

Drug utilization study in the inpatients of pediatric department of a tertiary care hospital

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ABSTRACT

Background: Infants and children constitute a large proportion of the population in developing countries. In Gujarat, studies on drug use patterns in the pediatric age group are lacking in the Saurashtra region hospitals. The objective was to study demographical information and the utilization pattern in the in patients of the pediatric ward.

Methods: A cross-sectional, observational drug utilization study was carried out over a period of 6 months in 630 pediatric inpatients of the pediatric department of Guru Gobind Singh Hospital, Jamnagar, a tertiary care teaching hospital. Analyzed data included demographic details and drugs prescribed in respective patients.

Results: Most commonly affected age group was 1-5 years, boys in 62.06% and girls in 37.94% and 40.16% were admitted in the pediatric ward. Acute gastroenteritis and pneumonia had the highest admission rate with 31.90% and 22.38%, respectively. The majority of children were prescribed 5-6 drugs. Ceftriaxone (64.92%) was the top most frequently prescribed antibiotic, followed by amoxicillin (49.21%). Prescribing drugs were mainly from essential drug list (64.44%) and by generic names (61.89%). Drugs prescribed orally in 66.10% and by injections in 33.90%.

Conclusion: It is quite evident that significantly large number of children were from 1 to 5 year age group. The majority of the children were admitted in inpatients of the pediatric ward for acute gastroenteritis, followed by pneumonia and meningitis. Most frequently prescribed antibiotic group was cephalosporin, followed by penicillin group.

Keywords: Infants and children, Drug utilization pattern, Prescribing pattern

INTRODUCTION

The WHO defines drug utilization study as “the marketing, distribution, prescription and use of the drug in society, with special emphasis on the resulting medical, social and economic consequences.”¹ There are also many people who have access to drugs but do not get the right drug in the right dosage when they need it.² Monitoring of prescriptions and drug utilization studies could identify the associated problems and provide feedback to prescribers.³ Developing countries have limited funds available for healthcare and drugs and it becomes very important to prescribe drug rationally so that the available funds can be utilized optimally.⁴ Children constitute about 40% of India’s population. Infants and children suffer from frequent but usually non-serious illnesses. Most of these are self-limiting⁵ and are often

treated not only inappropriately, but also resorting to polypharmacy.⁶ Infants and children are especially vulnerable to contract illnesses and to the harmful effects of drugs due to differences in pharmacodynamics and pharmacokinetics.⁷ The assessment of drug utilization is important for clinical, educational and economic purposes.⁸ Most of reported drug utilization studies have been carried out in adult patients with only a few being reported from pediatric patients.⁹

METHODS

Study site and design

A cross-sectional, observational drug utilization study was carried out in 630 pediatric inpatients of Pediatric department

of Guru Gobind Singh Hospital, Jamnagar, A Tertiary Care Teaching Hospital.

Prior permission of Institutional Ethics Committee was obtained for conducting the study. The data was analyzed using descriptive statistics to determine drug use indicators and utilization pattern of drugs in the Inpatients of Pediatric department.

Study duration

6 months (July 2009-December 2009).

Inclusion criteria

Pediatric patients up to 12 years, of either sex and whose written informed consent, were obtained from parents or guardian after explaining in simple and vernacular language by the principal investigator.

Exclusion criteria

Patients of >12 years, Referred indoor cases from other departments, diagnosis is not certain, Patients referred to higher center, absconded or discharged against medical advice and patients who were not willing to take part in the study.

Data analysis

Patient indicators include

1. Age: average age of boys and girls
2. Sex: the total number of boys and girls.

Prescribing indicators include

1. Average number of drugs per encounter
2. Total number of drugs per encounter
3. Prescribing frequency of drugs
4. Percentage of encounters with an antibiotic prescribed
5. Percentage of drug prescribed from formulary or essential drug list
6. Percentage of drug prescribed by generic name
7. Percentage of oral drugs and injections per encounter
8. Length of ward stay
9. Dosage regimen (form, route, frequency, and duration).

RESULTS

For this study, a total of 630 pediatric patients were included after ruling out exclusion criteria. Demographic data revealed, out of 630 patients, maximum 391 (62.06%) were boys followed by 239 (37.94%) girls and maximum patients 253 (40.16%) belonged to age group 1-5 year which include 157 boys and 96 girls. This is depicted in Table 1

and Figure 1. The mean \pm standard deviation (SD) of the age of all patients being admitted in the pediatric ward was 3.95 ± 3.15 years.

