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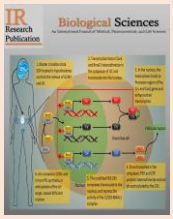

# Evaluation of Antibiotics Prescribing Patterns practiced at Panjab University Health Centre, Chandigarh

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ABSTRACT

Prescription Monitoring Program is a WHO initiative to encourage rationality in drug prescribing patterns among health practitioners based on observational cohort studies to assess, monitor, and regulate drug usage in primary healthcare centers. The objective of this study is to understand the present trends of Antibiotics prescribing followed by physicians at Panjab University Healthcare Centre in order to assess and evaluate the rationale use of Antibiotics. A cross-sectional observational study was conducted at PUHC Outpatient Department for 2 months from 1st October to 30th November 2022. A total of 100 prescriptions were studied. This study included a diverse group of population on a random basis. The data collection and assessment were in accordance with WHO Prescription Performa. During this period, 100 prescriptions were collected and analyzed from OPD patients based on WHO Performa. The Demographic study showed that out of 100 prescriptions, 44% were female and 56% male followed by 25% pediatric (1-20 years) and 4%, geriatric. The study of age demographics revealed most prescription was of 21-40 years (age-group). The most common indication for antibiotics prescribing was found to be Upper Respiratory Tract Infections (URI). The majority of patients visiting PUHC were diagnosed with URI (86 prescriptions out of 100) followed by ENT & eye infections, burn wound and bacterial typhoid fever. Out of total antibiotics prescriptions, 50.71% brand drugs and 49.29% generic drugs were prescribed. The most frequently prescribed antibiotic was among Macrolides class which was Azithromycin. The average cost of antibiotics per prescription was Rs. 68.57. Out of 100 patients 81% were aware about dosage regimen and 86% patients had knowledge about medication indication. Only 37% of patients were familiar with therapeutic category of drug. According to evaluation, 68% of prescriptions were in accordance with WHO Prescribing Indicators. The study reflected the current prescribing pattern of antibiotics in PUHC and highlights the drawbacks for scope of improvement in rationale prescribing of drugs.

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## Introduction

Antibiotics are the therapeutic class that is tremendously prescribed by physicians for the management, treatment, and prophylaxis of a wide spectrum of infectious causative agents both in outpatients and inpatients in a hospital setting (1). The most common indication of antibiotics prescribing includes UTIs like (acute cystitis, vaginitis, urethritis) followed by RTI infections which cause laryngitis, pharyntitis, pneumonia, and other commonly acquired infectious diseases (2). Although antibiotics are crucial agents used for disease control and eradication in several bacterial infections, their extensive and unethical usage has led to the development of Antimicrobial Resistance (AMR) against a broad range of pathogens (3, 4). In the WHO report, it was concluded that the maximum incidence of AMR is associated with commonly acquired infections caused by *Escherichia coli, Klebsiella pneumoniae, Staphylococcus aureus, N. gonorrhea* species. Ciprofloxacin which is used to treat UTI showed 8.4%-92.9% resistance rate. Carpenams antibiotics which are used in intensive-care unit for hospital-acquired pneumonia was found to be ineffective in 50% of patients. Furthermore, the rapidly emerging resistance to sulphonamides, tetracyclines, and fluoroquinolones was stated. According to the CDC 2019 and Antimicrobial Resistance Report 2016, the morbidity rate due to AMR is nearly 5 million and it is estimated to be 10 million by 2050 respectively (5-7).

There are several factors that contribute to the development of AMR which includes Irrational prescribing, improper selection of medication, frequent usage of broad-spectrum antibiotics, OTC sales of antibiotics or self-medication by patients, non-adherence to dosage regimen by patients, poor patient compliance, lack of knowledge or unaware about drug mechanism, drug /food interactions, diseased state, the genetic makeup of the individual (8).

The prevalence of Antimicrobial resistance has created an alarming situation worldwide and this has led to the emergence of the concept of "Rationale Use of Antibiotics" which emphasizes the selection of the right drug at the right dose, frequency, and route of administration with proper examination and monitoring of patient condition (4, 9).

As it has become a global challenge to reduce the incidence of Antimicrobial Resistance, different parts of the world have united to overcome this public health threat. Several regional and national policies have been implemented to tackle the increasing Antimicrobial resistance (9).

The CDC's Antimicrobial Stewardship is a systematic review system that addresses the issue of AMR by serving as a tool to measure the appropriateness of antibiotic prescribing and educates the physician and clinical pharmacist to follow evidence–based antibiotic prescribing. It promotes the practice of carefully and responsibly giving antibiotics only when it's necessary and provides a way to effectively optimize, manage, and prevent the development of resistance (10). Under WHO, the AMR Surveillance Programme is initiated through 'Prescription Monitoring' which comprises several parameters to assess and evaluate the rationality of antibiotics prescribing. The data is collected in three categories – Prescribing, Dispensing, and Patient Care. It aims to maximize the therapeutic benefit while minimizing errors and drug-related toxicity by controlling antibiotic prescribing (4, 9).

