

Original Investigation

Prescribing Pattern of Antibiotics in Paediatric Inpatients of Bakulahar Ratnanagar Hospital, Chitwan

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ABSTRACT

INTRODUCTION: The rational use of antibiotics is crucial in paediatric healthcare settings to mitigate the risk of antimicrobial resistance. This study aimed to assess the prescription patterns of antibiotics among paediatric inpatients at Bakulahar Ratnanagar Hospital, Ratnanagar, Chitwan.

MATERIALS AND METHODS: A cross-sectional study conducted over a 2-month period in May-June 2023 involved the analysis of 160 patient case sheets from the paediatric inpatient department. Patients with various infections were included, and data were analyzed using SPSS.

RESULTS: The mean age of paediatric patients was 2.83 years. Each encounter involved an average of 3.4 drugs, with 1.86 antibiotics per patient. Pneumonia emerged as the most prevalent disease. Among antibiotics, the Cephalosporin group, particularly Ceftriaxone and Cefotaxime, were frequently prescribed. The combination antibiotic Ceftriaxone plus Tazobactam was widely used.

CONCLUSIONS: Strict adherence to antibiotic prescription policies can significantly curb overuse and reduce antibiotic resistance development.

Keywords: Antibiotics, Inpatient, Paediatric, Prescription pattern, Rational



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INTRODUCTION

Prescribing practices play a pivotal role in reflecting the discernment of healthcare professionals in choosing optimal drugs that will maximize benefits for patients [1]. Prescribing practices involve thoughtful medication selection, considering efficacy, safety, and patient factors, promoting personalized care. Monitoring patterns is crucial for medical audits, ensuring rational and cost-effective medical care through monitoring and modifications as needed. The process of, medical audit is imperative for ensuring appropriate drug utilization, considering efficacy, safety, convenience, and economic aspects throughout the drug use continuum [2,3].

While research on drug utilization in the elderly has increased, paediatric medicine use studies are relatively limited, despite their clinical, educational, and economic importance [4]. This gap is particularly pronounced in developing countries, where a considerable proportion of the population comprises infants and children facing recurrent respiratory and gastrointestinal infections [5]. Lower respiratory tract infections are a leading cause of mortality among children under five years [6]. Common childhood illnesses, such as acute respiratory infections, acute watery diarrhea, and viral fever, contribute

significantly to paediatric healthcare visits. The World Health Organization emphasizes Rational Drug Use (RDU) to ensure appropriate prescriptions aligned with clinical needs, cautioning against risks such as polypharmacy and antibiotic misuse in children, which may lead to adverse clinical outcomes. Additionally, paediatric pharmacokinetic differences from adults warrant careful consideration during antibiotic prescriptions to prevent potential fatal consequences [7,8].

Antibiotics, a class of drugs used to combat bacterial infections, inhibit the growth or kill microorganisms [9]. The rising concern of antibiotic resistance on a global scale underscores the significance of prudent antibiotic use [10,12]. Recognizing paediatric patients in terms of age classification—neonate, infant, toddler, pre-school, school-age, and adolescent—facilitates tailored medical approaches [11]. The rising alarm regarding antimicrobial resistance calls for a concentrated investigation into antibiotic prescribing patterns, especially in paediatric healthcare settings where prudent use is paramount [8].

Research indicates a significant portion of paediatric patients receive antibiotics, with a notable percentage

considered inappropriate, intensifying the global antibiotic resistance dilemma. Recognizing distinct prescribing patterns and factors influencing antibiotic use in paediatric hospitals is essential for crafting targeted interventions to encourage rational drug use, mitigate resistance risks, and improve overall patient care. The objective of this research was to evaluate and analyze the prescription practices of antibiotics within the paediatric inpatients at Bakulahar Ratnanagar Hospital, situated in Ratnanagar, Chitwan as it is the provincial hospital inpatient facilities getting the large numbers of paediatric patients from extended geographical areas.

