Assessment of prescribing at a private pediatric outpatient setting in northern India

Ahlawat R[1], Tiwari P[1], Gupta G[2]

[1]Department of Pharmacy Practice, National Institute of Pharmaceutical Education and Research (NIPER), Sector 67, SAS Nagar, Punjab-160062.
[2]Charak Care Clinics, Phase 7, S.A.S. Nagar, Punjab-160055, India.

Abstract

Background: Drug prescribing reflects the physician's skills and attitude toward diagnosis of an ailment and selection of appropriate treatment. As prescribing pattern changes over a period of time, it is imperative to carry out evaluation of prescribing on a continuous basis. Objectives: Present study was carried out to assess the prescribing pattern in pediatric outpatient clinic. Methods: A drug utilization study was carried out in 2307 patients at a pediatric outpatient setting for a period of one year in the pediatric population (ages 1 day-18 yrs). The data for the year 2011 was captured from the "Wise-kid" software. Results: Upper respiratory tract illness was found to be the most common (47%) illness. The average number of drugs prescribed was 3.40±0.41, while drugs prescribed by generic name were nine percent. The percentage of encounter with injection and antimicrobials prescribed were found to be 0.71 % and 15 % respectively. Cephalosporins were found to be the most commonly prescribed class of antibiotics (33%). Conclusion: The prescribing pattern in the present study indicates that antimicrobials were used in a judicious manner in accordance with the current guidelines. Injections were prescribed to a few patients only. This article provides an overview of drug utilization review in a pediatric outpatient clinic.

Keywords: Drug utilization review, Drug utilization, Child, Pediatrics, Physician's Practice Patterns

INTRODUCTION

According to WHO, drug utilization review is a system of on-going, systematic, criteria-based evaluation of drug use that will help ensure that medicines are used appropriately.[1] WHO has provided certain tools to measure the physician prescribing behaviour. The inappropriate use of drugs is known to increase the cost of treatment, incidence of adverse drug reactions and development of resistance against antimicrobials.[2]

Drug utilization pattern depends on several factors like the age of the patient population, health care facility, diagnosis, time period, and geographical regions . Effect in any one of the factor leads to change in prescribing pattern. On the basis of this, it is important to study the drug utilization in different geographical regions and health care facility at different period of time. This will give us the more accurate measurement of drug use, which could future utilize in promoting appropriate drug use.

In developing countries, like India, the cost of prescription is known to be a barrier to healthcare. Indian pharmaceutical market has thousands of drug formulations, as compared to only hundreds of drug listed in National List of Essential Medicines-2011 (NLEM) and pharmaceutical companies encourage doctors to prescribe branded medicines. There is enough evidence to demonstrate that prescribing of drugs has shifted from generics to branded and prescribing out of

NLEM.[3] There are some evidences already available on the drug utilization in Indian children.[4] But, as prescribing behaviour is a continuous changing phenomenon which makes its important to carryout such study over a period of time.

MATERIAL AND METHODS

This study was carried out at a pediatric outpatient setting over a period of one year. The data in the prescriptions of children up to 18 years approaching to clinic were captured at the time of consultation. The data was organized using spread sheet and analyzed to determine WHO recommended prescribing indicator and three complementary indicators for cost. Patients were classified as infants (1day-1yr), toddlers (1-3yrs), pre-schoolers (3-6yrs), schoolers (6-12yrs) and adolescents (12-18yrs).

In the computation of cost, only the direct cost of drugs in terms of Maximum Retail Price (MRP) was considered. The prices as mentioned on the website of Current Index of Medical Specialities (http://www.mims.com/India) were used for computation of cost. All the estimations for cost were done for the total duration of therapy.

In addition, the prescriptions were also analyzed for morbidity pattern, utilization of different dosage forms, route of administration and type of antibiotics. These indicators were represented as average±standard error of mean or percentages, as applicable.

RESULTS

A total of 2307 prescriptions were analyzed prospectively to assess the drug utilization pattern, with special emphasis on the antibiotics. The population consisted of 1003 female patients.

