Original Research Article

Prospective study for utilization review for multiple antibiotics prescribed in the specialty department in tertiary care teaching hospital

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ABSTRACT

Background: The aim of the work was a prospective study of utilization review for multiple antibiotics prescribed in the specialty department in a tertiary care teaching hospital.
Methods: A prospective study was conducted for 6 months in specialty department in a tertiary care teaching hospital.
Results: In the 6 months duration of the study, a total number of 96 prescriptions were analyzed. The 77 prescriptions were prescribed with Beta-lactam antibiotics. and remaining prescriptions were prescribed with 2, 3 and 4-5 different classes of antibiotics.
Conclusions: The result obtained from our study is for judgment use of antibiotics will reduce the burden of multi-drug resistance and thereby enable better patient management and limit patient morbidity and mortality.

Keywords: Antibiotics, Antibiotic resistance, Utilization review, Morbidity

INTRODUCTION

In Europe 18th November is considered an awareness day for the rational use of antibiotics and efforts are made using camping aimed at rationalizing and reducing the overconsumption of antimicrobial agents.[1] Antibiotics are commonly prescribed drugs nowadays in a hospital setup.[2] Serious infections caused by bacteria that have become resistant to commonly used antibiotics have a major global health care problem in the 21st century. Antibiotic resistance is initially a problem in a hospital setting associated with an increased number of hospital-acquired infections.[3] It is imperative to create school and community-based awareness programs by policymakers for adolescents to upgrade their knowledge on the safe use of antibiotics.[4] Antimicrobial resistance is a global public health challenge, which has been accelerated by the overuse of antibiotics worldwide. Over-prescribing of antibiotics is associated with an increased risk of adverse effectst.[5] Overuse and misuse of antibiotics can lead to

resistance even death may occur.[6] The role of the pharmacist in antibiotic prescription review can play an important role to optimize antimicrobial use to improve patient outcomes and minimize adverse consequences.[7] In the COVID-19 scenario, the usage of antibiotics has achieved a new tectonic shift. This includes hydroxychloroquine, doxycycline, azithromycin, etc., are included in the management of COVID-19 complications. Thus, proper review of antibiotics prescription has become the need of the hour to streamline the prescription practice. Therefore, we have aimed to review the antibiotic usage in the specialty departments as this is the department with a maximum number of admission and multiple diagnoses. Overprescribing antibiotics is result in an increased percentage of morbidity and mortality. As a result, a physician would better retrain their prescription of antibiotics. Therefore, a case-by-case assessment of the appropriate use of antibiotics may be warranted.[8] Antibiotics are given to all hospitalized patients with

possible infections, it is unnecessary to prescribe antibiotics (or) widespread antibiotics. Moreover, clinicians fear to delay the antibiotics may increase patient risk for worse outcomes (or) it is uncomfortable to withhold the antibiotics that may have an infection (or) long stay in hospitalized patients.[9] In the world, they have conducted a study on antibiotic overuse for acute respiratory tract infections. Most acute respiratory tract infections are a common reason for antibiotic overuse in tertiary care hospitals with influenza-like illnesses and received antibiotics although they were confirmed with influenza. In the training of physicians regarding guidelines concordant management deals with diagnostic uncertainty.[10] High levels of antimicrobial drug resistance affecting the outcome of treatment with antibacterial agents are causing increased concern worldwide. Antibiotics shouldn't be started before the results of microbiological culture are available.[11] Sticking to the narrow spectrum agents when possible, using broad-spectrum antibiotics such as quinolones leads to antibiotic resistance.[12] Two practices that can decrease antibiotic prescribing are electronic medical record 'remained' that provides physicians and antibiotic justification notes when inappropriate antibiotics are prescribed for a particular diagnosis and providing information that explains the state of the patient's disease and diagnosis.[13] Antibiotics use is most common in the inpatient prescription i.e.,; approximately 50% of patients have been prescribed one antibiotic prescription during their hospital stay. The overuse (or) misuse of antibiotics led to an antibiotic resistance crisis due to the lack of new drug development by the pharmaceutical industry reduced economic incentives and challenges. The objectives of the study to identify the types of various prescribed antibiotics, and also to identify and report drug related problems associated with prescribed antibiotics. To assess the effectiveness of antibiotics in a specific clinical condition, and also to provide accurate, unbiased and patient specific information about the prescribed antibiotics for better patient care.

