

Assessment of drug prescribing practises in paediatric patients in a secondary care teaching hospital

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ABSTRACT

Background

Paediatrics is a branch of medicine dealing with disease and disorder of children. These age groups are a unique population and the most vulnerable ones, as their body undergoes radical changes during this period. Inappropriate prescribing of drugs is recognized as a widespread health care problem and is mostly affected by the children.

Objective

The objective of the study was to identify and analyze the current drug prescribing patterns in paediatric patients by using NFI, thereby reducing the drug related problems that they encounter during the treatment period.

Methods

The proposed prospective, observational study was conducted over 210 in-patients of the Paediatric Department in K.C. General Hospital, Bengaluru for a duration of six months.

Result

A total of 1267 drugs were obtained from 210 sample prescriptions which mainly comprises antibiotics (29.9%), followed by antipyretics (15.8%). The most commonly prescribed antibiotics were found to be Aminoglycosides (51.1%) & Cephalosporins (43.7). Lower Respiratory Tract Infection (19%) was identified as the prevailing diagnosis among the children within the age group of 1 - 3 years (29%). Prescribing errors as well as drug interactions were encountered with 17.6% and 40%.

Conclusion

Our study concluded that in most of the prescriptions, generic drugs were commonly prescribed over branded drugs and antibiotics were the most prescribed class of drug, contributed mainly by aminoglycosides. None of the patients were found to be affected with the possibly identified potential drug interactions during the study period. Hence, the current prescribing pattern was ascertained as rational.

Keywords: Paediatric, Drug prescribing pattern, Rationality

I. INTRODUCTION

Prescribing practice evaluates the skill of healthcare professionals to choose the best drug for patients among all the available options. ⁽¹⁾ Prescription pattern studies are powerful and an investigative tool to discover and examine the prevailing disease traits and drugs used in a healthcare system. ^(2&3)

The Prescription analysis aids to:

- Promote rational use of drugs
- Prevent antibiotic resistance
- Contribute cost benefit analysis of drugs
- Make drug policy by policy makers
- Reduce medication errors (ME), morbidity and mortality. ^(3&4)

Prescribing is anticipated to be sensible, suitable, and safe. Effective medical care is the ultimate goal in developing countries like India, thus in view of these facts our analysis is proposed to assess the drug prescribing practices in the paediatric department at a secondary care hospital. ⁽²⁾

Children comprise about 40% of the Indian population and are prone to recurrent non-serious illness. ⁽¹⁾ Age group identified by the ICH on pharmacokinetic (PK) and physiological difference is as follows:

- Preterm new-born infants
- Term new-born infants (0 – 27 days)
- Infants and toddlers (1 – 23 months)
- Children (2 – 11 years)
- Adolescent (12 years – 16-18 years (region dependant)) ⁽⁵⁾

Use of medicines in paediatric patients is complex compared to adults. The organ body system and enzyme of a child grows at a different rate and therefore drug dosage, formulation, response and adverse drug reactions (ADR) affect them rapidly. Various factors that contributes to this radical changes in paediatrics are dynamic maturation process (physiological and pharmacological changes), high extracellular body fluid and total body water, poor hepatic and renal elimination capacity, differences in the metabolic

pathways and increased drug sensitivity/toxicity in children when compared to adults ⁽⁶⁾

Inappropriate prescription is recognized as a worldwide health care problem and paediatric patients being the most affected. ⁽⁷⁾ There is a lack of licensed medication for the paediatric population because of its extreme diversity that extends from new-born to adolescent with regard to organ development, body weight, metabolism, skin maturation etc. Thus, it is difficult to come up with one formulation that can provide safe and effective medication to all age groups. ⁽⁵⁾

Paediatric drug administration basically requires special knowledge and experience, as these doses are prescribed in an amount that is not commercially available. ⁽⁸⁾ Differences in physiology, PK and pharmacodynamics (PD) between adults and children must be studied thoroughly for selection of paediatric dose. Scarcity of PK and physiological data, limits the ability to determine accurate drug dosage in children. ⁽⁹⁾ Dose fixing is an issue considering clinical perspective and drug development standpoint. ⁽¹⁰⁾ Drug dose can be calculated using age-based, bodyweight-based and body surface area (B.S.A) based regimen. ⁽¹¹⁾

In order to be rational, the drug prescribed must meet the needs of patients in a dose that fulfils the individual needs for an adequate period at a reasonable price without affecting patient safety. ⁽¹²⁾ Most common causes of irrational drug usage in paediatrics are use of non - indicated drugs, prescribing expensive drugs, multi-prescribing, and overuse of antibiotics. This leads to unproductive treatment, prolongation or worsening of disease, pain and damage to the patient along with some serious side effects later. ^(8&3)

Drug related problems (DRPs) are defined as a condition or an event that potentially or actually tampers the treatment regimen with

achieving a healthy outcome. ⁽¹³⁾ DRPs are classified as ADRs, noncompliance with treatment, ineffective treatment, inappropriate use of the drug, drug interaction (DI), drug intoxication, technical defect and drug dosing problems. ⁽¹⁴⁾

Therefore, the ultimatum of our study is to analyze the prescribing practices in the paediatric patients in order to identify prevailing disease traits, drugs prescribed, ADRs, dosage form, routes of administration and DRP among them.

