# A prospective observational study of drug usage in paediatric inpatients at district teaching hospital

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## Abstract

**Introduction:** Aim of our study was to observe and analyse the prescribing pattern of drugs in hospitalised patients of paediatric department.

**Materials and Methods:** A prospective observational study was conducted over a period of one year, after getting approval from Institutional Ethics committee. A specially designed proforma was used to collect the data from inpatients of paediatric ward of a tertiary care hospital. Inpatients with age group of 0 – 14 years were included in the study.

**Results:** Out of 1050 patients, 471 were below the age group of one year, 220 patients were between 1-5 years and 359 patients were above the age of 5 years. The percentage of patients with antibiotic prescribed was 92.1%. Among the antibiotics, amikacin (483) was most commonly prescribed followed by cefotaxime (414) and ceftriaxone (301). Paracetamol was used as analgesic and antipyretic (45.5%) in the majority of the patients. The average number of drugs prescribed per patient was 5.7. In the majority of patients parenteral formulations were used either in the form of antibiotics or IV fluids (98.2%). Out of 96 different drugs, 57 (59.3%) drugs were prescribed by generic name. About 58.3% of drugs were prescribed from Essential Medicines WHO Model List (2015).

**Conclusion:** Drug utilization studies are powerful exploratory tools to ascertain the role of drugs in society and create sound socio-medical and health economic basis for health care decision making. Continuous medical education with a focus on rational drug use and evidence based medicine should form part of the program in the hospital.

**Keywords:** Drug utilization studies, Paediatric inpatients, WHO prescribing indicators.

## Introduction

In recent years, drug utilization studies are found to be useful tool to facilitate rational use of drugs in health care delivery systems. It truly reflects the status of health care system. 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.[1]

There is much concern about inappropriate and expensive prescribing, as well as under-prescribing. The development of drug utilization (DU) as a research area made it possible to study drug prescribing and drug usage in a scientific and formal manner.[2]

Paediatric population is prone to suffer from recurrent infection of the respiratory tract and gastrointestinal system[3]. Acute respiratory infection, acute watery diarrhoea and viral fever are the common childhood illnesses accounting for the major proportion of paediatric visits.[4]Drug utilization among outpatient is frequently monitored in many countries but the studies on inpatient are rare and incomplete.[1]

As per World Health Organization (WHO), rational use of drugs requires that patients receive medications appropriate to their clinical needs, in doses that meet their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at low cost to them and their community.[3]

The need for the safe and effective drugs for use in sick neonates, infants, children and adolescents requires the establishment of thoughtful drug therapy strategies.[5] Thus, the aim of our study is to observe and analyse the prescribing pattern of drugs in hospitalised patients of paediatric department.

## Materials and Methods

A prospective observational drug utilization study was carried out in 1050 paediatric inpatients of Paediatric department of Mandya Institute of Medical Sciences, A Tertiary Care Teaching Hospital. Prior permission of Institutional Ethics Committee was obtained for conducting the study. The data was analysed using descriptive statistics to determine drug use indicators and utilization pattern of drugs in the Inpatients of Paediatric department.

- **Inclusion criteria**

Paediatric patients up to 14 years, of either sex and whose written informed consent and ascent form, were obtained from parents or guardian after explaining in simple and vernacular language by the principal investigator.

- **Exclusion criteria**

Patients referred to higher centre, absconded or discharged against medical advice and patients who were not willing to take part in the study, outpatients, ICU emergency patients and patients with AIDS.

- **Data collection and analysis**

Duration of disease, co-existing disease, past history of any major illness were collected. Treatment history

like, drugs prescribed, dose, frequency, duration and route of administration were also collected.

- The collected data was assessed for following prescribing indicators of WHO.[6]
  1. Average number of drugs per encounter.
  2. Percentage of drugs prescribed by generic name.
  3. Percentage of encounters with an antibiotic prescribed
  4. Percentage of encounters with an injection prescribed.
  5. Percentage of drugs prescribed from essential drugs list or formulary.

Data entry and analyses were done using the Statistical Package for Social Sciences (SPSS) for Windows software (version 18). Descriptive statistics such as mean and standard deviation (SD) for continuous variables, frequency and percentage for categorical variables were determined.

## Results

For this study, total of 1050 paediatric patients were included after ruling out exclusion criteria. Out of 1050 , the 471 patients were below the age group of one year, 277 patients were between the age group of 1 to 5years, and 302 patients were more than 5 years of age. Other demographic data revealed that out of 1050 patients, maximum number i'e 683(65.04%) were boys followed by 367 (34.95%) were girls.