METHODS

This prospective case series analysis study was conducted for 6 months between December 2020 and May 2021. The study was conducted in the specialty departments, of Gandhi medical college and hospital, Secunderabad. The study protocol was approved by the instructional ethical committee, CMR college of pharmacy, Hyderabad. Selected cases were collected and documented in a structured data collection from the in-patient units of the above-mentioned departments daily according to study inclusion criteria which include all ages and genders in which antibiotics were identified. Confirmed antibiotic cases were included only with complete information till discharge. Study exclusion criteria include cases without antibiotic prescription, HIV-positive cases, and cases with incomplete information were excluded from the study. After the selection of the study, a structured documentation form was prepared to document relevant data. The study was initiated by visiting the selected in-patients' departments on daily basis to review individual case sheets of the patient to identify antibiotics and report drug-related problems associated with the prescribed antibiotics. Selected cases were followed and updated daily basis to find the suggested management outcome and for any other issues. These cases were followed until discharge and a discharge summary was used to note down in the documentation form for further processing. Analysis and interpretation of data were performed according to various categories and parameters to get the result. Further discussion of the result was executed to accomplish the outcome. The statistical tool which is used to analyse the data is one-way analysis of variance was applied to compare the collected data to obtain final outcome. Sample size for the study was considered based on 90% confidence interval, with 7% margin of error and 50% of population proportion.

RESULTS

A total of 96 cases were identified, collected, documented, and analyzed for the study according to inclusion and exclusion criteria.

Table 1: Gender and age-wise distribution of collected cases.

Variables	No. of prescriptions	Percentage (%)
Gender		
Male	54	56
Female	42	44
Age (years)		
Less than 40	42	44
40-60	25	26
More than 60	29	30

Gender-wise distribution of collected cases shows that male is slightly higher than female at 56% and 44% respectively. The age-wise distribution shows less than 40 years of age constituent the maximum 44% followed by more than 60 years 30% and 40-60 years 26% (Table 1).

Table 2: Diagnosis-wise distribution in collected cases.

Diagnosis	No. of cases	Percentage (%)
Respiratory diseases	30	31.25
Renal diseases	27	28.13
Gastrointestinal diseases	21	21.87
Hepatic disorders	18	18.75

Diagnosis-wise distribution of collected cases show that respiratory disease has slightly higher than other diseases, such as renal disease, gastrointestinal disease, and hepatic disorder 31.25%, 28.13%, 28.87%, and 18.75% respectively (Table 2).

Table 3: Distribution of frequency of antibiotic prescription in collected cases.

Antibiotic prescribed	N	Percentage (%)
Piperacillin + tazobactam	42	43.75
Doxycycline	36	37.50
Clarithromycin	28	29.16
Augmentin	12	12.50
Levofloxacin	08	8.33
Monocef	08	8.33
Meropenem	06	6.25
Azithromycin	05	5.20
Metrogyl	04	4.16
Amikacin	03	3.12
Taxim	03	3.12

The distribution of antibiotic prescription frequency shows a total of 11 different antibiotics were prescribed in the collected cases. The frequency of antibiotics prescription shows a total of 155 times prescribed in the collected cases. Among the prescribed antibiotics piperacillin and tazobactam (43.75%) and doxycillin (37.50%) were prescribed mostly followed by clarithromycin. Other antibiotics are prescribed with minimal frequency (Table 3).

Table 4: Distribution of no. of different antibiotics prescribed in each prescription in collected cases.

No. of antibiotics prescribed in each prescription	No. of cases	Percentage (%)
Only one antibiotic	42	44
Two antibiotics	26	27
Three antibiotics	12	12
More than three antibiotics	16	17

The number of antibiotics prescribed in each prescription from the collected cases, the patient was prescribed with one antibiotic is the highest (44%) among two antibiotics (26%) then compare to three antibiotics and more than three antibiotics respectively (12% and 17%) (Table 4).

Table 5: Distribution of various characteristics associated with antibiotic prescription (number of the drug-related problems and the drug-interaction).

