

Medication Prescribing Pattern at a Pediatric Ward of an Ethiopian Hospital

*Fitsum Sebsibe Teni¹, Abdrrahman Shemsu Surur², Addisu Getie¹,
Abel Alemseged¹, Mulugeta Meselu¹

¹Department of Pharmaceutics and Social Pharmacy, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

²Department of Pharmaceutical Chemistry, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

Abstract

Introduction

Drug use in pediatric patients is a unique dilemma in the management and monitoring of disease. This study aimed at assessing medication prescribing in a pediatric ward of an Ethiopian hospital.

Materials and Methods

A retrospective cross-sectional study was done by reviewing the medical records of 249 patients among those admitted in the period between 11th of September 2007 and 10th of September 2008 to the pediatric ward of Gondar University Referral Hospital, Northwest Ethiopia. Data on characteristics like age, sex and weight; the diagnoses for which patients were admitted and medications prescribed to them during their stay in the ward was collected from the medical records of the patients.

Results

An average of 3 diagnoses per patient with the most frequently diagnosed being malnutrition (29.23%), severe community acquired pneumonia (12.96%) and underweight (8.86%) were reported. A mean of 4.5 medications per patient with the most commonly prescribed being antibacterials namely penicillins which constituted 25.42%, other antibacterials making up 19.61% and medications used for correcting water, electrolyte and acid-base disturbances accounting for 17.19% of the total number of medications prescribed in the ward. The most common individual medications prescribed to the patients included crystalline penicillin, gentamicin and maintenance fluid constituting 9.22, 7.52 and 6.45 percentages respectively most of them in solution forms which were administered dominantly intravenously.

Conclusion

In this study the common prescription of antibacterials and those used for correcting water, electrolyte and acid-base disturbances was observed which went with the common diagnoses of malnutrition and pneumonia.

Keywords: Ethiopia, Gondar, Medication, Pediatric, Prescribing .

*Corresponding Author:

Fitsum Sebsibe Teni, Department of Pharmaceutics and Social Pharmacy, School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Gondar, Ethiopia.

E-mail: fitse4@gmail.com

Received date: May25, 2014 ; Accepted date: Jun 22, 2014

Introduction

Rational use of medicines refers to the correct, proper and appropriate use of medicines. It requires conditions like appropriate medicine, in the proper dose, for an adequate period of time, and at the lowest cost to them and their community. As estimated by World Health Organization (WHO) more than half of all medicines are prescribed, dispensed or sold inappropriately, and that half of all patients fail to take them correctly. This incorrect use may take the form of overuse, underuse and misuse of prescription or non-prescription medicines, polypharmacy; overuse of antibiotics and injections; failure to prescribe in accordance with clinical guidelines; inappropriate self-medication (1).

Pediatric population is a spectrum of different physiologies and comprises subgroups differing by age as preterm neonates, full term neonates, infants and toddlers, and older children and adolescents. Significant changes in the pharmacokinetics and pharmacodynamics occur as preterm infants mature toward term, as infants mature during the first few years of life, and as children reach puberty and adolescence (2). The bioavailability, pharmacodynamics, pharmacokinetics, efficacy and adverse effect information can differ markedly between pediatrics and adult patients as well as among pediatric patients because of difference in age, organ function and disease state (3).

Pediatric patients should be given medicines that have been appropriately evaluated for

their use. Safe and effective pharmacotherapy in pediatric patients requires the timely development of information on the proper use of medicinal products in pediatric patients of various ages and, often, the development of pediatric formulations of those products (4).

Drug use in pediatric patients is a unique dilemma in the management and monitoring of disease as establishing safe and effective therapeutic regimen is challenging. This is related to the scarcity of data on pharmacokinetics, pharmacodynamics, efficacy and safety of drugs in infants and children. This challenge results in different problems, for example, Gray baby syndrome from chloramphenicol (3).

Different problems occur in using medicines in treating children and adolescents which include off-label and unlicensed use of medicines, availability of over-the-counter, traditional and herbal medicines with generally no evidence based use; presence of counterfeit and substandard medicines. In particular for resource poor countries the unavailability of treatment especially during war and civil strife and the availability of medicines through illegal street vendors are some of the problems (5).