Among morbidity pattern observed in inpatients of the pediatric ward, acute gastroenteritis had the highest admission rate with 31.90%, followed by pneumonia in 22.38% and meningitis in 10.38%. The morbidity pattern analysis is depicted in Figure 2.

The average number of drugs per encounter found 5.58 in this study with a range of 1-13. The majority of children were prescribed 5-6 drugs. 22.54% of children were prescribed 6 drugs and 20.16% of children were prescribed 5 drugs. That is shown in Figure 3. Other drugs with their frequency usage in <5% were prednisolone, pheniramine,

Table 1: Age and sex wise distribution.

Category	Boys	Girls	Total
1-month to 1-year	97	59	156
1-5 year	157	96	253
5-12 year	137	84	221
Total	391	239	630
Percentage	62.06	37.94	100.00

Table 2: Most frequently prescribed drugs.

Name of drug	Number of children receiving drug (number of encounters)	Percentage
Ceftriaxone	409	64.92
Amoxicillin	310	49.21
Paracetamol	275	43.65
Chloroquine	275	43.65
Albendazole	243	38.57
Ampicillin+ clavulanic acid	227	36.03
Cetirizine	219	34.76
Ranitidine	207	32.86
Salbutamol	159	25.23
Ipratropium bromide	144	22.86
Co-trimoxazole	131	20.79
Domperidone	125	19.84
Metronidazole	108	17.14
Amikacine	96	15.24
Pantoprazole	87	13.81
Vancomycin	81	12.86
Artesunate	72	11.43
Doxycycline	54	8.57
Dopamine	49	7.78
Cloxacillin	36	5.71

ondansetron, crystalline penicillin, ampicillin, etc. Parenteral nutrition, nutritional supplements such as vitamins, standard intravenous fluids, immunizations, oxygen, blood transfusion and odds ratios were not considered in data collection.

In our study, total encounters with an antibiotic prescribed were 558 and percentage of encounters with an antibiotic prescribed is 88.57% (Table 3). A number of antibiotics per encounter was 234 (37.14%) out of 630. Of 45 drugs used, 29 (64.44%) drugs were prescribed from WHO model list of essential medicines for children, 2007. In our study 2250 (61.89%) drugs were prescribed by generic name and 1386 (38.11%) drugs were given by brand name out of 3636. A total number of drugs prescribed orally were in 2439 (66.10%) and by injections in 1251 (33.90%).

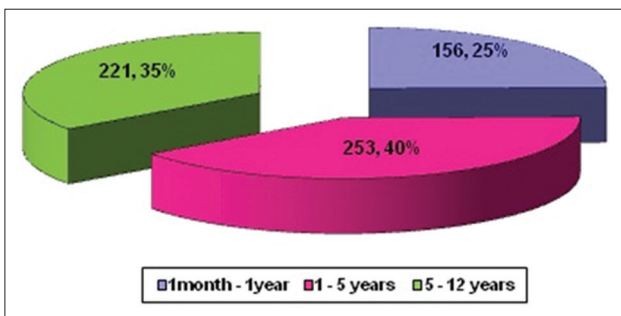


Figure 1: Age distribution.

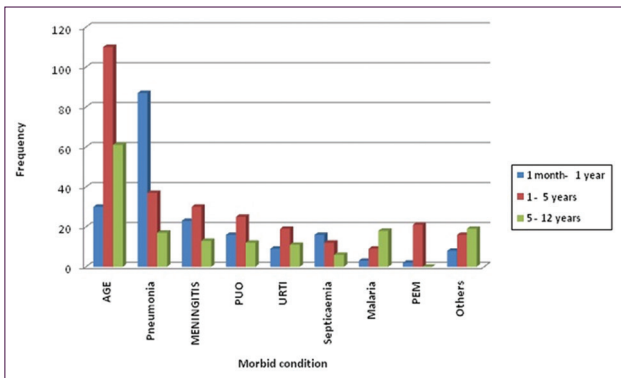


Figure 2: Age wise analysis of morbidity pattern.

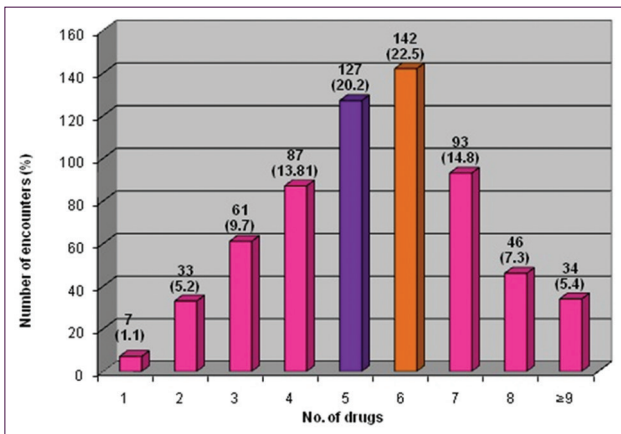


Figure 3: A total number of drugs per encounter.

