e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2023; 13(12); 207-211

Original Research Article

Antibiotic Prescribing Patterns in a Rural Tertiary Care Hospital in Telangana, India

D Sudhamadhuri[1], Srinivas N[2], Nivedita Mohan[3], N. Sridevi[4]

[1]Professor & Head, Department of Microbiology, Government Medical College, Sangareddy.
[2]Associate Professor, Department of Microbiology, Government Medical College, Sangareddy.
[3]Senior Resident, Department of Microbiology, Government Medical College, Sangareddy.
[4]Associate Professor, Department of Microbiology, Government Medical College, Sangareddy.

Received: 12-09-2023 / Revised 14-10-2023 / Accepted 26-11-2023
Corresponding author: Dr N. Sridevi
Conflict of interest: Nil

Abstract:

Introduction: Antimicrobial resistance (AMR) is a major global public health threat. The WHO Access, Watch, Reserve (AWaRe) antibiotic classification is aimed at improving the prescription patterns, and clinical outcomes, lowering the likelihood of AMR. The current study was conducted to analyse the prescription pattern and AWaRe classification of antibiotics prescribed in a rural tertiary care hospital in Telangana.

Methods: A cross sectional prospective study was conducted by the Department Microbiology, Government General Hospital, Sangareddy. Hospitalised patients > 18 years, on antibiotic treatment due to infections were included in the study. Patients below 18 years and those not on antibiotics were not considered. Medical case sheets of the patients were analysed. Average number of drugs per prescription, percentage of antibiotics prescribed by generic name, percentage of antibiotics per prescription, percentage of injected antibiotics prescribed and percentage of antibiotics prescribed from essential drugs list or formulary were the WHO Core drug indicators (prescribing indicators) analysed and presented in percentages.

Results: A total of 900 patients's data were analysed. Female to Male ratio was 1.23. Most patients were between 21 – 40 years. The average duration of admission was 7.5 days. Diagnosis was mentioned on 95.45% case sheets. An average of 5.82 drugs were prescribed per patient. Surgical prophylaxis (46%) was the leading indication; 54.02% of prescribed drugs belonged to the WHO Access group. Around 20.85% antibiotics were prescribed by generic name. Drug dosage was mentioned in 94.80% prescriptions and frequency in 98.04% prescriptions. Duration of medication was mentioned in 97.27% prescriptions and 93.82% prescriptions have the doctor's signature.

Conclusions: Assessment of the prescription patterns in a hospital helps to monitor and ensure rational drug use. This is essential to achieve good quality healthcare for patients and for the community.

Keywords: Drug, Dosage, Prescription, Antibiotics, AWaRe.

Introduction

Antimicrobial resistance (AMR) is a major global public health threat. [1] Inappropriate use of antibiotics is a major contributor of AMR. It leads to increased hospitalisation, longer treatment duration, increased treatment costs and higher mortality. Timely and appropriate administration of antibiotics reduce the morbidity and mortality among the patients with infectious diseases.[2] Antimicrobial Stewardship Program (AMSP) helps clinicians to improve the clinical outcome and minimises the harmful effects by proper antibiotic prescription. [3] Understanding the patterns of antibiotic usage in a healthcare facility is the initial step in implementing an effective Antimicrobial Stewardship Program. [4]

In developing countries such as India, treatment cost is an important concern. By assessing the antibiotic prescribing pattern, we can monitor, evaluate, and suggest modifications in the practitioner's prescription habits, thus making patient care reasonable and effective. [5] The WHO Access, Watch, Reserve (AWaRe) antibiotic classification is aimed at improving the accessibility and clinical outcomes, lowering the likelihood of AMR, and preserving the efficacy of last-resort antibiotics. [6] The Access group of antibiotics are first and second choices for empirical treatment of 21 common or severe clinical syndromes. The Access group of antibiotics are a core set of antibiotics and should always be made available in every place at an appropriate quality, dose, duration, formulation, and price. The Watch group includes the antimicrobials

with higher toxicity concerns or resistance potential as compared to the Access group. The Reserve group consists of the last resort options used for specific patients if the other alternatives fail. Hence prioritising the antimicrobials as per the AWaRe is essential in reducing the AMR. [7] The AWaRe index also helps estimate the relative use of narrow spectrum and broad-spectrum antibiotics.

The present study was conducted to analyse the antibiotic prescribing pattern of a newly established rural tertiary care hospital. This will help analyse the existing prescribing patterns among the clinicians in the hospital, and later be useful in establishing an Antimicrobial Stewardship Program.

Methods:

A cross sectional prospective study was conducted in the department of Microbiology, Government General Hospital, Sangareddy. The study was conducted over 6 months, between January and June 2023. Study protocol was approved by the Institutional Ethics committee. Hospitalised patients > 18 years, on antibiotic treatment due to infections were included in the study. Healthcare Associated Infections (HAI), prophylactic or empirical antibiotic treatment were also considered. Those < 18 years, patients not on antibiotics were not included in this study.

