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Original Article

Drug Related Problems in Sulaimani Pediatric Teaching Hospital, Iraq

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Abstract

This prospective study highlights some drugs related problems (DRPs)in Sulaimani Pediatric Teaching Hospital, Kurdistan region, Iraq. The physician medication orders for newly admitted patients, during February 6th – June10th 2013 were evaluated for medication errors. A specially standardized questionnaire was utilized to identify expected types of medication errors appeared in the follow up sheets of randomly selected pediatric patients, admitted to the hospital due to different causes. Parents, usually mothers, answer some of the questions. More than 500 medication orders were reviewed with 499 reported medication errors (85%). The most common types of medication errors include incorrect dose (33%), incomplete prescription (29%), 6% for both drug-drug interaction and incomplete allergy and past medical history information in the case sheet; followed by 4% for adverse reactions, 2% for incorrect dosage interval, incorrect duration of therapy and delay in services, and 1% due to omission of drugs. The most common types of incomplete prescriptions are dose (53%) and dosage form (18%). In conclusion, medication errors in Sulaimani Pediatric Hospital are very high; most of them are avoidable in the presence of good health care system that supports the roles and activities of clinical pharmacists.

Keywords: DRPs; medication errors; pharmaceutical care; pediatrics

INTRODUCTION

As the number and potency of available drugs increases, drug prescribing practice and clinical use become more complex and associated with variety of Drug Related Problems (DRPs). Pharmacists' interventions have been documented and proved as a valuable contribution, both in primary health care [1-6], and in the hospital setting [7-9]. Generally, problems related to the use of approved drugs can be summarized with the term "drug-related problems" [10]. When reviewing the literature on DRPs, one can easily predict that most studies are difficult to compare because of the variations in definition and classification of DRPs [11,12]. Medication errors (MEs) are one of the most common types of medical problems, and one of the most common and preventable causes of iatrogenic injuries. They may potentially contribute to the morbidity and mortality of hospitalized patients. In the USA, MEs have been found to be responsible for 7,000 patient injuries per year [13], with a similar incidence and consequences in the UK [14]. Approximately, one third of adverse drug events (ADEs) is associated with medication errors and is thus preventable [15]. The pediatric population has unique needs that require special considerations in the provision of health care and the prescribing of medications. Medication errors are the most common iatrogenic cause of morbidity and mortality among hospitalized pediatric patients. When MEs occur, pediatric patients have much higher risk of death than adults do. Many factors are involved in assigning children at a greater risk for MEs, such as age and weight variations, high intra-patient variability, rapid changes in the pharmacokinetic properties of drugs in children, and the frequent use of "off-label" indications in children [17,18]. Since there is no locally reported data regarding this problem, the present study was

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designed to shed a light on the extent of DRP in Sulaimani Pediatric Hospital.

METHODOLOGY

Study design and setting: The present prospective study was performed in Sulaimani Pediatric Teaching Hospital, Sulaimani City, Kurdistan Region, Iraq. The physician medication orders for newly admitted patients, during a period of four months (6^{th} February - 10^{th} June, 2013) were evaluated for medication errors. The total capacity of Sulaimani Pediatric Hospital was approximately 334 beds (including emergency and neonatal intensive care unit). The cases were collected in 3 wards (excluding cases from emergency and neonatal intensive care unit), which represent approximately 61% (207 beds) of the overall hospital capacity. A standardized questionnaire, especially adopted for the present study, was utilized to identify all the expected types of medication errors appeared in the follow up sheets, which belongs to randomly selected pediatric patients admitted to the hospital due to different causes. Parents, usually mothers, answer some of the questions.

Main outcome measures: The medication orders were hand-written by the authorized medical staff, including rotators, permanents, and consultants. All medication orders were rewritten every day and whenever an additional order or change is needed. Information on each patient profile, including age, weight, gender, residency, diagnosis upon admission, reason and frequency of admission, any reported allergies, and a complete medication profile for the present hospitalization were reviewed. Medication orders were reported, reviewed, and carefully assessed according to standard globally followed criteria recognized elsewhere. Data were evaluated for the following: 1) the types of errors in terms of dose, frequency, dosage interval, duration of therapy, adverse drug reactions, drug-drug interactions, dosage calculation and a complete medication profile for the present hospitalization;2) Types of medication classes prescribed and types of medication classes involved in the errors.

