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Prescribing Pattern of Antibiotics in Pediatric Inpatient Department of a Tertiary Care Teaching Hospital in Bangalore

Laya Vahdati Rad[1], Modupalli Alekhya
Doctor of pharmacy (Acharya & BM Reddy college of pharmacy)
Department of pediatrics, Dr.B.R.Ambedkar medical college , Bangalore , Karnataka , India.

Abstract: *Prescription pattern analysis oversees the observance of standards of medical treatment at all levels of the healthcare delivery system. Health professionals are primarily responsible for treatment and to know about their prescribing practices can contribute to the achievement of initiatives and regulations relevant to IUA. Evaluation of prescribing pattern will also help in minimizing adverse drug reactions as children are more susceptible to them and it shall also aid in providing cost effective medical care.The assessment of the prescription will helps to know the attitude of the physicians towards prescribing and to provide rationality in the prescription.we sought to evaluate the prescribing patterns of antibiotics in pediatric inpatient department of a tertiary care hospital.Findings of this study are expected to provide relevant information to paediatricians and general practitioners.The study was a prospectiveobservational study carried out among in-patients of the pediatric department.The patients below the age of 18 years and being treated with antibiotics were includedin the study.A total of 109 patients were reviewed for the use of antibiotics.*

Key words: *Rationality, cephalosporins, Drug use pattern, Antibiotics, pediatrics.*

I. Introduction

Antibiotics are the substances that destroy or inhibit the growth of other microorganisms and are used in the treatment of external or internal infections.[1]

Antibiotics are among the most commonly prescribed drugs in pediatrics. Because of an overall rise in health care costs, lack of uniformity in drug prescribing and the emergence of antibiotic resistance, monitoring and control of antibiotic use are of growing concern and strict antibiotic policies should be warranted.[2]The use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of pediatric illness like fever, UTI, gastroenteritis, skin infections, LRTI, URTI.Maximum use of antibiotic prescriptions were found in age groups of 5-12 yrs.[3]Prescription pattern analysis oversees the observance of standards of medical treatment at all levels of the healthcare delivery system. The study of prescribing patterns is a part of the medical audit and seeks to monitor, evaluate, and if necessary, suggest modifications in prescribing practices to make medical care rational and cost-effective.[4] The maximum number of antibiotics prescribed was according to guidelines.[5]

- Amoxicillin + clavulanic acid (35%)
- Ceftriaxone (29%)
- Amikacin (17%)
- Cefotaxime + sulbactam (12%)
- Vancomycin (2%)
- Tobramycin (1%)
- Pipercillin (1%)
- Gentamicin (0.5%)

The pediatric population comprises of 20-25 percent of the total world population, and numerous acute and chronic diseases can effect this sub population. Premature neonates have poorly developed organ functions and are at highest risk of eliciting unexpected toxicity or poor clinical response from sub optimal dosage regimens of drug usage.[6]

Physicians are the health professionals who are primarily responsible for treatment and to know about their prescribing practices can contribute to the achievement of initiatives and regulations relevant to IUA.[7]Monitoring of antimicrobial use and knowledge of prescription habits are some of the strategies recommended to contain resistance to antimicrobials in hospitalized patients. [8]Antimicrobial resistance substantially raises already-rising health care costs and increases patient morbidity and mortality.[9]

Prescribing drugs is an important skill which needs to be continuously assessed and refined accordingly. It not only reflects the physician's knowledge of pharmacology and pathophysiology but also his/her skill in diagnosis and attitude towards selecting the most appropriate cost-effective

treatment.[10]Evaluation of prescribing pattern will also help in minimizing adverse drug reactions as children are more susceptible to them and it shall also aid in providing cost effective medical care.[11] In order to be rational, use of a drug must be effective, safe, prescribed for the proper therapeutic indication and the correct dosage in an appropriate formulation, easily available and of a reasonable cost.[12]It is estimated that 20%-50% of all antibiotic use is inappropriate resulting in an increased side effects higher costs and higher rates of AMR in community pathogens.[13]Rational use of drugs is the corner stone of successful implementation of rational use of medicines.[14] Selecting the appropriate antibiotic for an infection and educating the patients about the importance of taking therapy exactly as prescribed are considered areas for improvement needed.[15]Liquid medicines are usually recommended for infants and younger children so the ability to mask unpleasant taste with sweeteners and flavors is crucial. More sophisticated formulations such as granules and oro-dispersible tablets may be required but there will be limitations on choice and concentration of excipients.Prudent use of antibiotics will curtail health care costs and potential adverse effects to the individual taking them and also diminishes the wide ecologic effects leading to selection of antibiotic resistant pathogenic organisms.[16]

