



A STUDY ON PRESCRIBING PATTERNS OF ANTIBIOTICS IN PAEDIATRIC DEPARTMENT OF A TERTIARY CARE TEACHING HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

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. Before such policies can be implemented, detailed knowledge of antibiotic prescribing practice is important. A prospective observational Study was conducted from March-August (2012) at a 600 bedded Multispecialty Tertiary Care Teaching Hospital in South India. The prescribing pattern of antibiotics in the paediatric ward was studied based on the WHO recommended prescribing indicators. Out of 140 patients most commonly hospitalized were aged from 1-5 years. Acute gastroenteritis with dehydration (27%), bronchopneumonia (22%), lower respiratory tract infections (17%), pyrexia (12.8%), upper respiratory tract infections (5%) were the most commonly found diseases in the in-patient pediatric ward. High number antibiotics were prescribed for patients with AGE (25.51%) followed by, Bronchopneumonia (24.8%). The total number of antimicrobials prescribed were 294 of all the prescriptions and mean number of antibiotics per prescription was 2.1. The parenteral dosage form was mostly prescribed. All antibiotics were prescribed by their trade name. Ceftriaxone (26.87%) was the most commonly prescribed antibiotic, amikacin (24.14%) next followed by coamoxiclav. This result indicates a scope for improving the prescribing pattern of drugs and minimizing the use of antimicrobial agents with the help of laboratory investigations. It is observed that further detail analysis in respect to selection of dose, frequency and duration of therapy of antimicrobial agents used in the wards is needed.

KEYWORDS: Paediatrics, prescribing pattern, antibiotics, antibiotic policies.

INTRODUCTION

Paediatrics is the branch of medicine dealing with the development, diseases and disorders of children.^[1] Drug therapy is considered to be a major component of paediatric management in health care setting like hospital. Effective medical treatment of a paediatric patient is based upon an accurate diagnosis and optimum course of therapy, which usually involves a medication regimen. Infants and children are among the most vulnerable population groups to contract illnesses. At the same time infancy and childhood is a period of rapid growth and development. Most of these are self-limiting² and are often treated not only inappropriately, but also resorting to poly pharmacy.^[3,4] The use of antimicrobial agents, especially antibiotics has become a routine practice for the treatment of paediatric illnesses.^[4,5] However, there are also reports of an irrational use of antibiotics^[6,7] which may even lead to infections that are

worse than the originally diagnosed ones. The assessment of drug utilization is important for clinical, educational and economic reasons.^[8] There is enough evidence to demonstrate that prescribing of drugs has shifted from generics to branded.^[9-11] The rational prescribing can be assessed with the help of conducting prescription audit on continuous basis. Data about drug usage patterns in India are particularly lacking. Keeping these facts in consideration the present study has been planned to define the pattern of drug use in the paediatric out-patient department. The present study was undertaken to evaluate the drug prescription patterns in patients attending the paediatric in-patient department and to generate data on the extent of rational/ irrational prescribing in this institute. Feedback from the study would help both the prescriber and institutional authorities to review their prescribing practices and

modify if necessary to facilitate better health care delivery.

MATERIAL AND METHODS

Study site Study period Study design

A Prospective- observational study was conducted in the department of Pediatrics, Malla Reddy Institute Of Medical Science And Hospital a 500-bedded tertiary care teaching hospital in Hyderabad. The study was carried out for the period of six months from March 2012 to August 2012.

Inclusion Criteria

Inpatients who were prescribed with antibiotics in the paediatrics department in the age group 0 to 12 years.

Exclusion Criteria

Patients aged above 12 years.

Study approval

The protocol of the study that includes the objectives and methodology was submitted to the medical superintendent of the hospital. The authorization from medical superintendent was procured. We were permitted to utilize the hospital facilities to make a follow up of the prescriptions in the selected department. A standard data entry format for collecting patient details was designed and, during the ward rounds the entire patient data with special reference to the antibiotic prescribed were recorded in the format. Information came from observation and talking informally to the nursing staff.

The antimicrobial agents were divided into major groups for the study. The prescription data were analyzed on the basis of the following parameters. WHO recommended prescribing indicators.

