

*Original Article***Factors contributing to medication errors in Jordan: a nursing perspective***Mohammad Al-Shara****Abstract**

BACKGROUND: Significant efforts have been directed to understand medication errors in recent years. Therefore, this study was conducted to determine the factors contributing to medication errors and related areas for improvement, as perceived by nurses.

METHODS: Two hundred registered nurses were asked to complete a questionnaire which asked them to identify types, stages and issues perceived as contributing factors to medication errors.

RESULTS: Out of 200 delivered questionnaire, a total of 126 of registered nurses responded or completed the questionnaire representing a 63% response rate. The leading types of medication errors were wrong patient (26.2%) and wrong dosage (26.2%). The highest level of medication errors were 48.4%, 31.7% and 11.1% related to nurses, physicians and pharmacists, respectively. In addition, the leading causes of medication errors were due to heavy workload (41.4%) and new staff (20.6%).

CONCLUSIONS: A wide range of factors perceived as contributing factors of medication errors were identified. These results provide valuable information that could be used to improve the medication system in Jordan.

KEY WORDS: Medication errors, medication therapy management, patients, safety, Jordan, nursing.

IJNMR 2011; 16(2): 158-161

The major part of the clinical nurse's role is drug administration which is achieved through four stages (i.e., prescription, transcription, dispensing and administration). These stages involve physicians, pharmacists and nurses.¹ Therefore, medication error is defined as any type of error in the prescription, transcription, dispensing and administration process which could bring about serious consequences.

Medicine is usually prescribed by the doctor and dispensed by the pharmacist, but responsibility for correct administration rests with the registered nurse. The correct administration that could be responsibility of the nurse includes preparing, checking and administering medications, updating their knowledge about medications, monitoring the effectiveness of treatment, reporting adverse reactions and teaching patients about their drugs. However, several studies suggest that this does not always occur.²⁻⁵

According to several studies, medication errors usually occur during the prescription and administration stages and could be accounted for 65-87% of all medication errors.⁶⁻⁹

In a study of 315 medication errors in neonatal and paediatric intensive care units, nurses and pharmacists were responsible for 60.3% and 29.6% of those errors, respectively.³ Another study conducted on a total of 70 preventable administration errors indicated that nurses caused 34% of the administration errors, with the remaining 56% occurring during ordering and 10% during transcription and dispensing.⁷

In another study conducted on 441 medication errors in the UK, nurses accounted for 22% of errors and that 25% of errors were administration errors. 72% of errors were attributed to doctors, 68% were prescribing errors, 5% were attributed to pharmacy staff and 7% were recorded as supply errors and the outstanding 1% was attributed to doctor/nurse combination errors.⁸

* PhD, Assistant Professor, Department of Pharmacology, School of Nursing, Irbid National University, Irbid, Jordan.
Email: alshara_70@yahoo.com

Many studies addressed medication errors. However, in Jordan there is only one published study about this subject.¹⁰ Therefore, the main purpose of this study was to identify and understand the contribution of medication errors from a nursing perspective, so that improvements can be implemented.

Methods

A questionnaire of three parts¹¹ was prepared as the following:

Part 1 asked the nurse to rank a list of 10 of most frequent types of medication errors with number 1 being the most frequent and number 10 being the least frequent type of medication error. Part 2 asked the nurse to rank a list of 6 possible stages of medication errors, which are carried by medical staff with number 1 being the most frequent and number 6 being the least frequent stage of medication error. The six possible stages of medication error were as following: patient monitoring (nurse), physician ordering (physician), transcribing (pharmacist), drug administration (nurse), pharmacy dispensing (pharmacist), and missing of medication (nurse). Part 3 asked the nurse to rank a list of 7 possible causes of medication errors, with number 1 being the most frequent cause and number 7 being the least frequent cause of medication errors.

The participant was asked for some characteristics to be filled like gender, level of education, years of experience in nursing and area of work in the hospital.

Two hundred questionnaires were sent by the research group to three governmental and two private hospitals in Jordan during a two-month period (April-May 2009). The working group explained to the registered nurses how to fill the questionnaire. To encourage the nursing staff to participate in the study, the name of the participant or hospital was not asked and confidentiality of participant's information was assured. However, written consent was obtained from all participants. Only completed questionnaire which were filled by registered nurses were included in the study. Whereas, incomplete questionnaires or questionnaires that were

filled by unregistered nurses were excluded from the study.

