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The prescribing pattern of drugs in pediatric patients of a tertiary care hospital

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ABSTRACT

Background & Objective

Worldwide infants and children represent a higher proportion (28%) of the population. The rational use of medications for infants and children is a worldwide concern, and is therefore prominent among health care professionals. The present study was carried out to evaluate the current drug usage pattern in pediatric patients of teaching hospital in south India. *Methods:* A prospective observational study was carried out on 100 subjects executed for six months. Data were collected from patient case sheet and analyzed for the WHO indicators and drug interactions. *Results:* The gender distribution of the 100 evaluated patients in the study were; 45 female and 55 male. The mean age was found to be 4 years (range: 0–12). Average hospital stay of study population was 5 days. The distribution of various diseases in study population were CNS (5), anemia (13), respiratory system (15), infectious diseases (57), fever (10) and other diseases (9). Most of the study population diagnosed with infectious diseases. The study population most frequently prescribed with antibiotics (50.7%). Ceftriaxone and paracetamol were the leading prescribing drugs. Average number of drugs per prescription was 3.9. The drugs prescribed by generic name were 18.7 %. The average consultation time was found to be 6.2 minutes. The average numbers of parental, antimicrobial and total drugs costs per prescription were 165,176 and 201(INR) respectively. The study population contains 12 minor and 32 moderate drug interactions. *Conclusions:* Our study highlighted some rational prescribing practices a lower dispensing time and higher consulting time resulting in knowledge of correct doses and hence of improved compliance. Some areas of concern were polypharmacy, higher antimicrobials cost, higher rate of antibiotics prescribing, prescribing by brand names and no hospital formulary.

Keywords: Prescribing pattern, Pediatric patients, Tertiary care hospital.

INTRODUCTION

Worldwide, infants and children represent a higher proportion of the population. 28% of the world's total population is accounted by Children younger than 15 years of age[1]. Pediatrics is among the most vulnerable population group of infectious diseases. Since pharmacodynamic and pharmacokinetics are different in children, which often make them more susceptible to various drug related problems[2].

The rational use of medications is a worldwide concern, and is therefore prominent among health care professionals. Concerted efforts to readjust pharmaceutical actions and practices aiming at the rational use of medication are essential in today's society, in which drugs are the most used therapeutic resource. Aiming to evaluate the conditions of the services offered to the population concerning medication, the World Health Organization (WHO) developed Medication Use Indicators, which can help the Heath Care Centers to obtain better organization and improve healthcare attention to the public[3, 4].

Studies to measure drug use will vary from setting to setting. The nature and design of such studies will depend on many factors; broadly they will fall into four broad categories (describing current treatment practice, comparing the performance of individual facilities, periodic monitoring of specific drug use behavior and assessing the impact of an intervention) [4].

Considering the above fact this study was mainly subjected

- To assess the patients diagnostic details.
- To assess the various classes of drugs prescribing in pediatric inpatient wards
- To assess the various classes of antibiotics prescribing in the department.
- To assess the prescribing, patient care and facility indicators at pediatric department.
- To assess the drug interactions.

MATERIALS AND METHODS

Study design & settings

A prospective study was conducted in the pediatric wards of Shri B.M. Patil medical college hospital and research center. Hospital provides primary and specialized health care facilities to people in and around Bijapur district.

Patients

All patients admitted to the pediatric wards were screened for eligibility to enter the study. The participants included in the study were all the inpatients admitted to pediatric wards either male or female below the age of 12 years. The participants excluded in the study were all the out patients and inpatients above the age of 12 years.

Source of data

Patient case file (consist demographic, medical and medication details), Truven Micromedex online database and Stockleys Drug-Drug Interactions text book.

Sample size

Thirty patients from pediatric department were included in the pilot study to check the validity of questionnaire and to calculate the sample size. In the pilot survey at 99% confidence interval the average drugs per encounter availed by the 30 patients was 3.90 ± 0.797 with ± 0.2 error. Including 0.79 as standard deviation the sample size obtained was 104

W.H.O. core drug use indicators

To investigate the drug use in health facilities, World Health Organization introduced core drug indicators. They were prescribing, patient care and health facility indicators.

Study design

A prospective study with the sample size of 104 study participants was carried out for a period of six months (April 2014 to September 2014).

Data collection

Data from each patient collected by either interview or patient case file or both of the above. The data collected from the each Patient was documented in patient data collection form (attached in Annexure) designed according to the study objectives. Data regarding drug interactions collected from Micromedex online data base and Stockleys Drug-Drug Interactions text book.

Data evaluation and analysis

The demographic details and distribution of diseases in the study participants were analyzed. Intravenous fluids and herbal products were excluded from this study. The collected patient data subjected for prescribing, patient care and health facility indicators. Verification of potential drug interactions was carried out using the software Truven Micromedex database and Stockleys Drug-

Drug Interactions. The collected data will be analyzed with suitable statistical methods with the use of standard reference resources to obtain the results.

