ORIGINAL ARTICLE

Quality of Pediatric Prescription Writing at Department of Pediatrics and Child Health, Tikur Anbessa Specialized Teaching Hospital, Addis Ababa, Ethiopia

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ABSTRACT

***Background**: Drugs are important weapons in the fight against disease and play crucial role in saving life. Incorrect prescription of drugs is equally dangerous and could cause life threatening complications. Erroneous prescribing habits are not uncommon in clinical practice. Hence the objective of this study is to assess the nature of prescription deficiencies (omission and error) and documented corrective measures taken by the dispensing pharmacist.*

***Objective**: to assess the quality of pediatric prescriptions written by doctors in Tikur Anbessa Specialized teaching Hospital, Department of Pediatrics and Child Health, Out-patient Department (OPD), follow up clinics and Emergency Unit.*

***Materials and Methods:** This is a cross- sectional hospital based study done on all prescriptions written to non admitted patients below 14 yrs of age visiting pediatric OPD, emergency unit and follow up clinics of Tikur Anbessa Specialized Hospital. The study was conducted from January 2014 to October 2014 based on the national standard prescription format adopted by Food, Medicine and Health Care Administration and Authority (FMHACA).*

***Results:** Total number of prescriptions studied was 246. With regard to patient identification, 78% of prescriptions lack patient age, 80.5% sex and 86.2% patient weight. 50.8% of the prescriptions do not bear drug formulation and 19.9% lack drug generic name. 30% of the prescriptions were issued with erroneous dose. Prescribers name was not documented in 45.5% of the prescriptions and date of prescriptions issued was not written in 65% of the prescriptions. Documented corrective measure was not seen in any of the prescriptions issued.*

***Conclusion and recommendation:** From this study, prescription quality is unsatisfactory. To improve prescription writing skills the Department of Pediatrics and Child health has to give great emphasis on correct prescription writing. Frequent feedback should be given to incorrect prescribers to avoid or decrease prescription errors.*

INTRODUCTION

Once a patient with a clinical problem has been evaluated and a diagnosis has been reached, the practitioner often selects among others drug therapy which requires the writing of a prescription.

A written prescription is the prescriber's order to prepare or dispense a specific treatment-usually medication—for a specific patient. When a patient comes for an office visit, the physician or other authorized health professional prescribes medications 67% of the time and an average of one per office visit are written because more than one prescription may be written at a single visit (1).

The ideal prescription format contains patient information which includes name, age, sex, weight, height and a diagnosis. Also it is composed of drug information which is generic name, formulation, concentration, dose, frequency

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duration of treatment and treatment instructions. The prescription should be legible and must include the prescriber's name, signature and date. Prescriptions have legal implications, as they may indicate the prescriber's responsibility for the clinical care of the patient and in particular for monitoring efficacy and safety [2].

For several reasons, current methods of medical prescription suffer deficiencies. There is lack of knowledge in clinical pharmacology among doctors and students [3].

Several types of prescribing errors are particularly common. These include errors involving omission of needed information; poor writing perhaps leading to errors of drug dose or timing; and prescribing drugs that are inappropriate for the specific situation [1].

Children face the risk of medication error because of factors such as weight –based dosing, need for stock medicine dilution, decreased communication abilities, inability to self-administer the medication and the high vulnerability of young critically ill children to have injury from medications [4-6].

Drugs are important components of health care and play crucial role in saving life. The limited information available on drug use throughout the world indicated that drugs are not optimally used (7). Despite the importance of good quality prescriptions erroneous prescribing habits are not uncommon worldwide [8].

Medication errors (MEs) are major issues in health care and are probably one of the most common types of medical errors. Inappropriate prescription is associated with health risks to the patient, and children in particular are three times at risk than adults (9-19). Studies have shown monitoring errors in prescription writing (20), incorrect 'corrections' by pharmacists themselves (21) and inadequate knowledge of prescription writing by physicians themselves (22).

However, data regarding MEs in Africa, especially in Ethiopia is scarce. The objective of this study was to assess the quality of pediatric prescription written by doctors in hospital out-patient department and ER in a tertiary teaching hospital in Addis Ababa, Ethiopia.

