

Cross Sectional Prospective Study on Drug Utilization in an Outpatient Pediatric Department of Tertiary Care Teaching Hospital

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Abstract: Pediatric patients form a special group of population and are more vulnerable to the various adverse events related to drug use, it is important to study drug use patterns in pediatric population. To evaluate the drug utilization in an outpatient pediatric department of tertiary care hospital (SRM Medical College Hospital and Research Centre) using WHO prescribing indicators and to assess the prescriptions for the WHO recommended complementary indicators. A cross sectional prospective study was carried out in the pediatric department involving patients up to 12 years of age. Out of 240 prescriptions collected, 680 medicines prescribed were analyzed, in which 85.0% of medicines were prescribed from hospital formulary. Medicines prescribed by generic name were 20% and the percentage encounter with an antibiotic and injection prescribed was 10.6% and 1.5%. Percentage cost spent on antibiotics and injections of the total drug cost was found to be 41.61%, 6.4%. The percentage of prescribing by generic name, percentage of encounter with antibiotic and injections were less. However there was overprescribing of drugs to the outpatients that need a special attention of all doctors and clinical pharmacists to work together to establish a rational and practical protocol for clinical conditions.

Key words: Drug Utilization Review • Hospital Formulary • Pediatrics

INTRODUCTION

In order to have the concept of essential drug program to promote rational drug use, WHO published its report on selection of essential drugs in 1977. Study of drug utilization pattern in a particular setting given an idea about the prescribing practices and characterizes the early signals of irrational drug use. With the help of WHO prescribed drug use indicators and concept of defined daily doses it is possible to compare drug utilization patterns between different settings [1] (Introduction to Drug Utilization Research, WHO; 2003).

Appropriate drug utilization studies are important tools to evaluate whether drugs are properly utilized in terms of efficacy, safety, convenience and economic aspects at all levels in the chain of drug use[2]. Various drug utilization studies have been carried out all over the world but there are limited studies addressing drug use patterns in pediatric population in India.

The aim of this study is to evaluate the drug utilization in the outpatient pediatric setting of a public teaching hospital using WHO recommended prescribing indicators. Apart from this three complementary indicators, cost of drug treatment; percentage cost spent on antibiotic and percentage cost spent on injections are also determined.

MATERIALS AND METHODS

A cross sectional prospective study was carried out in the pediatric department of SRM hospital involving patients up to 12 years of age over a period of 3 months from August 2010 – October 2010. A total of 240 pediatric patients were recruited for the study based on inclusion and exclusion criteria. The data obtained were analyzed for the calculation of the prescription and complementary indicators. The various prescription indicators are

- Average number of medicines per encounter
- Percentage of medicines prescribed from essential drug list
- Percentage of medicines prescribed by generic name
- Percentage of encounters with an antibiotic prescribed
- Percentage of encounters with an injection prescribed

Average cost per day was calculated for drug treatment. The price list obtained from Hospital pharmacy was used as source for finding the cost. The drug cost was calculated in Maximum Retail Price.

Ethical Aspects: The study project was approved by the Research Ethics Committee of the Hospital. The investigators signed a commitment term related to data utilization for the study purposes, ensuring the ethical aspects, according to Resolution

RESULTS

Profile of the Patients: A total of 240 outpatient pediatric patients were recruited in the study. Out of 240 patients 73.3 % (176) were males and 26.7 % (64) were females as shown in Table 1. The mean \pm SEM age of outpatients for male and female were found to be 4.33 ± 0.30 and 4.14 ± 0.49 years, respectively.

Prescribing Indicators: The prescribing indicators were calculated for all the patients to determine the differences in the prescription.

Average Number of Medication per Prescription: Table 2 showed that a total of 680 medicines were prescribed to 240 patients. Mean \pm SEM of medicines prescribed was 2.96 ± 0.68 . Mean \pm SEM of medicines prescribed for male patients were 2.84 ± 0.13 , while for female patients it was 2.81 ± 0.209 .

Percentage of Medicines Prescribed from Hospital Formulary: A total of 578 (85.0%) medicines were prescribed from hospital formulary as shown in Table 3.

Percentage of Medicines Prescribed by Generic Name: Table 4 showed that only 20% of medicines (138) were prescribed by generic name. There was poor tendency of prescribing by generic name and paracetamol, amoxicillin and vitamins constituted the major proportion of medicines prescribed by generic name.

