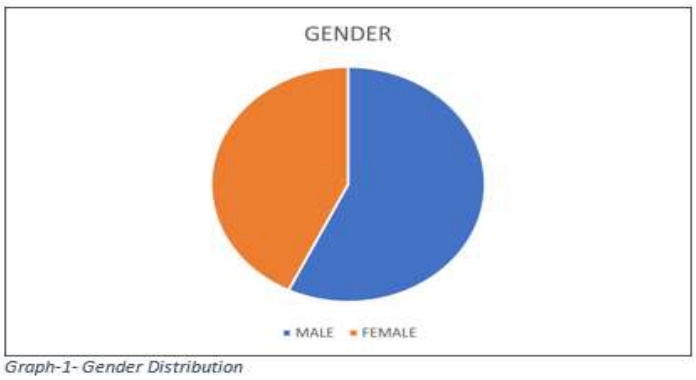
TABLE-1- CORE DRUG USE INDICATORS

PRESCRIBING INDICATORS	
1	Average number of drugs per encounter
2	Percentage of drugs prescribed by generic name
3	Percentage of encounters with an antibiotic prescribed
4	Percentage of encounters with an injection prescribed
5	Percentage of drug prescribed from essential drugs list or formulary
PATIENT CARE INDICATORS	
6	Average consultation time
7	Average dispensing time
8	Percentage of drugs actually dispensed
9	Percentage of drugs adequately labelled
10	Patient's knowledge of correct dosage
FACILITY INDICATORS	
11	Availability of copy of essential drugs list or formulary
12	Availability of key drugs

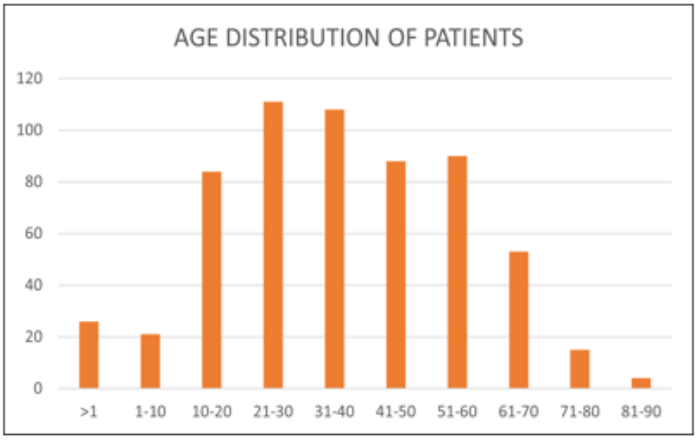
The prescribing indicators include a group of measured parameters such as the averages of number of drugs per encounter, encounters with antibiotics and injection, drugs prescribed by generic, drugs from the essential drug list or formulary (EDL). These indicators help assess the of polypharmacy, prescribing by generic names or overuse of antibiotics or injections, adherence to national drug policy, etc.(3)
The patient care parameters comprise of data such as average dispensing and consultation time, percentage of drugs adequately labelled and that of drugs actually dispensed. It also assess patients' knowledge of correct dosage. Patient care indicators examine healthcare from the point of view of patient. The patient-provider interaction is studied in detail.(3)
Facility-related indicators checks the availability of a copy of the essential drug list and key drugs. They help indicated if there is adequate supply of essential drugs and if patients have access to unbiased information about the drugs.(3)
Most of the studies performed in India encompass prescription analysis of a particular drug or group of drugs such as antimicrobials, anti-diabetics, antihypertensives, etc. rather than assessing all indicators, which record a wider picture of current trends.(1)

SAMPLE CHARACTERISTICS:

600 prescriptions pertaining to various Out Patient Departments of Tertiary Care Teaching Hospital were randomly selected and data was collected over a period of 1 month (Feb 2022). Highest number of prescriptions were from General Medicine department 33.7%) followed by Orthopaedics Department (12%) and Surgery Department (11.8%). 57.1% participants were male and 42.9% were females. The ages of patients ranged from 1 day to 84 years. Important patient information i.e., name, age and gender were printed in 100% of the prescriptions.