MATERIALS AND METHODS

This is a cross- sectional hospital based study.The study was conducted at Addis Ababa University, Department of Pediatrics and Child Health, Tikur Anbessa Specialized Teaching Hospital, at outpatient, emergency, follow up clinics and special pharmacy. From January 2014 to October 2014 all prescriptions written to non admitted patients below 14 years of age were investigated.

This study investigates deficiencies of prescriptions written for patients when compared with the standard prescription format adopted by FMHACA.

A checklist is used to asses for completeness of the following components: a) patients' information: full name, age, sex, weight and diagnosis b) drug information: the generic name, dosage, concentrations, frequency, formulation and duration of treatment c) prescriber's identification: clarity of hand writing, prescriber's name and signature and date the prescription was written.

Prescriptions were collected at both pharmacies (Paediatric emergency and special pharmacy) every day till the desired number is reached and the prescription papers were marked at the back with a registration unique number and name of the specific clinic that the patient was seen. Each prescription was checked for completeness, error and whether correction was made by the dispensing pharmacist by the same checklist used in the OPD.

Prescriptions issued from 5 pm to 8am on each working day and prescriptions from paediatric anti-retroviral treatment and diabetic clinics were excluded.

Probability of prescription errors in the community vary from 0.04%-24% in the literatures (23, 24). Since there is no study in our situation we took a probability prevalence of prescription errors of 20%. The sample size was calculated based on this probability and 95% level of confidence and margin of error of 0.05.The calculated sample size was 246.

Data was collected by two trained clinical nurses. Each check list was evaluated by paediatric consultant independent of OPD for the study period for appropriateness of the specific drug prescribed based on the hospital protocol.

At 5pm every marked prescription was collected from Paediatric Emergency and Special pharmacy

by a trained pharmacist and was assessed against FMHACA approved prescription format. Drug dosage and preparation was checked against Nelson Text book of paediatrics 19th edition (25). Completeness, error and correction made by the dispensing pharmacist were also checked by the same check list every day.

Proper data collection was checked by principal investigator every day and problems identified through the process was addressed on daily bases.

Data was entered and analyzed using statistical package for social sciences (SPSS version 20) software.

The study was conducted after obtaining ethical clearance from the Department of Pediatrics and Child health, Addis Ababa University, School of Medicine.

RESULTS

The total number of prescriptions studied was 246. Of the 246 prescriptions; 3.6 % of the prescriptions were issued for infants below two months of age, 11.4% for 2-12 months, 34.6% for 12-59 months and 50.4% for 59-168 months old. 52.8% of the prescriptions were issued for male patients and 47.2% for female patients (Table1).

Table 1: Distribution of outpatient prescriptions by age and sex, Tikur Anbessa Specialized Teaching Hospital, DPCH*,

Age of patient in months	Sex		Total	
	Male	Female		
0-2	5	4	9	(3.6%)
2-12	13	15	28	(11.4%)
12-59	52	33	85	(34.6%)
59-168	60	64	124	(50.4%)
Total	130 (52.8%)	116 (47.2%)	246	(100%)

*DPCH: Department of Pediatrics and Child Health

From all pediatric outpatient departments; 93.1% of the prescriptions were issued from the different follow up subspecialty clinics and 7% from regular OPD (ROPD). Table 2 shows the distribution of prescriptions by the place where they were prescribed.

Table 2: Distribution of prescriptions by specialty clinic', Tikur Anbessa Specialized Teaching Hospital, DPCH*

Name of clinic	Number of prescriptions issued	Percent (%)
Cardiac	65	26.4
Hematology/oncology	54	22
Neurology	45	18.3
Renal	19	7.7
Emergency Unit	18	7.3
Chest	18	7.3
Regular OPD	17	7
Others	10	4.1
Total	246	100

*DPCH: Department of Pediatrics and Child Health

Completeness of patient and drug information is shown in table 3. Drug dose was omitted in 7% of the prescriptions among which 64.7% of the omissions were for bronchodilators. Error in

dosing was noted in 30% of the prescriptions. Of the prescriptions with error in dosing 42.5% was for prophylactic antibiotics (table 4).

46.6% of drugs with error in dosing were issued from oncology /hematology clinic and 54.4% of the errors in dosing were from all other clinics.