RESULTS

Table describes the demographic characteristics of the pediatric patients (n=100), which include age, gender, address, level of education, economical status profile. Figure 1 demonstrates that within 587 medication orders, 499 medication errors (85%) were reported. The types and percentage of these errors were ranked as follow: 33% incorrect dose, 29% incomplete prescription, 6% for both drug-drug interaction and incomplete information regarding allergy and past medical history in the case sheet, 4% adverse reactions, 2% for incorrect dosage interval, incorrect duration of therapy and delay in services, and 1% due to omission of drugs. In figure 2,the data shows that 53% of incomplete prescriptions are due to the dose, 18% dosage form, 13% rout of administration, 8% date of order, 6% dose interval, and 2% due to patient's age. Table 2 shows that 71% (n=138) of incorrect doses are sub-therapeutic, while 29% (n=56) are overdoses.

DISCUSSION

Medication errors are an internationally recognized source of significant morbidity and mortality in hospitalized patients [13]. Hospitalized children are more susceptible to prescribing errors and mistakes made during dosage calculation compared to adults, because of their lower body weight and other physiological characteristics [14]. When the results of the present study are compared with others that focus on DRPs, one can verify many differences in the classification and outcome of errors, which may be attributed to the fact that there are various definitions for DRPs and MEs. Additionally, there are many variations in the methods of collecting and analyzing data and the prevalence of errors, which may predispose to different outcomes relative other reports. Accordingly, the outcome of the present study cannot necessarily represent what is found in other countries. There are relatively few studies of MEs in the Middle East compared to the large number of studies conducted in USA and Europe [19]. In the present study, the percentage of medication errors of all orders involved is 85%; although the percentage is high, there are many other studies which support the current finding [20]. Prescribers are human and therefore mistakes are highly expected. Recognition of these errors is the first step in their prevention. It is important that prescribers are aware of their own vulnerability and that we all learn from our own mistakes and those of others. Increased awareness of error is an important preventive tool [21].As medication errors are categorized into different types, the result of the present study shows that the most common type of medication errors are related to dosing error (33%), and in most cases, it is within the sub-therapeutic level. The second most common type of medication error identified in the present study represents incomplete prescription (29%), while the third most common types are drug-drug interaction, lack in knowledge about allergy status and the past medical history information (6% for each). Moreover, dosing errors are the most common type of medication error in children, with overdoses generally outnumbering under-doses, but in the

current study the main type of dosing error is sub-therapeutic. Pharmacists and nurses should check the drug, the dose, patient identity and any other relevant information before administering medicine. When a query arises, as to whether a drug should be administered, the patients, or the parents in case of children, should be listened to attentively, their questions should be answered, and the prescription should be double-checked with the prescriber [22]. Although, ward pharmacists routinely checked all the case sheets included in the present study, MEs were not being identified or corrected. The main reasons behind these problems are the absence of appropriate role of pediatric clinical pharmacist, shortage in number of clinical pharmacists, work overload, and poor communication between physicians and pharmacists. Recently, Fortescue *et al*. showed that monitoring medication orders by a clinical pharmacist might prevent 58% of all errors and 72% of potentially harmful errors, while improving physician-pharmacist communication may prevent 47.4% of errors [23]. Other factors, which contribute to these problems, are children's lower body weight and other physiological characteristics, which render them more vulnerable than adults to prescribing errors during dosage calculation. Moreover, decreased communication abilities of children, inability to self-administer medications, and the high susceptibility of young critically ill children to injury from medications, particularly those with immature renal and hepatic systems may be additional factors [24].In conclusion, the level of medication-related errors in Sulaimani Pediatric Hospital is relatively high, compared with the well-recognized internationally accepted levels. Further detailed studies are suggested in this regard to improve health care services in the public sector.