- (1) Total numbers of the antimicrobial agents prescribed irrespective of number of prescription.
- (2) Mean numbers of the antimicrobial agents per prescriptions.
- (3) Prescribing frequency of antimicrobial agents.
- (4) Numbers of antimicrobial agents prescribed by generic vs. trade name.
- (5) Numbers of antimicrobial agents administered orally or parenterally.
- (6) Numbers of prescription with one or more than one antimicrobial agents.

Data were also analyzed by using prescribing patterns of antimicrobial agents for every infections involving different system. Data were also analyzed by using Microsoft excel sheet. Proportions of different antimicrobial agents were calculated from the total number of antimicrobial agents prescribed. Further, proportions of the different antimicrobial agents prescribed for different systems were calculated.

RESULTS

Out of 140 patients most commonly hospitalized were aged from 1-5 years were 41 % whereas patients from 0-12 was 35 % and the least were patients aged 5-12 years was 24% (Table 1). 56% of the patients were male were as only 44% of the patients were female (Table 2).

Table No 1: Pediatric In-Patient Age Wise Distribution

	Age	Number of patients	%
1	0-12 months	49	35
2	1-5 years	58	41
3	5-12 years	33	24
4	Total number of patients	140	100

Table No: 2 Pediatric In-Patient Gender Wise Distribution

	Gender	Number	Percentage
1	Male	79	67%
2	female	61	33%

AGE with dehydration (27%), bronchopneumonia(22%), LRTI (17%), pyrexia(12.8%), URTI (5%) were the 5 most commonly found diseases in the in-patient pediatric ward (Table 3). High number antibiotics were prescribed

for patients with AGE (25.51%) followed by, Bronchopneumonia (24.8%), pyrexia(15.64%) LRTI (12.92%), UTI (7.48%), URTI (3.74) (Table 3).

Table No 3: Antimicrobials Prescribed According To Diagnosis

	Diagnosis	Antimicrobials prescribed	% of antibiotics	No. of patients	% no. of patients
1	Gastroenteritis	75	25.51	38	27.14
2	Bronchopneumonia	73	24.82	31	22.14
3	LRTI	38	12.92	24	17.14
4	Pyrexia	46	15.64	18	12.85
5	URTI	11	3.74	7	5
6	UTI	22	7.48	6	4.28

7	Seizures	4	1.36	4	2.85
8	NNJ	2	0.68	2	1.42
9	Dengue?	2	0.68	2	1.42
10	Tonsillitis	2	0.68	2	1.42
11	Mesenteric lymphadenopathy	2	0.68	2	1.42
12	Poisoning	2	0.68	1	0.71
13	Granuloma /tuberculoma	1	0.34	1	0.71
14	Gastritis	3	1.02	1	0.71
15	Adenoitis	2	0.68	1	0.71
16	TOTAL	294	100	140	100

The total number of antimicrobials prescribed were 294 of all the prescriptions and mean number of antibiotics per prescription was 2.1 (Table 4).

Table No 4: Prescription Analysis In Pediatric Wards

1	Total number of prescriptions	140
2	Total number of antimicrobial agents prescribed	294
3	Mean number of antimicrobials per prescription	2.1

The parenteral dosage form was prescribed at 69% whereas oral forms of the drug was prescribed by 31% (Table 5).

Table 5: Route of Administration

	Antimicrobial administered by route	Total number	%
1	Parenteral	202	69
2	Oral	92	31
3	Total	294	100

All antibiotics were prescribed by their trade name. Of the total 35.71% of prescriptions contain two antibiotics whereas 30.71% of prescriptions contain three antibiotics. Only 27.86% of prescriptions prescribed with one antibiotics, four and five antibiotics were prescribed in 4.29% and 21.43% of prescriptions respectively.

Ceftriaxone (26.87%) was the most commonly prescribed antibiotic, amikacin (24.14%) next followed by coamoxiclav (15.3%), ofloxacin (5.58%), albendazole(4.06%) (Table 6).