The study protocol was approved by the Deanship of Research of Irbid National University and the administrations of participating hospitals.

Data were analyzed using SPSS software (version 15 for Windows) to calculate the frequencies.

Results

Out of 200 delivered questionnaires, a total of 126 registered nurses responded or completed the questionnaire representing a 63% response rate. There were 50 (39.7%) males and 76 (60.3%) females. Sixty five (51.6%) respondents had less than five years of nursing experience and 61 (48.4%) had more than five years of nursing experience. The educational qualifications of participants were as following: 57 (45.2%) held a diploma (of two years of nursing study), 59 (46.8%) had a bachelor degree in nursing and 10 (8.0%) held higher than bachelor degree.

The highest types of medication errors occurred when the medication is delivered to the wrong patient (26.2% of the total medication errors) followed by 22.2% due to wrong dosage. However, frequency of medication and changing of medication were the least frequent with 3.1% and 1.5% of medication errors, respectively.

The highest levels of medication errors (48.4%) occurred when the medication was delivered to patient by the nurse in different stages like patient monitoring (31.7%), administration of medication (11.1%) and missing of medication (5.6%).

Other levels of medication errors occurred during ordering the medication by a physician (27.0%) and by the pharmacist (24.6%), during medication transcribing (15.9%) and dispensing (8.7%).

The highest cause of medication errors was due to heavy workload (41.4%) by the nurse, followed by errors due to new staff (20.6%). Whereas, the lowest cause of medication errors was due to unfamiliarity of nurse with patient's condition (1.6%, Table 1).

Table 1. Types of Medication Errors

Variable	Medication Errors n (%)	Rank
Type of error		
Wrong patient	33 (26.2)	1
Wrong Dose	28 (22.2)	2
No or wrong date	16 (12.7)	3
Wrong drug	12 (9.5)	4
Wrong time	11 (8.7)	5
Wrong documentation	8 (6.3)	6
Wrong Route	6 (4.7)	7
No medication	6 (4.7)	8
Frequency of medication	4 (3.1)	9
Changing of medication	2 (1.5)	10
Stage of error		
Patient monitoring (Nurse)	40 (31.7)	1
Physician ordering (Physician)	34 (27.0)	2
Transcribing (Pharmacist)	20 (15.9)	3
Administration (Nurse)	14 (11.1)	4
Pharmacy dispensing (Pharmacist)	11 (8.7)	5
Missing of medication (Nurse)	7 (5.6)	6
Cause of error		
Heavy workload	52 (41.2)	1
New staff	26 (20.6)	2
Personal neglect	19 (15.1)	3
Unfamiliarity with medication	15 (11.9)	4
Insufficient training	6 (4.8)	5
Complicated prescription	6 (4.8)	6
Unfamiliarity with patient's condition	2 (1.6)	7

Discussion

This study found that choosing the wrong patient or the wrong dose were the two leading types of medication errors. Similar findings are also reported.^{7,12,13} However, the lowest leading types of medication errors were due to frequency of medication and changing of medication.

Nurses, physicians and pharmacists are involved in medication errors. Results of this study indicated that the person who is most responsible for occurrence of medication errors is the nurse, (i.e., during delivering the medication to patient), followed by a physician (i.e., during ordering the medication) and finally, by a pharmacist (i.e., during medication transcribing and dispensing). Comparable findings were reported in the literatures.^{3,14,15} In contrast, some studies indicated that physicians had been committed the most medication errors followed by pharmacists and then nurses.^{16,17}

Furthermore, the results of this study indicated that the majority of nurses believed that

multiple causes were involved in each medication error. The three main causes that they believed to be involved were heavy workload, new staff and personal neglect. This result is consistent with other results reported in the literatures.^{12,18-20} In contrast, some studies indicated that the main causes of medication errors were due to personal neglect followed by medication errors (accounting for 30%) and new staff.^{14,17}

Conclusion

Results of this study demonstrated that medication errors result from interrelated factors concerning the types of errors (wrong patient and wrong dose), stages of errors (introduction of medication to the patient, ordering the medication and transcribing and dispensing) and causes of errors (heavy workload, new staff and personal neglect). This multiple interrelated factors of medication errors call for a continuous monitoring and reviewing of medication errors in the hospitals and the country at large. Therefore, if the perceived causes of me-

medication errors are correlated with the actual causes, the authorized people can use the perceived causes of errors to bring about positive

changes and facilitate error prevention.

