

Prescription pattern of antimicrobial drugs in pediatrics outpatient department of a tertiary care teaching hospital of North India

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ABSTRACT

Background: The pediatric population comprises of 20-25% of the total world population, and numerous acute and chronic diseases can effect this sub population. Antibiotics are among the most frequently prescribed classes of medications for children.

Methods: The study is prospective interventional study carried out in the pediatric outpatient of the MIMS for a period of 3 months (September-November 2013+1 month for analysis).

Results: Most (84%) children were given single antimicrobial agent and 16% were given more than one antimicrobial or fixed dose combination of the antimicrobial agent. Amoxicillin (48%), erythromycin (20%) and cefixime (16%) were found to be the most frequently used antibiotics.

Conclusions: The high percentage of prescriptions involving antimicrobials observed in MIMS requires rational use of antimicrobials and judicious prescribing. It should be followed by the appropriate use of the selected medicine from the NLEM with frequent update of information. The implementation of antibiotic policy and treatment guidelines with periodic assessment of the clinical pharmacologist in the study area is very important in order to monitor the clinical use of these medications.

Keywords: Antibiotics, Pediatric patients

INTRODUCTION

The pediatric population comprises of 20-25% of the total world population, and numerous acute and chronic diseases can effect this sub population. Antibiotics are among the most frequently prescribed classes of medications for children.¹ Previous studies have estimated that 150 million ambulatory visits result in an antibiotic prescription annually, including 30 million prescriptions for children.^{2,3} However, the threat of antibiotic resistance among children is a cause for concern. Effective medical treatment of pediatric patient is based on accurate diagnosis & rational treatment of the medical condition. Infant & children are the most susceptible group to contact infection. According to the National Ambulatory Medical Care Service antibiotic are the second most commonly used drugs in the country.⁴ The choice of antibiotics for infants and children is usually empirical. The antibiotics are more effective and play an important role in management of infectious diseases if the diagnosis is accurate. However, they can lead to many

serious consequences ranging from super infection such as toxic mega colon, pseudo-membranous colitis, and more seriously also lead to emergence of multidrug-resistant micro-organism which is expected to cause more serious infections. Now a day's many pediatric physicians include antibiotics in their prescribing pattern without considering it, to be rational or irrational. Therefore, an effective step should be taken for rational and effective use of antibiotics, especially in the pediatric population.^{5,6}

Prescribing drugs is an important skill which needs to be continuously assessed and refined according to the need of the individual and society. Prescription behavior is influenced by many factors such as unethical drug promotion, lack of knowledge, individual inexperience with the more efficacious drug, direct manufacturer to consumer advertising, and unavailability of drugs. Hence, there is always a chance of irrationality in the prescription. The assessment of the prescription will helps to know the attitude of the physicians toward prescribing and to provide rationality in the

prescription. Thus, rational prescriptions help the physician to upgrade the knowledge and improves attitude toward selecting the most appropriate cost-effective treatment.⁷

Mayo institute of medical sciences, 550 beded tertiary care teaching hospital situated in Barabanki, Uttar Pradesh contains two pediatric units with 60 beds. No studies were conducted previously in this hospital regarding the prescription pattern of antimicrobials in the pediatric population. Hence, the present study is taken to know the prescription pattern of antimicrobial in pediatric outpatient. This study hopefully will help to promote the rationality in the prescribing pattern and minimizing the errors in the prescriptions.

METHODS

This study is prospective interventional study carried out in the Pediatric outpatient of the Mayo institute of medical sciences hospital for a period of 3 month (September-November 2013+1 month for analysis). Prior consent was obtained by the Institutional Ethical Committee, Mayo institute of medical sciences.

Study criteria

Inclusion criteria

1. All pediatric patients from the age group of 1 month-16 years.
2. Prescription containing antimicrobial agents.

Exclusion criteria

1. All pediatric patients in the Pediatric ICU.

Data collection and management

Sample size

The Sample size of the study was 140 (n=140).