Prescribing drugs is an important skill which needs to be continuously assed and refined accordingly. Commonly the prescription behaviour is influenced by by many factors like un ethical drug promotion, lack of knowledge, direct to consumer advertising, and non availability of drugs. So there is a chance of irrational drugs in the prescription. The assessment of the prescription will helps to know the attitude of the physicians towards prescribing and to provide rationality in the prescription. This rationality of the prescriptions will helps the physician to upgrade the knowledge and improves attitude towards selecting the most appropriate cost-effective treatment.[17]

Increased resistant species and decreased efficiency of antibiotics cause enormous costs in health systems.[18] The main objective of this study is to evaluate the prescribing patterns of antibiotics in pediatric patients of inpatient, and to evaluate whether the prescription is rational or irrational.Findings of this study are expected to provide relevant information to paediatricians and general practitioners. To evaluate the prescribed drugs which needs to be continuously assessed and refined according to the need of individual and society.

II. Materials And Methods

2.1 Study design :

This study was a hospital based prospective and observational study conducted at Dr. B.R. Ambedkar Medical College and Hospital, a 760 bedded multispecialty tertiary care teaching hospital over a period of 6 months (November 2014 – April 2015).

2.2 Study population:

The study was done in the Department of pediatrics of a tertiary care teaching hospital. The data was collected from the patients admitted to pediatric ward, over these three months. The hospital caters to both urban and rural population. Most of the patients belong to middle and upper strata of the society.

2.3 Sampling method:

All the patients up to the age of 18 years who were on antibiotic prescription and were willing to give consent were included in the study.109 patients were selected based on the criteria. The pediatric wards were visited on all five days of the week and information regarding the patient demographics and drug use were recorded in a semi-structured proforma.

2.4 Study criteria :

A. Inclusion criteria :

- Patients of either sex aged 0-18 years.
- Patients admitted to the Department of pediatrics.
- Patient who are willing to give consent.

B. Exclusion criteria:

- Patients of either sex aged >18 years of age.
- Patients who are not willing to consent.
- Unconscious patients. (E.g. continuous coma state).

2.5 Study materials:

a)Patient Consent Form:

Consent was collected by using self-designed Patient Consent Form. Consent form made in two languages (Kannada - Annexure 1a and English - Annexure1b) and consent of each patient/guardian was taken.

b)Patient Data Collection Form:
Data was collected by using a self-designed data collection form, which consists of details like patient demographics, laboratory data, drug therapy and other relevant information.

c)Patient Medical Record:
Data was collected from Patient Medical Record which comprised of patient demographics, history of patient, general physical examination, laboratory data, and drug therapy.

2.6 Ethical approval :
The study was approved by the Institutional Ethical Committee of DR. B.R. Ambedkar Medical College.

2.7 Data analysis :
The prescriptions were analyzed for the percentage of drugs prescribed by generic name, percentage of encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed, percentage of drugs prescribed, frequency of the treatment, duration of the treatment the data was pooled and descriptive analysis done. All the documented data were evaluated by applying different Statistical Analysis like mean, standard deviation, correlation. This data was analyzed by using Microsoft Excel.The results were presented as mean and percentages.

III. Results And Discussion

3.1 Age distribution of patientsobserved in our study
Out of 109 patients enrolled in the study from inpatient pediatrics department, Majority of patients 60(55.4%) belonged to age group of 0-5 years.

Table 3.1: Age distribution of patients observed in our study (n=109)

Age distribution	Number of patients	Percentage (%)
0-5	60	55.4%
6-10	31	28.7%
11-15	13	12.03%
16-18	5	4.62%
Total no. of patient	109	100%