The authors declare no conflict of interest in this study.

References

1. Betz RP, Levy HB. An interdisciplinary method of classifying and monitoring medication errors. *Am J Hosp Pharm* 1985; 42(8): 1724-32.
2. Fuqua RA, Stevens KR. What we know about medication errors: a literature review *J Nurs Qual Assur* 1988; 3(1): 1-17.
3. Raju TN, Kecskes S, Thornton JP, Perry M, Feldman S. Medication errors in neonatal and paediatric intensive-care units *Lancet* 1989; 2(8659): 374-6.
4. Keill P, Johnson T. Shifting gears: improving delivery of medications *J Nurs Care Qual* 1993; 7(2): 24-33.
5. Ferner RE. Is there a cure for drug errors? *BMJ* 1995; 311(7003): 463-4.
6. Bates DW, Leape LL, Petrycki S. Incidence and preventability of adverse drug events in hospitalized adults *J Gen Intern Med* 1993; 8(6): 289-94.
7. Bates DW, Cullen DJ, Laird N, Petersen LA, Small SD, Servi D et al. Incidence of adverse drug events and potential adverse drug events. Implications for prevention. ADE Prevention Study Group *JAMA* 1995; 274(1): 29-34.
8. Wilson DG, McArtney RG, Newcombe RG, McArtney RJ, Gracie J, Kirk CR et al. Medication errors in paediatric practice: insights from a continuous quality improvement approach *Eur J Pediatr* 1998; 157(9): 769-74.
9. Benjamin DM. Reducing medication errors and increasing patient safety: case studies in clinical pharmacology *J Clin Pharmacol* 2003; 43(7): 768-83.
10. Mrayyan MT, Shishani K, Al Faouri I. Rate, causes and reporting of medication errors in Jordan: nurses' perspectives *J Nurs Manag* 2007; 15(6): 659-70.
11. Tang FI, Sheu SJ, Yu S, Wei IL, Chen CH. Nurses relate the contributing factors involved in medication errors *J Clin Nurs* 2007; 16(3): 447-57.
12. Leape LL, Bates DW, Cullen DJ, Cooper J, Demonaco HJ, Gallivan T et al. Systems analysis of adverse drug events. ADE Prevention Study Group *JAMA* 1995; 274(1): 35-43.
13. Lesar TS, Lomaestro BM, Pohl H. Medication-prescribing errors in a teaching hospital. A 9-year experience *Arch Intern Med* 1997; 157(14): 1569-76.
14. Ashcroft D, Birtwistle M, Cooke J, Hingley K, Moore P. When do medication errors occur and who reports them? Analysis of a web-based incident reporting scheme in secondary care. *The International Journal of Pharmacy Practice* 2003; 11:86.
15. USP. Center for the Advancement of Patient Safety, Summary of the 1999 Information Submitted to Medmarx. United States Pharmacopoeia, 2000 Rockville, MD.
16. Dibbi HM, Al Abrashy HF, Hussain WA, Fatani MI, Karima TM. Causes and outcome of medication errors in hospitalized patients *Saudi Med J* 2006; 27(10): 1489-92.
17. Beyea SC, Hicks RW, Becker SC. Medication errors in the OR--a secondary analysis of Medmarx *AORN J* 2003; 77(1): 122, 5-4.
18. Conklin D, MacFarland V, Kinnie-Steeves A, Chenger P. Medication errors by nurses: contributing factors *AARN News Lett* 1990; 46(1): 8-9.
19. Taunton RL, Kleinbeck SV, Stafford R, Woods CQ, Bott MJ. Patient outcomes. Are they linked to registered nurse absenteeism, separation, or work load? *J Nurs Adm* 1994; 24(4 Suppl): 48-55.
20. Roseman C, Booker JM. Workload and environmental factors in hospital medication errors *Nurs Res* 1995; 44(4): 226-30.