Variables	No. of cases	Percentage (%)
Drug-related problem		
Prescribing error	14	56
Drug overdose	7	28
Adverse drug reaction	4	16
Types of drug interactions with prescribed antibiotics		
Major	28	68
Moderate	09	22
Minor	04	10

Drug-related problems (DRP) identified in collected cases are major with prescribing errors at 56% followed by drug overdose and ADR with 28% and 16% respectively. The identified type of drug interaction with prescribed antibiotics in collected cases shows that major drug interaction is higher than compared to moderate and minor 68%, 22%, and 10% respectively (Table 5).

DISCUSSION

In this prospective study, cases were collected from various inpatients units of specialty departments and a total no. of cases are 96 with da different types of antibiotics with different classes in the duration of a 6 months period. Out of 96 collected cases, 30 were diagnosed with respiratory, 27 were diagnosed with renal, 18 were diagnosed with hepatic, and, 21 were diagnosed with the abdomen. In our study there are different types of antibiotics were prescribed; they were prescribed with 2 (or) more antibiotics; 4.16% adverse drug reaction, 14.58% prescribing error, and 7.29% drug overdose were identified in the duration of a 6 months period.

In our collected cases, they have prescribed the same prophylactic therapy for surgical procedures and also some pre- eruptive Surgery results as similar to Moser et al has conducted a study on antibiotic therapy as personalized medicine-general consideration.[14] In our collected cases, some of the antibiotics prescribed due to a lack of knowledge and awareness of antibiotic guidelines are reported by Machowska et al.[15] Similar to the study i.e., an aim to optimize the use of antibiotics is need inappropriate use (or) is, use of antibiotics will increase the patient stay in hospital result show to similar Campion et al.[16] Similar to the study it has been re-reported that t the practice of polypharmacy d injudicious usage of antibiotics in hospital settings arise ported by Abhijit et al.[17] It was similar to conducting a study (or) review about the use of antibiotics in Europe and presented major factors. Most of the cases which are collected are due to a bacterial infection they are prescribed with different antibiotics following the guidelines of the antibiotic prescribing which are conducted by Al-Shimemeri et al.[18] A similar study conducted on the origin and evolution of antibiotics resistively provides strict control on antibiotic use by humans, no dispense of drugs without a doctor's prescription to enhance optimization concluded by Davies et al.[19] As the study is contraindicated antibiotics in endocarditis are not done according to the guideline leads to the antibiotic resistance reported by Roduit et al.[20] As similarly concluded that most bacteria med wards ward is due to gram-positive cocci. As the antibiotics are prescribed without guidelines the patients are going to experience local effects which are reported by Erdelijc.[21] As the study conducted on various strategies proposed to facilitate and improve appropriate antibiotic use has been reported by Maraha et al.[22] As in the study on antibiotic use in the intensive care unit. In collected cases of lower respiratory infection, they have prescribed a different type of antibiotics without guidelines, and overprescribing of antibiotics is published by Manal and

Sayed.[22] This is similar to the study conducted on antibiotics misuse (or) lower maternal education. As antibiotic overprescribing will lead to antibiotic resistance the physician should follow guidelines reported by Salem.[23] A similar review conducted on antibiotics and the mechanism of resistance to the antibiotic may cause community-acquired and nosocomial infection the appropriate indications, appropriate dosage, and proper guidance should be implemented as reported by Cesurs.[24] A similar study reported and concluded that due to increased use of antibiotics causes resistance which is concluded by Odonkors et al.[25] A similar study on antibiotic misuse in hospitals, and outpatient, checking whether the drug is truly indicated in a particular scenario and whether the correct choice of dosage and route of administration prescribed is appropriate has been reported by Ashrat et al.[26] In a similar study on the risk associated with antibiotic overuse and reducing the problem, an increased mortality rate has been suggested by Clor et al.[27] As the contraindicated to the study due to shortage of doctors, unlicensed medical providers in India the patient themselves participating in the decision to treat an illness with antibiotics has been concluded by Barker et al.[28] A similar study conducted on the appropriateness of antibiotic usage was appropriate in 50% of patients and inappropriate in 50% of patients due to incorrect choices they result in different drug-related problems and adverse drug reaction has been reported by Madhu et al.[29] A similar study conducted that associated the adverse event with antibiotic use and the usage of antibiotics play a critical role when used appropriately and misuse may lead to mortality has been reported by Tomma et al.[30] Similar to a study conducted on evidence-based practice in the use of antibiotics of non-evidence-based prescription of antibiotics and overuse of antibiotics. Is similar to a previous study conducted by Pranita.[31] Has concluded that antibiotics may play a critical role when used approximately 30% of the antibiotics of inpatients were unnecessary. As a previous study reported by Jindal.[31] Has concluded that there are different policies and guidelines for the appropriate use of antibiotics. A study in contrast with the result conducted by the Ventola et al.[32] Has concluded that the misuse (or) overuse of antibiotics leads to the antibiotic resistance crisis. Our study was also contributed by Mitchell et al.[33] To understand the role of antibiotic usage and knowledge and hence the value of public education about antibiotic usage intension. The study was conducted by the Sakeena et al.[34] Has reported that the role of the pharmacist in the area of critically ill patients with infections and diseases in the intensive care unit and education regarding infection-control practices is also important. Limitations of study are when patient is absconded or die. Antibiotic usage guidelines can be prepared for department.