II. SUBJECTS AND METHODS

This observational, prospective study was conducted at paediatric in-patients department at K.C.General Hospital, Bengaluru for a period of six months from September 2019 to February 2020. Paediatric in-patients within the age group of 28 days to 12 years were incorporated in the study, whereas children above 12 years of age as well as paediatric out-patients were excluded.

The objectives of the study were to identify and analyze the current drug prescribing patterns in paediatric patients and to check for the rational use of drugs in prescribing regimen. Clinical data were obtained from 210 in-patients of Paediatric department using patient profile form, medication error reporting form and ADR reporting form. The results are formulated by using MS - Excel.

III. RESULTS

Among 210 sample prescriptions, male paediatric in-patients (59%) were more in number when compared to females (40.9%). Children with the age group of 1 - 3 years contributed 29% of all prescriptions analysed, followed by infants < 1 year of age 21.9% and children > 11 years of age (12.8%) as depicted in Table 1.

Parameters	No. of patients
Gender	
Male	124
Female	86
Age	
<1 yrs	46
1 – 3 yrs	61
3 – 5 yrs	23
5-11 yrs	80

Table 1 - Patient Characteristics

Disease prevalence among paediatric patients was predominantly of pulmonary origin. Lower respiratory tract infection (LRTI) (19%)

being the most prevalent, followed by pneumonia (14%), fever (10%) and acute gastroenteritis (9%) as shown in figure 1.

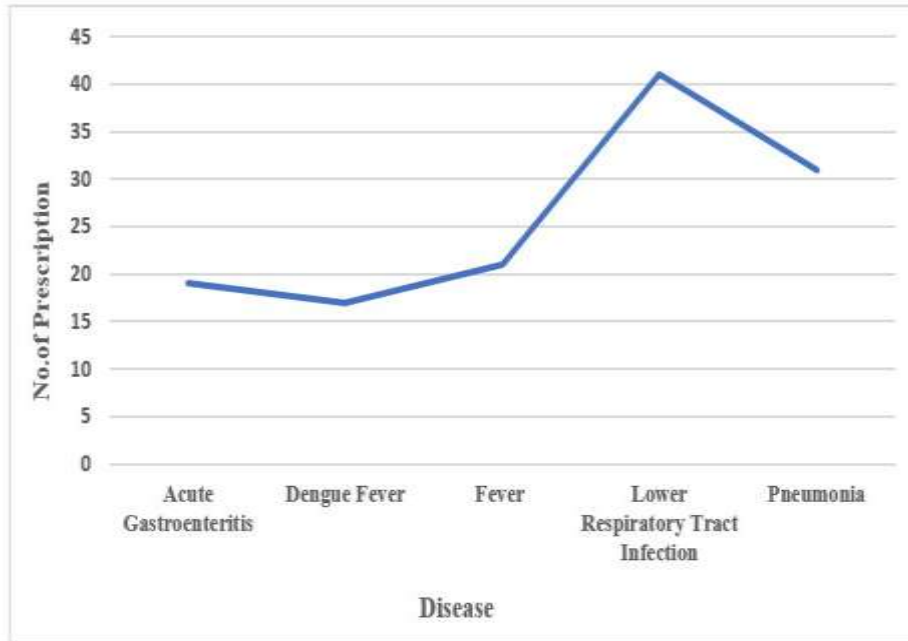


Figure 1 - Disease Distribution

A total of 1267 drugs were identified from the prescription. 73% of prescriptions were contributed by generic drugs over branded drugs. Drug distribution shows 24.2 % patients were prescribed with 5 drugs and 22.8% patients were

prescribed with 6 drugs. Antibiotics (29.9%) were identified as the most prescribed class of drugs, followed by antipyretics (15.8%) and bronchodilators (13.3%) respectively. (Figure 2)

