Evaluating Medication Errors for Hospitalized Patients: The Jordanian Experience

Zena H. Sulaiman[1], Salim A. Hamadi[1]*, Nathir M. Obeidat[2], Iman A Basheti[3]

[1] Department of Pharmacology and Basic Biomedical Sciences, Faculty of Pharmacy, Petra University, Amman, Jordan.
[2] Department of Internal Medicine, Faculty of Medicine, The University of Jordan, Jordan University Hospital, Amman, Jordan.
[3] Department of Clinical Pharmacy and Therapeutics, Faculty of Pharmacy, Applied Science University, Amman, Jordan.

ABSTRACT

To investigate the rate, frequency, and severity of medication errors detected by a clinical pharmacist at a teaching hospital in Amman, Jordan. Secondly, to determine the risk factors associated with the occurrence of these errors.

This prospective observational study used two methods of medication error detection, direct observation and the chart review method. Both methods were conducted in the internal medicine ward between June and December 2013. In the selected shifts, all procedures performed on the patients were observed and recorded by the clinical pharmacist. The number and types of medication errors were documented. Risk factors associated with more medication errors were then tested using multiple univariate regression to identify potential risk factors. All collected data were entered into SPSS and analyzed accordingly.

The study included 283 patients and 15 nurses. A total of 803 medication errors per 6396 opportunities for errors (12.6%) were observed. The most frequent errors were administration errors (n= 739, 20.2%), transcription errors (n= 40, 1.5%), dispensing errors (n= 21, 0.8%) and prescribing errors (n= 3, 0.1%). Risk factors associated with the total number of detected medication errors were mainly shorter nurse's experience in the ward ($R^2 = 0.456$, $p< 0.042$) and patients with higher number of prescribed doses ($R^2 = 0.451$, $p< 0.025$).

This study revealed that medication errors happening in a teaching hospital occur mainly during the administration and transcription stages of the medication use process. Shorter nurse experience and caring for inpatients with more complicated therapeutic regimens can lead to higher rates of medication errors.

Keywords: Medication errors, prescribing, administration, transcription, Jordan, clinical pharmacist.

1. INTRODUCTION

Medication errors (MEs) are a significant issue affecting the healthcare system all around the world [1,2]. MEs result in patient injury, death and higher health care costs [2]. They are considered the eighth leading cause of death in the US, where more people die in a given year as a result of MEs than from motor vehicle accidents, breast cancer or AIDS. Their costs have been estimated between 17-29 billion per year in hospitals including the expense of additional care needed to correct those errors, lost income and disability[3-5].

Over the past five decades, various terms and definitions have been used to describe MEs. The 'National Coordinating Council for Medication Error Reporting and Prevention' defined MEs as "any preventable event that may cause or lead to inappropriate medication use or patient harm [6]. MEs have been classified into five

* shamadi@uop.edu.jo
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categories according to where they occur in the medication use process; these categories include prescribing, transcription, dispensing, administration and monitoring category [7, 8].

Studies on MEs were conducted as early as 1962, where the incidence of MEs occurred frequently back then, (16 errors per 100 doses) [4, 9] decreasing over the years in many countries [10]. It is argued, however, that the current incidence of MEs is greatly underestimated and underreported [11]. As with an aging population, the consequent increase in chronic health problems and larger number of medications [3, 12] one would expect an increase in the number of MEs to be happening.

Results from studies conducted on MEs all over the world have been shown to be alarming [5]**.** In the US, one ME was shown to happen out of every five doses dispensed [13]. The problem was mutual in other countries such as the UK [14], Europe [15], Denmark [16] and Spain [17]. In Asian countries, such as India and Pakistan, the incidences of MEs were even higher constituting 21.8% and 22.6%, respectively [18, 19]. As for the Middle Eastern countries, the incident rates of MEs varied from 7.1% to 90.5% for prescribing and from 9.4% to 80% for administration errors [20, 21]. In Jordan, with a documented average number of 2.2 MEs per nurse [22-25], such vital issue requires a current thorough investigation.