Source of data

Prescription orders.

Sampling technique

Systematic random sampling technique was followed for data collection.

Source of data

Data were obtained from the prescription from the OPD of Pediatric Department.

Material used

A well-designed patient data collection form was developed with the help of the consulting pediatrician, trained pharmacist & the faculty members of the Pharmacology Department of the College & Hospital.

Statistical analysis

Descriptive analysis was used in the statistical analysis of the data.

RESULTS

Demographic data

Of the total (n = 140) pediatric patients who attended the OPD of the Department of Pediatrics 86 (61.43) were males and 54 (38.57%) were females. 57 (40.7%) of the children were toddlers (age in between 1 and 3) followed by 28 (20%) school children (age in between 6 and 10) and 55(39.3%) adolescents (age in between 11 and 14) (Figure 1).

Prescription data

Most (84%) children were given single antimicrobial agent and 16% were given more than one antimicrobial or fixed dose combination of the Antimicrobial agent. Amoxicillin (48%), erythromycin (20%) and cefixime (16%) were found to be the most frequently used antibiotics (Table 1). A study in Nepal too showed the same pattern of antibiotic usage among children clearly indicates clinical diagnosis.⁸ The prescription of antibiotics was mainly based on clinical judgment, 86 (61.4 %) were diagnosed with respiratory tract infection, 39 (27.9%) were suffering from diarrhea & 15 (10.7%) from the urinary tract infection.

Average number of drugs per prescription was 2.78 ± 0.63 . The average cost of the prescription was Rs 76.23 ± 6.83 per prescription while the cost of antimicrobial was

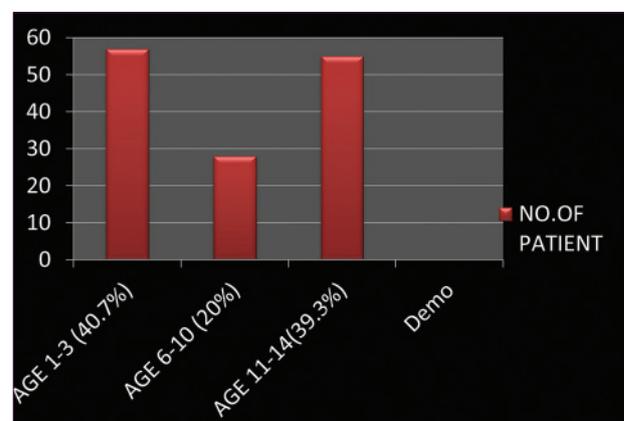


Figure 1: Demographic data.

Table 1: Uses of different antibiotics in pediatric patients*.

Diagnosis	Amoxicillin	Erythromycin	Cefixime	A+C	C+C	Cipro	Metro	Total
URTI	26	15	11					
LRTI	11	7	7					
Fever	3	3	1					
Diarrhea	-	-	-					
UTI	8	-	5					
Others	12	3	-					
Total	67 (48%)	28 (20%)	23 (16%)					140

Rs 46.48±2.56 per prescription. Polypharmacy (>3 drugs) was found in 16 (11.45%) prescriptions.