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Table 1: Demographic Profile of the pediatric patients

Demographic data	Frequency	Percent
	Age groups	
1-6 months	19	19%
6 months-1 year	18	18%
1.1-5 years	36	36%
> 5 years	27	27%
Total	100	100%
	Gender	
Male	52	52%
Female	48	48%
Total	100	100%
	Residency	
Sulaimani City	41	41%
Out side	59	59%
Total	100	100%
	Mother Education	
Illiterate	24	24%
Primary	61	61%
Secondary	12	12%
University	3	3%
Total	100	100%
	Father Education	
Illiterate	18	18.4%
Primary	65	66.3%
Secondary	13	13.3%
University	2	2.0%
Total	98	100%
	Economic Status	
Poor	23	23%
Medium	72	72%
Good	5	5%
Total	100	100%

Table 2: Category, number and percentage of incorrect doses

Category	Number	Percentages
Sub-therapeutic	138	71%
over dose	56	29%
Total	194	100%

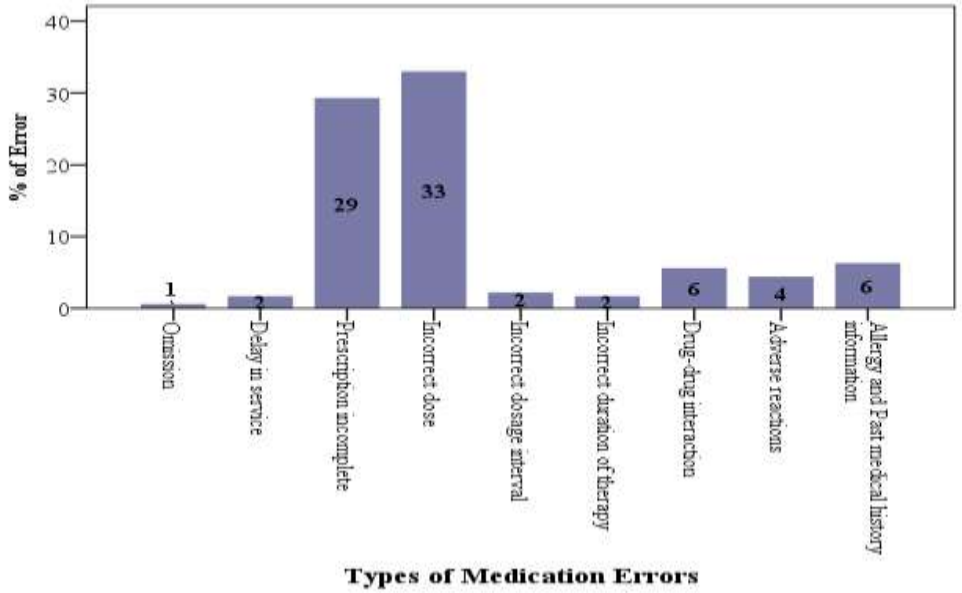

Figure 1: Types and percentages of medication errors reported in Sulaimani Pediatric Hospital.

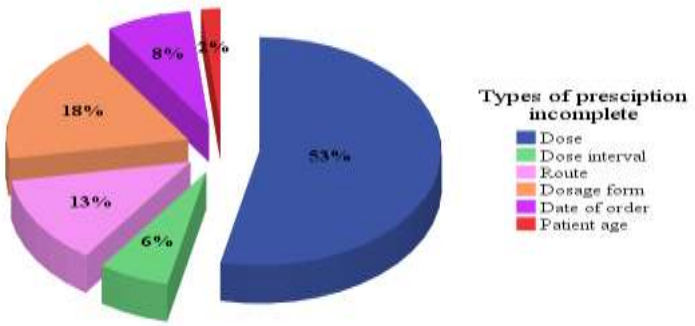

Figure 2: Types and percentages of incomplete prescriptions

REFERENCES

1. Wolfson, D.J., Booth, T.G., and Roberts P.I. (1993): The community pharmacist and adverse drug reaction monitoring: (2) an examination of the potential role in the United Kingdom. Pharm J. 251, 4–21.
2. Hawksworth, G.M., Corlett, A.J., Wright, D.J., and Chrystyn, H. (1999): Clinical pharmacy interventions by community pharmacists during the dispensing process.Br J Clin Pharmacol. 47, 695–700.
3. Rupp, M.T. (1992): Value of community pharmacists' interventions to correct prescribing errors. Ann Pharmacother. 26, 1574–1580.
4. Leemans, L., Veroeveren, L., Bulens, J., Hendrickx, C., Keyenberg, W., Niesten F., et al. (2003): Frequency and trends of interventions of prescription in Flemish community pharmacies. Pharm World Sci. 25, 65–69.
5. Garcao, J.A., and Cabrita, J. (2002): Evaluation of a pharmaceutical care program for hypertensive patients in rural Portugal. J Am Pharm Assoc. 42, 858–864.