In Jordanian hospitals, physicians are responsible for prescribing medications, pharmacists are responsible for transcribing, dispensing, and storing of medications, and nurses are responsible for preparing and administering medications. Although nurses play the pivotal role in the process of medication administration and they are at a higher risk of committing errors [18, 22], it is important to investigate the MEs through the eyes of a clinical pharmacist. Over the previous few years, clinical pharmacists in Jordan have demonstrated a main role in patient care and health management [26-28]. No previous study in Jordan investigating MEs through the eyes of a clinical pharmacist has been conducted so far. Therefore, the aims of this study are to identify the nature and frequency of the most common MEs happening at an educational hospital in Amman, Jordan, as assessed by a clinical pharmacist; and to explore the associated factors resulting in higher rates of MEs.

Methodology

Study Design

This study was conducted during a six-month period (between June and December 2013) in a 54 bed internal medicine ward of a teaching hospital in Amman, Jordan. Errors were detected by using the disguised direct observation and chart review methods completed by the observer, a well-trained clinical pharmacist in ME detection (who introduced herself as a trainee pharmacist). Nurses were unaware of the true purpose of the study; in order to prevent the "Hawthorne effect" whereby participants may seek to 'improve' their performance when observed. The study was approved by the Institutional Review Board at the Jordan University Hospital in Amman Jordan.

Patient inclusion criteria included patients admitted into the hospital recently, Arabic speaking, whom age is ≥ 18. Exclusion criteria included patients without medication administration record (MAR) and those with a mental disability.

During each observational day (from 8 am to 3 pm), a list of up to 10 patients' MARs were selected for error reviewing using the chart review method at the ward's pharmacy, where medications were dispensed once daily. The sections that were included in the study for evaluation included physician orders in the MAR, transcribed labels and dispensed medications. The nurses responsible for the selected MARs were also directly observed during the medication preparation stage at the ward's treatment room, and administration of medications to the patients. Direct observational method evaluated the physician's orders on the MAR for prepared and administered medications.

Demographic characteristics of patients and their medical profile

Data were collected from the patient's medical file and from a personal interview. Data were gathered according to a pre-prepared and validated (for clarity) 'patient data form'. The form included patient's date of admission,

length of hospitalization, chief complaint according to doctor diagnosis, gender, age, nationality, marital status, smoking status (and cigarettes per day), alcohol consumption, caffeine intake (number of coffee-tea cups/glasses per day), educational level; patient co-existing chronic condition(s). Information obtained from the 'patient medical file' included the chief complaint (primary diagnosis), comorbidities (co-existing acute or chronic medical condition/s) and prescribed medications (physician orders on the MAR).

Direct observation method

Based on the direct observation method established by Barker and McConnell [9], this method was conducted during the morning shift (10 am to 3 pm) for five days/week over the study period. The observation included the nurse who prepared and administered the medications. The observations were recorded on a pre-prepared 'data collection form' and included: physician order as stated in the patient's MAR including medication name (trade and generic), dose, dosage form, route, time of administration, with/out meal, frequency of administration, and discontinued drugs. As for the preparation techniques, it included observing hands washing and wiping the syringe, correct drug formulation (tablet, capsule, solution, and suspension), dose calculations, using correct techniques (e.g. crushing the medication and I.V. adjustments), and following physician's instructions correctly. All prepared and administered medications for each patient were recorded and compared with eligible prescriptions in the patient's MAR. Any discrepancy between the prepared/administered medications and that prescribed in the MAR was recorded.