Graph-1- Gender Distribution

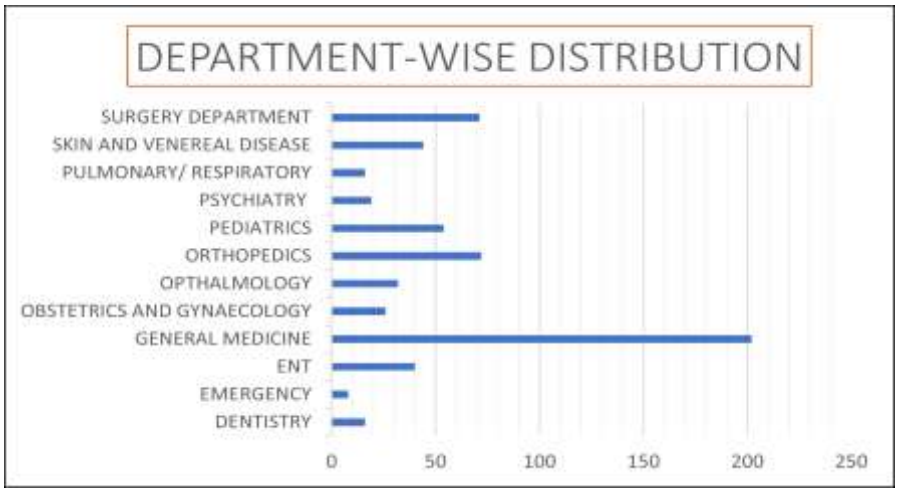


Graph-2- Age Distribution

The results of the study are as follows:

	PRESCRIBING INDICATORS	RESULTS	OPTIMAL VALUES
1	Average number of drugs per encounter	3.19	1.6-1.8
2	Percentage of drugs prescribed by generic name	24.29%	100
3	Percentage of encounters with an antibiotic prescribed	24.16%	20.0-26.8
4	Percentage of encounters with an injection prescribed	1.7%	13.4-24.1
5	Percentage of drug prescribed from essential drugs list or formulary	60.16%	100
PATIENT CARE INDICATORS			
6	Average consultation time	5.31 mins	>10 Mins
7	Average dispensing time	206.6 secs	>90 secs
8	Percentage of drugs actually dispensed	91.20%	100
9	Percentage of drugs adequately labelled	97.22%	100
10	Patient's knowledge of correct dosage	46.7%	100
FACILITY INDICATORS			
11	Availability of copy of essential drugs list or formulary	Yes	Yes
12	Availability of key drugs	100	100

VALUE	NUMBER OF DRUGS PER PRESCRIPTION	AVERAGE COST
MEAN	3.19	522.13
MEDIAN	3	330
STD. DEVIATION	1.59	617.52
MINIMUM VALUE	1	6
MAXIUM VALUE	12	5459



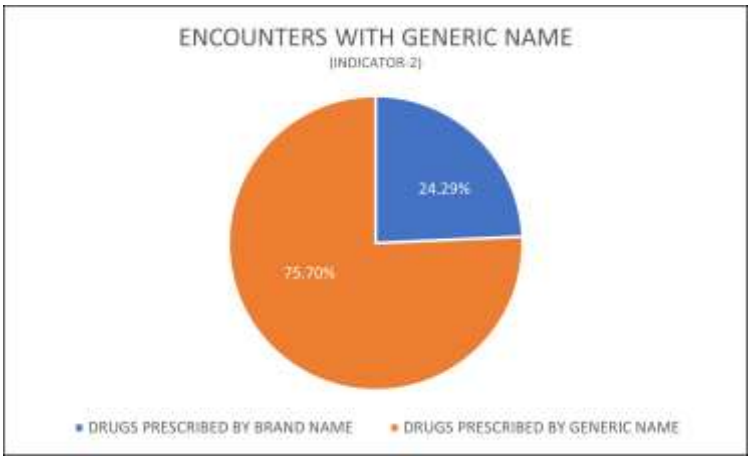
Graph-3- Department wise distribution

The data collected had number of drugs ranging from a minimum of1 to maximum of 12 drugs with the average being 3.19± 1.52 which was found to be higher than the standard defined by WHO. Considering departments; General Medicine Department had highest number of drugs per prescriptions 3.75 ± 1.934.

Emergency Department, Obstetrics and Gynaecology department, Orthopaedics department, and Pulmonary and Respiratory medicine department had an average of over 3 drugs per encounter.