In our hospital, respiratory tract infections were predominantly seen among children, especially bronchopneumonia was seen in 6.6% of the patients. Respiratory distress was one of the most common contributing factors for neonatal NICU (Neonatal Intensive Care Unit) admission. Other most commonly diagnosed disease were acute gastroenteritis (86), enteric fever (44), viral fever (66), seizure disorder (62), allergy and alleged poisoning (34) and some renal problems (16).

Fig 1 shows the different categories of drugs prescribed to patients. Antibiotics were prescribed in 92.1% of the patients, followed by intravenous (IV) fluids in 71.5%, analgesics in 47.4% , vitamins and minerals in 45%, ulcer protective in 35.3%, drugs used for cough in 26.3%, antiemetics in 24.1% antiepileptic drugs in 21.4% , corticosteroids in 14.2% and other drugs in 29.7% of the patients.
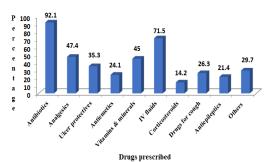


**Fig 1: Categories of drugs prescribed**

Most commonly prescribed antibiotic was amikacin in 46% of patients followed by cefotaxime (39.4%), ceftriaxone (28.8%), ampicillin (13.6%), amoxicillin+ clavulanic acid (9.2%), meropenem (7.5%), piperacillin +tazobactum (6.5%), azithromycin (4.2%), metronidazole (3.6%) and ciprofloxacillin (2.8%). (Fig 2)
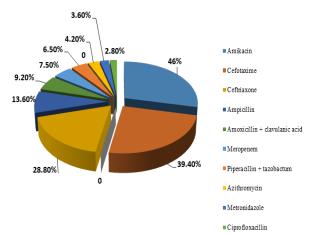


**Fig 2: Most commonly prescribed Antibiotics**

**Table 1: Most commonly prescribed Antibiotics combinations**

| Antibiotic combinations | N | Percentage |
|---|---|---|
| Amikacin + ampicillin | 127 | 12.09 |
| Amoxicillin+ lavulanic acid | 97 | 9.2 |
| Piperacillin + tazobactum | 69 | 6.57 |
| Ceftriaxone+amikacin | 65 | 6.19 |
| Amoxicillin+clavulanic acid+ amikacin | 44 | 4.19 |

Table 1 shows most commonly used antibiotic combinations. Amikacin and ampicillin is most commonly used antibiotic combination (12.9%), followed by combination of amoxicillin and clavulanic acid (9.2%), piperacillin and tazobactum (6.57%), ceftriaxone and amikacin (6.19%), amoxicillin and amikacin (4.19%) were used.

Fig 3 shows the percentage of different routes of drug administration used during the therapy. As the study was conducted in inpatients of paediatric ward, the intravenous route (55.5%) was the most commonly preferred route for antibiotic therapy, IV fluids and proton pump inhibitors. Oral route (37.24%) was used to give analgesics and other drugs. In patients with cough and bronchial asthma inhalation route (5.31%) was used for drugs like bronchodilators. Drugs like saline nasal drops and oxymetazoline was given by nasal route (1.02%). Topical (0.48%) and rectal (0.41%) route were the least commonly used routes.
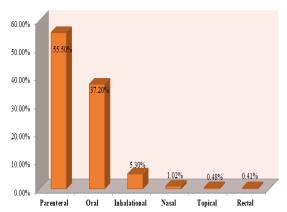
**Fig 3: Different routes of drug administration**

Table 2 shows analysis of WHO core prescribing indicators.

**Table2: Assessment of WHO core prescribing indicators**

| S. No. | WHO Prescription Indicators | Values |
|--------|------------------------------|--------|
| 1. | Average number of drugs per prescription | 5.7 |
| 2. | Percentage of encounters with antibiotic | 92.1% |
| 3. | Percentage of encounters with an injection prescribed | 98.2% |
| 4. | Percentage of drugs prescribed from essential drug list | 58.3% |
| 5. | Percentage of drugs prescribed by generic name | 59.3% |

Table 3 shows assessment of WHO core prescribing indicators by age group. The average number of drugs in patients with age group of below one year was 5.75, similar finding was found in patients with age group of one to five year and more than 5 years. The percentage of encounters with an antibiotic prescribed was more in age group of below one year (94.69%). The percentage of encounters prescribed by an injection was 96.39%, 36.46% and 59.27% in age of below one year, 1 to 5 years and more than 5 year respectively. Percentage of drugs from the WHO essential drug list 53.33%, 53.52% and 70.68% in age of below one year, 1 to 5 years and more than 5 year respectively. Prescription by generic name was more in patients with age group of more than 5 years (63.7%).