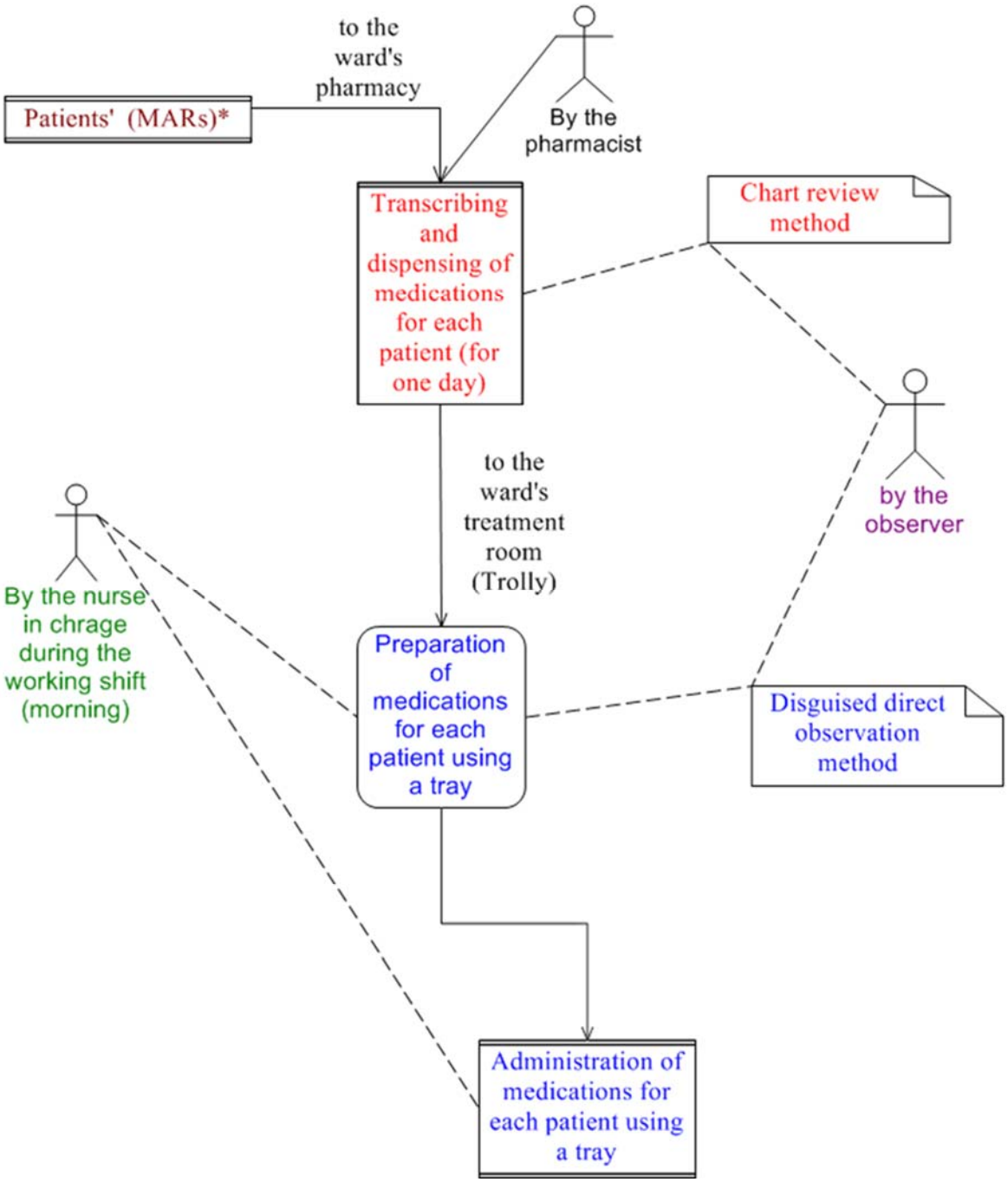
The criteria for identification of MEs was based on the criteria used by Lisby et al [16]. MEs detected were classified into ten categories similar to that used by other authors previously [13, 29, 30] (Online Appendix). The resources used during the ME detection process included clinician's Pocket Drug Reference (Med Notes 3rd Edition; Pocket Drug Guide). Figure 1 illustrates the error detection process used highlighting the disguised direct observation and chart review methods.

