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Antibiotics Use in a Tertiary Care Hospital Using Point Prevalence Survey Method

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ABSTRACT

Background: Point prevalence survey on antibiotic use developed by WHO are already in use in acute care hospitals around the world. The aim of this study was to collect prescribing of antibiotics using Point prevalence survey method in KIST Medical College and Teaching Hospital.

Methods: This was a cross sectional descriptive study and data collection was completed within 8 working days in the study site. The study was conducted among inpatients admitted at or before 8:00AM on the day of survey in various wards. Patient sampling was done as per the Point Prevalence Survey methodology. Data analysis was done and presented as frequencies and percentages.

Results: Out of 32 patients, maximum patients were of age group 20-30 years and 19 (59%) patients were females. Most patients, 8 (32%) were from the surgery ward. There were patients from 8 different wards including a patient who had renal transplant. Blood, sputum, urine and CSF culture were done in 11 patients, only 2 urine cultures were positive. At least one antibiotic was used among 18 patients. Ceftriaxone (34.4%) was maximally used followed by levofloxacin (3%). One or two antibiotics were used in prophylaxis with a duration of one to five days.

Conclusions: WHO Point prevalence survey methodology has been used in this study. Ceftriaxone was the most commonly used antibiotics. Parenteral administration was the commonest method of administration. At least one antibiotic was used among 18 patients. There is presence of a functioning Drugs and Therapeutics Committee, Infection Prevention & Control Committee and committee on pharmacovigilance. However, many indicators for hospital infrastructure, policy and practice and monitoring and feedback were not present.

Keywords: Antibiotics; Nepal; point prevalence survey; tertiary care center.

INTRODUCTION

Continuous data collection on antibiotic prescribing is not possible due high workload and greater level of resources needed for regular monitoring. Irrational use of antibiotics and poor monitoring systems are the major causes for the global burden of AMR. [1,2]

Antibiotics are used inappropriately.[1,3] Hospitals can be an important source for obtaining information on antibiotic prescribing due to the high volume of patients with varieties of diseases with a need of antibiotic therapy. Interventions for optimizing the use of antibiotics in the hospitals can have a significant impact for decreasing the problem of AMR at all levels of healthcare. Point prevalence survey (PPS) can be an important method for collecting data in a specific point of time.[4] This methodology has been carried out in many hospitals worldwide.[5] The aim of this study was to collect the information on the prescribing of antibiotics using PPS in KIST Medical College and Teaching Hospital.

METHODS

This was a cross sectional descriptive study, carried out at KIST Medical College and Teaching Hospital from 8th September 2021 to 15th September 2021. This hospital is a 623 bedded tertiary level which provides inpatient service of almost every specialty. Data collection was

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completed within 8 working days in the study site. Ethical approval was obtained from Institutional Review Committee (IRC) of KIST Medical College and Teaching Hospital. The study was conducted among acute care inpatients admitted at or before 8:00AM on the day of survey in various wards like medical, surgical, pediatric, pediatric intensive care unit, neonatal medical ward, neonatal intensive care unit, adult intensive care unit, mixed adult/pediatric ward, mixed adult ward and mixed pediatric ward and high risk wards like transplantation wards. Patients of both gender and all age groups admitted were included.

Emergency department, day surgery wards, psychiatry wards, emergency wards, day care wards (e.g. renal dialysis) and COVID wards were excluded. Patients from outpatient clinics and discharged patients waiting for transportation were excluded. Similarly, patients on antiviral agents, anti-fungal and antitubercular antibiotics, topical antibiotics and outpatient parenteral antibiotic therapy were also excluded.

Patient sampling was done as per the PPS methodology which describes every alternate patient to be selected for the hospital having beds from 500-800. Eligible patients irrespective of getting antibiotic treatment were included in the study. The list of all eligible patients was prepared by the ward investigators. The name list was prepared alphabetically according to the patient's surnames and not by their bed number. The patients' number were recorded for every wards. The ward investigator selected the patients randomly between the first and the second patient on the list as the starting point for the sampling and selected every second patient from the list. Thus, every alternate patient was selected for the study.