Table 1: Profile of the patients

	Number of patients	Average age \pm SEM
Male	176	4.33 ± 0.300
Female	64	4.1 ± 0.4966
Total	240	4.21 ± 0.41

Table 2: Average number of medication per prescription

No. of drugs per prescription	No. of persons	Percentage
1	16	6.7%
2	96	40%
3	80	33.3%
4	24	10%
5	8	3.3%
6	16	6.7%
Total	240	100

Table 3: Percentage of medicines prescribed from hospital formulary

Drugs prescribed from Hospital Formulary	Drugs prescribed not from Hospital Formulary
578	102
85.0%	15.0%

Table 4: Percentage of medicines prescribed by generic name

Prescription items	Generic (n=138)	Brand (n=522)
Single drug	138	470
Combination drug	0	60

Table 5: Percentage encounter with antibiotics prescribed

Antibiotics	No. of antibiotics	Percentage
Amoxicillin+Clavunallin acid	8	11.1%
Ceftriaxone	28	38.9%
Ampicillin	4	5.6%
Cefotaxime	16	22.2%
Azithromycin	4	5.6%
Amikacin	8	11.1%
Clotrimazole	4	5.6%
Total	72	100

Percentage Encounter with an Antibiotic Prescribed: The percentage encounter with an antibiotic prescribed was 10.6% (72 cases). For the cases where antibiotic was prescribed average number of antibiotic per prescription was one. Antibiotics were mostly prescribed for upper and lower respiratory tract infections as shown in Table 5.

Percentage Encounter with an Injection Prescribed: Use of injection was very low and percentage encounter with an injection prescribed was only 1.5% (10 cases).

Complementary Indicators: Apart from prescribing indicators three complementary indicators were also calculated. Cost calculated is the maximum retail price (MRP).

Table 6: Top ten medicines

Category	Percentage
Paracetamol	17.9%
Anti-asthmatics	13.2%
Vitamins	11.5%
Antibiotic	10.6%
Cough suppressants	9.7%
Antiepileptic	8.5%
Analgesic	6.5%
Antihistamines	4.7%
Anti-ulcer	4.7%
Nasal decongestants	4.1%

Table 7: Diagnostic characteristics of the patients

Diagnosis	Male (n=176)	Percentage	Female (n=64)	Percentage
Dysentery	10	5.68%	2	3.1%
Viral fever	22	12.5%	10	15.6%
LRTI	32	18.18%	12	18.75%
URTI	30	17%	6	9.35%
UTI	14	7.95%	18	28.12%
Hernia	6	3.4%	0	0
Typhoid	16	9.0%	4	6.25%
Asthma	22	12.5%	4	6.25%
Dengue	6	3.4%	0	0
Malaria	8	4.54%	2	3.12%
Seizure	8	4.54%	2	3.12%
Hepatitis	2	1.13%	4	6.25%

Table 8: Utilization of different dosage form

Dosage forms	Number of drugs	Percentage
Syrup	380	55.9%
Tablet	144	21.25%
Capsule	38	5.6%
Oral drops	50	7.4%
MDI	16	2.3%
Sachets	22	3.2%
Suspension	20	2.9%
Injections	10	1.5%

Cost for 680 prescriptions was calculated. It was found that average cost of drug treatment per day was 36.4 Rupees whereas percentage cost spent on antibiotics was 41.61%. Injections accounted for only 6.4% of the total drug cost.

Other Parameters

Top Ten Medicines: During the study it was observed that paracetamol was the most frequently prescribed medicine followed by anti-asthmatic and antibiotic as shown in Table 6.

Usage of Anti-Microbial Agents: Antibiotics were used in 70 cases and five different antimicrobial agents were prescribed. In more than 1/3rd of cases ceftriaxone were prescribed which was followed by amoxicillin and ampicillin+cloxacillin.

Diagnostic Characteristics of the Patients: Lower respiratory tract infection was found most common (18.18%, 18.75%) among the males and females followed by UTI (7.95%, 28.12%, respectively) and viral fever (12.5%, 15.6% respectively) as shown in Table 7.

Utilization of Different Dosage Form: Table 8 showed that a significant number of drugs were prescribed as syrup (55.9%) followed by tablet (21.25%), oral drops (7.4%), capsule (5.6%), sachets (3.2%), suspensions (2.9%), MDI (2.3%) and injections (1.5%).

Prescribing Differences Between Male and Female Patients: On correlating data with respect to male and female patients it was found that there was no difference in prescribing between the two groups with respect to number of drugs prescribed ($p = 0.9406, 0.9099$).