Chart review method

The chart review method was conducted based on previous publications [13, 16]. The review process verified that all prescriptions in the MAR were identical to the prescriptions in the transcribed labels, and examined whether the prescriptions in the MAR were unambiguous. The MARs that were included in the observational step screened for MEs during the same shift at the ward's pharmacy were medication transcription and dispensing over five days/week. Reviews were recorded on a data collection form which included: physician order (prescription) in the patient's MAR, medication name (trade and generic), dose, dosage form, route of administration, time of administration, with/out meal, frequency of administration and whether it was discontinued or not. The transcription notes included the medication name (trade and generic), dose, dosage form, route of administration, time, frequency of administration, physician note (and whether it was discontinued or not), the pharmacy label, and quantity dispensed. Any discrepancy between the prescribed medications and transcribed medications by the pharmacist were recorded as a transcription error. In addition, discrepancies between the transcribed label of prescribed medications and that dispensed were considered a dispensing error.

Characteristics of the ward and nurses

The characteristics pertinent to each observed nurse included age, gender, nurses' work experience (measured by the number of years the nurse reported working in the ward during his/her career) and educational level. The characteristics of workload pertinent to each observed nurse included the patient to nurse ratio, I.V. infusion preparation per nurse and number of patient admission/discharge during the observation period.



*MAR= medication administration records.

Figure 1: Medication errors detection mechanism using disguised direct observation and chart review methods by clinical pharmacist

Analysis

The data were processed using the Statistical Package for Social Sciences (SPSS) software package 11.5. Results are stated as mean ±SD and/or percentage as appropriate. Univariate predictor analysis was used to determine the associated risk factors with the total detected errors. P value <0.05 was considered statistically significant.

The rate of errors was calculated by dividing the number of errors by the number of opportunities for errors, and multiplied by 100. An opportunity of error (OE) included any dose given as well as any dose ordered but omitted. The frequency of each type of ME (the number of each type of ME divided by the total number then multiplied by 100) was described along with its associated percentages. Severity assessment of MEs was identified using the 'NCC MERP Index' for categorization of medication errors. This was done by the clinical pharmacist and reviewed by the other study investigators (experienced clinical pharmacists). Categorization of MEs was based on the 'Index of MEs outcome severity categorization' [6], consisting of nine categories from A to I, with four levels indicating potential for error: category A (actual error without harm), categories B, C, and D (actual error with no harm), categories E, F, G, and H (actual error with harm) and category I (actual error that resulted in death).

Table 1. Demographic characteristics of study patients (n=283)

Age, mean ±SD (range) , years	**54.2±17.59 (51-60)**
Gender, n (%)	
Male	85 (30%)
Female	198 (70%)
Nationality, n (%)	
Jordanian	280 (98.9%)
Other	3 (1.1%)
Educational level, n (%)	
Lower secondary school	13 (4.6%)
Upper secondary school	92 (32.5%)
University tertiary level	178 (62.9%)
Marital status, n (%)	
Single	46 (16.3%)
Married	229 (80.9%)
Widow	6 (2.1%)
Divorced	2 (7%)
Smoking, n (%), (range of cigarettes per day)	36 (12.7%), (20 cigarettes (1 pack))
Ex-smoking, n (%)	12 (4.2%)
Caffeine intake, n (%), (range of coffee/tea cups/glasses per day)	274 (96.8%), (1-2 cups/glasses)
Alcohol consumption, n (%)	1 (0.4%)
Length of hospitalization (days), mean ±SD (range)	7.39± 8.39 (1-65)

