

Prescribing Patterns of Antibiotics in Tertiary Care Hospital of Abbottabad, Khyber Pakhtunkhwa

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Abstract

Background: The antibiotic resistance is on a rise globally due to irrational use. This survey evaluated the prescribing patterns of antibiotics in tertiary care hospital in Abbottabad.

Study type, settings & duration: This observational, descriptive, and prospective study was carried out in divisions of Gynecology, General Medicine, Pediatric Surgery, Orthopedics and Pulmonology, Tertiary Care Hospital, Abbottabad, KPK from 2019 to 2020.

Methodology: An antibiotic prescribing pattern survey was carried out among the patients of hospital. Medical case sheets of patients and drug charts were used to record in standardized performa.

Results: Total 203 patients on antibiotics were included in the study. Antibiotics prescribed in Gynae Department were UTIs 57%, LSCS 35%, NVD 20%, wound infection 16.6%, D&C 10%, SVD 10%, RTIs 6.6%, Extraction 6.6%, Stitch removal 6.6%, Hysterectomy 5%, Ectopic Pregnancy 5% post ovariectomy 3.3% Uterine bleeding 3.3%, & most common dosage form: Tablets: 56.6%, Capsules: 40%, Syrups: 3.33% in Pead's Department URTI 62%, Cold and fever 10%, Eye Infection 8%, LRTI 6%, in dosage form: Syrups: 82%. Drops: 12%, Injection: 4%, Tablet: 2%. In Surgical ward Ceftriaxone: 35%, Titan: 20%, Grasil: 20%, Flagyl: 10%, Kefzol: 5%, Ampiclox: 5%, Bestrix: 5%. In General OPD, RTI 48%, Wound Infection 18%, fever 14%, UTIs 8.33%, Pneumonia 1.66% the most prescribed dosage form, Injection: 28%, Syrup: 12%, Drops: 8.0% Tablets: 8.0%, Capsules: 6.0%. In orthopedic ward: Grasil: 22.2%, Amikacin: 19.3%, Oxidil: 18.8%, Titan: 11.11%, Cefbactam: 11.11%, Kefzol: 10%, Sulperazone: 5.55%, Augmentin: 5.55%, Gentacin: 2.7%, Most prescribed dosage form: Injection: 100%, Tablets, Capsules and Syrup 0%. In Pulmonary disease department Respiratory tract infection 55% and in Bronchitis are 35%. Most commonly prescribed dosage form: Injection: 50%, Tablets: 45%, Capsules: 5%, Syrup, and Drops 0%. Mainly Augmentin was prescribed as a combination therapy. Most antibiotics were prescribed for 5-7 days.

Conclusion: The survey indicates that the use of antibiotic in tertiary care hospital is very high and is not rational.

Key words: Antibiotic, drug resistance, infectious diseases, tertiary care hospital.

Introduction

Resistance against antibiotics by microbes is becoming a big challenge around the globe due to increased morbidity, mortality and expense.¹ Antimicrobials are not being used properly which

ultimately results in evolving of resistant microbes, more spread in public and in hospitals.² There is a harmony that there is a need to coordinate and take measures to handle microbial resistance.³ There are a lot of factors which attribute to increased consumption of antibiotics including non-restrictive prescription by health care providers, prescription errors, frequent sale of Over the Counter Drugs (OTC) drugs, absence of stable policy and exposure of patients to contagious and resistant microorganisms.^{4,5}

Therefore, there is a need of platform to monitor the rational and appropriate use of antibiotic prescription.⁶ Antibiotic utilization information has been assessed by 'point prevalence surveys' from last two decades. This methodology is simple and feasible to obtain data in hospitals and clinics.⁷

A functional representative system for surveillance of antimicrobial consumption and antimicrobial resistance has not been in place in

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Authors Contribution

FA conceptualized the project. PZ, HA, MA & RA did the data collection. FA, PZ, HA & MA did the literature search. HA & RA performed the statistical analysis. Drafting, revision & writing of manuscript were done by FA & RA.