Informed written consent was taken from all the participants after explaining the study protocol. Medical case sheets of the study participants were analysed. The relevant clinical, diagnostic, treatment, comorbid, demographic information was entered in the proforma. The route of administration of the antimicrobials, any adverse drug reactions, and so on were also recorded in the proforma.

With the data, various WHO drug indicators like average number of drugs per prescription, percentage of antibiotics prescribed by generic name, percentage of antibiotics per prescription, percentage of injected antibiotics prescribed and percentage of antibiotics prescribed from essential drugs list or formulary were calculated. Antibiotics were classified based on AWaRe Classification into Access, Watch, Reserve groups. All data was analysed in Microsoft Excel and presented in percentages.

Results

Data was collected from 900 patients from departments of General Medicine, General Surgery, Pediatrics, Orthopedics and Obstetrics and Gynecology. There were 405 males and 495 females among these. The mean age of the patients was 37.6 years. Average days of admission was 7.5 (min 1, max 38). Diagnosis is mentioned in 859 (95.45%) cases. A total of 2349 Antibiotics were prescribed to 900 patients. Total drugs prescribed per patient (avg 5.82, max 10, min 2). Number of antibiotics prescribed (avg 2.6, max 6, min 1). Out of the 2349 drug prescriptions, 1269 (54.02%) were of the WHO Access group, and 1080 (45.98%) were of the Watch group. No drugs from the Reserve group were prescribed.

Most common drug prescribed was Ceftriaxone (733/2349 prescriptions, 31.2%). Other drugs are Cefotaxim, Cefixime, Amoxicillin, Amoxicillin clavulanate, Metronidazole, Doxycycline, Azithromycin, Piperacillin Tazobactum, Amikacin, Ciprofloxacin, Norfloxacin. 265 (11.28%) Antibiotics were prescribed as monotherapy, while 256 (10.89%) where fixed dose combinations. 490 (20.85%) antibiotics were prescribed by their generic name. 1570 (66.83%) of the prescriptions were intravenous formulations. Dosage of the drug was mentioned in 2227 (94.80%) prescriptions. Frequency of administration drugs was mentioned in 2303 (98.04%) prescriptions. Duration of medication was mentioned in 2285 (97.27%) prescriptions. 238 (10.13%) Prescriptions have poor legibility. 2204 (93.82%) Prescriptions have a doctor's signature. Adverse drug reactions were mentioned in 1 case sheet.

Table 1: Prescribing indicators

Prescribing indicators	Results
Average number drugs per prescription	5.82
Average number antibiotics per prescription	2.6
Antibiotics prescribed by generic name	490 (20.85%)
Antibiotics prescribed by brand name	1859 (79.14%)
Monotherapy of antibiotics	265 (11.28%)
Antibiotics with fixed dose combinations	256 (10.89%)
Prescriptions with two or more Antibiotics	2084 (88.71%)
Antibiotics from essential medicines list	100%
Antibiotics with injections	1570 (66.83%)

Table 2: Types of inappropriate prescription practices

Type of inappropriate prescription practices	Number of patient's (%)
Illegible prescriptions	238 (10.13%)
Dosage not mentioned	121 (5.15%)
Frequency not mentioned	45 (1.91%)
Duration not mentioned	63 (2.68%)
No Doctor's signature	143 (6.08%)

Table 3: Systemic Indications of antibiotics

Indications	Number of patients (%)
Respiratory Infections	23 (2.56%)
Acute Febrile Illness	41 (4.56%)
Skin and Subcutaneous Infections	93 (10.34%)
Gastrointestinal Infections	45 (5%)
Urinary Tract Infections	9 (1%)
Surgical Prophylaxis	414 (46%)
Normal deliveries	27 (3%)
Non Infectious causes	207 (23%)
Diagnosis not mentioned	41 (4.56%)

Discussion

Early clinical suspicion and diagnosis of infections can significantly reduce morbidity and mortality. However, this can also lead to misuse and overuse of drugs, especially antibiotics. Prescription auditing is an important tool for assessing drug misuse and improving drug rationalisation. [8] The average age group of patients in this study was 37.6 years, with the majority falling in the 21-40 years category. Ratio of women to men was 1.23:1. This was similar to a study by Mugada et al. who observed a high antibiotic prescribing rate in the 19-44 patient age group and also showed a higher proportion of women. [9]

In this study, patients were admitted for an average of 7.5 days. A study in Kerala showed the mean duration of hospitalisation of 5.48 (±4.28) days. [5] Of 2349 prescriptions, patient diagnosis was mentioned in 95.45% of them. This rate is better than the same in a study by Sharma et al. [10] (29.5%). An average of 5.82 drugs were prescribed per patient, of which 2.6 (average) were antibiotics. This was higher than studies by Rai et al. [8] (3.2) and Sharma et al. [10] (3.4 ± 0.8), which reported a lower mean number of drugs per prescription. Similar to our study, Ramesh et al. [5] showed an average of 4.1 drugs per patient, of which antibiotics were 1.5 per prescription.