Table 6: Total Prescribing Frequency of Antimicrobials

S No	Antimicrobial Agents	No	%
1	Aminoglycosides		
	amikacin	71	24.14
2	β-lactams		
	Co -amoxiclav	45	15.3
	Piperacillin + tazobactam	7	2.38
	Ampicillin +cloxacillin	3	1.02
3	Cephalosporins		
	ceftriaxone	79	26.87
	cefotaxime	14	4.76
	cefixime	11	2.53
4	Fluoroquinolones		
	Oflaxacin	20	5.58
	Norflaxocin	6	1.52
5	Anti protozoal		
	Metronidazole	16	2.03
	ornidazole	2	1.01
	Albendazole	13	4.06

6	Macrolides		
	azithromycin	7	2.03

Cephalosporins 35% were most commonly prescribed antibiotics followed by amino glycosides 24%, beta – lactams19% (Table 7).

Cephalosporins, Aminoglycosides classes were the most commonly preferred antibiotics for treatment of AGE. Amoxiclav is the mostly prescribed along with amikacin for treating acute bronchopneumonia. Other antibiotics like ceftriaxone, ampicillin+cloxacillin, piperacillin+tazobactam azithromycin, were also used. Ceftriaxone, amoxiclav, amikacin were most commonly used antibiotics for treating lower respiratory tract infections and also other antibiotics like piperacillin+tazobactam, ceftriaxone+ tazobactam were used.

Ceftriaxone was the most commonly prescribed due to broad spectrum of activity.

Viral fever, pyrexia of unknown origin and enteric fever were most commonly diagnosed. Most common antibiotics used to treat were ceftriaxone and amikacin. Other antibiotics used were azithromycin, cefotaxime, cefixime, coamoxiclav, albendazole, piperacillin+tazobactam.

Length of stay of patients in the hospital /duration of treatment with antibiotics of inpatients was 6.11 days for UTI.

Out of 30 cases for culture sensitivity tests only 9 cases were isolated with organisms. E. coli, streptococci,

staphylococcus, enterococcus, klebsiella species were the organisms isolated.

DISCUSSION

A prescription by a doctor may be taken as a reflection of physician's attitude to the diseases and the role of drug treatment. It also provides an insight into the nature of health care delivery system.^[12]

Several classes of antimicrobial agents have been discovered and hundreds of them are available today. Antimicrobial agents are life saving in many conditions. With the advent of antibacterial therapy death from an incurable bacterial infection is considered a thing of past. These drugs are the most widely used category of drugs in the world accounting for over one quarter of hospital drug costs.^[13]

Most of the hospital admissions or hospital stay of the children was due to the behavior of the child which exempts them from going to school, lack of basic education in the family, low socio economic status, and uncertainty of diagnostic tests.

Most of the hospital admissions were during the rainy season, most of them with respiratory tract infections, AGE and fever.

In our study, it was found out that cephalosporins were commonly prescribed antimicrobials followed by aminoglycosides group, β -lactams and then fluoroquinolones and antiprotozoals. Ceftriaxone, Amikacin, coamoxy-clav and ofloxacin were frequently prescribed. Wider use of ceftriaxone, amikacin observed in our study may be due to its broad antibacterial spectrum and drug of choice for the most cases of hospital. Also physician's choice and easier availability in hospital pharmacy may also dictate a rather heavy use of a particular drug. Other factor contributing to the preferential uses of the above antimicrobial agents in the wards may be due to their low cost with better safety profile and ease of their availability from hospital pharmacy.

The diversity of antibiotic types likely to be prescribed by doctors in our setting was limited, with only 14 types being prescribed to patients during the study. This is in contrast with other studies where between 15 and 20 types of antibiotics have been identified to be in use for paediatric.^[14,15] We speculate that knowledge of local resistance patterns, which was one of the influencing factors for antibiotic choice, might explain this observation. However, there is a need for clear documentation of these local or regional resistance patterns to provide a more objective guide for clinicians in their antibiotic selection.

Diagnostic uncertainty contributed to antibiotic overuse.

High percentage of all hospitalized children receive antibiotics whereas in most cases they are started on an empirical basis, without proof of a bacterial infection.

Out of 140 patients only for 30 cases, culture and sensitivity test was done and micro-organism was isolated in 9 cases. E.coli, streptococci, staphylococcus aureus, klebsiella species and enterococcus were isolated. Culture was mainly of stool, urine and sputum. As the sensitivity pattern studies reflect the major organism to be treated, it helps to choose the appropriate antibiotics resulting in appropriate antibiotic therapy.