Profile of study Population

The average age of patients was found to be 45.61±5.34 months. The patients were divided into five subgroups on the basis

Address for correspondence*

Pramil Tiwari
M. Pharm., Ph.D., Department of Pharmacy Practice,
National Institute of Pharmaceutical Education and Research (NIPER),Sector 67, S.A.S. Nagar, Punjab-160062, India.

of age as mentioned in methodology. Most of the children were the preschoolers (33%). The toddlers and school going children contributed 25 percent each. (Table No. 1)

Morbidity Pattern

The most common diagnosis was the upper respiratory tract infections (URTI; 47% of patients). The rank order of next four diagnoses was acute gastroenteritis (AGE) > reactive airways disease (RAD) > lower respiratory tract infection (LRTI), allergic rhinitis (AR) and others (20%, 14%, 5%, 2%, and 12% respectively). Other diagnoses included urinary tract infection, viral fever, abdominal pain, gastroesophageal reflux disease.

WHO Prescribing Indicators

The average number of drug per encounter was 3.40±0.41. Only very few (0.71%) of the patients were prescribed with an injection. Forty percent of the total 7735 drugs prescribed belonged to the NLEM-2011 and Only 354 antibiotics were prescribed; and, this accounted for 15 percent of encounters with antibiotics in this study. (Table No.2)

Antibiotic utilization

Cefexime and Azithromycin were prescribed nearly equally (118 & 112 patients, respectively). The fixed dose combination of amoxicillin + clavulanic acid was the 3rd most common antibacterial prescribed. The group 'others antibiotics' in table 3 includes clarithromycin, cefuroxime & cefodoxime. (Table No.3)

For treatment of URTI, amoxicillin+clavulanic acid and azithromycin were prescribed to the most of the patients, while the other antibiotics prescribed were clarithromycin and cefexime. In the patients of AGE, however, the prescription of cefexime were found maximum followed by ofloxacin, cephalexin, cefodoxime. Azithromycin was the major antibiotic prescribed to the RAD patients. Other antibiotics prescribed included amoxicillin+clavulanic acid, clarithromycin and cephalexin. (Table No.3)

Prescribing of antibiotics varies in different diagnosis; overall fifteen percent of the patient was prescribed with antibiotic. (Table No.4)

Table 1: Age wise profile of patients

Age group	No. of Patients			
	Male	Female	Total	Percentage
1d-1yr, Infant	152	91	243	11%
1yr-3yr, Toddler	352	236	588	25%
3yr-6yr, Pre-schooler	442	323	765	33%
6yr-12yr, Schooler	318	251	569	25%
12yr-18yr, Adolescents	40	102	142	7%
Total	1304	1003	2307	100%

Table 2: WHO Prescribing indicators

Indicator	Value
Number of drugs per encounter	3.40±0.41
Drugs prescribed from NLEM	40%
Drugs prescribed by generic name	9%
Encounters with an injection	0.71%
Encounters with antibiotics	15%

WHO recommended complementary indicators

The average cost of prescribed drugs was found to be INR152±9.6 (1US$=INR55 approx.). The median (IQR) cost was found to be INR120 (88,217). Eight percent of the cost was spent on the antibiotics while only 0.11 percent of the total cost was spent on the use of injections.

Number of drugs per prescription

It was found that minimum of one drug per prescription and maximum of seven drugs in five and one percent respectively was prescribed. The median (IQR) number of drug found to be was 3 (3,4). The proportion of patients receiving three drugs per prescription and four drugs was equal (32% each). This was followed by sixteen percent patients with two drugs; and, only eleven percent received five drugs in the prescriptions.

For the treatment of URTI, three drugs were prescribed to thirty-nine of the patients; and, this was followed by the use of four, two and five drugs prescribed to (31%, 17% and 7% of the patients, respectively). Further, four drugs per prescription were prescribed to (31%) of the AGE patients followed by three, two and five drugs per prescription (27%, 18%, 13% respectively). The prescription of four drugs (39%) in RAD was followed by three and five drugs (28% & 20% respectively). (Figure No.1)

Route of administration and dosage form:

Ninety percent of the drugs were administered by oral route, followed by topical (6%) & inhalation route (3.60%). The parenteral route was used only in (0.20%) of patients. The drugs given parenterally included hydrocortisone, dexamethasone, epinephrine and ondansetron. It was found that 60 percent (of all the drugs) of the prescribed dosage forms were syrups. This was followed by equal proportion of drops & tablets (12% each) & powder (11%). The balance five percent comprised inhalation (4%) & other dosage forms such capsules & creams (1%).