DISCUSSION

The results confirmed that average number of drugs ($5.0 \pm 0.58, 2.96 \pm 0.68$) is higher than the recommended value of 2 [3]. However, this is higher than earlier Indian reports [4]. The average number of drugs in this study matches those previously reported [5, 6] while values under 1.4 have been reported from Sweden [7] and Barcelona [8]. Prescribing by generic name is known to reduce the cost of drug treatment and rationalizing drug therapy. This varies from 13.3-93% across the globe [9]. The results of work conducted in India report this as 73.4% [10] which does not compare very well with the figure (11.11%, 20%) found in this study. One of the reasons for poor prescribing by generic name is the non-availability of the pediatric formulations in the hospital pharmacy. Hence, clinicians often prefer to prescribe by trade names, with which they are familiar and the patients find it easier to procure.

It has been reported that dosage prescribed on TSF basis can lead to under dosing because while the quantity defined as ‘a teaspoonful’ is equivalent to 80 grains or 5.2g of water and the teaspoons available at home vary in size [11]. Because 59.2%, 55% medications were prescribed as syrups, this is an area of major concern. Prescribing dosage as ml and use of syringe or graduated caps to measure accurate amount should be strongly advocated in pediatric setting.

The present study provides few insights into the drug use patterns in a pediatric department of a tertiary care teaching hospital. The prescribing from hospital

formulary was fair, the use of injections was low and there is a scope for improvement in case of medicines prescribed by generic name.

CONCLUSION

The percentage of prescribing by generic name, percentage of encounter with antibiotic and injections were less. However there is over prescribing of drugs to the inpatients. That needs a special attention of all doctors and clinical pharmacists to work together to establish a rational and practical protocol for clinical conditions.

List of Abbreviations Used

ABBREVIATIONS	EXPANSIONS
ACE	Angiotensin converting enzymes
LRTI	Lower respiratory tract infections
URTI	Upper respiratory tract infections
ATC	Anatomical therapeutic chemical classification
DDD	Defined daily dose
DUR	Drug utilization review
MRP	Maximum retail price
NSAID	Non-steroidal anti-inflammatory drugs
UTI	Urinary tract infections
WHO	World health organization
TSF	Total systemic flow
MDI	Multiple daily vitamin

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REFERENCES

1. Cazzato, T., C. Pandolfini, R Campi and M. Bonati, 2001. Drug prescribing in out-patient children in Southern Italy. *Eur. J. Clin. Pharmacol.*, 57: 611-616.
2. Clavenna, A., M. sequi, A. Bortolotti, L. Merlino, I. Fortino and M. Bonati, 2009. Determinants of drug utilization profile in the pediatric population in Italy. *British Journal of Clinical Pharmacology*, 67(5): 565-71.

3. Jackevicius, C.A., K. Tu, W.A. Filate and S.E. Brie, 2003. Trends in Cardiovascular drug utilization and drug expenditures in Canada between 1996 and 2001. *Canadian Journal of Cardiology*, 19(12): 1359-66.
4. Okumura, J., S. Wakai and T. Umenai, 2002. Drug utilization and self-medication in rural communities in Vietnam. *Social Science and Medicine*, 54(12): 1875-86.
5. Hyam, E., M. Brawer, J. Herman and S. Zvieli, 1989. What's in a teaspoon? Under dosing with acetaminophen in family practice. *Fam Pract*, 6: 221-223.
6. Nsimba, S.E., 2006. Assessing prescribing and patient care indicators for children under five years old with malaria and other disease conditions in public primary health care facilities. *Southeast Asian J. Trop Med Public Health*, 37: 206-214.
7. Sanz, E., M.A. Hernández, S. Ratchina, L. Stratchounsky, M.A. Peiré, M. Lapeyre-Mestre, B. Horen, M. Kriska, H. Krajnakova, H. Momcheva, D. Encheva, I. Martínez-Mir and V. Palop, 2004. Drug utilization in outpatient children. A comparison among Tenerife, Valencia and Barcelona (Spain), Toulouse (France), Sofia (Bulgaria), Bratislava (Slovakia) and Smolensk (Russia). *Eur. J. Clin. Pharmacol.*, 60: 127-134.
8. Walsh, K.E., R. Kaushal and J.B. Chessare, 2005. How to avoid pediatric medication errors: a user's guide to the literature. *Arch Dis. Child*, 90: 698-702.
9. Hyam, E., M. Brawer, J. Herman and S. Zvieli, 1989. What's in a teaspoon? Underdosing with acetaminophen infamily practice. *Fam Pract*, 6: 221-223.
10. Cazzato, T., C. Pandolfini, R. Campi and M. Bonati, 2001. Drug prescribing in out-patient children in Southern Italy. *Eur. J. Clin. Pharmacol.*, 57: 611-616.
11. Murray, M.L. and C.S. Vries, 2004. Drug utilization study of antidepressants in children and adolescents using the general practice research database. *Archives of Disease in Childhood*, 89(12): 1098-102.