Clear hand writing was noted in 85.5% of the prescriptions, prescribers' name was mentioned in 54.5%. No documented correction was made by dispensing pharmacist in all of the prescriptions.

Table3: Distribution of prescriptions by completeness of patient and drug information, Tikur Anbessa Specialized Teaching Hospital, DPCH*

Patient information	**Omitted**		**Documented**		**Total**
	Number	%	Number	%	
Full name	4	(1.6)	242	(98.4)	246 (100%)
Age	192	(78)	54	(22)	246 (100%)
Sex	198	(80.5)	48	(19.5)	246 (100%)
Weight	212	(86.2)	34	(13.8)	246 (100%)
Diagnosis	162	(65.9)	84	(34.1)	246 (100%)
Registration number	122	(49.6)	124	(50.4)	246 (100%)
Drug information					
Generic name	49	(19.8)	197	(80.1)	246 (100%)
Formulation	125	(50.8)	121	(49.2)	246 (100%)
concentration	22	(8.9)	224	(91.1)	246 (100%)
Frequency	26	(10.5)	220	(89.5)	246 (100%)
Duration of treatment	23	(9.3)	223	(90.7)	246 (100%)

*DPCH: department of pediatrics and child health

Table 4: Group of Drugs Vs completeness/ correctness of Dosage, DPCH*, Tikur Anbessa Specialized Teaching Hospital

Group of prescribed drugs	**Dose**			**Total**
	Omitted	Error	Correct dosing	
Antibiotic(prophylactic)	5(29.4%)	31 (42.5%)	20 (12.8%)	56(22.8%)
Antibiotic (Therapeutic)	1(5.9%)	8 (11%)	11 (7.1%)	20(8.1%)
Anti-inflammatory	0	7 (9.6%)	13 (8.3%)	20 (8.1%)
Diuretics	0	21 (28.7%)	24 (15.4%))	45 (18.3%)
ACEI	0	0	10(6.4%)	10 (4%)
Bronchodilator	11(64.7%)	0	6 (3.8%)	17 (7%)
Anticonvulsant	0	4 (5.5%)	48 (30.7%)	52 (21.2%)
Chemotherapeutic agents	0	0	11(7.1%)	11(4.5%)
Others	0	2 (2.7%)	13 (8.3%))	15 (6%)
Total	17	73	156	246

*DPCH: department of pediatrics and child health

DISCUSSION

A standard prescription should contain the essential elements of patient, drug and prescriber information. Incomplete prescription writing may lead to medication errors particularly in children. Children face the risk of medication error because of factors such as weight – based dosing, need for stock medicine dilution, decreased communication abilities of children, inability to self-administer the medication and the high vulnerability of young critically ill children to have injury from medication [4-6]. Hence, it is mandatory for a paediatric prescription to be of high quality, containing essential elements to avoid medication errors and its consequences. Analysis of this study concerning patient information shows that the full patient name is omitted in 1.6% of the prescriptions. This makes them unidentifiable and can be wrongly issued to other patients. The patient's age is not mentioned in 78% of prescriptions and this makes it difficult for the pharmacist to check the dose on prescriptions where weight is not documented. Though weight based dosing is the best way for the pharmacist to check for dose error, weight was not mentioned in 86.2% of the prescriptions. On the other hand the diagnosis of patients was not documented in 65.9% of the prescriptions leaving the dispensing pharmacist in dark to check for the appropriateness of the drugs prescribed.

Comparing this study to a similar study conducted in three of the paediatric teaching hospitals in Khartoum, writing of full patient name was found to be 98.4% in our study while in Khartoum study it was reported to be 81.4% (26). Writing the patient age in our study was 22%while in Khartoum study it was reported to be 92.7%. Writing a diagnosis was 34.1% in our study while it was found to be 85.2% in Khartoum's study. This means that the quality of prescription writing in our study with regard to patient identification with exception of patient full name is worse than that of the Khartoum's study.