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Pakistan. Pakistan requires increased AMR surveillance to identify emerging resistance infections and outbreaks.⁸ Control of infectious diseases with antibiotics in clinical practices is of utmost importance.⁹ On the other hand, some prescription habits reflect the redundant use of antibiotics and there is an emergence of determining the factors responsible for antibiotics utilization.²

There is a complex relationship between antibiotic prescription and bacterial resistance. There is not much evident data available to establish a quantitative relationship between utilization and bacterial resistance.¹⁰ After the antibiotics discovered in 20th century medical practice has been changed to a lot of extent keeping in view that risk due to infections was decreased. As the time passed irrational and misuse of antibiotics appeared as a main problem.^{11,12} And it was reported later that about 50% of antibiotics were prescribed unnecessarily.¹³ Many complications have been noted related to overuse of antibiotics including diarrhea and other infections.¹⁴ Bacterial resistance is now becoming a global health crisis.¹⁵ Antibiotic overuse is driven by prescribing habits of practitioners, which are dynamic and likely to change over time.

Antimicrobial resistance as well as increase in ADRs (Adverse drug reactions) has been observed due to misuse of antimicrobial agents. This has resulted in increase in cost of the treatment, morbidities, and mortalities; hence it is significant to assess patterns of antibiotic utilization in Abbottabad, Khyber Pakhtunkhwa in order to evaluate increase in its usage and its overall effect on the health care system. For this purpose, an antibiotic utilization pattern study was conducted in different medical facilities like Pediatrics, Gynecology etc. of tertiary care hospital of Abbottabad, Khyber Pakhtunkhwa.

Despite the fact that a large portion of recent research has concentrated on global initiatives, there are still a lot of different local and international studies scattered throughout the antimicrobial resistance surveillance field. This study will examine how these initiatives might be strengthened and tailored to better fulfill the critical role of surveillance in limiting the emergence and dissemination of resistance. The point of this ponder was to get data around statistic profiles of patients, prevalence of infections and patterns of prescribing anti-microbials in tertiary care hospital of Abbottabad, Khyber Pakhtunkhwa.

Methodology

Subjects for study were patients attending the hospital in Abbottabad. Case records as well as prescriptions of outpatients who were prescribed antibiotics were used for the relevant data.

The study presented here is observational, descriptive, and prospective and was carried out in 203 patients' divisions of (Gynecology, general medicine, Pediatric, Surgery and Orthopedics) in 1000 bedded tertiary care hospital in Abbottabad, KPK, from 2019-2020. The 203 prescriptions were analyzed and were randomly collected who were on anti-microbial treatment or prophylaxis, were selected.

Following study parameters were considered for the data collection; total number of patients, percentage of male and female, age, average age, study duration, allergy season consideration if any, most frequently prescribed antibiotics, disease conditions antibiotics prescribed for, most prominent diseases, percentage of antibiotics prescribe in generic form, total number of departments, dosage forms, prescribing duration of antibiotics and combination therapy.

Medical case sheets of patients were obtained and were recorded in standardized Performa and were then analyzed. Demographics (Age, Sex), Chief complaints, Current diagnosis, medical history, medication prescribed (dose, route of administration, frequency, indication, therapy duration, marketing categories (generic/branded) were collected for analysis. The data later was then analyzed using indicators by WHO.¹⁶

The drug utilization is assessed by the WHO core drug indicators e.g., prescribing indicators. The number of drugs that are prescribed, number of antibiotics prescribed & number of antibiotics which were used alone and in combination, and drugs that are prescribed by generic name or trade names. The quantity of antibiotics per prescription demonstrates how many antibiotics were used at a time. The percentage of prescriptions with multiple antibiotics shows the extent of antibiotic combination therapy. The physicians prescribing the medications were not told about these prescription audits so that Hawthorne effects could be prevented.¹⁶

To view and record the data the observational study was conducted and to see the outcome the prospective study was completed. Furthermore, descriptive statistics were then applied on the collected data using Microsoft excel software and finally results were shown in percentage.