In Ethiopia, according to the 2011 demographic and health survey (DHS) infant mortality was 59 deaths per 1,000 live births and under-five mortality rate was reported to be 88 deaths per 1000 live births (6). Some studies have been conducted regarding the pattern of medication prescribing to pediatric patients in different parts of Ethiopia (7-10). There is still a need to show

the practice pattern and how it is changing with time. So, the aim of the present study was to assess the pattern of medications prescribing in the pediatric ward of Gondar University Referral Hospital located in northwest Ethiopian town of Gondar.

Materials and methods

In this study, a retrospective cross-sectional study was conducted to assess the pattern of medication prescribing in the pediatric ward. The sources of data on medications prescribed were the medical records of pediatric patients who were admitted to the ward in the period from 11th of September 2007 to 10th of September 2008. The review on the medical records to collect the data was done from 24th of April to 9th of May 2009.

The inclusion criteria applied in the selection of the medical records required that records be of pediatric patients (age younger than 18 years) and records with in which medications were prescribed. On the other hand the exclusion criteria were medical records with no medications prescribed in them, medical records of patients aged 18 years or older, and those records which were not legible. Based on the inclusion and exclusion criteria, 249 medical records which accounted for more than a third of the medical records of the total 712 patients admitted to the ward during the period from 11th of September to 10th of September 2008, were included in the study. The 249 medical records were sampled using a simple random sampling technique.

Data on the patient characteristics like age, gender and weight; the diagnoses for which

they were admitted and the medications prescribed to them during their stay in the ward were collected from the medical records of the patients in the ward. A data collection format was employed in collecting the data on the patients during their stay in the ward. The data collection was conducted by the principal investigators using the data collection format. Before the actual data collection pretest on the data collection format was done using 13 medical records which were not part of the sample size and excluded from the final analysis. The study was conducted after securing approval from school of pharmacy and the hospital. Furthermore the data obtained from the medical records were recorded using codes avoiding patient identifiers, were kept confidential and used strictly for the study only. The data collected in this study was analyzed descriptively using Microsoft Excel 2003 and presented in frequency tables and graphs describing the various features of medication prescribing in the ward (11).

Results

Out of the 249 medical records of patients aged younger than 18 years old were included in the study, 150 (60.24%) were males. Children had the highest proportion constituting nearly half (45.78%) of the total number of patients in the study followed by infants making up 30.12% of the total patients in the study (Figure. 1). The mean weights of the neonates, infants, children, school age patients and adolescents were 2.42, 5.76, 9.40, 17.70 and 26.80 kg respectively. The patients stayed in the ward for an average of 9.3 days since admission.