The objective of this study is the evaluation and assessment of the rationality of antibiotics prescribed based on WHO Performa.

## Material and methods

The PUCH also known as Bhai Ghanaiya Ji Health Centre, is located in Panjab University campus sector-14, Chandigarh which provides basic healthcare facilities to the students and employees. The healthcare facility comprises 12 physicians including CMO, 6 pharmacists, 1 nurse, 3 multipurpose health workers, and 1 chief pharmacist who is responsible for supervising dispensing of drugs and inventory control. A pilot study was conducted at PUHC prior to obtaining permission from the CMO to collect data from outpatients according to WHO Performa (FIG1). The data was collected from the random population through self–observation and patient counseling. The Performa was approved by the IEC (Institutional Ethical Committee) of Panjab University. The patients visiting the physicians were interviewed and data was collected in semi-coded Performa.

During this period of 2 months from 1st October - 30th November, a total of 100 prescriptions were collected in 2 slots (morning 9.00-10.00 am and evening 5.00-6.00 pm) from outpatients. The study only included antibiotics prescriptions and prescriptions with incomplete data or non-cooperative patients were excluded. The data was then filled and examined on WHO-designed Performa. It included several parameters which serve as a tool to evaluate the rationale for prescribing.

The information was categorized into 3 sections: 1) Demographic data which included name, age, and sex. 2) Information on each drug prescribed along

with dosage form frequency, individual/combination, generic/branded, and number of drugs dispensed. 3) Patient care indicators which constitute average consultation time, average dispensing time, and adequate labeling. The patient's knowledge of medication was assessed on criteria of dosage regimen, indication, and therapeutic class.

## Results

A total of 100 prescriptions were monitored and studied. The demographic analysis of OPD revealed out of 100 prescriptions, 56 patients were male and 44 were female (Fig.1). The most antibiotics prescribed age group was found to be 21-40 years (48%) followed by 0-20 years (25%) whereas age group above 60 years constitutes only 4%. This data is essential to design standard treatment regimens, especially in the case of pediatrics (0-20 years) or geriatrics (above 60 years) (Fig.2) (11).

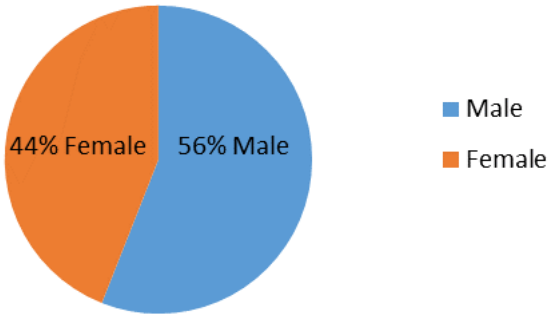


**Figure 1**. Antibiotics prescribing sex distribution.

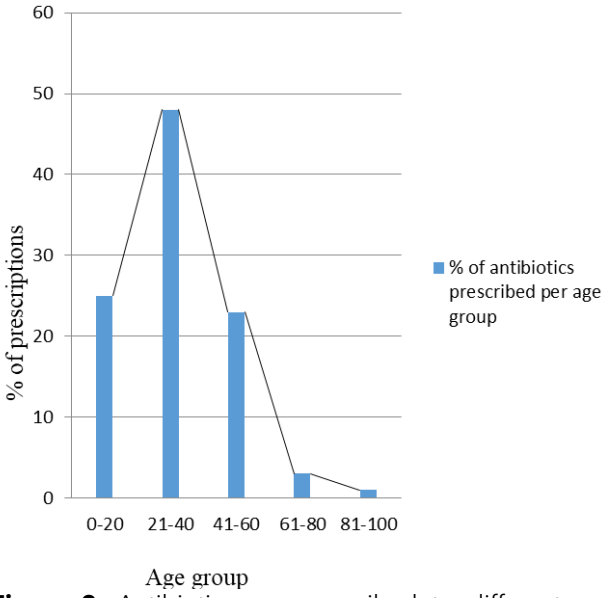


**Figure 2**. Antibiotics are prescribed to different age groups of patients (% of prescriptions).

Upper Respiratory tract infections (URI) as the most common indication for antibiotics prescribing and were present in 86% of prescriptions. ENT & eye infections are the next common symptoms that account for about 6% followed by 5% for *Staphylococcus aureus*-infected burn wound and 3% of antibiotics were prescribed for bacterial typhoid fever (Fig.3).