The ethical approval was obtained from the Research Ethics Committee of COMSATS

University Islamabad, Abbottabad Campus vide letter no. PMH.Eth/CF-M04/19-0134.

Results

Total number of 203 patients who were prescribed antibiotics were included in the present study. And out of these 96 were males and 107 females respectively. The mean duration of hospital stay was 5 days. Overall, according to the study, a number of 266 of antibiotics were prescribed and included 1.87 antibiotic per prescription. Out of 266 antibiotics, only 4.51% of antibiotics were prescribed in generic name. Mostly antibiotics were prescribed in brand name. A total 21 antibiotics were prescribed as combination. Mainly Augmentin was prescribed as a combination therapy. Most antibiotics were prescribed for 5-7 days. Average age of patients who were prescribed antibiotics was 29 years.

Following are the results which were analyses in different departments of tertiary care hospital in Abbottabad.

Gynae out-patient department

A total of 30 female patients' prescriptions were analyzed. Mean age of the patients were 28 years. Most of the antibiotics were prescribed for UTIs 57%. Most common antibiotics prescribed were Metronidazole 36%, Cefixime 24%, ofloxacin 16%, Azithromycin 8%, Moxifloxacin 8%, Ampicillin 4% and Cephradine 4%. About 16.6% antibiotics were prescribed for wound infections and most common antibiotics prescribed were cefixime 40%, Metronidazole 20%, Moxifloxacin 20% and Cephradine 20%. About 6.6% antibiotics were prescribed for RTIs and most common antibiotics prescribed were Azithromycin 50% and Amoxicillin 50%. Similarly, 6.6% antibiotics were prescribed for extraction purposes and most common antibiotics prescribed were Amoxicillin and Metronidazole 50% and Cefixime and Metronidazole 50%. Same percentage of 6.6% were observed in Stitch removal cases and most this purpose antibiotics prescribed were Cefixime 50% and Metronidazole 50%. Various other conditions for which antibiotics prescribed were post ovcotomy 3.3% and Uterine bleeding 3.3%.

The most common prescribed dosage forms were tablets 56.6%, Capsules 38% and Syrups 3.33%. The analysis showed that average number of antibiotics per prescriptions were 1.33%.

Gynae in-patient department

In gynae ward 20 prescriptions of female patients were analyzed. Mean age of patients were

27.2 years. Most of the patients prescribed with antibiotics were of Lower segment Cesarean section (LSCS 35%), in 71.4% cases the patients were treated with combination therapy of Cefixime and metronidazole. In 14.2% cases the antibiotics prescribed were Clexane and Metronidazole 14.2%. 20% of the antibiotics were prescribed to normal vaginal delivery (NVD) cases and all the observed cases were treated with Cefixime and Metronidazole combination 100%. 10% of the antibiotics were prescribed to Dilatation and Curettage (D&C) patients and most prescribed antibiotics were again Cefixime and Metronidazole combination 37%. Majority of the D&C cases were prescribed with Ceftriaxone, Cefixime and metronidazole (63%). Similarly, 10% of the antibiotics were prescribed for Spontaneous Vaginal Delivery (SVD) and the in 24% cases Cefixime and metronidazole were used for the treatment. There were cases of Hysterectomy 5%, ectopic pregnancy 5%, post operative wound infection 5%, forceps vaginal delivery 5%, and conservative pregnancy management 5%.

The dosage forms mostly prescribed were tablets 50%, capsules 30%, syrup 8%, injection 7%, and infusion 5%. The average number of antibiotics per prescription was 1.95%.