The WHO's AWaRe classification [11] specifies that the antibiotics consumed from the Access group should be at least 60%. In our study, 54.02% of the drugs were from the Access group and 45.98% were from the Watch group. There were no drugs from the Reserve group. This was most likely due to lack of availability of Reserv

group drugs in the Pharmacy. Mugada et al showed a higher percentage of Watch group antibiotics (53.19%) compared to Access group antibiotics (46.80%). [9]

In Antibiotic classes, Betalactams were commonly prescribed (63.02%), followed by Nitroimidazoles (Metronidazole) (27.39%). Ceftriaxone was the most common drug prescribed in our hospital (31.22%), similar to Kaur et al. [12] (19.2%). Remesh et al. also found that Betalactams (60.2%) were the most commonly prescribed antibiotics. [5] In a study by Lakshmi Jyothi et al, Cephalosporins (56.48%) and Beta Lactam- Beta Lactam Inhibitor combinations (19.08%) were the most commonly used. [13] (11.28%) Antibiotics were prescribed as monotherapy, while (10.89%) were fixed dose combinations, which is in stark contrast to Remesh et (46% monotherapy). [5] Only 20.85% antibiotics were prescribed by their generic name, which was similar to Rai et al (11.3%) [8] and Bandhopadyay et al (20.99%). [14] Higher generic drug prescription rates were also seen in some studies. [10] The Indian Medical Council urges all physicians to prescribe drugs in their generic name only. [15]

A staggering 66.83% of the prescriptions in this study had intravenous formulations. Remesh et al. [5] also showed a higher rate of injections (60%), which is in contrast to Rai et al. (42.3%). [8] This could be because our study was on inpatients in the hospital. However, switching over from intravenous to oral formulations at the appropriate time needs to be monitored to reduce costs and complications. Dosage of the drug was mentioned in 2228 (94.84%) prescriptions. Frequency of administration of drugs was mentioned in 2304 (98.08%) prescriptions. Duration of medication was mentioned in 2286 (97.31%) prescriptions.

Doctors all over the world have developed a reputation of illegible handwriting. In our study, we found that 10.13% of the prescriptions had poor legibility. In other Indian studies, illegible prescriptions ranged upto 15%. [16] The Medical Council of India (2016) has mandated that: "Every physician should prescribe drugs with generic names legibly and preferably in capital letters and he/she shall ensure that there is a rational prescription and use of drugs". [15] Only 93.91% prescriptions had a doctor's signature or initials. This is crucial to identify the prescribing physician, verify the legitimacy of their prescriptions, and hold them responsible for the drugs they've prescribed. [10]

Adverse drug reactions were mentioned only in 1 case sheet. However, the patient's symptoms were not mentioned. This was similar to a study by Sharma et al. [10] where no adverse reactions were mentioned in 200 prescriptions. Other details like comorbidities, family history and previous history of adverse drug reactions were not mentioned in any case sheet. This could be due to heavy patient load, emergency cases in the ER, non-specific complaints and tendency among clinicians to communicate verbally rather than writing down.

In our study, the most common indication for antibiotic prescription was surgical prophylaxis (46%). 414 patients received surgical prophylaxis, of which >1 antibiotic was prescribed to the majority of them, and they were provided for more than one day. Preoperative antibiotic prophylaxis is defined as administering antibiotics prior to performing surgery to help decrease the risk of postoperative infections. [17] Only surgical durations of greater than 4 hours or estimated blood loss over 1,500 mL necessitates repeat intraoperative dosing of antibiotics.[17] Various studies show that single dose antibiotic prophylaxis is as effective as multiple doses. [18, 19] 207 (23%) Patients were prescribed antibiotics where it was not indicated. This included viral infections, uncontrolled diabetes, hypertensive emergencies, Cerebrovascular diseases and severe anaemia. Assessment of the prescription patterns in a hospital helps monitor and ensure rational drug use. This is essential to achieve quality healthcare for patients and the community.

Conclusions

This study helped us analyse the existing antibiotic prescription patterns in this newly established tertiary care hospital. Polypharmacy is common finding, Access group drugs were prescribed more. Ceftriaxone was the most common drug prescribed in our hospital. Antibiotics prescribed by generic name were low. Dosage, duration, and frequency of the antibiotic was mentioned majority of prescriptions. There was urge to prescribe in capital letters, there were no mention about the adverse drug reactions. Rate of antibiotic prescription was 23%, major concern. This study can be taken as a stepping stone to conduct further studies to investigate the scope of educational intervention and behaviour changes in changing the prescription patterns. Continuous auditing can help improve prescribing standards, and in turn benefit patients.

Limitations of the Research

This study was a pilot cross sectional study to assess the antibiotic prescription patterns in a newly established rural teaching hospital. Hence, only details of 900 patients were assessed. The main disadvantage was the hospital's lack of standard treatment guidelines. Despite the fact that the remaining indicators are satisfactory, prescribing without standards is concerning.

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