DISCUSSION

Prescribing pattern is one of the components of the medical audit which help the prescribers to prescribe rational & cost-effective prescription. Antimicrobials represent one of the most commonly used drugs.⁹ Their irrational use leads to a number of consequences in term of cost, drug interactions and hospital stay along with increased probability of bacterial resistance toward the commonly used drugs.¹⁰ In this study, it was found that there was adequate use of antibiotic and injectables prescription compared to similar studies conducted in other part of the world. The percentage of antibiotic in prescriptions containing one or more antibiotic in the study area was consistent with the study conducted in United States, Nepal, Srilanka and India, but the result was generally higher compared to other studies^{10,11} and the WHO guideline.¹² The percentage of antimicrobial prescription in Toddlers was relatively higher compared to school children and adolescents which may be due to their more curious behavior & low level of immunity or may be due to physician behavior in^{13,14} ordering medication in association with age; diagnostic and clinical investigation factors, and variability in patient complaints and over conscious attitude of the parents. This result was consistent with the study conducted in Italy.¹⁵ The majority of common childhood illnesses are caused by viruses which do not require antibiotics. The proportion of antibiotic prescription was 79.4% in the present study as against the WHO recommendation of 20% antibiotic use for these common childhood illnesses. The mean number of injection prescribed per-prescription in the study area showed the burden of injectable prescription on pediatric population compared with the mean of antibiotics prescription in the same population. The mean number of generics prescribed per-prescription in the study area showed that not all drugs were prescribed by generic prescription. The WHO guidelines recommend 100% generic prescription.¹² The mean of antibiotics prescribed from NLEM of India showed that not all the antimicrobials included from the NLEM of India. A mono drug prescription in the retrospective study was found to be consistent with the study conducted in Nepal¹⁵ and the

WHO guidelines.¹⁷⁻²⁰ The frequently of single antibiotic prescription was consistent with other studies and the WHO guidelines.¹⁶ The frequency of multiple antibiotic prescriptions in the study area was consistent with other findings in which combination of ampicillin with gentamicin was the most frequent.¹⁶ Majority of antibiotic combinations were prescribed based on infectious disease guidelines. No potential drug interaction was reported. Most of the multiple prescriptions were considered as producing minor drug interactions. Such drug interactions have only limited clinical effects. Manifestations may include an increase in the frequency or severity of the side-effects, but generally would not require a major alteration in therapy. In the rest of the cases of multiple drug interaction, the interactions are considered unknown, but it does not mean that they have no drug interaction at all. The use of antibiotics in male pediatric patient was found a higher than the female pediatric patients, which was inconsistent with similar study conducted in Rome, Italy, where no statistically significant differences by sex were noted.¹⁴ The use of antibiotic by pediatric age category was found to be significant in our study (Pearson Chi-square $p=0.042$). The availability of a set of key antimicrobial drugs in the hospital stores on the day of the study was comparable to the study conducted in other parts of the world.

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 drugs prescriptions, the potential of drug-drug interaction, and percentage of hospital stay with one or more antibiotics in pediatric population. In general, we can conclude that there was:

- High percentage of antibiotics and Injectables were used.
- High percentage of drug and antibiotic were used in children.
- Amoxicillin was the most frequently prescribed single antibiotic while 'ampicillin injection+gentamicin' was the most frequently prescribed combined antibiotics.

Overall, there was poor generic prescription but promising antibiotics prescriptions containing drugs from NLEM and the WHO guidelines.

Recommendations

The high percentage of prescriptions involving antimicrobials observed in MIMS requires rational use of antimicrobials and judicious prescribing. It should be followed by the appropriate use of the selected medicine from the NLEM with frequent update of information. The implementation of antibiotic policy and treatment guidelines with periodic assessment of the sensitivity pattern of pathogenic organisms is recommended. The role & responsibilities of the clinical pharmacologist in the study area is very important in order to monitor the clinical use of these medications and to tackle associated factors. The WHO.¹⁷⁻²⁰ and the health & family welfare department of the Govt. of India should provide further updates and guidelines on the judicious use of antimicrobials in hospitals, especially in the pediatric population.

Antibiotics are frequently prescribed for children for viral conditions such as common colds, URIs, bronchitis, rotavirus, and diarrhea despite their non-recommendations. This study confirms that the overuse of antimicrobials for these common conditions is widespread, prevalent in all medical specialties without being influenced by demographic profile or financial status of the patient.^{21,22} The manner in which the antimicrobial agents are prescribed by the pediatric physician needs some broad studies about physician decision making and patient health-seeking behavior. Efforts to improve antibiotic-prescribing practices should target all physicians and parents who care for children and teenagers.

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