Figure 3.1a: Age distribution of patients observed in our study

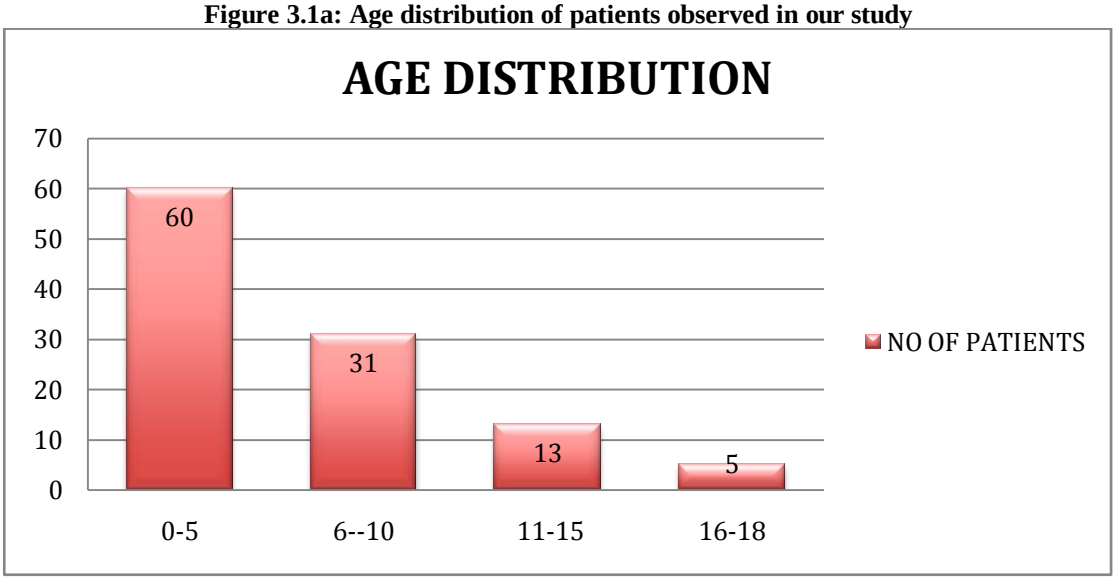
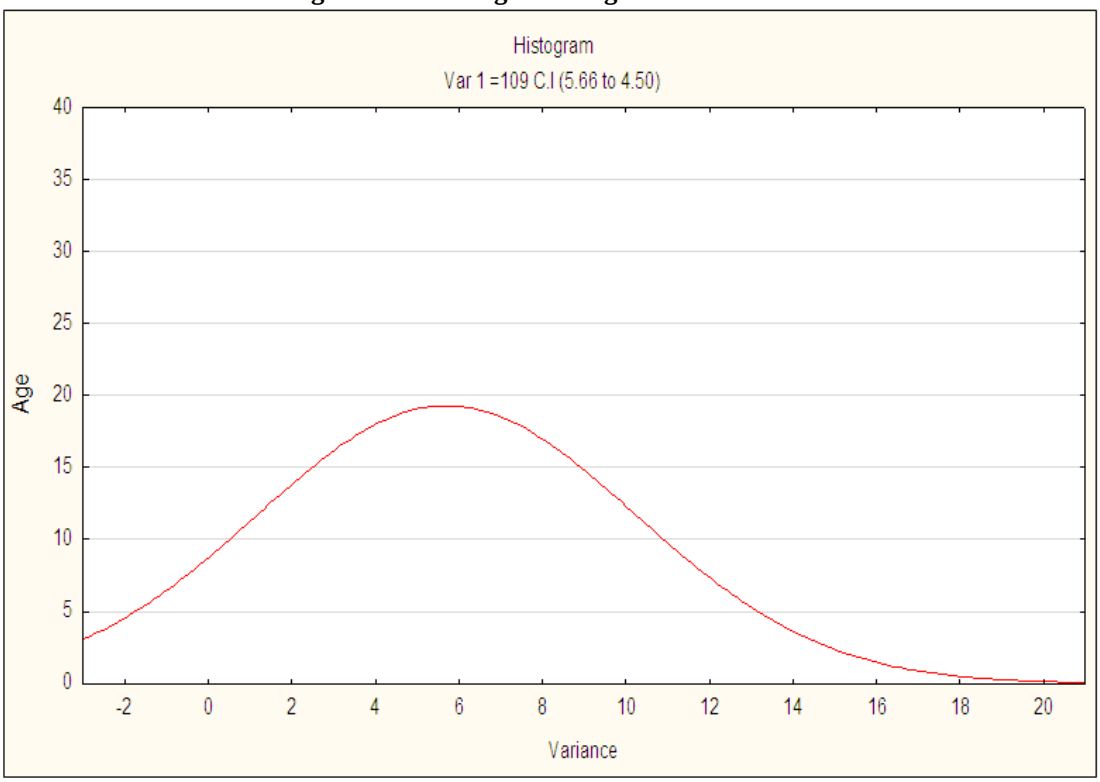