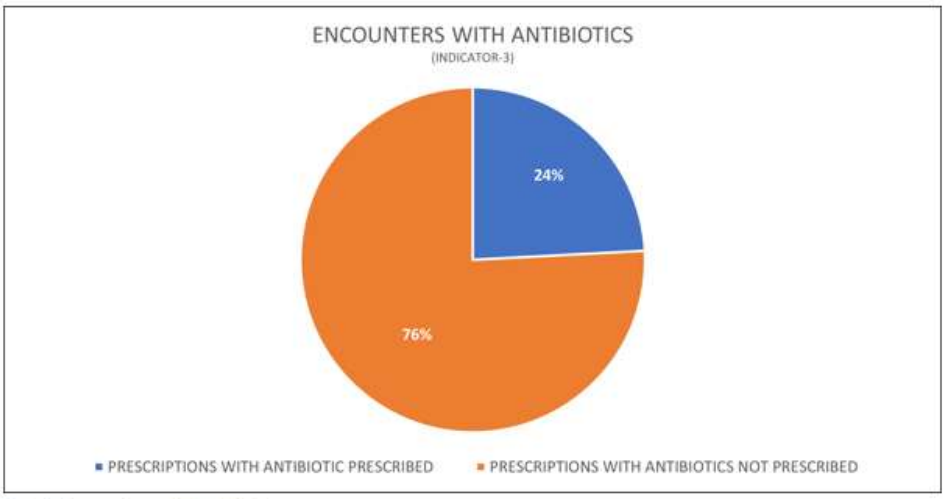
Average cost per prescription for the prescribed medicines was calculated and found to be 522.13 ± 617.52. The highest cost per prescription was 798.78± 865.65.

DEPARTMENT	TOTAL PRESCRIPTIONS	MIN.	MAX.	RANGE	AVERAGE NUMBER OF DRUGS PER PRESCRIPTION	% OF ENCOUNTERS WITH	% OF ENCOUNTERS WITH	LEGIBILITY OF HANDWRITING	AVERAGE COST
DENTISTRY	16	1	4	3	2.13 ± 0.71	62.5	0	100%	144.50±76.75
EMERGENCY	8	1	5	4	3.13 ± 1.246	62.5	0	60%	239.87 ± 284.20
ENT	40	1	6	5	3.13 ± 1.159	55	0	20%	401.87 ± 347.33
GENERAL MEDICINE	202	1	12	11	3.75 ± 1.934	13.86	1.5	73.3	798.78 ± 865.65
OBSTETRICS AND GYNAECOLOGY	26	1	5	4	3.19 ± 1.357	38.46	0	57.7	224.50 ± 242.95
OPTHALMOLOGY	32	1	6	5	1.75 ± 1.107	40.62	3.125	75	202.40 ± 175.50
ORTHOPEDICS	72	1	6	5	3.22 ± 1.258	9.7	2.78	52.78	538.20 ± 432.45
PEDIATRICS	54	1	8	7	2.50 ± 1.437	11.11	5.55	44.44	257.56 ± 405.23
PSYCHIATRY	19	1	4	3	2.32 ± 0.885	0	0	31.57	306.84 ± 240.19
PULMONARY/ RESPIRATORY	16	1	6	5	3.50 ± 1.549	37.5	0	93.75	424.02 ± 300.25
SKIN AND VENEREAL DISEASE	44	1	7	6	3.25 ± 1.203	20.45	0	59.09	517.10 ± 335.69
SURGERY DEPARTMENT	71	1	6	5	3.20 ± 1.166	40.25	1.4	69.01	440.59 ± 395.58