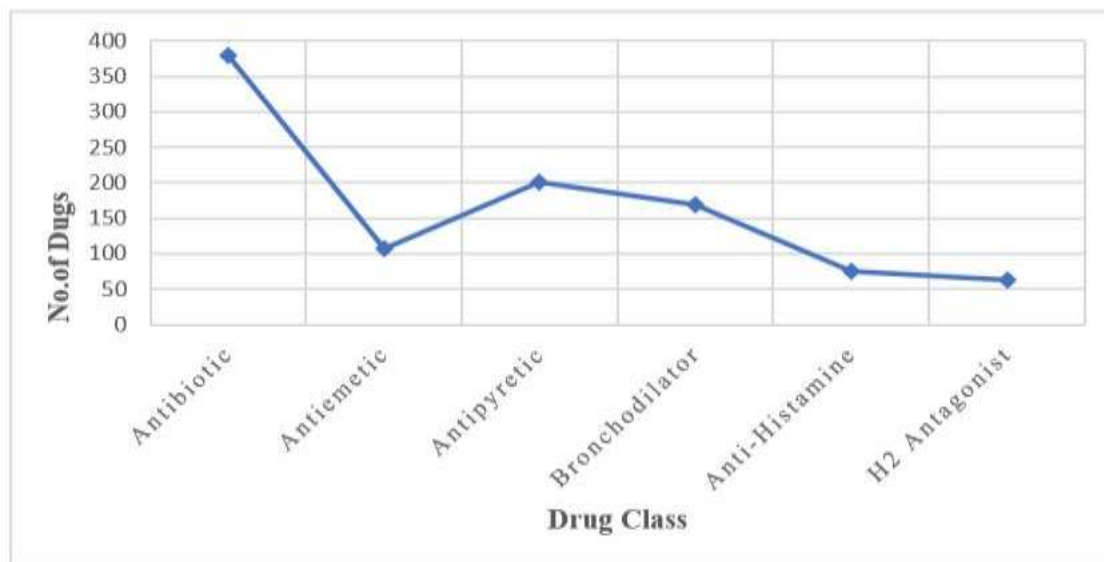


Figure 2 Category of drugs

Aminoglycoside (51.1%) as well as cephalosporin (43.7%) were the most often used antibiotics in paediatric patients. Fixed dose combination contributed 22.8% of all pediatric prescriptions. Among these Amoxiclav (Amoxicillin + Clavulanic acid) was the most

sorted one, followed by Piptaz and Pipzo (Piperacillin + Tazobactam) (Table 2). About 48.4 % of drugs were administered through parenteral route and therefore injectables were the most common dosage form administered as shown in figure 3.

Drug Characteristics	
No. of drugs/prescription	Frequency (n=210)
4	24
5	51
6	48
7	32
8	25
Type of antibiotics	Frequency(n=311)
Cephalosporin	136
Aminoglycoside	159
Fixed Dose Combination	50
Fixed dose combination	Frequency (n=50)
Amoxiclav	37
Piptaz	11
Pipzo	2
Drugs Prescribed	Frequency (n=1267)
Generic	928
Brand	339

Table 2 Drug Distribution

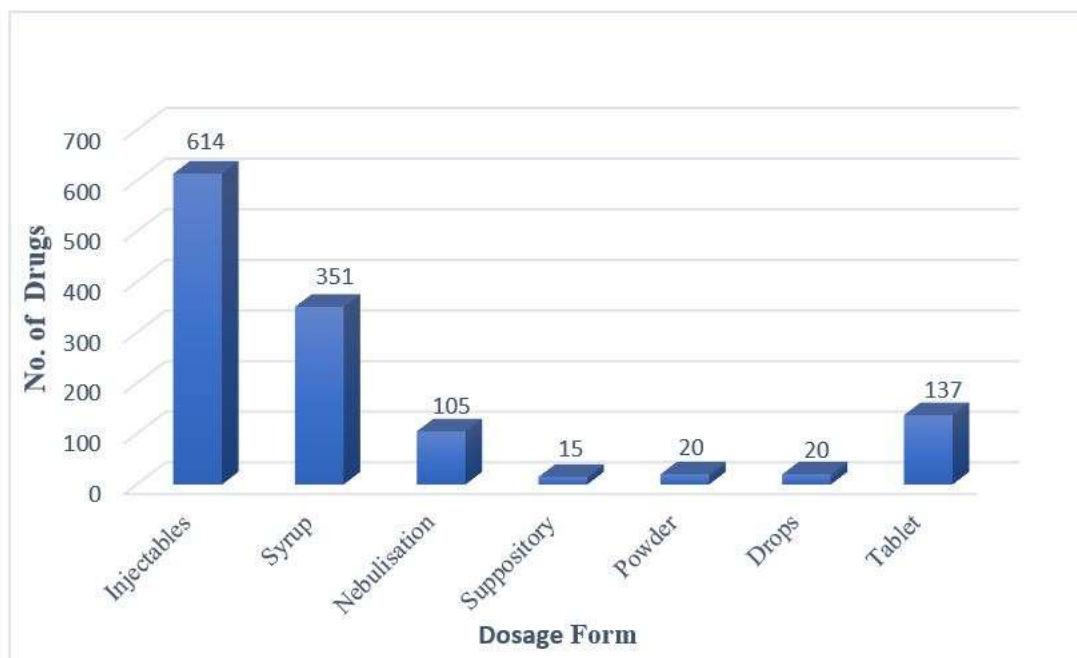


Figure 3 Dosage forms

Rationality

Patient files with irrational drug charts were merely identified. Drugs prescribed for the improper indication were found to be 11.9% and with the wrong dose contributed to 7.14%. About 1.42% prescriptions were indicated with improper route of administration, whereas wrong frequency contributed to 2.85%.