Figure 5.1b: Histogram of age versus variance



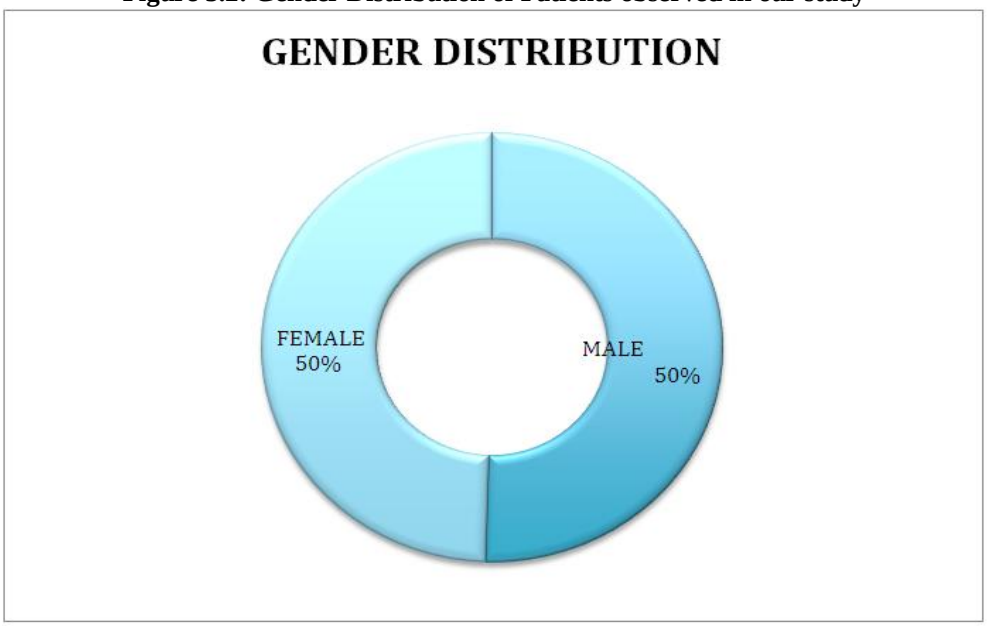
3.2 Distribution of Gender in patients observed in our study

Out of 109 patients, 55(50.45%) patients were males and 54(49.54%) patients were females. the number of male patients were slightly high by 1%.

Table 3.2: Gender Distribution of Patientsobserved in our study (n=109)

Gender	Number of Patients	Percentage (%)
Male	55	50.45%
Female	54	49.54%

Figure 3.2: Gender Distribution of Patients observed in our study



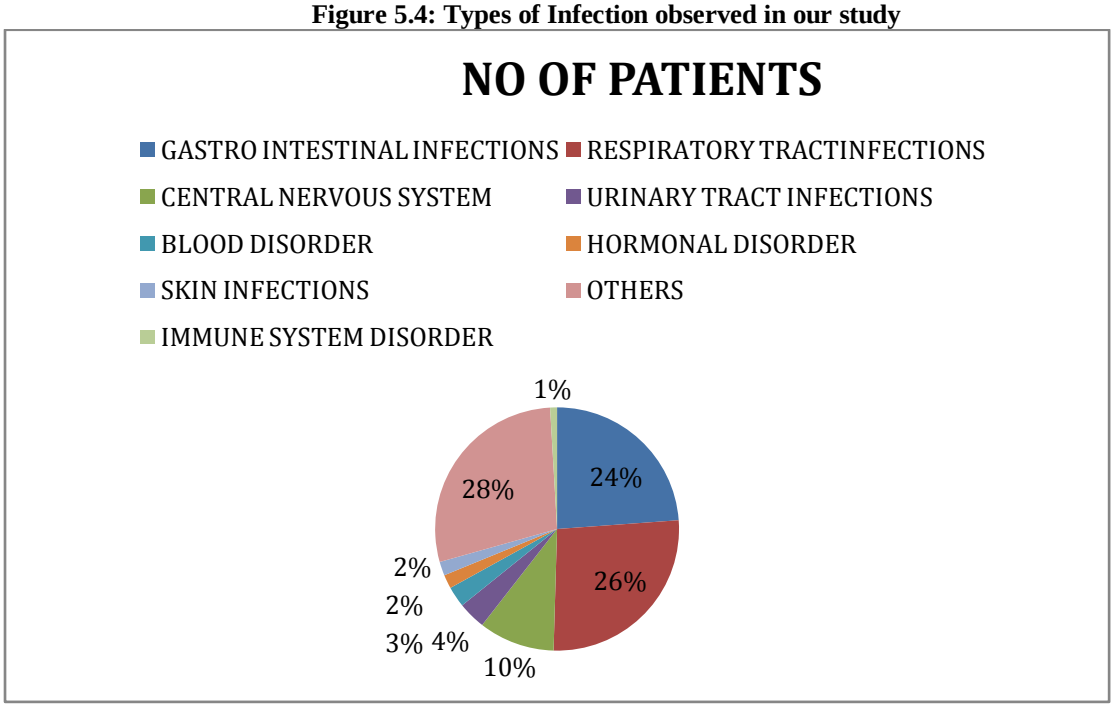
3.3 Distribution of Infections in Pediatric Patients observed in our study