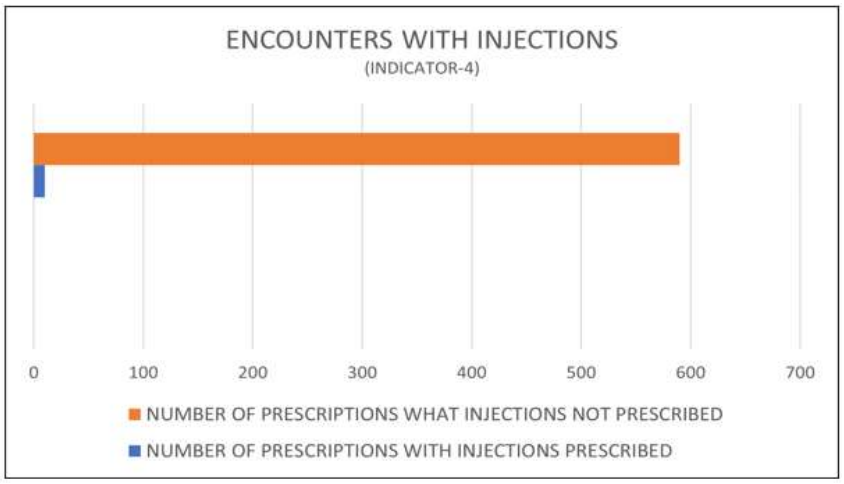


Graph-4-Drugs prescribed by generic name

Out of 1918 drugs prescribed only 466 drugs were prescribed by generic name.
Abbreviation of generic name was considered as generic name as well.
24.16% of prescriptions had at least one prescribed antibiotic in either oral, ophthalmic or topical formulation; which is within optimal WHO limits (20.0-26.8).

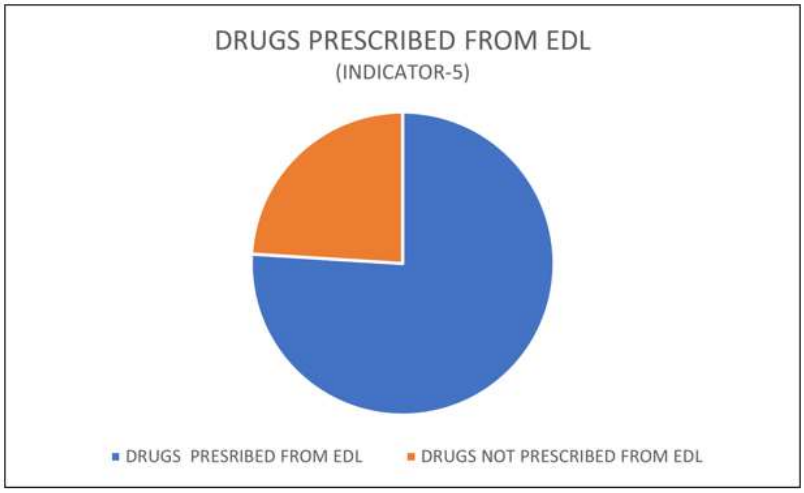


Graph-5-Encounters with Antibiotics



Graph-6-Prescriptions with injections

Only 1.74% prescriptions had prescribed injections; which is lower than WHO limit (13.4-24.1%).