Results

A total of 283 patients were involved in this study (Table 1). The mean age of patients was 54 years, the majority were females (70%), Jordanian 99% and with university tertiary (63%). The length of patient hospitalization period was around a week, ranging from 1 to 65 days (Table 1). Fifteen nurses were observed during the study period. Female nurses represented 53.3% of the total observed nurses. Average age was 25.86 years (SD= 0.83) with the majority of nurses having a baccalaureate degree in nursing (n=14, 93.3%) and 1 nurse having a master degree in nursing. Four nurses reported less than 1 year experience (26.7%), six nurses reported 1-2 years of experience (40%), and five nurses reported more than 2 years of experience (33.3%). As for the nurse workload, the number of patients per nurse was 22 and the number I.V. infusions prepared by each nurse was 22. While the median number of patient admission into the ward was one, and patient discharge was also one.

Table 2. Characteristics of the prescribed medications for study patients (n=283)

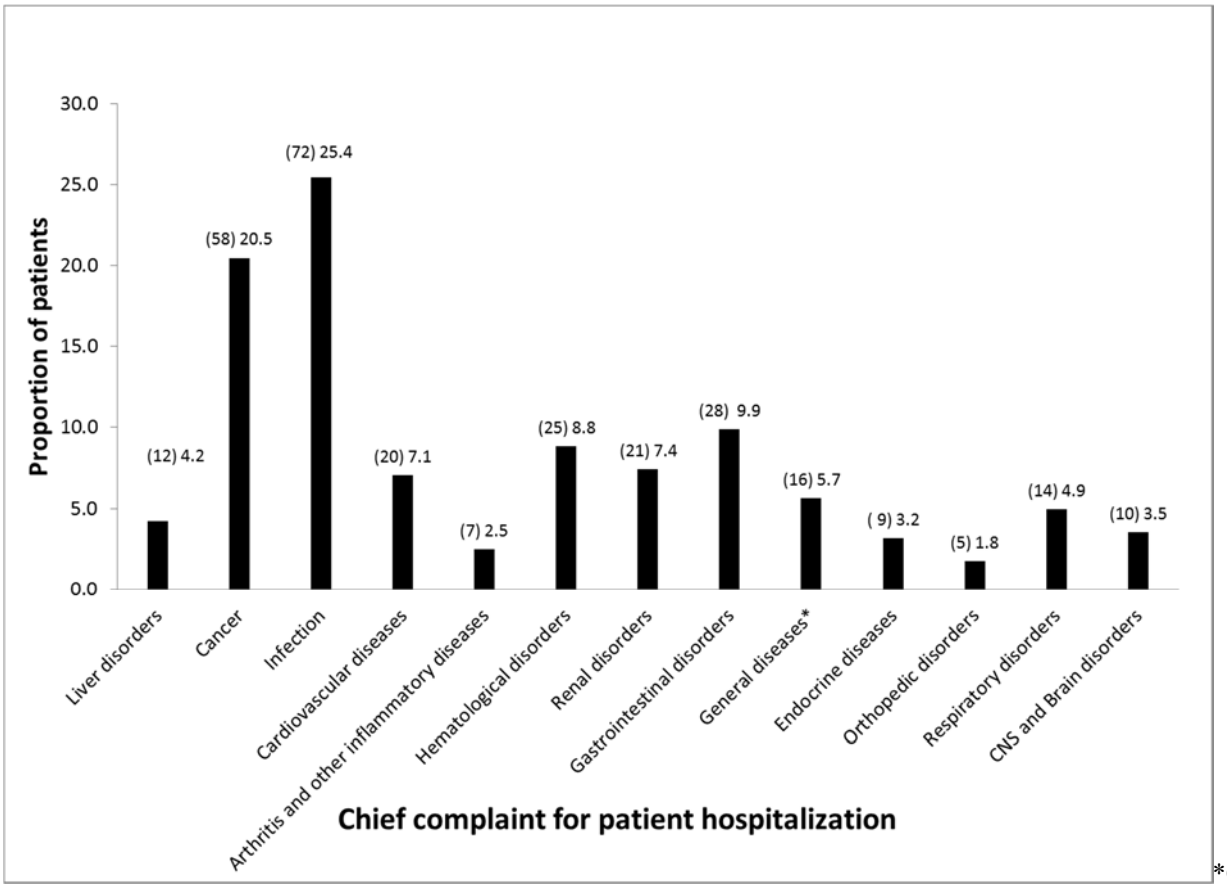
Drug Characteristics (n=2729)	
Doses (for different classes of medications) prescribed per patient during the study period, mean ±SD (range)	4.53 ±2.22 (2-12)
Drug class, n (%)	
Antimicrobials	555 (20.34%)
Gastrointestinal	334 (12.24%)
Anticoagulants	283 (10.37%)
Cardiovascular	238 (8.72%)
Diabetics	235 (8.61%)
Vitamins	134 (4.91%)
Chemotherapeutics	100 (3.66%)
CNS	98 (3.59%)
Respiratory	93 (3.41%)
Electrolytes	93 (3.41%)
Sedatives/analgesics	86 (3.15%)
Hematologic	19 (0.7%)
Hormones	1 (0.04%)
*Other drug classes	460 (16.86%)
Route of administration	
Oral	615 (27.53%)
I.V. Bolus	433 (19.38%)
I.V. Infusion	432 (19.34%)
Subcutaneous	406 (18.17%)
Inhalation	96 (4.30%)
Intraocular	63 (2.82%)
Rectal	14 (0.63%)
I.M.	5 (0.22%)
Others	170 (7.61%)