MATERIALS AND METHODS

Study design and setting

Hospital based cross-sectional study conducted in paediatric inpatient department of Bakulahar Hospital, Chitwan. Bakulahar Ratnanagar Hospital is situated at Ratnanagar Municipality, Tandi, Chitwan. This hospital provides 12 types of specialized healthcare services including paediatric services. This quantitative study was conducted over a 2-month period between May-June 2023.

Participants, sample size and sampling technique:

This study's inclusion criteria encompass patients who are admitted to the hospital with an infective disease and are undergoing antibiotic treatment. This demographic provides a targeted focus on individuals experiencing infectious conditions and receiving antibiotics as part of their therapeutic regimen. Conversely, the exclusion criteria involve patients with non-infective diseases, those with co-morbidities, or those classified as critically ill. Additionally, patients using antibiotics for prophylactic purposes are excluded from the study. Study population comprises a total of 160 patients enrolled through complete enumeration technique.

Data collection procedure and study variables:

Data was collected by using the self-constructed structured questionnaire to collect the information from the guardian of the children. The tool was validated by getting review from experts in the field, including professor of pharmacy department. Proforma was used to gather information related to inpatient drug related records of the admitted patients. The information i.e., demographic records, lab reports disease diagnostic report, duration of hospital stay, name and category of antibiotic use were recorded.

Statistical analysis and data management:

The data was entered and analyzed using IBM SPSS version 20. Descriptive statistics was used to calculate frequency, percentage, mean, median and standard deviation (SD). Pie chart and bar chart were constructed as per the nature of the data to present it in visually appealing form.

Ethical consideration:

Ethical approval for the research protocol was diligently obtained from the Institutional Review Committee at

Chitwan Medical College (Reff. CMCIRC 079/080-162). This critical step ensures that the study adheres to the highest ethical standards, safeguarding the rights, well-being, and confidentiality of the paediatric inpatients involved in the research.

RESULTS

Among 160 patients, the highest number of patients were in the age group less than 1 years i.e. 38.1% and lowest number were in age group 9-11 i.e. 0.6%. The mean age of paediatric patient was 2.83 years. Out of 160 sample size, 113 patients were male and 47 were female. The Tab 1. Socio-démographie information of participants

Parameters	Frequency (%)
Age (years)	
Mean ±SD	2.29±10.88
<1	61 (38.1)
<1-3	57 (35.6)
<3-5	22 (13.7)
>5-7	15 (9.37)
>9	5 (3.1)
Sex	
Male	113 (70.5)
Female	47 (29.4)
Total	160 (100)

percentage of male and female patient was 70.6% and 29.4% respectively.

The most common prevalence of disease among study patients' sample was pneumonia (22.5%) followed by Acute Gastroenteritis (AGE)(16.3%), Lower Respiratory Track Infection (LRTI) (9.4%) and Sepsis (8.1%) etc.

Cephalosporin was the widely prescribed antibiotic because of its broad spectrum of activity and tolerance across age group and Fluoroquinolones class of antibiotic was the least prescribed. Third generation, ceftriaxone (49.3%) was the leading antibiotic prescribed followed by cefotaxime (26.2%) cefixime (24.3%) and other antibiotics. The least antibiotic prescribed was ofloxacin, ampicillin, ceftazidime and chloramphenicol.

The detail of combined antibiotics used is given in table below. Among 160 patients, 56.87 percent of patients receive combination antibiotic i.e. 91. The most frequently used combined antibiotic is Ceftriaxone + Tazobactam (27.47%) followed by Cefotaxime + Amikacin (24.17%) and Ceftriaxone + Amikacin and Cefotaxime & Erythromycin were the combinedly prescribed antibiotics with least percentages (3/29% each).