Table 4 shows the length of ward stay, notably majority 34.29% of encounters had duration in the range of 3-5 days. Mean \pm SD of the length of stay in the pediatric ward of all patients being admitted was 4.89 ± 8.56 days.

DISCUSSION

We collected data of 630 patients matching inclusion criteria admitted in Inpatients of Pediatric department of Guru Gobind Singh Hospital, a tertiary care teaching hospital attached to Shri M P Shah Government Medical College, Jamnagar. Data of the patients like age, sex, diagnosis, duration of stay in hospital of Pediatric department and drug treatment were analyzed.

The largest proportion of patients admitted in the pediatric ward were boys in 62.06% (Table 1), This is in accordance with study done by Kumar et al.¹⁰ in which 57% of patients were boys. In this study, patients admitted in pediatric ward with 1-month to 1-year age period was 24.76%, in 1-5 years age period was 40.16% and in 5-12 years age period was 35.08% respectively (Figure 1) It is quite evident that significantly large (40.16%) percentage of children were from 1 to 5 year, this is in consonance with study done by Palikhe¹¹ in which patients admitted in pediatric ward, in 1-month to 1-year age period was 28.90%, in 1-5 years age period was 36.40% and in 5-12 years age period was 34.70%, respectively. The mean age in our study was 3.95 ± 3.15 years. This is in accordance with a study done by Palikhe.¹¹ In our study mean duration of stay in Inpatients of the pediatric ward for all patients being admitted was 4.89 ± 8.56 days. In previous studies, mean duration of stay in Inpatients of pediatric ward was 7.29 ± 4.26 days.¹¹

Table 3: Number of antibiotics per encounter.

Number of antibiotics per encounter	Number of encounter	Percentage
0	72	11.43
1	148	23.49
2	234	37.14
3	112	17.78
4	46	7.30
5	18	2.86
Total	612	100.00

Table 4: Length of a pediatric ward stay.

Duration of stay (days)	Number of encounter	Percentage
<2	128	20.31
3-5	216	34.29
6-8	177	28.10
9-10	60	9.52
>10	49	7.78
Total	630	100.00

Majority of the children were admitted in pediatric ward for acute gastroenteritis (AGE) (31.90%), followed by pneumonia (22.38%) meningitis (10.48%), fever of unknown origin (8.41%), upper respiratory infection (6.19%), septicemia (5.40%), malaria (4.76%), protein/energy malnutrition (3.65%) (Figure 2). These findings comply with the study done in Kathmandu valley, Duwakot in which the largest number of children were having pneumonia, meningitis, Enteric fever, and pyrexia of unknown.¹¹ It is clearly evident from the observations that 1-5 year age is more susceptible to these morbid conditions. In our study it was seen that 61.70% of children with pneumonia, 47.06% of children with septicemia were from 1 month to 1 year age group and acute gastroenteritis (54.73%), protein/energy malnutrition (91.30%), meningitis (45.45%) were from 1 to 5 year age group. These results are in accordance with Palikhe¹¹ in which reports from Nepal showed 15% of children with pneumonia were from <1 year age group, 4.13% of children with meningitis were from 5 to 12 year group and 5% of children with Enteric fever were from 1 to 5 year age group.

The average number of drugs per encounter was 5.58 in our study with a range of 1-13. The majority of children were prescribed 5-6 drugs (Figure 3). In a study done by Palikhe,¹¹ 5.01±1.36 drugs were given to children on an average. As severely ill patients were admitted in pediatric ward, use of polypharmacy is quite common and similar as study by Shankar et al.¹² Most commonly prescribed drug was ceftriaxone in 64.92% followed by amoxicillin in 49.21% (Figure 4). The results are in accordance with a study conducted by Shankar et al.¹² and Palikhe.¹¹ The frequency and intensity of the use of these drugs appear to be directly related to the severity of the clinical status and inversely related to the age of children.

In our study, total encounters with an antibiotic prescribed were 558 which account for almost 88.57% of total encounters. The majority of the children received at least 2 antibiotics. Around 27% children were prescribed 3 or more than 3 antibiotics.