Out of 109 patients enrolled in the study, it was observed that respiratory tract infections in 29(26.60%) followed by gastrointestinal infections 26 (23.85%), and central nervous system in 11(10.09%).

Table3.3 : Type of infections observed in our study(n=109)

Types of Infection	Number of Patients	Percentage (%)
Respiratory Infections	29	26.60%
Gastrointestinal Infections	26	23.85%
Central Nervous System	11	10.09%
Urinary Tract Infections	4	3.67%
Blood Disorder	3	2.75%
Hormonal Disorder	2	1.83%
Immune System	1	0.92%
Skin infections	2	1.83%
Others	31	28.44%

Figure 5.4: Types of Infection observed in our study



3.4 Distribution of Types of Respiratory Tract Infection observed in our study

Out of 29 patients having Respiratory Tract Infections , the most common was Lower Respiratory Tract Infection 16(55.17%),followed by Pneumonia in 4(13.79%) and Upper Respiratory Tract Infections in 3(10.34%).

3.5 Distribution of Antimicrobial Agentsobserved in our study

Out of 155 Antimicrobial Agent prescribed, Cephalosporin's were 90(58.06%), followed by Beta Lactamase inhibitors in 30(19.35%) and Amino glycoside Antibiotics in 25(16.12%).

3.6 Distribution of types of Cephalosporinobserved in our study

Out of 90 cephalosporin's prescribed, the most commonly prescribed was ceftriaxone 61(67.77%), followed by cefixime in 29(33.33%).

3.7 Dosage forms Of Antibacterial used observed in our study

The most preferred dosage form was injectables. It was used in 136(87.74%) patients , followed by Tablet 10(6.45%). Syrup wasused only in 8(5.16%).

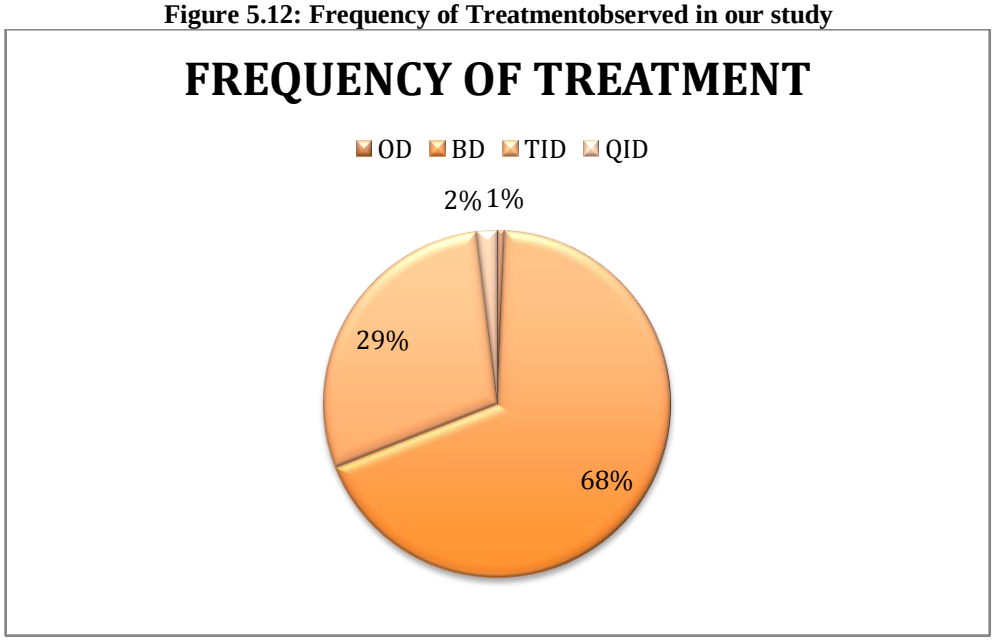
3.8 Distribution of frequency of treatmentobserved in our study