Data Collection tool used was a standard WHO tool for PPS methodology.[1] The investigators visited the hospital wards and filled in the data collection tool by accessing patient medical file, lab reports, cardex, prescription papers. Data analysis was done by entering the data in SPSS version 21 and presented as frequencies and percentages.

The hospital data also collected information on structural indicators related to antibiotic use including infrastructure, policy and practice and monitoring and feedback.

RESULTS

Maximum patients (9) were of age group 20-30 years as shown in the figure 1. Similarly, 19 (59%) patients were females and 13 (41%) patients were male. Ward wise distribution of the patients showed maximum number, 8 (32%) of patients in the surgery ward as shown in the figure 2. The diagnoses made in the patients are shown in Table 1.

Table 1. Diagnoses made in patients

Diagnoses made in patient	Number of patient
Acute appendicitis	1 (3.1)
Perforated appendix	1 (3.1)
Baby born to mother with primary syphilis	1 (3.1)
Benign prostatic hyperplasia	1 (3.1)
Chronic liver disease with cholelithiasis	1 (3.1)
Emergency caesarian section	1 (3.1)
Fetal distress	1 (3.1)
Gall bladder polyp	1 (3.1)
Hypertensive crisis with urinary tract infection	1 (3.1)
Lower respiratory tract infection	1 (3.1)
Mild prostatomegaly with lower urinary tract infection	2 (6.2)
Multiple cholelithiasis	1 (3.1)
Neonatal jaundice	1 (3.1)
Non-functioning left kidney	1 (3.1)
Pneumonia along with influenza	1 (3.1)
Acute respiratory distress syndrome	1 (3.1)
Right tibial fracture	1 (3.1)
Right thalamic hemorrhage	1 (3.1)
Stent induced cholangitis	1 (3.1)
Transplant for chronic kidney disease	1 (3.1)
Viral encephalitis	1 (3.1)
Meningitis	1 (3.1)
Acute renal failure	1 (3.1)
Viral hepatitis	1 (3.1)
Hepatitis A	1 (3.1)
Viral meningoencephalitis	1 (3.1)
Upper gastrointestinal bleeding	1 (3.1)
Primigravida with premature rupture of membrane	1 (3.1)
Normal delivery with perineal tear	1 (3.1)
Normal delivery with episiotomy with perineal tear	1 (3.1)

Comorbidities were seen among 9 (28.1%) patients. Types of comorbidities were tuberculosis, anemia, cholelithiasis, chronic liver disease, chronic obstructive pulmonary disease, diabetes mellitus, hypertension, hypothyroidism, rheumatoid arthritis and syphilis. Underlying disease found to be HIV in one case.

The samples taken for the culture were blood, sputum, urine and cerebrospinal fluid. The culture was done for 11 (34.4%) of patients and the result was found to be positive in two urine cultures. The microorganisms isolated in positive culture results were Escheria Coli, Pseudomonas and Klebsiella. The catheter was used in 8 (25%) patients. The types of catheters used were central venous catheter and urinary catheter. Urinary catheter was used in 6 (18.8%) of patients.

Types of surgeries done were caesarean section, kidney transplant, laparoscopy appendectomy, cholecystectomy, open left nephrectomy and transurethral resection of prostate (TURP).

Table 2. Number and types of antibiotics prescription.