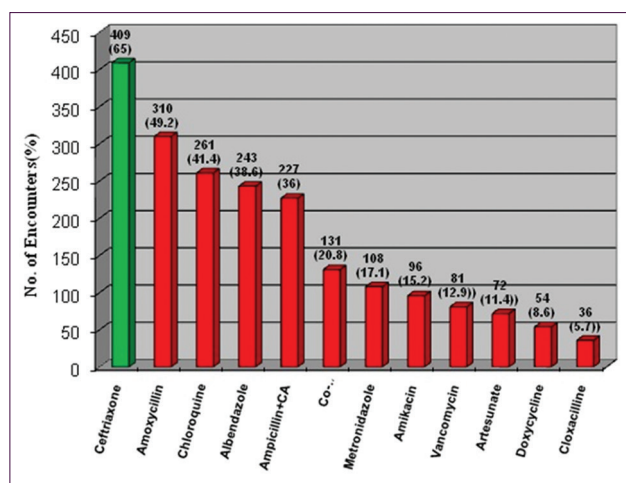


Figure 4: Number of prescribed antibiotics per encounter.

It is clearly evident that children who did not receive any antibiotic make trivial contribution (11.43%) to data (Table 3). As antibiotics were given as life-saving measures it is difficult to focus on their irrationality, these findings are in accordance with study conducted by Shankar et al.¹²

It is generally established that combination therapy of penicillin/cephalosporin and aminoglycoside is effective. Due to emerging resistance to ampicillin, cephalosporin and aminoglycoside combination is recommended as first-line therapy.¹³ This is evident from our study as the majority of patients were receiving ceftriaxone and amoxicillin, simultaneously. Ampicillin, cefotaxime, and gentamicin were the most commonly prescribed antibiotics in western Nepal study by Shankar et al.¹² In a study in eastern Nepal, by Rauniar et al.,¹⁴ gentamicin, ampicillin, crystalline penicillin and cefotaxime were most commonly prescribed antibiotics. Cephalosporin was the most frequently prescribed antibiotic group followed by penicillin group. In a study done by Palikhe,¹¹ ampicillin+cloxacillin combination was prescribed in 7%. In studies done by Italian collaborative study group¹⁵ and Lesko et al.,¹⁶ it was concluded that penicillins and aminoglycosides were the most commonly used antibiotics. In a study in a teaching hospital in Bangladesh, by Akter et al.,¹⁷ most commonly-prescribed antibiotics were ampicillin, gentamicin, amoxicillin, cloxacillin, and ceftriaxone, etc.

In our study, 33.90% children received drugs via a parenteral route. This result complies with a prospective study done by Shankar et al.¹² who reported 48.90% of drugs were given by parenteral route. Out of 45 drugs used, 29 drugs (64.44%) were prescribed from WHO model list of essential medicines for children, 2007. WHO has given a first model list of essential medicines for children in October 2007 which is intended for use for children up to 12 years of age. In our study, 2250 drugs (61.89%) were prescribed by generic name and 1386 drugs (38.11%) were given by brand name out of 3636. It is clearly evident that about 2/3 of drugs were prescribed by brand name which unnecessarily adds to the cost of therapy. Increasing generic prescribing would rationalize use and reduce the cost of drugs.¹⁸

The study was carried out over a 6 months period, and seasonal variations in disease pattern and drug utilization were not considered. The study was carried out during the rainy and winter months. Seasonal variations should be explored further in future studies. A study of 1-year duration can nullify the effect of seasonal variations. The drug costs and other costs were not taken into account. We looked at the appropriateness of prescribing in relation to the diagnosis and observed problems.

CONCLUSION

This study was carried out in inpatients of the pediatric ward of GG Hospital over a period of 6 months in 630 children. The majority of patients (40.16%) admitted in

pediatric wards were from the age group of 1-5 years period, and the majority were boys (62.06%). Acute gastroenteritis, pneumonia, meningitis were major morbid conditions accounting for 65% of total children. These morbidities were more prevalent in 1-month to 5 years age. The drugs dominated the list of prescribed medicines were ceftriaxone, amoxicillin, paracetamol, chloroquine, albendazole, cetirizine, etc. The majority of the drugs were given via oral route. 64.44% drugs were prescribed from the WHO essential drug list for children. 61.89% drugs were given by generic name. The average duration of stay in the pediatric ward was about 5 days. Pneumonia, meningitis and septicemia were major causes of mortality. As pediatric patients are not simply small adults, there is a great need to study the drug utilization pattern. Drug utilization studies are powerful exploratory tools to ascertain the role of drugs in society and create sound sociomedical and health economic basis for health care decision making.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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