CNS=Central Nervous System; *other drug classes, (e.g. corticosteroids, anti-gout mediations, antihistamines and miscellaneous agents); intravenous; intra-Muscular; [5]other routes of administration (e.g. local administration).

During the 84 shifts observed, with each shift taking 7 hours, the observations of 2729 doses of prescribed medications administered to the 283 patients involved were completed.

The mean number of doses prescribed (for different classes of medications) per patient was 4.53 doses (SD 2.22), ranging from 2 to 12 doses per observational day (Table 2). Among the different classes of medications prescribed, antimicrobials were the most frequently prescribed in the ward (20.34%), followed by gastrointestinal (12.24%) and anticoagulants (10.37%). As for the rout of administration, 27.53% of the prescribed medications were given by the oral route of administration, followed by intravenous bolus and infusion (19.38% and 19.34% respectively).

Patients' chief complaints (chief diagnosis) showed that the most frequent chief complaints encountered were infections (n=72, 25.4%), cancer (n=58, 20.5%) and gastrointestinal disorders (n=28, 9.9%, Figure 2).



*General diseases include unspecified reasons for hospitalization.

Figure 2: Patient's (n=283) chief complaint for hospitalization at study entry

Out of 6396 total opportunities for error, 803 errors (12.6%) were detected with 2.8 errors per patient. Administration errors were the most common errors detected (n= 739, 20.2%); followed by transcription errors (n= 40, 1.5%), dispensing errors (n= 21, 0.8%), and prescribing errors (n= 3, 0.1%). Most of the errors were associated with antibiotics use (Table 3).

Table 3. Rate and frequency of detected total number of medication errors (n=803)

Type of error	No. of errors	% within the identified errors	% within total errors	Medication error rate
Administration errors (no of opportunities= 3667), n				
Dose omission	55	7.44	6.85	1.5
Unauthorised dose	3	0.41	0.37	0.1
Wrong route	1	0.14	0.12	0.03
Wrong administration technique	7	0.95	0.87	0.2
Wrong time	667	90.26	83.06	18.2
Extra dose error	6	0.81	0.75	0.2
Total administration error	739	100.0	92.03	20.2
Transcription errors (no of opportunities= 2729), n				
Omission	33	82.5	4.11	1.2
Wrong frequency	5	12.5	0.62	0.2
Discontinued order	2	5.00	0.25	0.1
Total transcription error	40	100.0	4.98	1.5
Dispensing errors, n				
Wrong drug error	4	19.05	0.5	0.1
Wrong dosage form	2	9.52	0.25	0.1
Wrong quantity error	15	71.43	1.87	0.5
Total dispensing error	21	100.0	2.62	0.8
Prescribing errors, n				
Wrong route	1	33.33	0.12	0.04
Wrong prescription instructions	2	66.67	0.25	0.1
Total prescribing error	3	100.0	0.37	0.1
Total number of errors (no of opportunities= 6396), n	803		100.0	12.6