CONCLUSION

Our study concluded that for the management of common infections are need to minimize the overuse and misuse of antimicrobial agents in tertiary care hospitals. Rational prescribing of antibiotics avoids polypharmacy and prevents antibiotic resistance. This study highlights the need to minimize the average number of drugs per prescription, the average percentage of antibiotics, and to minimize the percentage of infection. Therefore, a strict protocol for prescribers is required to promote rational use of antibiotics which not only prevent antibiotic resistance but also reduce treatment expenditure. The worldwide increase in antimicrobial resistance is of great concern and it is the responsibility of the prescriber to develop good prescribing habits and prescribe by WHO prescribing indicators generic prescribing should be encouraged, brand prescribing should be restricted, and an average number of drugs per prescription should be kept minimum to prevent polypharmacy.

REFERENCES

1. Kourkouta L, Kotsittopoulo S, Papageorgiou M, Iliadis CH, Monios A. The rational use of antibiotics medicine. J Health Care Communications. 2017:2,4-36.
2. Meher BR, Mukharjee D Udayshankar. A study on antibiotic utilization pattern in a general medicine ward of a tertiary care teaching hospital. J Chem Pharmaceutical Res. 2014:6(7):1847-49.
3. Alfonso J. Alanis resistance to antibiotics. Are we in the post-antibiotic Era? Arch Med Res. 2005;36;697-705.
4. Rijal S, Kunwar SD, Dahal A, Gupta S. Knowledge of use of antibiotics, its resistance and consequences among students in private school. J Nepal Med Asso. 2018:56(212);740-44.
5. Llor B. Antimicrobial resistance risk associated with antibiotic overuse and initiatives to reduce the problem. Ther Adv Drug Saf. 2014;5(6);229-41.
6. Peamanik MD. Impact of overuse of antibiotics on human health. ResearchGate. 2016.
7. Parente DM, Morton J. Role of pharmacist in antimicrobial stewardship. Med Clin North Am. 2018;102(5);929-36.
8. Porco TC, Gao D, Scott JC, Shim E, Enanoria WT, Galvani AP, Lietman TM. When does overuse of antibiotics become a tragedy of the commons? PLos one. 2012;7(12):e46505.
9. Klompas M. Overuse of Broad-Spectrum Antibiotics for Pneumonia. JAMA Intern Med. 2020;180(4):485-6.

10. Tillekeratne LG, Bodinayake CK. Antibiotic overuse for Acute respiratory tract infections Era? A qualitative study of outpatient and their physicians. BMC Fam Pract. 2017;18(1):37.

11. Baltatzis M, Chandra Balan V. Antibiotic use in acute pancreatitis: An adult of current practice in a tertiary center. Panceratology. 2016;16(6):946-51.

12. Cesur S, Demiroz AP. Antibiotics and the mechanism of resistance to antibiotics. Med J Islamic World Academy Sci. 2013;21(4):138-42.

13. Odonkor ST, Addo K. Bacteria resistance of antibiotics: recent trends and challenges. Int Bio Med Res. 2011;2(4):1204-50.