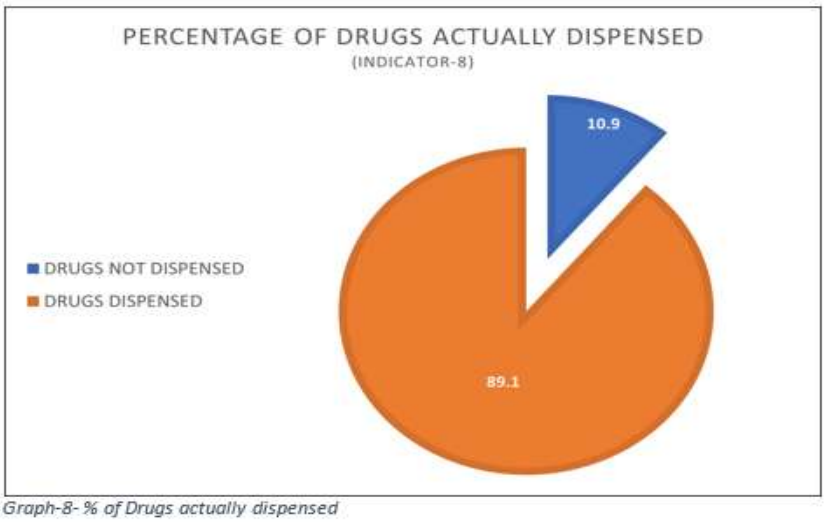


Graph-7-Drugs prescribed from EDL

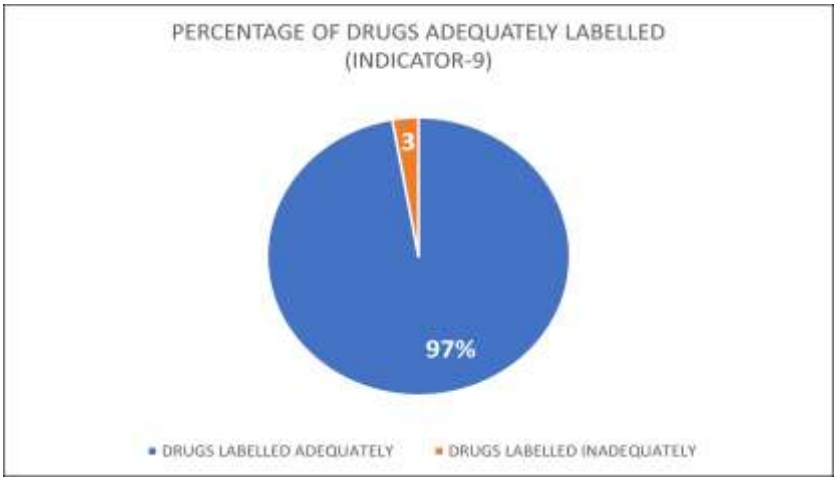
The WHO Model List of Essential Medicines was used as reference to calculate the drugs prescribed from EDL out of total 1918 drugs prescribed. In case of Fixed-Dose Combinations, even if one drug belonged to the EDL, it was considered to be prescribed from EDL.

PATIENT-CARE INDICATORS-

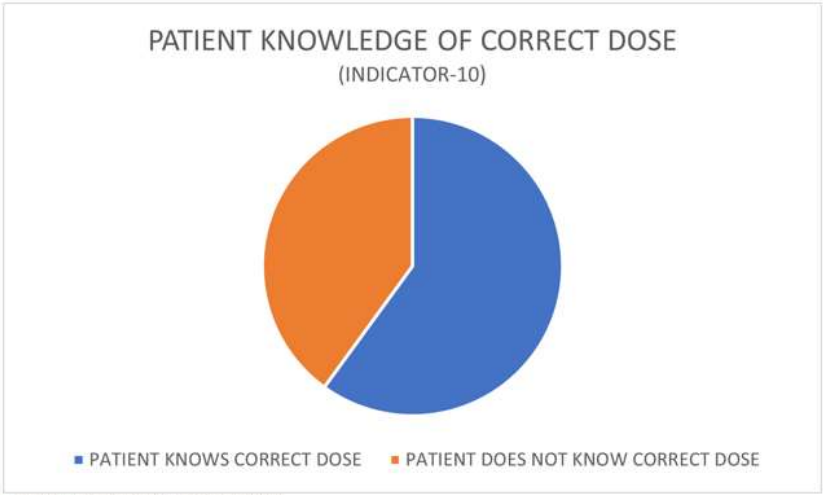
The average consultation time was found to be 5.31 mins and average dispensing time was 206.6 secs
A total 3 drugs out of 105 drugs were prescribed for 30 patients surveyed; were inadequately labelled.



Graph-8- % of Drugs actually dispensed

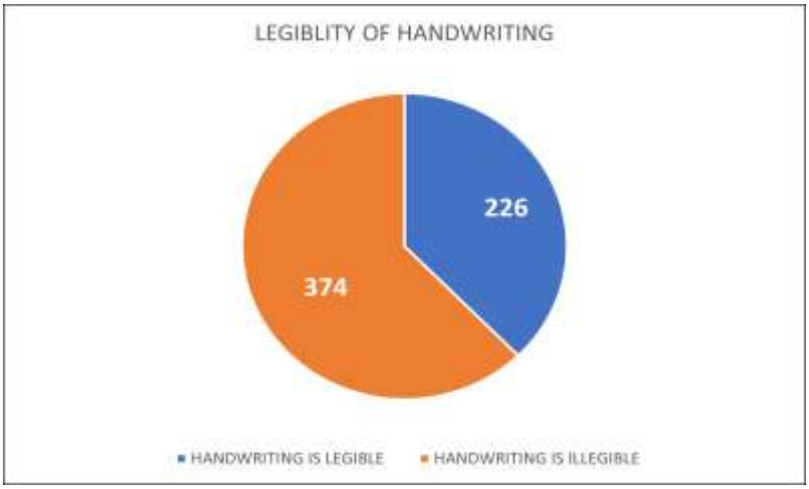


Graph-9-Drugs adequately labelled



Graph-10- Patient knowledge of correct dose

30 patients were surveyed by asking them about the frequency and timing of the prescribed medicines (before/after meals, with water/milk etc.) and 40% of patients did not appropriate knowledge about the medication.