RESULTS AND DISCUSSION

The demographic characteristics of study participants are summarized in Table 1. The gender distribution of the 104 evaluated patients in the study were; 45(43.5%) female and 59(56.5%) male. Age wise distribution of the patients were 0-3 years 57(54.8%), 3-6 years 27(25.9%), 7-9 years 11(10.6%), 10-12 years 9(8.7%).The mean age of 104 evaluated patients was found to be 3.9 years (range: 0–12 years).

The distribution study populations with various diseases were summarized in table 2. The study participants' diagnosis contains 48% infectious diseases, 16.4% respiratory diseases, 12.5% anemia, 9.6% fever, 5.8% CNS and 9other diseases (8.6%). The results confirmed that infectious diseases occupied major portion in paediatric study population which is similar to previous Indian studies.[5, 6]

The distributions of various drugs in the study population were summarized in Table 3.

The study population mostly prescribed with antibiotics (50.7%) followed by antipyretics (19%), bronchodilators (11.9%), anemia supplements (4.7%), proton pump inhibitors (1.3%), antihistamines (1.3%) and other drugs (11%). The results confirmed that antibiotics occupied major portion in prescribed drugs followed by antipyretics and nasal decongestants which is similar to previous Indian studies. [6, 7, 8, 9.]

The table 4 indicates most of the study participants prescribed with paracetamol (24.3%) followed by ceftriaxone (18.9%), Amikacin (14.7%), ORS (5.9%), salbutamol+ ipratropium (5.9%), zinc supplements (3.3%) and others (27.4%). The results confirmed that paracetamol occupied major portion in prescribed drugs followed by ceftriaxone which is similar to some Indian studies.[5, 10]

The Table 5 indicates the drug prescribing pattern of physicians in various diseases. The results confirmed that prescribed drugs were appropriate for such conditions.

The drug use indicators for the study participants were summarized in table 6.Average number of drugs per encounter in study population was found to be 3.9.[9, 10]

Percentage of drugs prescribed by generic name was 18.7% which is higher than some Indian studies.[5,10] Percentage of encounters with an antibiotic and injection were 91.2 and 92.4. Average mean days of hospital stay for study participants were found to be 5. Percentage of drugs actually dispensed was 94.5%. Average consultation & dispensing times were 6.2 and 1.7 minutes. Which is not similar to some studies.[5] Copy of formulary and essential drug lists were not available in the hospital. Key drugs were available in pediatric wards. Average numbers of antimicrobial, parental and total drugs costs per prescription were 166, 176.9 and 201.8 INR. [5]

The study population observed with 44 drug interactions (minor 12, moderate22). Top four drug interactions were listed on the table 7.

Table 1: Patient demographic characteristics

Characteristics	Results
No. of evaluated patients	**100**
Female	45 (43.5%)
Male	59 (56.5%)
Age (yrs.)	
00-03	57 (54.8%)
03-06	27 (25.9%)
06-09	11 (10.6%)
09-12	09 (8.7%)
Mean age	3.9

Table: 2 Distribution of diseases in study population

Diseases	0-3	3-6	6-9	9 -12
TOTAL				
Infectious diseases 50 (48%)	27	14	5	4
Respiratory diseases 17 (16.4%)	9	4	3	1
Anemia 13(12.5%)	6	1	3	3
Fever 10 (9.6%)	7	3	0	0
CNS diseases 05 (4.8%)	2	2	0	1
Others 09 **(**8.6%)	6	2	1	0

Table: 3 Distribution of various classes of drugs in study population

DRUG CLASS	RESULT
Antibiotics	841(50.7%)
Cephalosporin's	439
Amino glycosides	245
Penicillin's	40
Others	117
Anti-pyretic	316(19 %)
Bronchodilators	197(11.9%)
Anemia supplements	78 (4.7%)
Proton pump inhibitors	21 (1.3%)
Anti-histamines	20 (1.3%)
Other	183 (11%)
Total	1656

Table: 4 Top 6 frequently prescribed drugs in the study population

DRUGS	FREQUENCY (%)
Paracetamol	403 (24.3%)
Ceftriaxone	311 (18.9%)
Amikacin	243 (14.7%)
Oral rehydration salts	99 (5.9%)
Salbutamol + ipratropium	91 (5.5%)
Zinc supplements	54 (3.3%)
Other	455(27.4%)
Total	1656