Concerning drug information, omission of drug generic name was found in 19.9% of prescriptions. Generic name prescription will enable the patients to choose the cheapest effective drug while prescribing its trade name lead to loss of this opportunity. This is much better than one noted in the Khartoum's study which is 60.6%. Drug formulations were omitted in 50.8% of our prescriptions as compared to 22.3% in Khartoum, drug concentration was omitted in 8.9% of our prescriptions as compared to 39.7% in Khartoum, and drug dosage was omitted in 7% of our prescriptions as compared to 1.7% in Khartoum. Drug frequency was omitted in 10.5% of our prescriptions as compared to 3.9% in Khartoum; duration of treatment was omitted in 9.3 % of our prescriptions as compared to 19.4% seen in the Khartoum study. This shows that reporting drug information quality is lower particularly in drug formulation, dosage and frequency.

8.9% of our prescriptions lack drug concentration whiles a study done in Switzerland showed 33% [27]. As the dose is calculated according to specific concentration, this may lead to faulty dosage. In our study omission of treatment duration was found to be 9.3% which is significantly better than the Ribat study (2) which is 25.7% while it was worse than that reported from the London study which was only 2.8% [21,26].

Regarding the prescribers' information our study showed that clear handwriting was lacking in 14.5% of the prescriptions which is higher than seen in the Khartoum study (7-9%). The prescriber's name and signature were reported in 54.5% and 82.1% of our prescriptions respectively while the Khartoum study showed 60.7% and 29.6% of the prescriptions respectively. This is much lower than the Arizona study where prescribers name and signature was noted in 91.7% and 97.3% respectively [30].The date was omitted in 63% of our prescriptions as compared to the Khartoum study where omission of date was reported to be 11.3%.

A study done in Jimma University Hospital (Western Ethiopia) in patients in the intensive care unit (ICU) showed that the rate of illegible hand writing was 8.8%, and there was no prescribers' signature and date in 30.6% and this is better than our study.

Among the medication errors 42.5% was for prophylactic antibiotics, 28.7% were for diuretics. 11% of therapeutic doses of antibiotics bearing prescriptions were issued with wrong dose. A study done in Jimma University Hospital in the ICU showed that 32.5% of the prescription errors

were for antibiotics and 9.6% were for analgesics (31).

Among the medications with the wrong dosage, 46.6% of medications were issued from Oncology clinic and 27.4% from cardiac clinic. As there was no documented correction made by dispensing pharmacist in any of the prescriptions this calls for careful production of prescriptions to minimize the morbidity and mortality of patients due to avoidable mistakes like the ones seen in our study.

In conclusion, from this study prescription production is unsatisfactory because of the lack of essential elements of good prescription. Patients' identification and drug information is poorly documented. Though it is mandatory to identify prescriber by his/her name, rank and signature, most of the essential elements of prescribers' identifications were omitted. This study showed that our prescriptions are deficient when compared with the standard prescription format adopted by FMHACA. The Department of Pediatrics and Child health has to give great emphasis on correct prescription writing. Frequent feedback should be given to incorrect prescribers to avoid or decrease prescription errors.