Graph-11- Legibility of Handwriting

One of the most notable findings was that about 37% of prescriptions were written in illegible handwriting; which means 226 prescriptions out of 600 had illegible handwriting. The most concerning results were from ENT department where legibility was only 20%. Dentistry Department had highest legibility of handwriting.

FACILITY-BASED INDICATORS-

A copy of National Formulary of India (NFI) and Hospital formulary was available at the store.
A list of key drugs was made and their availability on the day of evaluations was checked. 100% drugs from the list of key drugs were present.

AVAILABILITY OF KEY DRUGS (INDICATOR-12)		
NUMBER	DRUGS	AVAILABLE (YES/NO)
1	PARACETAMOL	YES
2	ORAL REHYDRATION SALTS	YES
3	AMOXICILLIN	YES
4	ONDANSATRON/ T. DOMPERIDONE	YES
5	IODINE OINTMENT	YES
6	LACTULOSE	YES
7	FOLIC ACID	YES
8	CARBAMAZEPINE	YES
9	HALOPERIDOL	YES
10	COTRIMOXAZOLE	YES
11	ACECLOFENAC	YES
12	LEVOCETRIZINE	YES
13	PHENYLEPHRINE	YES
14	PANTOPRAZOLE	YES

DISCUSSION

In the study, a total of 600 prescriptions were collected to measure prescribing and 30 patients were surveyed to assess patient care indicators.

The average number of drugs per prescription was high 3.19 ± 1.59. Similar Indian studies reported the average in a range of 2.8-3.2. (22–25) The study conducted by Hussain et. al. found an average of 2.91 ± 1.30(14) and that of Mohanty et. al., was 3. This could result in an increased risk of drug-drug interactions and higher out-of-pocket costs for the patient.(9)

The higher number of drugs per prescription shows a trend towards polypharmacy, however, seasonal variations must be taken into account. It should be considered that most prescriptions were from General Medicine Department (33.7%), which is frequented by patients with chronic diseases and comorbidities that require more drugs for adequate management.

Out of a total of 1918 drugs prescribed, only 466 drugs were prescribed by generic name. Abbreviated forms of generic names were also considered. WHO recommends that all prescribing shall be done by writing generic names as it helps avoid dispensing errors and helps in cost reduction as compared to more expensive brand name variants.(3) The results of this study were better than Abidi et. al. and Lalan et. al. whose results were 15.1 and 3.79 resp.(25,26) but considerably lower than WHO standards.

The possible reasons for low generic drug name prescribing would be concerns about the efficacy and bioavailability of generic drugs. Prescribers can often be ignorant towards the burden of costs of medicines on the patient. Lack of appropriate information about the availability and influence of pharmaceutical companies on prescribers.

Antibiotics were prescribed (24.16%) within the standard range. Dentistry Department (62.5%) and Emergency Department (62.5%) had the highest number of antibiotics prescribed. Interestingly, no antibiotics were prescribed in 19 prescriptions collected from Psychiatry Department. Even the average number of drugs per prescription (2.132) was low for this Department. Rational use of antibiotics was observed to be practiced.

11 injections were prescribed out of a total of 1918 drugs, making the percentage of 1.74%. Similar results were obtained in other Indian studies. The results of studies conducted by Hazra Krishna et. al., Lalan et. al., Abidi et. al., were 3.9, 0.17, 6.19 resp.(23,25,26) WHO recommends minimum use of injections despite having a faster onset of action and important use in emergency conditions. The reasons could be that injections are more costly as compared to their oral counterparts, required trained personnel for administration, and pose a risk of infections caused by using unsterilized needles.

Essential Drug List is developed and constantly updated by WHO and it serves as a basis for the development of National Lists. These drug lists are essential as they promote rational use of medicine by reducing the prescription of unnecessary medicines. This study referred to eEML by WHO which was updated on Oct-2021. 60% of drugs were prescribed from EDL.

The most commonly prescribed classes of medicines were analgesics, antacids, and supplements.

This study identified the legibility of handwriting in the prescriptions collected. It was computed that 266 prescriptions had illegible handwriting; diagnosis and medicines mentioned were difficult to read and hence can result in dispensing error. Prescriptions from ENT Department were most difficult to read followed by Psychiatry Department (31.5%), Paediatrics Department (44.4%), Orthopaedics Department (52.7%). This was particularly problematic in the case of LASA drugs. Some prescribers did not mention the strength and frequency of prescribed medicines, causing confusion for dispensers regarding the same. Steps must be taken to ensure that prescriptions are easy to read and include all essential information about the patient as well as clearly mentioned provisional diagnosis/ diagnosis. All drug-related information including name, strength, frequency, and duration must be adequately mentioned.