Number of antibiotics used	Percentage
None	3 (9.3)
One	18 (56.4)
Two	9 (28.1)
Three	1 (3.1)
Four	1 (3.1)
Antibiotics used in prophylaxis	
Yes	5 (15.6)
No	27 (84.4)
Number of antibiotics in prophylaxis	
None	27 (84.4)
One	4 (12.5)
Two	1 (3.1)
Duration of antibiotics used in prophylaxis	
One day	1 (20)
Three days	1 (20)
Five days	3 (60)

Table 2. shows the types of antibiotics prescription among the study participants. Only one antibiotic was found to be used among 18 patients. Antibiotics used in prophylaxis was one to two, with a duration of one to five days. Ceftriaxone was the antibiotic found to be maximally used followed by levofloxacin. Ceftriaxone was used in the cases of acute appendicitis, multiple cholelithiasis, gall bladder polyp, primi gravida with premature rupture of membrane, acute exacerbation of COPD, lower respiratory tract infection, emergency caesarian section, hypertensive crisis with urinary tract infection and upper gastrointestinal bleeding. Levofloxacin was used for the patients with right thalamic hemorrhage, benign prostatic hyperplasia, acute renal failure and mild prostatomegaly with lower urinary tract infection. Similarly, Moxifloxacin was used in a patient with chronic liver disease with cholelithiasis. Routes of drug administration used were oral, intramuscular and intravenous. Dosage forms used were capsules, tablets, syrups and vials.

Table 3. shows the number and types of different antibiotics used in the patients from various wards.

Table 3. Type of antibiotics used in patients.

Types of antibiotics used	Number
Ampicillin	1 (3.1)
Benzathine Penicillin	1 (3.1)
Cefotaxime	1 (3.1)
Cefopodoxime	1 (3.1)
Ceftriaxone	11 (34.4)
Clindamycin	2 (6.2)
Levofloxacin	3 (9.3)
Meropenam	2 (6.2)
Teicoplanin	1 (3.1)
Doxycycline	1 (3.1)
Cotrimoxazole	1 (3.1)
Moxifloxacin	1 (3.1)
Polymyxin B	1 (3.1)
Amikacin	1 (3.1)
Azithromycin	1 (3.1)
Cotrimoxazole	2 (6.2)
Amoxicillin and Clavulanic acid	1 (3.1)

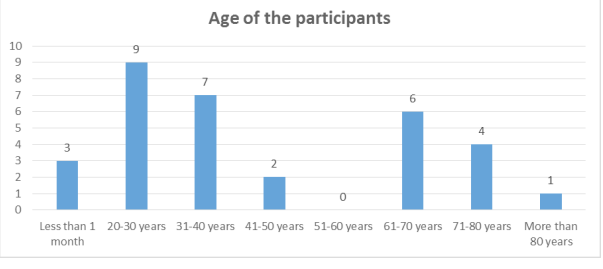

Figure 1. Age wise distribution of the patients.

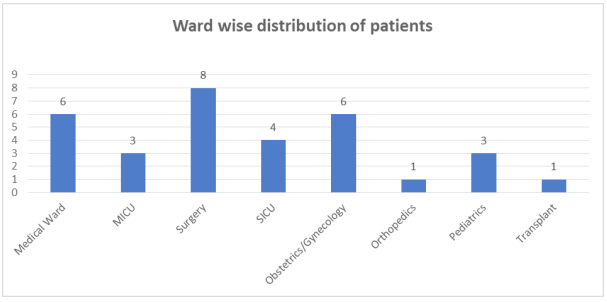

Figure 2. Ward wise distribution of the patients.

The institutional capacity to promote appropriate antimicrobial use, which had been defined by the infrastructure, policy and practice and monitoring and feedback in the hospital showed the presence of a functioning Drugs and Therapeutics Committee, a functioning Infection Prevention & Control Committee and a functioning committee on pharmacovigilance. There was also a microbiological laboratory/division within the hospital. The hospital also had a facility to access microbiological services outside the hospital. The hospital also had an outpatient parenteral antibiotic therapy (OPAT) unit.

Similarly, the indicators for policy and practice showed that there was an antibiotic guideline and a local antibiotic guideline. The local antibiotic guidelines were present in the institute and was based on local antibiotic susceptibility with an assistance for selecting antibiotics for common clinical conditions.