The most commonly used diagnostic tool for respiratory tract infections was x-ray and WBC count, preferably due to their low cost whereas culture sensitivity test was costly as most of the patients were from low socio economic background.

During study we have observed that, highest numbers of antimicrobial agents were prescribed for respiratory tract infections^[15,16] followed by gastroenteritis.

Among the total numbers of antimicrobial agents prescribed for respiratory tract infections, highest numbers were prescribed from β -lactam and aminoglycosides groups.^[15,16]

For acute gastro enteritis most commonly prescribed were cephalosporins, aminoglycosides, and fluoroquinolones among which ceftriaxone amikacin and ofloxacin were most commonly prescribed.

The types of antibacterials used at each centre depend on many factors like the patient profile, type of infection, availability of antimicrobial, susceptibility patterns, the prescriber's awareness on rational antimicrobial use etc. Such statistics form an important index of ongoing antimicrobial audit as they indicate the changes in the pattern of usage accordance with the susceptibility patterns of bacteria.

Data analysis in our study showed that numbers of prescription with two or more than two antimicrobial agents is quite high as compared to those with single antimicrobial agent. Mean number of drugs per prescription was 2.1. This indicates a large numbers of prescriptions in our study were for multiple drugs. This may indicate empirical nature of therapy. A study carried out in Kathmandu valley (2004) reported that, a high percentage (93%) of patients were prescribed at least one antibiotic.^[17] These figures are quite opposite to our study. A study carried out by Marlieset *al.*, (1998) reported that 36% of the patients were prescribed at least one antibiotic.^[18] These reports are higher to our study. Prakashet *al.*, (1989) and Ansari *et al.*, (1998) found this number to be 5.86 and 5.05 medicines per prescription respectively in their studies.^[19,20] These figures are quite high as compared to our study. It is not possible to draw any firm conclusion since the patients are not matched

socio-economically. The morbidity pattern also may not be similar. Average number of the drugs per prescription is an important index of the scope for review and educational intervention in prescribing practices. One must remember that the benefit: risk ratio for each drug decreases when multiple drugs are given. Extreme and empirical treatment is an important cause of irrational antimicrobial use. It is preferable to keep the mean number of drug per prescription as low as possible. Since, the highest figures always lead to increased risk of drug – drug interaction.^[21]

In study, it was found out that 69% antimicrobial agents were prescribed by parenteral administration, while only 31% were by oral route in paediatric patients. A study carried out in Kathmandu valley (2004) showed that, 75% of antibiotics were given by injections.^[17] These figures are somewhat similar to our study. The parenteral use of drugs in general and antibacterial in particular is important parameters to judge rationale drug use. Unnecessary use of parenteral antimicrobial adds to cost of therapy.

Preference to parenteral route over oral route observed in our study could be due to study conducted in the indoor patients. In our study observed that antimicrobial agents were prescribed by generic name (100%) as compared to trade name (0%). Use of generics in a country like India helps poor people, so initiatives should be taken to use generics which reduces the medical care costs.

CONCLUSION

Ceftriaxone, amikacin, co-amoxycylav, and ofloxacin were commonly prescribed. In this study branded drugs are prescribed in more numbers, multiple drug prescriptions found out and antimicrobials are administered by using parenteral route more frequently.

So this result indicates a scope for improving the prescribing pattern of drugs and minimizing the use of antimicrobial agents as low as possible, using medicines appropriately after selecting and consciously keeping the cost of therapy low. It is observed that further detail analysis in respect to selection of dose, frequency and duration of therapy of antimicrobial agents used in the wards is needed to judge the rationality of the therapy

Consequently, physicians must keep a clear understanding need for microbiological diagnosis, use of antibiotics and make good judgment in clinical situations.

Empirical therapy and antimicrobial usage for viral infection can be reduced by the availability of rapid diagnostic method to differentiate between viral and bacterial infection.

Proper education program on rational usage of drug and an antimicrobial order form should be implemented in the hospitals to reduce the inappropriate therapy.

Standard treatment guidelines for the treatment of common diseases should be formulated. For achieving the goal of rational use of medicines it is not sufficient to choose the right medicines only but also they must be employed in the most appropriate manner.

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