Pead's out-patient department (POPD)

In POPD total patients' prescriptions analyzed were 50 (26 male and 24 female). Mean age of the patients were 6.1 years. About 62% antibiotics were prescribed for URTI and the most prescribed antibiotics were Amoxicillin/Clavulanic acid 22.5%, Amoxicillin alone 22.5%, Clarithromycin 19.3%, Cefixime 19.3%, and Ceftriaxone sodium 6.4%. In all cases of LRTI 6% the antibiotic prescribed was Azithromycin. 10% of the prescriptions were for cold and fever and in most of the cases Ciprofloxacin 80% and Klaricid 20% were prescribed. In eye infection (8% cases) the antibiotic prescribed was tobramycin 100%. 16% of the prescriptions were for abdominal pain and most cases Cefixime 87.5% and Metronidazole 12.5% were advised. Most prescribed dosage forms were Syrups: 82%, Drops: 12%, Injection: 4%, Tablet: 2%.

Surgical ward

Total of 13 patients sampling were analyzed in surgical ward, 8 were female and 5 were male. Mean age of the patients were 27 years. 63.3% cases were of appendicitis and common antibiotics advised were: Ceftriaxone 52%, Metronidazole 33.33%, and Amikacin sulfate 14.67%. 33.33% of cases were of Cholecystitis and common prescribed medicine were: 67% Ceftriaxone and 33.33%

Metronidazole. The most common dosage form of antibiotics used was I/V injection.

General out-patient department

Total patients' prescription analyzed were 50 (male 74.46%, female 25.54%). Mean age of the patients were 27 years. The 48% cases were of RTI's, and prescribed antibiotics were: Clarithromycin 24%, Amoxicillin/Clavulanate Potassium 18.33%, Cefoperazone 13.33%, Cefixime 13.33%, and Doxofylline 12.5%, Doxycycline 11.78%, and Ceftriaxone 6.66%.

UTI's cases were 8.33% and most common antibiotics prescribed were: Ceftriaxone 67% and Moxifloxacin 33%. 18% of the cases were of wound infection and most common prescribed medicines were: Metronidazole 45%, Cefixime 29%, and Moxifloxacin 20% and Cephadrine 6%,. Fracture cases were 22% and antibiotics prescribed for this purpose were: Metronidazole 25%, Ceftriaxone 24.33%, Co-amoxiclav 23.3%, Amikacin 16%, Cefoperazone plus Sulbactam 10.63%, and There were some cases of Dengue fever 1.66%, and two antibiotics were mostly prescribed: Ceftriaxone 56%, Ciprofloxacin 44%. In Pneumonia cases (1.66%) only Amoxycillin was advised as antibiotic. The most prescribed dosage form were: Tablets: 28.0%, capsules: 20.0%, Drops: 19.0%, Injection 19%, and Syrup: 14%.

Orthopedics department

In this department total prescription analyzed were 20 (Male 75 %, Female 25 %). Mean age of the patients were 40 years. 16% of the prescriptions collected were of patients with fractures and those patients were prescribed with Ceftriaxone 66.67% and Amikacin 33.33%.

Crush injury cases were 60.33% and commonly prescribed antibiotics were Ceftriaxone 33.33%, Cephalosporin 32.67%, Gentamicin 18%,

and Amikacin 16%. Hand Injury cases were 20.67% and commonly prescribed antibiotics were Ceftriaxone 63.33%, Amikacin 20.67% and Cefepime 16%. In this department in 60% cases single agent was prescribed. Some of the best combination noted were Ceftriaxone + metronidazole 30%, Oxidil and amikacin 5%, and Ceftriaxone and amikacin 5%. Most prescribed dosage forms were Injection 95%, Capsules 3%, Tablets 1%, and Syrup:1%.

Pulmonary disease department

In this department 20 cases were analyzed (Male 65%, Female 35%) and mean age of the patients were 51 years.

RTIs were (65%), and most prescribed antibiotic were Ceftriaxone 80%, Doxycycline 10%, and Ciprofloxacin 10%. Bronchitis cases were (35%), and medicine prescribed were Moxifloxacin 15%, and Clarithromycin 5%. Most prescribed dosage forms were: Injection 50%, Tablets 45%, and Capsules 5% (Table 1 & 2).