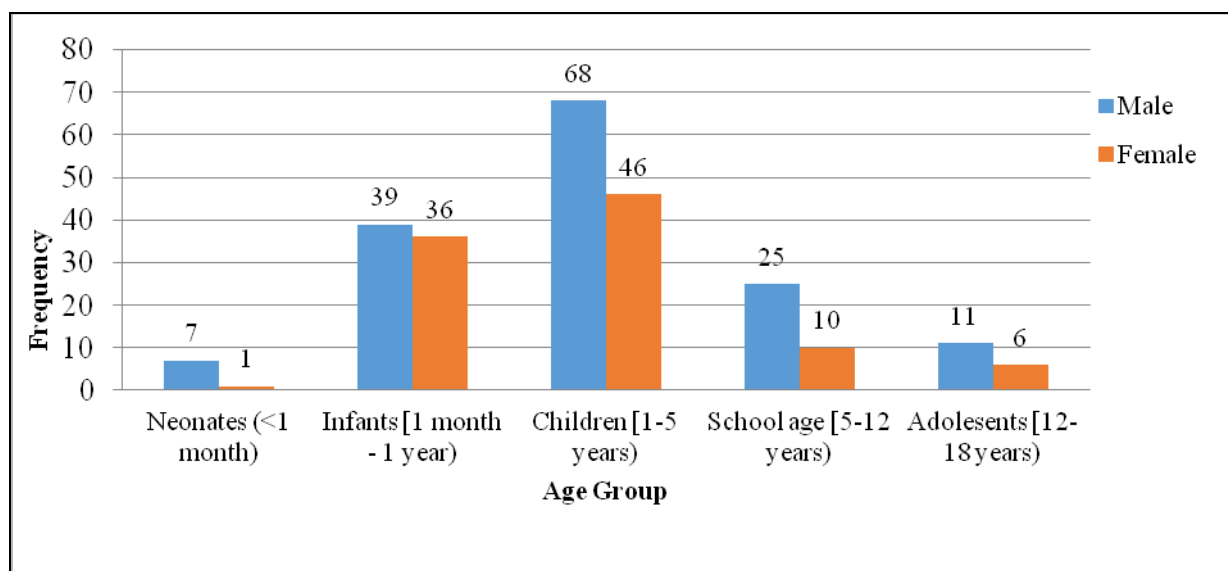


Fig.1: Age and sex distribution of patients in the pediatric ward

Among the total 249 patients 75 different diagnoses were identified during their stay in the ward with a total frequency of 756 diseases. So, an average of 3 diagnoses per patient occurred among the patients. Among the most frequently encountered diagnoses malnutrition (29.23%), severe community acquired pneumonia (SCAP) (12.96%) and underweight (8.86%) were the top ranking in that order (Figure. 2).

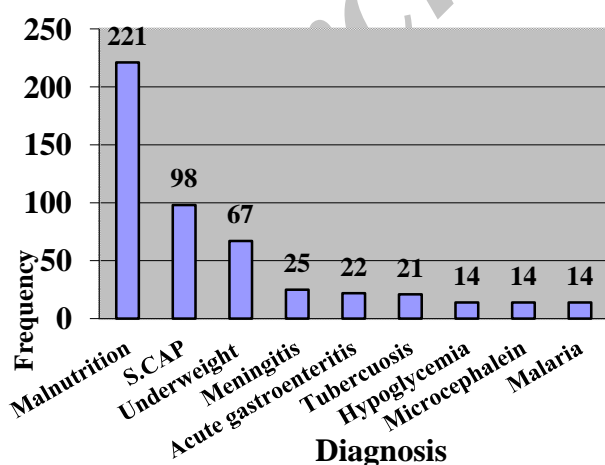


Fig. 2: The most frequent diagnoses among the patients in the pediatric ward

In the pediatric ward, the total frequency of medications prescribed was 1117 constituted by 76 different kinds of medications. This made up a mean of 4.5 medications per patient prescribed during their stay. The categories of medications most commonly prescribed were penicillins which constituted 284 (25.42%) of the total followed by other antibacterials making up 219 (19.61%) of the total number of medications. These were followed by medications used for correcting water, electrolyte and acid-base disturbances account for 192 (17.19%) of the total number of medications prescribed in the ward (Table. 1).

In this study the most common individual medications prescribed to the patients in the ward included crystalline penicillin, gentamicin and maintenance fluid constituting 9.22, 7.52 and 6.45 percentages respectively. These were followed by amoxicillin and ampicillin with 5.91% each and dextrose with 5.37%. All the mentioned medications made up the individual medications prescribed with a frequency of

more than 5% of the total number of medications (Table. 2).

Most of the medications prescribed to the patients were in solution forms, of which those in the form of injectable solution constituted 343 (30.71%) and oral solution accounted for 178 (15.94%) of the total number of medications (Table. 3).

The findings in this study showed that, most of the medications prescribed in the pediatric ward were to be administered intravenously constituting 631 (56.49%) of the total medications followed by the oral route with a frequency of 378 (33.84%) (Figure. 3).

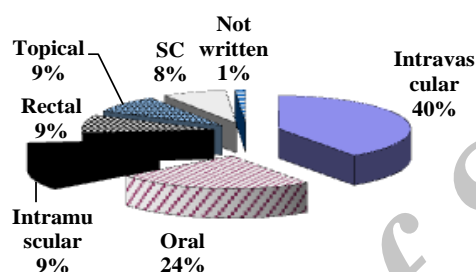


Fig. 3: Routes of administration of the medications prescribed in the pediatric ward

Table 1: The most frequently prescribed categories of medications in the pediatric ward

Rank	Category	Frequency	Percentage
1	Penicillins	284	25.43
2	Other antibacterial	219	19.61
3	Drugs used for correcting water electrolyte and acid-base disturbance	192	17.19
4	Vitamins	98	8.77
5	Analgesics (Antipyretics)	64	5.73
6	Antimalarials	36	3.22
7	Corticosteroid preparation	34	3.04
8	Anti Asthmatics	32	2.87
9	Diuretics	25	2.24
10	Sedatives and Hypnotics	20	1.79
11	Anthelmintics	17	1.52
12	Ant anemic agents	16	1.43
13	Others	80	7.16