Prescribing pattern according to the class of drug

Antipyretics (21%) were found to be the most commonly utilized class of drugs followed very closely by herbal cough syrups (19%), cough & cold preparations (17%), probiotics (9%), antihistamines (8%), bronchodilators (8%), antibiotics (7%), saline drops (6%) and ORS (5%). For the treatment of cold and cough, fixed dose combinations of cetrizine+ambroxol followed by chlorpheniramine+phenylephrine and chlorpheniramine+dextromethorphan were used (Figure No.2).

Antipyretic drug utilization:

The use of Paracetamol (44%) was followed by ibuprofen+paracetamol combination (36%) and paracetamol+mefenamic acid combination (12%) and mefenamic acid (9%).

Pattern of utilization of different antihistamines: Among antihistamines, Fexofenadine was prescribed to only half of the patients as compared to cetrizine (26% & 52%, respectively). Other antihistamines prescribed included loratidine (8%), hydroxyzine (8%), levocetrizine (3%) and promethazine (3%).

DISCUSSION

The results of the one year long study were based on the data obtained from 2307 patients. One third of the patients were preschoolers followed equally well by toddlers and school going kids. The male to female ratio reflected a higher number of male patients visiting the clinic when compared to female patients.

Table 3: Pattern of antibiotic utilization

| Antib. \ Diagno.	Amox+ clav.	Azithro-mycin	Cefixime	Oflox-acin	Other*	Total
URTI	55/60	78/112	1/118	0	18/35	152/354
AGE	0	0	112/112	21/29	0	133/354
RAD	5/60	34/112	0	0	10/35	49/354
Others#	0	0	5/112	8/29	7/35	20/354
Total	60	112	118	29	35	354

Other diagnosis- urinary tract infection, allergic rhinitis, LRTI, abdominal pain, fever etc,
* Other antibiotic includes- cefuroxime, clarithromycin, cefodoxime etc

**Table 4: Pattern of antibiotic use vis-a-vis diagnosis**

Percentage of encounter with an antibiotics prescribed	[(antibiotics prescribed/total diagnosis)*100]
Acute gastroenteritis (AGE)	28% (152/1078)
Upper respiratory tract infection (URTI)	14% (133/468)
Reactive airways disease (RAD)	15% (49/332)
Others	14% (15/105)
Overall encounter with antibiotic prescribed	15% (354/2307)

Other diagnosis- urinary tract infection, allergic rhinitis, LRTI, abdominal pain, fever etc., other antibiotic includes- cefuroxime, clarithromycin, cefodoxime etc
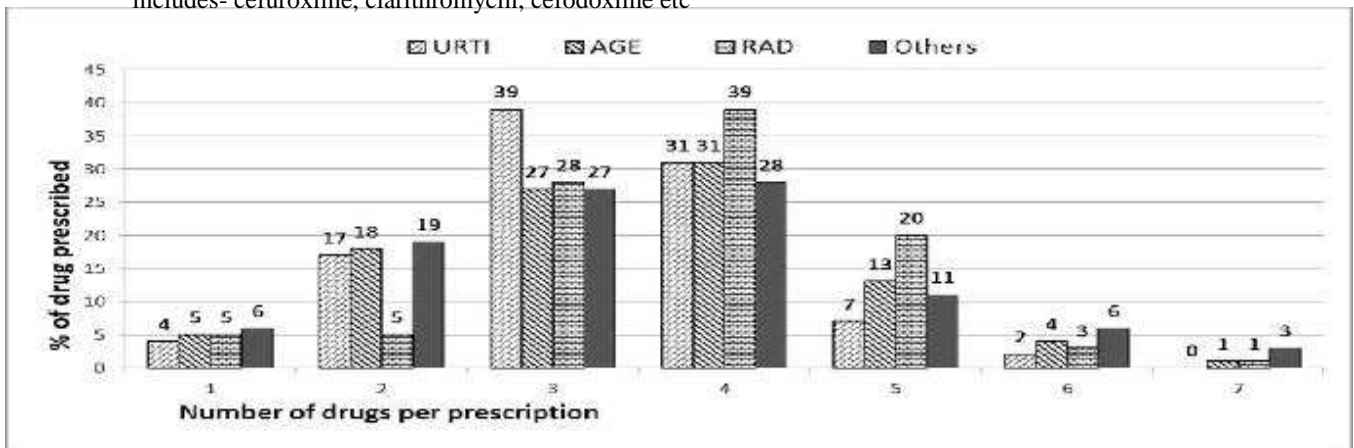
#Other diagnosis- urinary tract infection, allergic rhinitis, LRTI, abdominal pain, fever etc.