Discussion

We conducted a point prevalence survey of antibiotics utilization among patients of Tertiary Care Hospital of Abbottabad. The study identified a high prevalence of antibiotic use as indicated in results. The results of our study showed that there is greater percentage of antibiotics prescribed to outpatients as compared to that of in-patients (64.03% vs 35.9%). These results are comparable to that of a study in developing countries like Yemen where fifty percent of all the prescriptions contains antibiotics.¹⁷ A study in Ethiopia suggested that there is a need for an antibiotic stewardship program to monitor the prescribing

Table 1: Prevalence of antibiotic use across departments.

Department	Patients on antibiotics			Antibiotic prescriptions		
	Number	% Prevalence 95% CI	Parenteral%	Oral%	Total	%Prevalence 95% CI
Gynae OPD	30	70	1	99	100	3.3
Gynae IPD	20	65	12.5	85	97.5	4.8
Pead's OPD	50	67	4	96	100	2
Surgical ward	13	82	98	2	100	7.6
General OPD	50	56	28	68	96	1.9
Orthopedics	20	69	95	5	100	5
Pulmonary disease	20	85	50	50	100	5

Prevalence was determined by dividing the number of inpatients on antibiotics at the time of survey by the total patients on admission; CI, confidence interval; $p < 0.05$.

Table 2: Proportions of prescribed antibiotics by department.

Drug Name	Departments						
	Gynae OPD %	Gynae IPD %	Pead's OPD %	Surgical ward %	General OPD %	Orthopedics %	Pulmonary disease %
Cefixime	23.68	40	27.65	-	6.66	-	-
Metronidazole	39.47	47.5	2.12	11.76	3.33	-	-
Ofloxacin	7.89	-	-	-	-	-	-
Azithromycin	10.5	-	4.24	-	-	-	4.54
Moxifloxacin	7.89	2.5	-	-	3.33	-	9.09
Ampicillin	2.63	-	-	-	-	-	-
Cephadrine	2.63	2.5	-	-	1.66	-	-
Amoxicillin	5.26	-	34.04	-	23.3	5.7	-
Ceftriaxone	-	2.5	2.12	47.05	28.3	31.4	50
Tobramycin	-	-	6.39	-	1.66	-	4.54
Ciprofloxacin	-	-	8.5	-	-	-	-
Clarithromycin	-	-	14.9	-	15	-	27.27
Amikacin	-	-	-	23.52	5	37.14	-
Cefazolin	-	-	-	5.8	-	2.8	-
Cefotaxime	-	-	-	5.8	-	-	-
Ampicillin	-	-	-	5.8	-	-	-
Doxycycline	-	-	-	-	3.33	-	-
Polymyxin B	-	-	-	-	-	-	-
Cefoperazone	-	-	-	-	1.66	17.14	-
Gentamycin	-	-	-	-	3.33	2.8	-
Piperacillin	-	-	-	-	-	2.8	-
Vibramycin	-	-	-	-	-	-	4.54

pattern of antibiotics.¹⁸ An overview of the pattern of antibiotic prescriptions for children in tertiary care centres is provided by a study. The prescribing pattern for antibiotics deviates from WHO guidelines, indicating a need for vigilant monitoring of antimicrobial therapy given the increased usage of injectable drugs. On the other hand, the prescription followed the drug formulary, and the proportion of antibiotics was reasonable.¹⁹ RTIs, UTIs, and skin infections are the most frequent clinical indications for antibiotic prescriptions in general practice in Switzerland (which speaks German). The most often recommended antibiotics are amoxicillin combined with BLI, ciprofloxacin, and clarithromycin. However, at the expense of their possibly inappropriate usage and greater use of BSP, it was discovered that prescriptions for fluoroquinolones, macrolides, and lincosamides were decreased. Antibiotic prescription was correlated with a number of patient and general practitioner variables.²⁰ In South Korea, different non-teaching community hospitals use antibiotics in different ways. Out of all antibiotic prescriptions, more than 30% were inappropriately prescribed.²¹ For the past few decades, antimicrobial resistance (AMR) has been on the rise in low- and middle-income countries (LMICs). In contrast, AMR rates are lower in a number of high-middle-income countries (HMICs). Variations in the patterns of antibiotic prescription can be used to pinpoint global opportunities for AMR prevention. In order to encourage optimal antibiotic prescribing behaviour,

policies and targeted interventions can be developed by taking into account the factors that drive disparities in prescribing patterns and the problems faced by both LMICs and HICs.²²