DISCUSSION

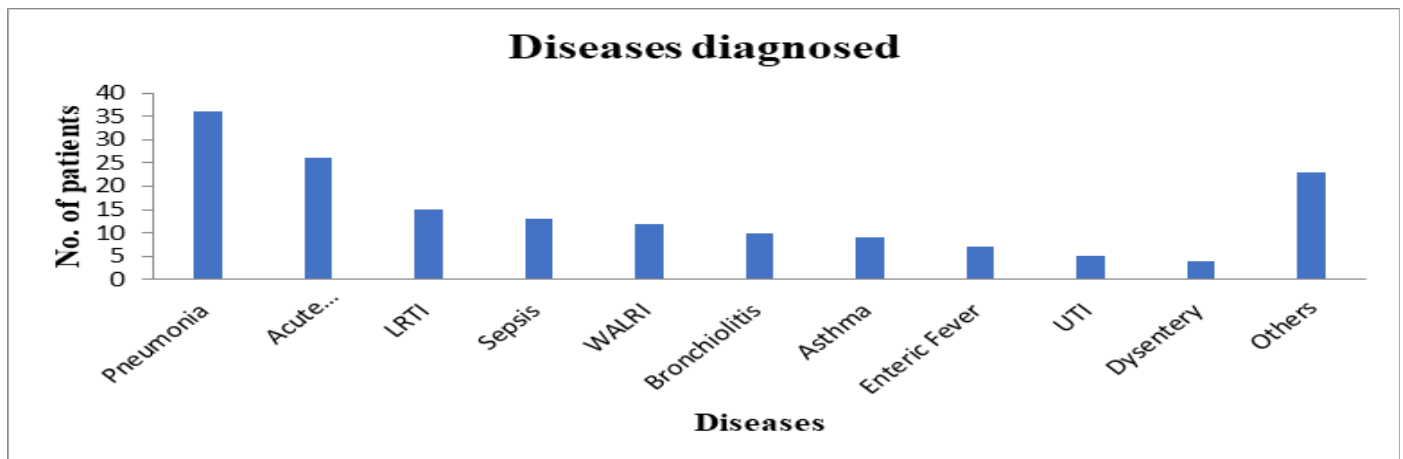


Figure 1. Diseases diagnosed

Table 2. Antibiotics prescribed*

Antibiotics	No. of patients	Percent
Ceftriaxone	79	49.3
Cefotaxime	42	26.2
Cefixime	39	24.3
Azithromycin	32	20.0
Cefpodoxime	23	14.3
Erythromycin	10	6.2
Cefuroxime	10	6.2
Meropenem	3	1.8
Vancomycin	2	1.2
Ampicillin	1	0.6
Ofloxacin	1	0.6
Ceftazidime	1	0.6
Chloramphenicol	1	0.6

*Multiple response

The study, employing complete enumeration techniques, encompassed a cohort of 160 participants at Bakulahr Ratnanagar Hospital in Ratnanagar, Chitwan. Notably, a significant proportion of paediatric patients were observed to fall within the age group of less than 1 year, indicating an elevated susceptibility to infections in this demographic. This aligns with findings from a study conducted by demonstrating a similar trend where infants under 1 year received antibiotics more frequently than their older counterparts [13]. The heightened antibiotic prescription in this age group may be attributed to their increased vulnerability to infections, warranting greater attention to infant health. Conversely, findings from a study by Choudhury DK in 2013 revealed a higher representation of patients in the 5-12 years age group [14]. The number of male patients was comparatively more than the number of female patients. The same findings were seen in other similar study by Choudhury DK (2013) [15].

As average number of drugs is an important indicator for assessing rationality of prescription. Hence, it is preferable to keep the mean number of drugs per prescription as low. The average number of drugs per prescription was 3.46. In a study by Mow et al. (2019) study shows average number

Table 3. Combinations of antibiotics (n=91)

Combination of Antibiotics	No. of patients	Percent
Ceftriaxone + Tazobactam	25	27.47
Cefotaxime + Amikacin	22	24.17
Ceftriaxone + Azithromycin	17	18.68
Amoxicillin + Clavulanic Acid	15	16.48
Cefpodoxime + Azithromycin	6	6.59
Ceftriaxone + Amikacin	3	3.29
Cefotaxime & Erythromycin	3	3.29

of drugs per prescription was 2.27 which is quite low present study. This variation may be because of differing in socio-demography between two countries with gross differences in economic level. The WHO recommends that the average number of drugs per prescription should be less than two. In present study this number is more than two, so it indicates polypharmacy [16,17]. The average number of antibiotics per prescription value should be low as possible to prevent the unfavorable outcomes of polypharmacy such as increased risk of drug interactions, increased cost of therapy, non-compliance and emergence of resistance in case of use of antimicrobials.