Figure 1: Profile of number of drugs prescribed per prescription in different disorders
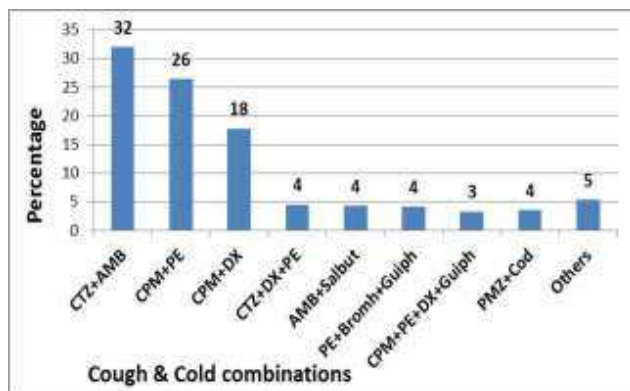
#CTZ-cetrizine, AMB-ambroxol, PE-phenylephrine, CPM- chlorpheniramine, DX- dextromethorphan, Salbut- salbutamol, Bromh- bromhexine, Guiph- guaiphenesin, PMZ- promethazine, cod- codeine, Others-Bromh+Guiph+Terbutaline, PE+PCM+CPM, PE+DX+triprolidine

Figure 2: Pattern of cold and cough medicines prescribed

URTI were remains to be the most common reason for the visit to the physician in a pediatric OPD of a primary care health center like the similar study carried out by tiwari and co-workers. The average number of drug prescribed increased with increase in number of diagnosis. In this study, the average number of drugs prescribed was over three. The rational use of drugs demands that the number of drugs prescribed is as small as possible, which not only reduces the cost of treatment but also the chances of drug interaction and adverse effects. The results of Dimri et. al., Mohajer et. al., Mirza et. al. and Tiwari et. al. have reported the average number of drugs prescribed to be 2.31, 2.81, 3.72 and 3.20 respectively All these results are obtained in public health facility except that of Tiwari & co-workers. In the present study, nine percent of the medicines were prescribed by generic name. The results of Mirza et. al. and Nazmi et. al. studies in public hospital setting have reported the prescribing of generic medicines as 30% & 23% .The public hospitals procure the drugs

on bulk basis and the prescribers are more likely to prescribe by the generic names. In contrast, the private set up relies upon the dispensing pharmacist. In spite of this, the tendency to prescribe the generic drugs in this setting is a good indicator of prescription.

A very fair proportion of drugs (40%) were prescribed from the NLEM-2011. Tiwari et al have also reported this to be forty percent, though in a sample size one fifth of the present study . Prescribing from the NLEM has been reported by various researchers across India by Dimri et. al., Shankar et. al. 68% &45% The results of Agalu et. al. from Ethiopia have reported this to 90% .The prescribing from NLEM was found on higher side as these studies were carried out in hospital setting. The prescribing from the NLEM should be promoted for optimal use of financial resources and to satisfy the health care needs of the majority of the population safely.

The prescribing from NLEM was found on higher side as these studies were carried out in hospital setting. The prescribing from the NLEM should be promoted for optimal use of financial resources and to satisfy the health care needs of the majority of the population safely.

The parental dosage forms are not only expensive but also cause pain due to the prick. WHO recommends lesser use of injection as it is helpful in reducing the cost of treatment and eliminates the pain to the patient. In the present study, less than 1% of the drugs were used by parenteral route which is in concurrence with the findings of Dimri et al & Tiwari et al (1.18% & 1.17% respectively) .