The majority of detected errors (n= 743, 92.5%) were categorized as (category C: error reached the patient with no harm). Only one detected error was categorized as 'requiring monitoring' (category D). Errors with higher severity, including; 'error with permanent harm' and 'error resulted in death' were not identified in this study.

Multiple univariate regression modelling indicated that nurse experience in the ward (R^2=0.456, p=0.042), number of doses given to the patient (R^2=0.451, p=0.025), patient to nurse ratio (R^2=0.409, p=0.010) and length of hospitalization (R2=0.399, p=0.049) were the variables significantly associated with identified MEs (R2=0.0, p=0.059). Nurses' gender did not show significant association.

Table 4. Summary of the regression model obtained for the dependent variable, identified medication errors, over study period (total number of detected errors=803)

Variables	R^2	p value
Nurse characteristics		
Age	0.121	0.045
Gender	0.0	0.059
Educational level	0.148	0.027
Experience in the ward	0.456	0.042
Nurse workload		
Patient admission during observation	0.315	0.039
Patient discharge during observation	0.231	0.047
Patient to nurse ratio	0.409	0.010*
No of I.V. infusion per nurse	0.154	0.021
Other factors		
No of doses given to the patient	0.451	0.025
No of doses prescribed	0.015	0.001*
Length of hospitalization	0.399	0.049

*99% CI was obtained for this value. "R^2" is the coefficient of determination, "R^2" values with their "p" values show whether each variable is making a statistically unique contribution to the model ($p<0.05$) or not. "R^2" ranges from 0 to 1, with 1 representing a perfect fit between the variables and regression line, and 0 representing no statistical explanation between the variables and the regression line.

Discussion

This is the first study conducted in Jordan to identify the nature and frequency of the most common MEs happening at an educational hospital and associated factors resulting in higher rates of ME. The innovative part of this study is the use of direct observation of medication administration errors by an experienced clinical pharmacist. To reduce the rate of MEs, all health care professionals should work together to design a safe systems that can ensure a safe medication administration and management process [22, 23].

The direct observational method used in this study is considered to be the 'gold standard' in detecting MEs, since it is more efficient, reliable and objective when compared to other methods of detection [13, 16, 31]. Notably, unlike previous studies conducted in Jordan [22-24], this is the first study to use the 'disguised observational' methodology. Although this observational method is highly demanding, time consuming and incorporates exhaustive revisions of medical orders, it was found to be the most valid method used to identify the number of administration errors accurately [13, 17, 29-32].

This study reveals that important MEs are happening at a pivotal teaching hospital in Amman, Jordan. A total of 803 errors per 6396 opportunities for errors (12.6%) were detected in this study, equaling to 2.8 errors per patient. However, it is important to state that 'making an error is not a sign of unprofessionalism" [33]; unprofessionalism, as we see it, lies in the failure to explore ways to minimize and eventually prevent such MEs. In this study, important factors contributing to the MEs were identified, including high patient to nurse ratio and high number of doses prescribed. Previous studies reported a wide range of error rates (7% to 43%) [16, 18, 30, 34]. This large variation could be attributed to differences in the hospital setups, number of beds, number of patients followed, severity of the

complicated medical conditions and number of drugs required by the patients in the medical wards investigated.