Table 2: Frequency and percentage of Individual drugs prescribed the pediatric ward

Rank	Name of drug(s)	Frequency	Percentage
1	Crystalline penicillin	103	9.22
2	Gentamicin	84	7.52
3	Maintenance Fluid	72	6.45
4	Amoxicillin	66	5.91
5	Ampicillin	66	5.91
6	10% Dextrose	60	5.37
7	Chloramphenicol	56	5.01
8	Paracetamol	54	4.83
9	Cloxacillin	49	4.39
10	Folic acid	40	3.58
11	Vitamin A	40	3.58
12	Ceftriaxone	31	2.78
13	Furosemide	24	2.15
14	Oral Rehydration Salts	22	1.97
15	Co-trimoxazole	21	1.88
16	Ringer lactate	19	1.70
17	Mebendazole	15	1.34
18	Chloroquine	14	1.26
19	Coartem	13	1.16
20	Others	268	23.99

Table 3: Dosage forms of medications prescribed in the pediatric ward

Rank	Dosage Form		Frequency	Percentage
1.	Solution	Injection	343	30.71
		Oral	178	15.94
2.	Powder for injection		305	27.31
3.	Tablet		175	15.67
4.	Suppository		26	2.33
5.	Suspension	Injection	21	1.88
		Oral	4	0.36
6.	Capsule		21	1.88
7.	Ointment		13	1.16
8.	Cream		6	0.54
9.	Gel		5	0.45
10.	Not written/recorded		20	1.79

Discussion

In this study malnutrition and infectious diseases were the two most prevalent problems; malnutrition (29.23%) was the leading diagnosis in pediatric ward of Gondar University Hospital (GUH), which

was different from the findings of retrospective study done on prescribing pattern in pediatric wards of three north West Ethiopian Hospitals (Bahir Dar, Debre Tabor and Gondar) in which tuberculosis 12.9%, diarrheal disease 17.4% and bronchopneumonia 25.5% were the most

frequently recorded diagnoses in Gondar, Bahir Dar and Debre Tabor Hospitals respectively (7). Another study done in a university hospital in south western Ethiopia also found that the leading diagnosis was severe pneumonia (25%) which was the second leading diagnosis in the present study (12). Yet another study done a governmental hospital in Palestine revealed that gastrointestinal infection (24.7%) as a top diagnosis which was different compared to the present study (13).

The average number of medications prescribed per patient was 4.5 in the average duration of stay 9.3 days in the ward. The study in three pediatric wards of hospitals in Northwest Ethiopia reported that the average number of medications per patient was 4 in Gondar, 3.2 in Bahir Dar, 3.3 in Debre Tabor during the average stay of 24.9 days in Gondar, 4.8 days in Bahir Dar and 10.1 days in Debre Tabor. This showed that in our study larger number of medications was prescribed within shorter period of stay in the ward compared to the past finding in the same ward (7).

Crystalline penicillin (9.22%) was the most frequently prescribed medication in our study which was similar compared this with the findings in the three Northwest Ethiopian hospitals in which crystalline penicillin (13.4%) was found to be the most frequently prescribed medication in the same hospital about ten years ago. However, it was different from that of Bahir Dar and Debre Tabor hospitals in which chloramphenicol was the most frequently prescribed drug with 76 (12.7%) and 68 (11.8%) in the respective hospitals (7).

Chloramphenicol was the most frequently prescribed drug in Bahir Dar and Debre Tabor as mentioned above; it is also the second most highly prescribed drug in

Gondar in the same study. But in our study prescribing of chloramphenicol (5.01%) was seventh in its rank of frequency which showed that the use of chloramphenicol was decreasing. This decreased tendency is a practice to be encouraged because chloramphenicol has potentially serious adverse effects (14). The high prescribing rate of mebendazole (1.34%) as anthelmintic agent was encouraging practice as it is cheap, broad spectrum which is useful for mixed worm infections as was reported in the study in Jimma University Specialized Hospital (12).