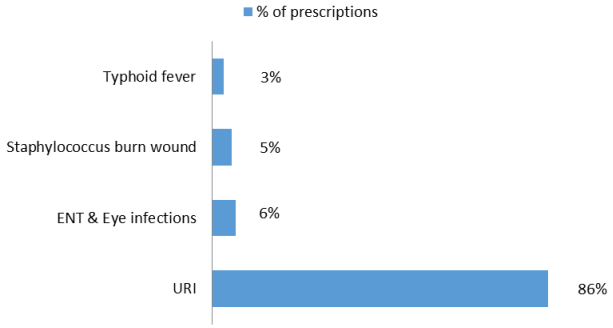


**Figure 3**. Indications of Antibiotics prescriptions.

The most common category of antibiotic prescribed was Macrolides (Azithromycin) which was present in 86/100 prescriptions. The PUHC physician practiced fixed combination of drugs with Azithromycin for URI such as Azithromycin+cetrizine (26/86 prescription), Azithromycin+PCM (12/86prescription), Azithromycin+Cetrizine+PCM (21/86prescriptions), Azithromycin+Nocold+Cetrizine (16/86 prescriptions (Fig.4). The remaining 14 prescription addressed various infectious diseases like ENT & eye infections such as post auricular inflammation, cataract surgery, stye eye. The antibiotics prescribed were Ciprofloxacin (3/14), Augmentin (3/14), Cefotab (3/14), Erythromycin (1/14), T. bact ointment (2/14), clindamycin (1/14), Clotrimazole ointment (1/14) (Fig.5).

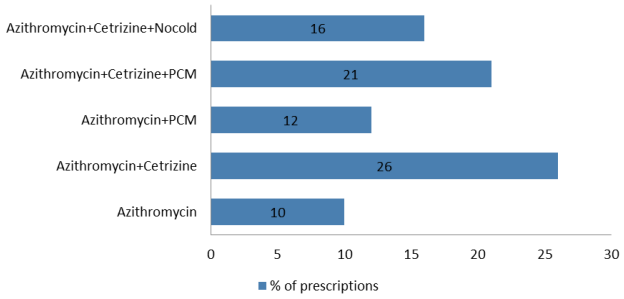


**Figure 4**. Drug combinations with Azithromycin for URI were dispensed at PUHC (% of prescriptions).

Out of 100 prescriptions, a total of 211 drugs were dispensed of which 50.71% were branded and 49.29% were generic. The PUHC pharmacy dispenses most of the drugs from the Essential Drug List approved by the committee. The most preferred dosage form is tablet (90%) due to high patient compliance followed by ointment {5%) and eye drops (4%). The average cost of antibiotics per prescription was Rs. 68.57.

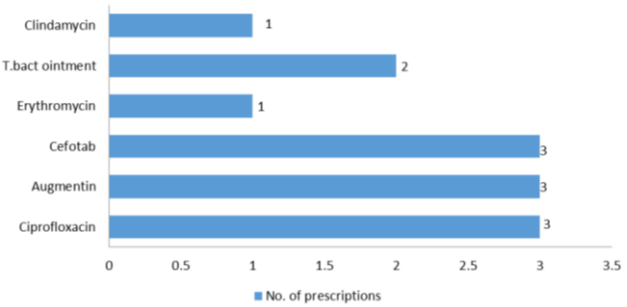


**Figure 5**. Number of prescriptions with antibiotics against ENT/ eye infections.

The patient care indicator analysis showed that the average consulting time was 4.5 min and the average dispensing time was 2 min. The patients were provided with oral instructions related to their dosage regimen and no written information was given. On average the number of patients physicians see per hour was 14 patients. The patient knowledge of medication was assessed by interviewing them about the dosage regimen, indication, and therapeutic class. 81% of patients were aware of the dosage regimen followed by 86% of patients who knew about the indication of medication and 37% of patients had knowledge about the therapeutic category of antibiotics (Fig.6).

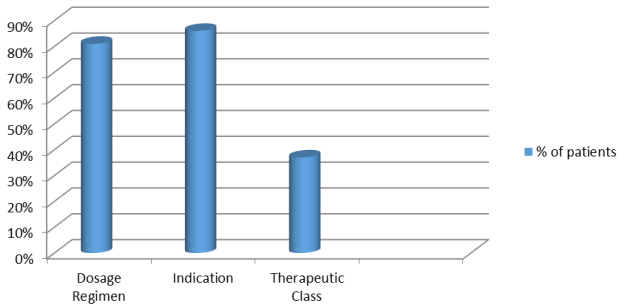


**Figure 6**. Patient knowledge Indicators.

## Discussion

A prescription-based survey is considered to be one of the effective methods to evaluate the prescribing pattern of physicians and dispensaries of pharmacists (12). Out of 100 prescriptions, 56% were male and 44% were female. In our investigation, 68% of prescriptions were in accordance with the optimal range of WHO Indicators (Table 1) concludes all the parameters that were evaluated to estimate the rationale prescribing patterns.