Out of 155 antibiotics prescribed 106 (68.3%) were given as Twice a day, followed by 45(29.03%) were given as Three times a day and Four times a day in 3 (1.93%).

Table 3.8 : Frequency of treatmentobserved in our study

Frequency of treatment	Number of patients prescribed with antibiotics	Percentage (%)
Once Daily	1	0.65%
Twice a day	106	68.3%
Three times a day	45	29.03%
Four times a day	3	1.93%

Figure 5.12: Frequency of Treatmentobserved in our study



In our study, majority of the patients belonged to the age group of less than 5 years And the average age of the patients was (5.66±4.51). The main reason is it may be because these group of people have less immunity and are more prone to infections, which was similar to the study conducted by **Arulmoli S K et al**, where they observed that the majority of the patients belonged to the age group 1-5 years (45%).[19] It was observed that males and female population was almost similar in our study, there is no more predominance in the gender under taking treatment.

Out of 109 patients enrolled in the study, it was observed that respiratory tract infections in 29(26.60%), More respiratory tract infections were reported in our study as the study was conducted during winter season.

Out of 155 antimicrobial agent prescribed, major class was cephalosporin's were 90(58.06%), followed by beta lactamase inhibitors in 30(19.35%) and amino glycoside antibiotics in 25(16.12%). Out of 90 cephalosporin's prescribed, the most commonly prescribed was ceftriaxone 61(67.77%), followed by Cefixime in 29(33.33%). The study conducted by **Kanish R et al** found that the most common antimicrobial agents prescribed were cephalosporins followed by amino glycosides, in cephalosporins the most common was ceftriaxone (51.79%), followed by Amoxicillin- clavulanic acid (35.07%). A study conducted by **Rybak MJ et al,** justifies the use of antibacterial combination therapy in treatment of infections.[20,21]

The most preferred dosage form was injectables. The injectables were prescribed more because of the inpatient history. Injectables are given more because for urgent control of infections and to minimize morbidity as compared to oral route. As the injectable antibiotics are prescribed more which will increase the cost of therapy. Children have incompliance issues and prescribing a tablet or suppository will be difficult which justifies the treatment in the study injectable was mostly preferred in patients.Another study conducted by **Ramesh et al** on analysis of antimicrobial prescriptions in pediatric patients in a teaching hospital had proven that injection were the commonest route of administration by 58.25% followed by oral rout 38.20%.[22]

Out of 155 antibiotics prescribed 106 (68.3%) were given as BD, followed by 45(29.03%) were given as TID and QID in 3 (1.93%). This is based on the choice and course of antibiotics for the therapy.

IV. Conclusion

The present study was aimed at assessing the drug use pattern in pediatric department; we found that majority of the people belongs to an age group of 0-5 years. With regard to gender, no predominance of gender was seen in the study andboth males and females having almost same population. It was found that in inpatient pediatrics department, majority of patients suffered from respiratory infection since the study was carried during winter season.

Cephalosporins were mostly used for the infections caused by bacteria in the inpatient pediatrics department which was according to the prescribing guidelines of the hospital, and among the cephalosporin's , more than half of the prescribed one was ceftriaxone which is a third generation cephalosporin antibiotic spectrum which covers gram positive , gram negative and anaerobic organism . Use of new generation antibiotics will lead to increase in cost of total therapy.

Out of 155 antibiotics prescribed 106 were given as BD (twice daily) which is more than half of the pediatric patients receiving antibiotic therapy.

The pattern of drug utilization study conducted suggests there should be strict control over prescribing antibiotics in pediatrics population.

Our study highlights the need of rational drug use practices like prescribing by generics and drugs under essential drug list. Continuing education about rational drug use and development of easy to use treatment guidelines for common diseases in children is recommended.

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