Overprescribing with antibiotics could increase with the overestimation of illness by physicians. Parents expect (and demand) to see rapid symptomatic relief of disease and, often, put pressure on the prescriber to prescribe a "strong medicine" i.e. an antibiotic for relief. In this study, only 15% of antibiotics were prescribed. Other results have reported between 19-29 percent of antibiotics being prescribed . A comparison with results available in literature shows that the antibiotic use in the present study was minimal. Cefexime and Azithromycin were found to be the equally prescribed antibiotic (118 & 112) in this study. The findings of study conducted by Mohajer et. al. has shown that penicillins were prescribed maximum number of times (52%) followed by cephalosporin (32%).

According to the NICE clinical guideline for respiratory tract infection, penicillin is the first line antibiotic for pharyngitis and for treating cough illness and bronchitis macrolide is the drug of choice . Penicillins and macrolides were the most commonly utilized antibiotic used for the treatment of RTI, the findings are in concordance with study carried out by Ahlawat et al at a primary care health center . According to guideline of world gastroenterology organization, cephalosporins along with flouroquinolones, macrolides, and penicillins are the antibiotics of choice for treating AGE of bacterial origin . In present study, the prescribing of cefixime was followed ofloxacin. This indicates the adherence of physician to guideline in antibiotic prescribing.

In this study, 28 percent of the patients were prescribed with antibiotics while other study carried out among children diagnosed with AGE reported antibiotic use between 25% and 71% . On comparison with available literature, it was found that the antibiotic use in the present study was on the lower side. The antibiotics encountered in URTIs were nearly 14 percent which is quite smaller than previous reports as 52 percent (Senok et. al.)

[HYPERLINK \l "_ENREF_20" \o "Senok, 2009 #1" 20]. The antibiotic encounter in reactive airways disease was found comparable to the study carried out by Ahlawat et. al. in an outpatient setting . The antibiotic encounter in reactive airways disease was found comparable to the study carried out by Ahlawat et al in an outpatient setting .

Three drugs were prescribed to maximum number of the patients. This has to be viewed with the fact that the most common diagnosis was URTI. For treatment of URTI, a combination of analgesic, cough syrups, saline drops were prescribed with or without antibiotics. This is comparable with the results of Tiwari et. al. in which three drugs were prescribed to highest number of patients.URTI was the most commonly occurring infection among children; therefore antipyretic drugs, cough syrups and cough & cold combinations were found to be the most commonly prescribed class of drugs. Cetrizine+ambroxol was the most commonly prescribed combination in the children, it is reported for treating cough associated with sputum in URTI.

Antihistamines are among the most commonly prescribed medicines in current pediatric practice. Formulations containing antihistamines only, or in combination with other drugs (antitussive agents, systemic decongesting drugs, etc.) are widely used for control of symptoms and the treatment of upper respiratory tract infections in children.

The most commonly used dosage form was syrup (60%). The convenience of oral dosage form as the easiest to administer in the children in outpatient setting explains this. The result was found comparable to the study carried out by Karande et al in which (61%) of the drug were prescribed in the form of syrup .

In this study, the average cost of drugs per encounter was found to be INR152 only. Since, the prescribing of antibiotics and injections was rational in this study, cost of the prescription was highly reasonable. The cost of prescription increased as the number of injection and antibiotics drug prescribed increased. It indicates that the prescribing of antibiotics and injections determine the cost of prescription.

CONCLUSION

The findings of this study demonstrate that the prescribing in this outpatient pediatric setting was rational as antibiotics were used judiciously according to standard treatment guideline available for children. A large number of medicines were prescribed from the NLEM-2011. The results of this study have provided very strong evidence for the rational use of antibiotics in outpatient setting. This is an encouraging finding, especially when the prescribers and the policy makers are concerned about issues like antimicrobial resistance and NDM-1. This study has provided us detail information about the drug utilized in Indian children. These findings could be used in promoting appropriate use of drugs.

REFERENCES

1. Holloway K, Green T. Drug and therapeutics committees: a practical guide. Geneva: World Health Organization; 2003. p. 1-146.

2. WHO. The Pursuit of Responsible Use of Medicines: Sharing and Learning from Country Experiences. Geneva: World Health Organization; 2012. p. 1-64.