Patient care indicators defined by WHO measure healthcare from the patient's perspective. Average consultation time measures the amount of time spent by the patient with the consultant. WHO recommends a consultation time of more than 10 mins which gives an appropriate window for the consultant to take a detailed history, diagnose and prescribe rationally according to patient needs and leave room for clearing any doubts of the patient. The average consultation time was found to be 5. .31 mins in the current study; which is half the optimal recommended value. This can lead to improper history taking, lack of satisfaction, and confusion in patients.

Average dispensing time measures the time taken by the dispenser to dispense the medicine. WHO recommends more than 90 secs of dispensing time. This parameter is influenced by a multitude of factors such as the layout of the store, which determines the ease of access to medicines, the number of people working at the pharmacy store, and patient flow.

Shorter consultation and dispensing time can conclude that information about medication given to the patient is inappropriate and the patient has no chance to solve drug or disease-related queries.

Prescriptions from 30 patients were assessed for the number of prescribed drugs against the number of drugs actually dispensed. 91.20% of total prescribed drugs were actually dispensed. The reasons noted for the same were Unavailability of prescribed medicine.

Financial constraints of the patients.
In some cases, prescriptions were not written appropriately; dispensers were unable to decipher either names or strength of medicines hence, drugs were not dispensed.

Adequate labeling of drugs helps ensure that the patient takes the correct medicine at the correct time. If the frequency is mislabelled; the drug which is supposed to be taken once daily is labeled to be taken three times a day, it can cause toxicity and vice versa can cause low therapeutic efficacy.

The patient's knowledge of prescribed drugs was assessed by asking them a series of questions regarding drug indication, drug frequency, and methods of administration. About 46.7% of patients were able to recall the information provided to them during counseling.

The study implies that interventions regarding better prescribing practices must be made.

CONCLUSION

The reason behind a high number of drugs per prescription shall be assessed and educational interventions must be provided regarding the same. Generic prescribing shall be encouraged and prescribers must be made aware of its benefits. An attempt shall be made to assure prescribing from EDL. Most importantly, an intervention must be made regarding the illegible handwriting of prescribers and the importance of mentioning all adequate information such as diagnosis, name, dose, and strength of the medicine.

The prescriber should assess patient queries and a satisfactory counseling process regarding the drugs and their use must be done.

LIMITATIONS OF THE STUDY

It is quite difficult to adequately assess the quality of diagnosis and pharmaceutical treatment objectively. Hence, the indicators do not accurately measure all dimensions of appropriateness of pharmaceutical care.
Categorization of prescribers was not taken into consideration.
The time period of study was limited. (1 month) It represented limited number of patients and prescribers.
The study was performed in a single centre hence results can be extrapolated to other centres.

STRENGTHS OF THE STUDY

Results from this study point to particular drug use issues that need further detailed inspection.

FUTURE SCOPE OF THE STUDY

The collected data can be used to perform detailed pharmacoeconomical analysis.
Upon reporting the finding of the study to the hospital authorities; analysis can performed again to assess the effects of intervention made.
This study can be continued by assessing detailed complementary indicators such as adherence to therapeutic guidelines, patient satisfaction etc.

LIST OF ABBREVIATIONS

OPD	**Out-Patient department**
WHO	World Health Organisation
ADR	Adverse Drug Reaction
PPMS	Prescription Pattern Monitoring Study
INRUD	International Network for Rational Use of Drugs
IEC	Institutional Ethics Committee
eEML	Electronic Essential Medicine List
EVM	Evidence-Based Medicine
ICF	Informed Consent Form
SD	Standard deviation
EDL	Essential Drug List
NFI	National Formulary of India
ENT	Ear Nose Throat
SPSS	Statistical Package for Social Sciences
PHC	Primary Healthcare Centre
ANOVA	Analysis of Variance
CHC	Community Healthcare Center
DH	District Hospital
MC	Medical College
RUM	Rational Use of Medicines
PRISMA	Preferred Reporting Items for Systemic reviews and Meta-Analysis
ED	Emergency Department