14. Moser C, Lerche CJ, Thomsen K, Hartvig T, Schierbeck J, Jensen P et al. Antibiotic therapy as personalized medicine-general considerations and complicating factors. APMIS. 2019;127(5):361-71.

15. Machowska A, Lundborg CS. Drivers of Irrational Use of Antibiotics in Europe. Int J Environ Res Public Health. 2018;16(1):27.

16. Campion M, Scully G. Antibiotic use in the intensive care unit: optimization and De-Escalation. J Intensive Care Med. 2018:33(12);647-55.

17. Abhijit K, Jain P, Upadhyaya P, Shipra Jain S. Antibiotic Prescribing in Various Clinical Departments in a Tertiary Care Teaching Hospital in Northern India. J Clin Diagn Res. 2014;8(5):HC09-11.

18. Al-shimemeri A, Al-Ghadeer H, Memish Z. Antibiotic utilization pattern in a general medicine ward of a tertiary medical center in Saudi Arabia. Avicenna J Med. 2011:1(1):8-11.

19. Davies J, Davies D. Origin and evolution of antibiotic resistance. Microbiol Mol Biol Rev. 2010;74;417-33.

20. Roduit J, Jornod P, Dorta N, Blum AL, Dorta G. Antibiotic prophylaxis of infective endocarditis during digestive endoscopy: over and underuse in Switzerland despite professed adherence to guidelines. Endoscopy. 2002;34(4).

21. Erdeljic V, Francetic I, Sarini CV, Bilusic M, Huic M, Mercep I et al. Evaluation of justification for antibiotics at the internal medicine clinic of the clinical hospital in Zagreb. Acta Med Croatica. 2004;58(4);293-9.

22. Maraha B, Bonten M, Fiolet H, Stobberingh E. Trends in antibiotic prescribing in general internal medicine wards. Antibiotic use and indication for prescription. Clin Microbiol Infect. 2000;6(1);41-4.

23. EI Sayed MF, Tamim H, Jamal D, Mumtaz G, Melki I. National Collaborative Perinatal Neonatal Network (NCPNN). Prospective study on antibiotics misuse among infants with upper respiratory infections. European J Pediatr. 2009;168(6):667-72.

24. Ayyad S, Al-Owaisheer A, Al-Banwan F, Al-Mejalli A, Thalib L. Evidence-based practice in the use of antibiotics for respiratory tract infections in primary health centers in Kuwait. Med Princ Practice. 2010;19(5):339-43.

25. Odonkors S, Addo K. Bacteria resistance to antibiotics. Int J Biological Med Res. 2011;2(4):1204-10.

26. Ashrat M, Cook P. Antibiotic misuse in hospital, outpatient, and long-term care setting. North Carolina Med J. 2016,77(5):346-49.

27. Clor C, Bjerrum L. Antimicrobial resistance risk associated with antibiotic overuse and initiative to reduce the problem, the advance in drug safety. Ther Adv Drug Saf. 2014;5(6):229-41.

28. Barker AK, Brown K, Ahsanm, Safdar N. Social determination of antibiotic misuse: a qualitative study of community members in Haryana, India. BMC Public Health. 2017;17(1):333.

29. Madhu G, James E, Venu R. A study on the appropriateness of antibiotics used for gastrointestinal disorder in a Tertiary Care Hospital. Euro J Hospital Pharmaceutical Sci Pract. 2016;23(5):283-7.

30. Tomma PD, Avidc E, Li DX, Dzintars K, Cosgrove SE. Association of adverse event with antibiotic use in hospitalized patients. JAMA Int Med. 2017;177(9):1308-15.

31. Jindal AK, Pandya K. Antimicrobial resistance: A public health challenge. Med J Armed Forces India. 2015;71(2)178-81.

32. Ventola C. Pharmacy and therapeutics of the antibiotic resistance crisis Medi Media USA. PT. 2015;40(4):277-83.

33. Mitchell K, Miellet S, Fish J. The drivers of antibiotic use and misuse. BMC Public Health. 2019;19(17):1425-37.

34. Sakeena MHF, Alexandra A. Enhancing pharmacists role in developing countries to overcome the challenge of antimicrobial resistance. BMC Public Health. 2018;18(48):763-74.