3. Jhaj R, Bhargava VK, Uppal R, Reeta K, Saha L, Kaur N, et al. Drug prescribing in children in a North Indian

referral hospital. Pharmacoepidemiol Drug Saf 2000;9(5):423-7.

4. Ahlawat R, Gupta G, Tiwari P. Pharmacoepidemiology of Reactive Airways Disease (RAD) among children at a pediatric outpatient setting of northern India. In: PGIMER, editor. XXIV National Conference of IAP Respiratory Chapter; Chandigarh: Chandika Press Private Limited; 2012. p. 93-101.

5. Ahlawat R, Tiwari P, Gupta G. Cost analysis of antibiotics utilization in respiratory tract infection using prescribing indicators. Value in health. 2013;16(3):A87-A.

6. Dimri S, Tiwari P, Basu S, Parmar VR. Drug use pattern in children at a teaching hospital. Indian Pediatr. 2009;46(2):165.

7. Tiwari P, Ahlawat R, Gupta G. Pattern of prescribing at a paediatric outpatient setting in northern India. Indian Journal of Pharmacy Practice. 2012;5(1):40-4.

8. Bimo H, Hogerzeil V, Choudhury A, Das A, Diwan V, Kafle K, et al. How to Investigate Drug Use in Health Facilities: Selected Drug Use Indicators - EDM Research Series No. 007. World Health Organization. 1993.1-88.

9. Mirza NY, Desai S, Ganguly B. Prescribing pattern in a pediatric out-patient department in Gujarat. Bangladesh Journal of Pharmacology. 2008;4(1):39-42.

10. Mohajer KA, Al-Yami SM, Al-Jeraisy MI, Abolfotouh MA. Antibiotic prescribing in a pediatric emergency setting in central Saudi Arabia. Saudi Med J 2011;32(2):197-8.

11. Najmi MH, Hafiz RA, Khan I, Fazli FR. Prescribing practices: an overview of three teaching hospitals in Pakistan. J Pak Med Assoc 1998 Mar;48(3):73-7.

12. Shankar PR, Upadhyay DK, Subish P, Dubey AK, Mishra P. Prescribing patterns among paediatric inpatients in a teaching hospital in western Nepal. Singapore Med J. 2006;47(4):261.

13. Agalu A, Mekonnen H. Drug prescribing practice in a pediatrics ward in Ethiopian Int Res J Pharm Pharmacol. 2012;2(6):132-8.

14. Adebayo ET, Hussain NA. Pattern of prescription drug use in Nigerian army hospitals. Ann Afr Med 2010; 9(3): 152-8.

15. NICE. Respiratory tract infections - antibiotic prescribing. Prescribing of antibiotics for self-limiting respiratory tract infections in adults and children in primary care London: Centre for Clinical Practice, National Institute for Health and Care Excelance (NICE); 2008. p. 1-122.

16. Farthing M, Lindberg G, Dite P, Khalif I, Salazar-Lindo E, Ramakrishna BS, et al. World Gastroenterology Organisation practice guideline: Acute diarrhea. Milwaukee: World Gastroenterology Organisation; 2008. p. 1-29.

17. Karras DJ, Ong S, Moran GJ, Nakase J, Kuehnert MJ, Jarvis WR, et al. Antibiotic use for emergency department patients with acute diarrhea: Prescribing practices, patient expectations, and patient satisfaction. Ann Emerg Med. 2003;42(6):835-42.

18. Kotwani A, Chaudhury RR, Holloway K. Antibiotic-Prescribing Practices of Primary Care Prescribers for Acute Diarrhea in New Delhi, India. Value in Health.15(1):S116-S9.

19. Pathak D, Pathak A, Marrone G, Diwan V, Lundborg C. Adherence to treatment guidelines for acute diarrhoea in children up to 12 years in Ujjain, India - a cross-sectional prescription analysis. BMC Infect Dis. 2011;11(1):32.

20. Senok AC, Ismaeel AY, Al-Qashar FA, Agab WA. Pattern of upper respiratory tract infections and physicians' antibiotic prescribing practices in Bahrain. Med Princ Pract. 2009;18(3):170-4.

21. Karande S, Sankhe P, Kulkarni M. Patterns of prescription and drug dispensing. Indian J Pediatr. 2005;72(2):117-21.