**Table 3: Assessment of WHO core prescribing indicators by age group**

| WHO core prescribing indicators | Below 1 year | 1 to 5 year | More than 5 year |
|---------------------------------|--------------|-------------|------------------|
| Average number of drugs per prescription | 5.75 | 5.75 | 5.75 |
| Percentage of encounters with an antibiotic | 94.69% | 91.33% | 89.07% |
| Percentage of encounters with an injection | 96.39% | 36.46% | 59.27% |
| Percentage of drugs from the WHO essential drug list | 53.33% | 53.52% | 70.68% |
| Percentage of drugs Prescribed by generic name | 56% | 59.15% | 63.7% |

## Discussion

Drugs play an important role in improving human health and promoting wellbeing. However, to produce the desired effect of drugs, they have to be safe, efficacious and have to be used rationally. The WHO has recommended that more recognition and support should be given to Drug Utilization Studies and related work and government should be made aware of the importance of such studies. Drug usage figures should form an integral part of national statistics and should be made accessible to research workers and health planners.[7]

In our study we found that respiratory tract infections were commonly seen in paediatric age group. Majority of the neonates were admitted to NICU because of respiratory distress (preterm-9.8% and term-14.1%) and children in age group between 1 and 5 years because of bronchopneumonia (6.6%). Acute gastroenteritis (8.1%), enteric fever (4.1%), viral fever (6.2%) and seizure disorders (5.9%) were also prevalent in children. In the study conducted by Ashraf H et al, majority of the paediatric patients were suffering from pneumonia (30.18%) followed by diarrhoea (13.51%). Meningitis & enteric fever were diagnosed in equal number of patients i.e. 18 (8.11%).[8]

The prescription trend in our study found that antibiotics were prescribed in 92.1% of patients, followed by intravenous (IV) fluids in 71.5% and analgesics in 47.4%.

This finding was comparable to the study done by Thiruthopu et al, in which antibiotics 318 (33.29%) were highly prescribed followed by non-steroidal anti-inflammatory medicines 148 (15.49%) and antiulcer class of medicines 77 (8.06%).[9]

In our study, amikacin and ampicillin is most commonly used antibiotic combination (12.9%), followed by combination of amoxicillin and clavulanic acid (9.2%), piperacillin and tazobactum (6.57%), ceftriaxone and amikacin (6.19%), amoxicillin and amikacin (4.19%). The usage of antibiotic combinations was different when compared to study conducted by Ashraf H et al, in which Cefotaxime in combination with Sulbactum was at the top i.e. in 29 (38.65%) prescriptions. Amoxicillin with Potassium clavulanate was administered to 19 (25.33%) of the total patients, given in combination.[8]

As the study was conducted in inpatients of paediatric ward, parenteral route was the most commonly preferred route, followed by oral (37.2%)

and inhalational (5.3%) routes. In the study conducted by Ahmad Najmi et al, orally administered drugs contributed to the highest proportion of drugs prescribed with 78.16% of total drugs. Parenteral drug preparations were 14.99%. Inhalational preparations were given to patients with pneumonia by nebulization.[10] The average number of drugs per prescription was 5.75, which is nearly same compared with study done by Vishwanath M et al, performed in department of Paediatrics at Vanivilas Hospital in June 2012 where it was found that the average number of drugs per prescription was 5.69.[11]

The percentage of encounters in which antibiotics were prescribed in our institute was 92.1%, which was very high compared to the standard (20.0%-26.8%) derived to be ideal[12] and it was also higher than other studies conducted in Khartoum Hospital in 2010, Yavatmal in Central India 2012, and Ajmer (Rajasthan) India 2013 which were 81.3%, 78.15% and 77.42% respectively.[13-15]

The percentage of encounters in which an injection prescribed was 98.2 which was very higher than the standard (13.4%-24.1%) derived to serve as ideal. Optimal percentage of encounters with injection found by Al Balushi KA et al was 15%, Nimbagiri S et al was 21.8% and 22.8% was the mean value by the WHO study of 35 country from 1988-2002.[16,9]

In our study, of the total drugs prescribed, 59.37% were by generic name and 40.62% were by brand name, which was lower to the standard (100%) derived to serve as ideal. The study done by Kaur S et al, showed that, among the total drugs prescribed, 45.26% were generic and 54.73% constituted branded drugs.[17]

In the study done by Ajapuje et al, a total of 665 (81.69%) drugs were included in the model list of essential medicine whereas the remaining 149 (18.31%) drugs could be construed as non-essential. This finding was higher than that of our study where 58.33% drugs were from the Essential Medicine WHO Model List.[14]

## Conclusion

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. Further large scale studies are required at other tertiary care centres will help to compare, analyse and rationalize prescribing trends in paediatric patients, to give a broader perspective to these findings.

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