Average drug encountered per patient

This factor is an effective method to measure the extent of polypharmacy or multiple drug therapy. The study indicated the average number of drugs encountered was 2 whereas the optimum range is 1.6-1.8. This significantly contributes to increasing the chances of drug interactions, lack of patient compliance, and error in managing drug therapy among patients consuming multiple drug therapies at the same time.

Average cost of antibiotics per prescription

The study depicted the average cost of antibiotics per prescription was around Rs. 68.57. The treatment cost for antimicrobial infections can be optimized by formulating guidelines to reduce the economic burden of drug therapy.

Average consultation time

It refers to the time taken by the health professional with patients to consult, diagnose, and prescribe of drug. The result of our study showed the average consultation time was 4.5 minutes which is within the WHO specified limits. This parameter reflects that physicians are dealing with patients properly and addressing their health concerns to improve the quality of medical treatment.

Average dispensing time

The study showcased the average dispensing time was 2 mins which is appropriate in accordance with WHO guidelines. The productivity of medical treatment courses relies on the dispensing time taken by the pharmacist accompanied by giving proper instructions about dosage regimen and correct labeling.

Patient knowledge of medication Dosage Regimen, Indication of medication, Knowledge of therapeutic category

In our study, it was observed that 81% of patients were informed about the dosage regimen followed by 86% of patients who knew about the indication of medication and 37% of patients had knowledge about the therapeutic category of antibiotics. The success rate of drug therapy and effective recovery crucially depends on the knowledge of the patient about the medication. Therefore, formulating interventions that effectively deliver information to the patients by policymakers is suggested for fruitful treatment (9). In contrast to the past few years' study (13, 14), in the present scenario, respiratory tract infections are a more prevalent health problem. Azithromycin is mostly prescribed as a 3-day course treatment. After the COVID period, a serious concern has developed about URI. Nowadays, physicians are prescribing antibiotics as 1st line treatment for respiratory infections without proper diagnosis. At PUHC, doctors give set combination of

**Table 1**. This table shows the WHO Indicators based on which the Antibiotics Prescribing trend was studied and evaluated.

| PRESCRIBING NDICATORS | NUMBER OF DRUGS/PERCENTAGE |
|---|---|
| Total number of the prescription analyzed | 100 |
| Average drug encountered per patient | 2.1 (Optimal value: 1.6-1.8) |
| Total number of drugs prescribed | 211 |
| Total number of antibiotics encountered in the study | 100 |
| Number of antibiotics given as Monotherapy | 23 |
| Average duration of prescribed antimicrobial Treatment | 3 days |
| Average cost of antibiotics per prescription | Rs. 68.57 |
| Number of antibiotics prescribed as solid dosage form i.e tablets /capsules. | 90% |
| Number of antibiotics prescribed as eye drops | 4% |
| Number of antibiotics prescribed as ointment | 5% |
| Average consultation time | 4.5 min |
| Average dispensing time | 2 min |
| Patient knowledge on medication<br>Dosage Regimen<br>Indication of medication<br>Knowledge on therapeutic category | <br>81%<br>86%<br>37% |

antibiotics for URI treatment. A large proportion of prescriptions included broad-spectrum antibiotics such as Macrolides. The majority of patients suffering from the common cold, flu, and fever were prescribed antibiotics. This inappropriate and irrational use of antibiotics for viral infections has led to an increase in Antimicrobial resistance. Polypharmacy was seen in 37% of prescriptions that had three drugs. It has become a common practice among physicians and has increased the chance of drug interactions and adverse effects.

## Conclusion

In conclusion, our study is based on baseline data and lacunae in the present prescribing pattern such as indiscriminate practice of antibiotics prescription for viral infections and inadequate written instructions. An interventional study can be designed in order to improve the Antibiotic prescribing trends and promote the rationale use of antibiotics at PUHC.

## Contribution of authors

Anil Kumar and Beenta supervised and planned the study and coordinated with the Panjab University Healthcare Centre. Megha Chakraborty contributed to performing the observational study and writing of article along with co-authors Anil Kumar and Beenta.

## Acknowledgments

The authors express their gratitude to all of the PUHC physicians and patients who participated in the study and to the Chief Medical Officer of Panjab University Health Centre for his assistance and cooperation.

## Conflict of interest

The authors declare no conflict of interest.

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