The indicators for monitoring and feedback showed that the facility had produced a collective antibiotic susceptibility report during last year. The number of blood cultures made in the last year was 3869. However, the other indicators for hospital infrastructure, policy and practice and monitoring and feedback were not present.

DISCUSSION

Many factors play role towards the current scenario of antimicrobial resistance in the world. The factors are over use of antimicrobials by the healthcare professionals, poor patient compliance, counterfeit and poor quality medicines, wrong choice of antimicrobials, incorrect prescriptions with wrong dosage and inadequate infection control practices in the healthcare settings. Additionally, inadequate sanitation and poor hygiene can also contribute towards the problem of AMR.[1]

Irrational use of antibiotics is very common.[1,3] Information about the consumption of antibiotics and use is very less in low- and middle-income countries like Nepal. It is very important to obtain information on the antibiotics use in the country for framing effective policies and interventions for promoting rational use of antibiotics. In a study in central India, the most commonly prescribed class was combination of combination of penicillin with a ß- lactamase inhibitors. Cephalosporins and flouroquinolones were second and third mostly prescribed antibiotics.[6]

A clear picture for the use of antibiotics needs a harmonized data collection along with the strong monitoring systems. Continuous data collection on prescribing pattern of antibiotics is not possible in many countries. The reasons may be the high workload and the scarce resources needed for monitoring. PPS methodology has been used in many hospitals in many parts of the world. United States and the European Union have also developed and conducted their regional surveys using PPS methodology. [4,7]

A similar methodology has been developed by WHO which is targeted for the needs of low- and middle-income countries. This methodology enables to compare the use of antibiotics in various healthcare levels. This PPS methodology has flexibilities to suit for the challenges faced during data collection process in a country with limited resources. A set of core variables has been selected by the WHO that is necessary for data analysis and interpretation, and provides the possibility to implement follow-up activities.

Ceftriaxone was the most commonly used antibiotic, 11 (34.4%) followed by levofloxacin, 3 (9.3%). Parenteral administration was the commonest method of administration of the antibiotics. This finding was similar to the study which showed that it was most common in west and central Asia, Latin America, and eastern and southern Europe where it accounted for more than 80% of patients on antibiotics. The study also showed that broad-spectrum antibiotics were the common ones to be administered in those regions.[6,8]

Our findings showed that 18 (56.4%) of patients were prescribed at least one antibiotic. This was more than a study which reports a crude prevalence of patients with at least one antibiotic of 27.1%.[9]

The duration of use of antibiotics in prophylaxis was one to five days in our study, which was similar to another study done in Belgian hospitals.[9] This advocates that

antibiotic prophylaxis use was not being done as per the guidelines. Studies suggests that antibiotics should be given 1-2 hours before surgical incision for adequate amount of drugs in serum and tissues. [10-12]

This methodology can be used in low and middle income countries like Nepal to survey antibiotic prescribing in hospitals while maintaining comparability with those compared to high income countries. It also facilitates comparison of antibiotic use over time and among hospitals, districts, countries and regions. A PPS study of health care-associated infections and antibiotic use has been published using clinical criteria by European Center for Disease Prevention and Control protocol version 5.3.[13]

Some limitations being a cross sectional survey, only prevalence can be reported and patients were not followed up in time. Only a snap shots are shown by a prevalence study, thus not ideal to measure the problem of antimicrobial resistance.

CONCLUSIONS

Collection of data at a specific point of time can be done by using WHO PPS methodology. It has been used in this study. Ceftriaxone was the most commonly used antibiotics. Parenteral administration was the commonest method of administration. At least one antibiotic was used among 18 patients. There is presence of a functioning Drugs and Therapeutics Committee, a functioning Infection Prevention & Control Committee and a functioning committee on pharmacovigilance in hospital. However, many indicators for hospital infrastructure, policy and practice and monitoring and feedback were not present.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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