6. Bernsten, C., Bjorkman, I., Caramona, M., Crealey, G., Frokjaer, B., Grundberger E., et al. (2001): Improving the well-being of elderly patients via community pharmacy-based provision of pharmaceutical care. Drugs Aging 18, 63–77.
7. Bond, C.A., and Monson, R. (1984): Sustained improvement in drug documentation compliance, and disease control. A four-year analysis of an ambulatory care model. Arch Intern Med. 144, 1159–1162.
8. Hatoum, H.T., Catizone, C., Hutchinson, R.A., and Purohit, A. (1986): An eleven year review of the pharmacy literature: documentation of the value and acceptance of clinical pharmacy. Drug Intell Clin Pharm. 20, 33–48.
9. Galindo, C., Olive, M., Lacasa, C., Martinez, J., Roure, C., Llado, M., et al. (2003): Pharmaceutical care: pharmacy involvement in prescribing in an acute-care hospital. Pharm World Sci. 25, 56–64.
10. Meyboom, R.H.B., Lindquist, M., and Egberts, A.C.G. (2000): An ABC of drug-related problems. Drug Safety 22, 415–423.
11. van den Bemt, P.M.L.A., Egberts, A.C.G., De Jong-van den Berg, L.T.W., and Brouwers, J.R.B.J. (2000): Drug-related problems in hospitalized patients: a review. Drug Safety 22, 321–333.
12. van Mil, J.W., Westerlund, L.O.T., Hersberger, K.E., and Schaefer, M.A. (2004): Drug-related problem classification systems. Ann Pharmacother. 38, 859–867.
13. Kohn, L.T., Corrigan, J.M., and Donaldson, M.S., (Eds.), To err is human: building a safer health system, Washington, DC: Institute of Medicine National Academy Press, 1999.
14. Dean, B., Schachter, M., Vincent, C., et al. (2002): Prescribing errors in hospital inpatients: their incidence and clinical significance. Qual Safe Health Care 11, 340–347.
15. Bates, D.W., Boyle, D.L., Vander Vliet, M.B., et al. (1995): Relationship between medication errors and adverse drug events. J Gen Intern Med. 10, 199–205.
16. Kaushal, R., Bates, D.W., Landrigan, C., et al. (2001): Medication errors and adverse drug events in pediatric inpatients. JAMA. 285, 2114–2120.
17. British Medical Association, the Royal Pharmaceutical Society of Great Britain, the Royal College of Pediatrics and Child Health, and the Neonatal and Pediatric Pharmacists Group. British National Formulary for Children. London: BMJ Publishing Group, RPS Publishing and RCPCH Publications, 2007.
18. Stucky, E.R. (2003): American academy of pediatrics committee on drugs; American academy of pediatrics committee on hospital care. Prevention of medication errors in the pediatric inpatient setting. Pediatrics 112, 431–436.
19. Alsulami, Z., Conroy, S., and Choonara, I. (2013): Medication errors in the Middle East countries: A systematic review of the literature. Eur J Clin Pharmacol. 69(4), 995–1008.
20. Ghaleb, M.A., Barber, N., Franklin, B.D., et al. (2006): Systematic review of medication errors in pediatric patients. Ann Pharmacother.40, 1766–1776.
21. Simpson, J., Lynch, R., Grant, J., and Alroomi, L. (2004): Reducing medication errors in the neonatal intensive care unit. Arch Dis Child Fetal Neonatal Ed. 89, F480–F482.
22. Wong, I.C.K., Wong, L.Y.L., and Cranswick, N.E. (2009): Minimizing medication errors in children. Arch Dis Child. 94, 161–164.
23. Fortescue, E.B., Kaushal, R., Landrigan, C.P., et al. (2003): Prioritizing strategies for preventing medication errors and adverse drug events in pediatric inpatients. Pediatrics 111, 722–729.
24. Kaushal, R., Jaggi, T., Walsh, K., Fortescue, E.B., and Bates, D.W. (2004): Pediatric medication errors. Ambul Pediatr. 4(1), 73–81.