Out of 210 sample prescriptions, 80 prescriptions (40%) contained DI's. Inappropriateness in treatment was observed in 30 prescriptions (14%). Prescribing errors were identified in 37 prescriptions (17.6%) but only 3 prescriptions (1.42%) showed ADRs. Dosing problems were encountered in 15 prescriptions (7.14%).

A total of 111 pDDIs were identified in 84 prescriptions. Drug interactions were of mild severity (45.9%), followed by major (40.5%) and moderate severity (13.5%) respectively. Frequently encountered major interaction was Domperidone + Ondansetron, moderate interaction was Acetaminophen + Phenytoin and minor interaction was Amikacin + Amoxicillin.

IV. CONCLUSION

Our study concluded that in most of the prescriptions, generic drugs were commonly prescribed over branded drugs and antibiotics were

the most prescribed class of drug, contributed mainly by aminoglycosides. None of the patients were found to be affected with the possibly identified potential drug interactions during the study period. Hence, the current prescribing pattern was ascertained as rational

V. DISCUSSION

Paediatrics being a unique population undergoes significant changes in their body during the developmental stage. Hence, analysis of drug prescribing patterns in paediatric patients is inevitable to ensure the safe and effective use of medication in them.

In our study, a total of 210 patient files containing drug charts were retrieved and analysed. The proportion of male paediatric in - patients (59%) was higher than females (41%). Results of the current study were similar with the findings of Venkateswara Murthy.N et al., where the proportion of male population was 57.9%.⁽¹⁾

LRTI (19%) and pneumonia (14%) were the most prevalent diseases identified during the analysis which coincides with the results obtained from Neelkanth Reddy patil et al., where RTI (Respiratory Tract Infection) was identified as the most common disease contributing to 34.2% out of all the prescriptions.⁽¹⁵⁾

A total of 1267 drugs were prescribed within the 6-month study period, where- Generics drugs (73%) were most commonly prescribed over branded drugs (27%) this result contradicted with Neelkanth Reddy patil et al., where branded drugs (69.9%) were prescribed more over generic drugs (30.10%).⁽¹⁵⁾

Antibiotics (29.9%) were the commonly prescribed medicine. Aminoglycoside (51.12%) and cephalosporins (43.7%) were the most sorted ones among antibiotics. The findings of our study were in accordance with Choudhury DK et al., in terms of antibiotics as the most prescribed class and cephalosporin(41.5%) as the most common antibiotic.⁽¹⁶⁾

As per study conducted by Tadele Atinafu et al., parenteral (49.18%) were the most commonly used route of administration followed by oral (32.97%) and rectal (7.65%) drug administration which is proportionate to the results of our study where parenteral (48.4%) was identified as most regularly used route, followed by oral (40.1%) and rectal (9.6%) drug administration respectively.⁽¹⁷⁾

Micromedex was used to identify DI throughout the study. Most of the interactions showed a minor interaction (45.9%), followed by major (40.5%) and moderate interactions (13.5%). In contradiction to our study, Henok Getachew et al., observed that moderate interaction (50%) contributed the most, followed by major (42.7%) and minor (7.2%) interaction respectively.⁽¹⁸⁾

The study also evaluated the Rationality, ME, and DRP during the study period and 11.9% prescriptions showed wrong indication and 7.1% prescriptions showed dosing errors. This contradicts the study conducted by Rainu Kaushal et al., which showed 34% of dosing errors.⁽¹⁹⁾ Dosing errors identified during the study include 8 underdose and 7 overdose prescriptions; this is in contrast to the study conducted by Lidhu Daniel et al., where 44 overdose and 13 underdose were identified over 150 prescriptions. This was mainly due to the absence of dose calculations based on patient weight. We found out 19 incomplete prescriptions which included prescriptions without weight, frequency, route of administration etc and 18 prescriptions were illegible.⁽¹³⁾

Evaluation of study population pinpointed 3 ADRs, contributing to 1.42%. These results contradict with the study conducted by Lidhu Daniel et al., where 8 ADRs were identified, contributing to 5.33%.⁽¹³⁾

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