REFERENCES

1. Bertram G. Katzung. Basic and Clinical Pharmacology (Lange basic sciences) 10th edn.San Francisco Mc-Graw Hill publisher 2006.
2. Conroy S, McIntyre J. Pharmacy Therapeutic Subcommittee and the Department of Pharmaceutical Care Guidelines: a systematic review. Drug Safety 2004; 27:661-70.
3. Blatt A, Chamban R, L emardeley P. Legal format and costs of prescription at the Central hospital in Yaoundé. Tropical Medicine 1997; 57:37-40.
4. Fontan JE, Maneglier V, Nguyen VX, Loirat C, Brion F. Medication errors in hospitals: computerized unit dose drug dispensing system versus ward stock distribution system. Pharma world Science 2005; 25:112-17.
5. Kaushal R, Jaggi T, Walsh K, et al. Pediatric medication errors: what do we know? What gaps remain? Ambul Pediatr 2004 Jan-Feb; 4(1):73-81.
6. Rothschild JM, Lee TH, Bae T, Bates DW. Clinician use of a palmtop drug reference guide. J Am Med Inform Assoc 2002: 9: 223-29.
7. Yenet, (2005) Drug Administration and Control Authority of Ethiopia.
8. Belknaps, Moore H, Lanzotti S, et alApplication of software design principles and debugging methods to an analgesia prescription reduces risk of severe injury from medical use of opioids. Clinical Pharma Theurap 2008; 84(3):385 – 92.
9. Corrigan JM. Donaldson MS. Kohn LT, et al; (1999) *To Err is Human: Building a Safer Health System*. Washington, DC: National Academy Press.
10. Counsel of Europe. Partial agreement in the social and public health field. Survey on medication errors. Nov 2002.
11. WHO (1998). Promoting appropriate Drug use in Missionary Health Facilities in Cameroon-EDM Research Series No. 028. Geneva, Switzerland.
12. Moore T, Bykov A, Savelli T, et al. (1997) Guidelines for Implementing Drug Utilization Review Programs in Hospitals. Rational Pharmaceutical Management Project-Russia, Management Sciences for Health, Arlington, Moscow, Russia.
13. Kaushal R, Bates DW, Landrigan C, et al. Medication errors and adverse drug events in pediatric in patients. JAMA 2001;285:2114-20
14. Cousins D, Clarkson A, Conroy S, et al. Medication errors in children - an eight year review using press reports. Paediatric Perinatal Drug Therapy .(2002); 5:52-58.
15. Davies C. Junior doctor is cleared in baby overdose death. The Telegraphol 1999; 1426:34
16. Fahimi F, Sistanizadb M, Abrishami R, Baniasadi S. An observational study of errors related to the preparation and administration of medications given by infusion devices in a teaching hospital. *International Journal of Pharmacology Res* 2007; 6(4):295–299
17. Williams DJP. Medication errors. *J R Coll Physicians Edinb* 2007; 37: 343–346.
18. Moyen E, Camiré E, Stelfox HT. Clinical review: Medication errors in critical care. *Crit Care* 2008; 12(2):208.
19. Corrigan JM, Donaldson MS, Kohn LT, et al. *To Err is Human: Building a Safer Health System*. National Academy Press 1999;50:60-62
20. Conroy S, Appleby K, Bostock D, Unsworth V, Cousins D. Medication errors in a children's hospital. Paediatr Postna Drug Ther 2007;8:18-25
21. Winger T,Willis A., Chan, et al. A study of the quality of prescriptions issued in a busy pediatric emergency room. Public Health Reports 1995; 90:402-408.
22. Oshikoya KA, Senbanjo IO, Amole OO. Interns' knowledge of clinical pharmacology and therapeutics after undergraduate and on-going internship training in Nigeria. *BMC Medical Education* 2009*;* 9:50
23. Ashcroft DM, Quinlan P, Blenkinsopp A. *Prospective study of the incidence, nature and causes of dispensing errors in community pharmacies. Pharmaco epidemiol Drug Saf 2005;* ***14:327****–32. http://www.ncbi.nlm.nih.gov/pubmed/15386722 (accessed 27 Nov 2015).*[CrossRef][Medline][Web of Science]

24. Allan EL, Barker KN, Malloy MJ, et al. *Dispensing errors and counseling in community practice. Am Pharm 1995; **NS35:25**–33. http://www.ncbi.nlm.nih.gov/pubmed/8546071 (accessed 27 Nov 2015).*
25. Kliegman R.M, Stanton B.F, Schor N.F, Behrman R.E. Nelson Textbook of Pediatrics 19th edition.(Elsevier Saunders, Philadelphia 2011.
26. Abdullah AE, Abdelrahman SMK. Prescription writing quality in Paediatric teaching hospitals in Khartoum. Sudan Journal of Pediatrics 2012; 12 (1):64-69
27. Sibailly G, Dipaolo ER, Gehri M. ASHP guidelines on preventing medication errors in hospitals. Ame J Hosp Pharm 2005; 50:305-14.
28. Yousif E, Ahmed AM, Abdalla ME, Abdel Gadir MA. Deficiencies in medical prescriptions in Sudanese hospital. East Medit Health J 2006; 6:915-18.
29. Conroy S, Sweiss D, Planner C. Interventions to reduce dosing errors in children: a systematic review of the literature. Drug Saf 2007; 30:1111-25.
30. Nithman C, Parkhurs YE, Sommerst EB. Physician prescribing habit: effect of medicine. JAMA 1971; 217:585-87.
31. Agalu A, Ayele Y, Bedada W, Woldie M. Medication prescribing errors in the intensive unit of Jimma University Specialized Hospital, Southwest Ethiopia. Journal of Multidisciplinary Healthcare 2011;4: 377–382