Pneumonia was the most prevalent disease among paediatric patient which was similar to the finding of the study conducted by Palikhe (2004) in Kathmandu Hospital [18]. It is most common disease among developing countries because Childhood pneumonia is mainly a disease of poverty and results from sub-optimal child rearing and care seeking practices compounded by lack of access to healthcare.

Cephalosporin were the widely used class of antibiotics in this study followed by Macrolides. Among cephalosporin, third generation of ceftriaxone and cefotaxime were found to be mostly used. Cephalosporin was the widely prescribed antibiotic because of its broad spectrum of activity and tolerance across age group. Fluoroquinolones were used

least because of their adverse effects in children below 14 years of age. Ciprofloxacin, as one of the frequently prescribed quinolone, deserves continued monitoring whereas, the study of Sriram et al. have shown 73% of Cephalosporin [19]. However, Sandra R Arnold, 2005 revealed that antibiotics from the penicillin class were the most frequently prescribed antibiotics and other categories of antibiotics prescribed include Aminoglycosides (8.9%), Macrolides (6.1%) Fluoroquinolones (4.7%) [20].

The multiple antibiotics were prescribed in nearly 57% % of patients and this is more compared to Choudhury DK study (29%). This indicates severity of disease or failure of treatment with one antibiotic. In Palikhe, N(2004) study 79% of patients received multiple of antibiotics and 21% of patients received only one antibiotic. In our study, among the combination of antibiotics, Ceftriaxone and Tazobactam were found to be commonly prescribed antibiotics to paediatric patients but study conducted by Sriram et al., 2008, in tertiary care hospital that have found that the commonly used antibiotic combination were Cephalosporin with Aminoglycoside, Cephalosporin with Macrolide and Penicillin with Aminoglycosides. Whereas, study conducted by Shamsy et al., 2013 in another tertiary care hospital in Tamilnadu have shown the common combination of antibiotic were prescribed with Amoxicillin with Clavulanate, Piperacillin with Tazobactam, Cefotaxim with Sulbactam, Cefoperazone with Sulbactam, Ampicillin with Cloxacillin and Ceftriaxone with Tazobactam [21].

Recording adverse drug reaction is very important to evaluate the safety of drugs. In no case sheets adverse drug reactions were reported and it may be there is no proper documentation done.

CONCLUSIONS

This study gives an overview of the pattern of antibiotic use in the study area by age and sex distribution, frequency and percentage of single as well as combined antibiotic prescriptions and percentage of hospital stay with one or more antibiotics in paediatric population. The average number of drugs per prescription was 3.46, surpassing WHO recommendations and suggesting polypharmacy, potentially influenced by socio-demographic disparities. Pneumonia emerged as the most prevalent disease among pediatric patients, mirroring trends in developing countries, where poverty and inadequate healthcare access contribute to its prevalence. Cephalosporins were the most prescribed antibiotics, particularly third-generation cephalosporins like ceftriaxone and cefotaxime, favored for their broad spectrum of activity and tolerance across age groups. Notably, multiple antibiotics were prescribed in nearly 57% of patients, indicating disease severity or treatment failure with single antibiotics, emphasizing the importance of prudent antibiotic use to mitigate risks of polypharmacy and adverse effects. However, documentation of adverse drug reactions was lacking in all case sheets, suggesting a potential gap in monitoring drug safety.

ADDITIONAL INFORMATION AND DECLARATIONS

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Data Availability Data will be available upon request to corresponding authors after valid reason.

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