If the drug does not reach to the site of action, all the time and effort involved in diagnosis, treatment and dosages determination becomes a loss. Oral therapy is the most acceptable route for child but in the present study 59.44% of the medications used were injections (14). This could be associated to the fact that most of the patients admitted to the ward were unable to take oral medications.

Conclusion

In this study it was shown that the most frequent diagnoses were malnutrition and pneumonia which were matched by the frequent prescribing of antibacterials and medications used for correcting water, electrolyte and acid-base disturbance. The medications prescribed consisted mainly of injection dosage forms which were accordingly administered dominantly through intravascular route.

Conflict of interest: None

Acknowledgments

The authors would like to acknowledge the help of the staffs in the medical record office of Gondar University Hospital for facilitating access to the records of the patients.

References

1. WHO. Medicines: rational use of medicines Fact sheet N338. 2010. [Cited 2014 Feb 26]. Available from: <http://www.who.int/mediacentre/factsheets/fs338/en/Medicines>
2. Kearns GL, Reed MD. "Clinical pharmacokinetics in infants and children: a reappraisal," *Clinical Pharmacokinetics* 1989; 17(1): 29–67.
3. Nahata MC, Taketomo C. Pediatrics. In: DiPiro JT, Talbert RL, Yee GC, Matzke GR, Wells BG, Posey, LM,(eds) *Pharmacotherapy: A Pathophysiologic Approach*. USA the Mc Graw Hill Companies Inc. 2002; 5th edn p: 69–77.
4. European Medicines Agency. Note for Guidance on Clinical Investigation of Medicinal Products in the Pediatric Population. Clinical Investigation of Medicinal Products in the Pediatric Population. (2001) p 3. [Cited 2014 Feb 25]. Available from: http://www.ema.europa.eu/docs/en_GB/document_library/Scientific_guideline/2009/09/WC500002926.
5. WHO. Problems with medicine treatment in children and adolescents around the world. Promoting Safety of Medicines for Children. World Health Organization 2007. [Cited 2014 Feb 25]. Available from: http://www.who.int/medicines/publications/essentialmedicines/Promotion_safe_med_childrens
6. Central Statistical Agency [Ethiopia] and ICF International. Ethiopia Demographic and Health Survey 2011. Addis Ababa, Ethiopia and Calverton, Maryland, USA: Central Statistical Agency and ICF International. 2012. [cited 2014 Feb 26]. Available from: http://www.unicef.org/ethiopia/ET_2011_EDH_S.
7. Abula T, Desta Z. Prescribing patterns of drug in pediatric ward of three Ethiopian Hospitals. *Ethiopian Journal of Health Development* 1999; 13(2): 135–40.
8. Agalu A, Mekonnen H. Drug prescribing practice in a pediatrics ward in Ethiopian Int. Res. J. Pharm. Pharmacol 2012 Jun; 2(6): 132–8.
9. Bergicho M, Mohammed MA, Wabe NT. Assessment of the pattern of drug prescribing in pediatrics ward in tertiary setting hospital in Addis Ababa, Ethiopia. *Gaziantep Med J* 2012; 18(2): 61–5.
10. Feleke M, Yenet W, Lenjisa JL. Prescribing pattern of antibiotics in pediatric wards of Bishoftu Hospital, East Ethiopia. *Int J Basic Clin Pharmacol* 2013; 2(6):718–22.
11. Microsoft. Microsoft Excel. Redmond, Washington: Microsoft, 2003. Computer Software.
12. Mengistu A. Patterns of drug prescription in inpatient departments, Jimma University Specialized Hospital, South west Ethiopia. *Ethiopian Journal of Health Sciences* 2005; 15(2): 139–45.
13. Sawalha A, Al-Bishtawi G, Al-Khayyat L, Sweileh W, Al-Ramahi R, Jaradat N. Pattern of Parenteral Antimicrobial Prescription among Pediatric Patients in Al-Watani Governmental Hospital in Palestine. *An - Najah Univ. J. Res. (N. Sc.)* 2006; 20 (1): 191–206.
14. Matthew B. Weiner, Ginette A, Pepper, Gail kuhn-weissman, Joseph A, Romano. *Clinical pharmacology and therapeutics in nursing* .1st edition. United States of America 1979; 859–75.