Although, the use of antibiotics in average is comparable to the prevalence of 49.9% as reported in an hospital in USA.²³ This prevalence however, was higher than what was being observed in Europe (30.1-35%).²⁴ Antibiotic resistance is seen to increase with increased rates of usage; Vietnam and Turkey are two examples, where 30.8 and 46% of patients, respectively, were thought to have been improperly treated with antibiotics.^{25,26} This study was carried out to evaluate the appropriate use of antibiotics. Given the high incidence of antibiotic usage, it is likely that a sizable portion of the use in Abbottabad's tertiary care hospitals is either unnecessary or inappropriate.

An average number of antibiotics prescribed per prescription is a good indicator of rationality of the antibiotics and this must always be low to prevent interactions among the prescribed drugs and prevent the resistance to bacteria. Serious and life-threatening infections and diseases leads to increase in antibiotics per prescription. Overall, according to our study, total of 266 antibiotics were prescribed and included 1.87 antibiotics per prescription. In the cases we study majority of the patients were on two antibiotics which is comparable of the findings of a survey conducted in 2000.²⁷ The route of administration used very widely from department to department. The majority use of

however, oral route. Parental route was mostly used in Surgical and orthopedic departments. Such high usage of parenteral antibiotics may be associated with unsafe needle use.²⁸

Main reasons for antibiotic therapy in in-patients were respiratory tract infections and surgical prophylaxis. Particularly in the gynecology ward, rate of Caesarean section is higher leading towards the surgical prophylaxis. Most of the patients were diagnosed for respiratory tract infections and urinary tract infections.

Pediatric ward has most appropriate dose and indication from other wards particularly due to competent pediatric specialist. Inappropriate dosing was mostly seen in the inpatients because of overlooking patient's kidney's function and not tailoring the therapy according to the patient rather providing generalized treatment.

In this study, twenty-two different antibiotics were prescribed to the patients. The major contributing antibiotics were cefixime, metronidazole, amoxicillin, ceftriaxone, and amikacin. The average length of hospital stay of each in-patient was not more than 5 days, particularly because of increase patient load daily. We in our study did not follow up the patients who were discharged hence we were not able to see the antimicrobial therapy continuation. Two thirds of the evaluated prescriptions lack a diagnosis, despite the fact that the doctor's final diagnosis on the patient's prescription is crucial. As a result of the study's limitations, we were unable to determine if the current indication and the diagnosis matched. This finding therefore offers a chance to lower hospital antibiotic usage.

Our study, we hope, will set a benchmark, to compare with other studies to highlights areas of possible improvement in the health care system in Abbottabad and other areas. This study is a good reflection on the current state of antibiotic use in the hospital.

According to study the most common condition for which antibiotics prescribed were respiratory tract infection and Urinary Tract Infection. Most common antimicrobial utilized was ceftriaxone and Metronidazole & more than one antibiotic were prescribed and moreover trade name anti-biotics were prescribed instead of generic ones. A strict convention for prescribers is required to promote rational utilization of antibiotics which would not only avoid antimicrobial resistance but also diminish the treatment expenditure.

To achieve optimal and rational antibiotic consumption, there is a need to educate healthcare professionals on the importance of prescribing to conduct culture tests to improve decision making on

antimicrobial treatment. Moreover, local guidelines must be developed for the use of broad-spectrum antibiotics for certain rare cases only. There is also the need to further explore the factors contributing to the high prevalence of antibiotic use and the changing epidemiology of antibiotic use in the hospital.

Conflict of interest: None declared.

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