Table: 5 Top 10 diseases drug treatment schedule

S. No	Disease	Frequency	Prescribed drugs (No.)	Disease wise Prescribed drug's Distribution (%)
1	Acute gastroenteritis	15	299	Amikacin- 66(22%), ORS -59(20%) Ceftriaxone - 57(19%) Paracetamol -52(17%) Zinc - 21(7%) Ofloxacin -18(6%) Others -26(9%)
2	Enteric fever	16	258	Cefuroxime 75(29%) Paracrtamol 54(21%) Amikacin 41(16%) Salbutamol+ipratropium 36(14%)

				Others	53 (20%)
3	Anemia	13	132	Cefuroxime	29(22%)
				Folic acid	21(16%)
				Paracetamol	18(13.6%)
				Amoxicillin	16(12%)
				Others	48(36%)
				Amikacin	54(20.8%)
4	Bronchitis	14	259	Ceftriaxone	45(17.4%)
				Salbutamol+Ipratropium	46(17.7%)
				Salbutamol	29(11.3%)
				Paracetamol	31(12%)
				Others	54(20.8%)
5	Fever	07	130	Paracetamol	45(35%)
				Ceftriaxone	29(22.3%)
				Amikacin	21(16%)
				Nacl	13(10%)
				Others	22(17%)
6	pneumonia	05	123	Ceftriaxone	36(29%)
				Paracetamol	16(13%)
				Amikacin	16(13%)
				Salbutamol+ipratropium	15(12%)
				Others	40(36%)
7	lower respiratory tract infection	06	92	Salbutamol	31(33.7%)
				Paracetamol	21(22.8%)
				Amoxicillin+clavulonic	18(19.5%)
				Amikacin	9(9.8%)
				Others	13(14.2%)
8	Dengue fever	03	143	Ceftriaxone	37(26%)
				Paracetamol	35(24%)
				ORS	30(21%)
				Pantaprazole	21(15%)
				Others	20(14%)
9	Upper respiratory tract infection	03	42	Ceftriaxone	12(28%)
				Paracetamol	11(26%)
				Sodium chloride	7(17%)
				Amikacin	6(14%)
				Others	6(14%)
10	Malaria	03	61	Quinine	22(36%)
				Cefotaxime	22(36%)
				Paracetamol	12(28%)
				Others	5(8%)
Others		**19**	**117**	_	
Total		**104**	**1656**	_	

Table 6: Drug use indicators

Parameter	**Result**
Prescribing Indicators	
Average No. of drugs Per encounter	3.9%
Percentage of drugs Prescribed by generic name	18.7%
Percentage of encounters with an antibiotic prescribed	91.2%
Percentage of encounters with an injection prescribed	92.4%

Patient care indicators	
Average consultation time (Mins)	6.2
Average dispensing time (Mins)	1.6
Mean days of hospital stay	5
Percentage of drugs actually dispensed	94.5%
Facility Indicators	
Availability of copy of essential drug list	No
Availability of copy of formulary	No
Availability of key drugs	Yes
Complementary drug use indicators	166
Average anti-microbial drugs cost/Rx:	
Average parental drugs cost /Rx	176.9
Average medicines cost/ Rx	201.8

Table 7: Top four drug-drug interactions

DDI : Frequency		Severity	Clinical effect	Type
Amikacin + Ceftriaxone	- 15	P.K	Moderate	Nephrotoxicity
Gentamicin + Ceftriaxone	-10	P.K	Moderate	Nephrotoxicity
Aspirin + streptokinase	-07	P.D	Moderate	Bleeding
Cefuroxime + Amikacin	-06	P.K	Minor	Nephrotoxicity

ANNEXURE-1

Patient data collection form

Patient demographics

I.P. No.		Body weight:	
Name:		D.O.A:	
Age:		D.O.D:	
Gender:		Ward/Clinic:	
Chief complaints:			

Medication history

Immunization history:	
Past medications:	
Allergic history:	

Laboratory investigations

RBC:		GRBS:		**Other Investigations**
WBC:		Sr. Creatine:		
HGB:		ESR:		
Platelets:		MCH:		
Polymorphs		MCHC		

Diagnosis

Medication chart

S. No	Prescribed drugs		Dose	Indication	Dates of treatment										Cost / Unit	Total cost
	T. Name	G. Name														
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																
11																

12																
13																
14																
15																
16																
Antibiotics cost																
Injections cost																
Total cost of prescription																

PROGRESS NOTE

Drug interactions

S. No	Drugs	Type of interaction	Severity of interaction	Effect	Clinical management
1					
2					
3					

REMARKS

CONCLUSION

The study provides few insights in to the drug use patterns in a pediatric inpatient department of a tertiary care teaching hospital. The most study population belonging to infectious diseases and most prescribed drugs were antibiotics. The study reveals that there is a need of improvement in generic and cost effective prescribing of drugs. The study also reveals that there is a need of clinical pharmacists & Pharmacotherapeutic Committee to maintain hospital formulary and to procure stock and distribute medications in organized and cost effective manner so that they are affordable and available at all the times.

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