Medication administration errors were the most common type of errors detected in the present study, with a rate of 20.2%, decreasing to 2% when 'wrong time errors' are excluded. The overall medication administration errors rate in this study was relatively low in comparison with previous studies, where they ranged from 6.6% to 51.8% [16-18, 30]. Similar to previous studies, the most frequent administration errors identified in this study was 'wrong timing' followed by 'drug omission' [30, 31]. 'Wrong timing' errors are exceptionally important considering that most of these errors were associated with the use of antimicrobial agents, where timing of administration is a vital issue in achieving optimal therapeutic effects and in preventing bacterial resistance.

Absence of a standard definition of 'medication errors' across the studies conducted in this area resulted in difficulties comparing and contrasting the different results presented. Some of the studies reported 'medication errors' per 1000 patient-day[17], while others took into account the opportunities for errors within the different stages of the medication use process [15, 16, 29-31]. This study followed the latter definition of MEs, as it is the most popular and was found to be more suitable by the research team.

Previous studies didn't include many of the patient variables included in this study, such as patient's nationality, educational level, life style variables, and existing chronic medical conditions [13, 16-18, 22, 29, 31, 34]. Such factors are important when exploring associations between identified MEs and different patient factors.

In comparison with previous studies, the number of prescribed medications during this study period was higher than that seen in similar studies [30], which justifies the reason behind the presence of a slightly higher percentage of MEs in the present study. In comparison with the current literature, antimicrobials were also ranked as the highest drug class prescribed [29, 30]. Most of the errors detected in this study were associated with antimicrobial use, especially tienam® (imipenem and cilastatin). This comes in line with the fact that most of the patients observed were diagnosed with an infection (e.g. pneumonia, urinary tract infection) at study entry. Cancer was the second most diagnosed medical condition amongst the observed patients (including breast cancer, nasopharyngeal carcinoma, and gastric carcinoma), and as expected, immuno-compromised patients required more prophylactic antimicrobial agents to prevent suspected infections.

The severity categorization of the detected MEs in this study showed that nearly all errors (92.5%) were categorized as "error that reached the patient with no harm". Such findings are similar to what was reported in the literature, where most of the detected MEs did not result in any clinically significant harm to the patients [17, 18, 30, 34].

Revealing factors that can potentially increase the incidence of MEs is the first step towards decreasing the MEs [35]. Workload factors unveiled significant associations with MEs detected in this study. Workload in this area has been defined by Tissot et al. as the ratio of patients per nurse. Significant statistical association between MEs and nurse workload has been reported here and in previous studies as well [15]. Nurse level of education and nurse experience also showed strong associations with the number of ME identified, which is in agreement with many previous findings [29, 35].

One of the main limitations of this study is the inclusion of one ward only, hence results may not be representative of all the medical wards in the hospital. The study was conducted at a teaching hospital in Amman, the capital of Jordan, which may not be generalized to the rest of the hospitals in Jordan. The nurses were observed only during the morning shifts and on weekdays, resulting in incomplete results regarding the true number of MEs. Future studies can produce more robust findings if the observations were completed over 24 hours and for all weekdays. Consultant physicians were not involved; hence no decisions were made regarding the identified MEs in this study.

Conclusion

This study revealed that in a teaching hospital MEs

occur mainly during the administration and transcription stages of the medication use process. Shorter nurse experience, higher job pressure and caring for patients with more complicated therapeutic regimens can lead to higher rates of MEs. Raising the medical staff' awareness of the type of MEs that take place at their hospital is vital in order to draw their attention to prevent such errors from happening. Informing the policy makers at the hospital of the associated factors that can lead to higher rates of MEs is also important and can pave the way towards finding resolutions at the administrative level in the hospital.

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Online Appendix - Criteria for classification of medication administration errors

Type of error	Definition
Dose omission error	The failure to administer an ordered dose to a resident by the time the next dose is due, assuming there has been no prescribing error. Exceptions would include a resident's refusal to take the medication and failure to administer the dose because of recognized contraindications.
Wrong dose error	When the resident receives an amount of medication that is greater than or less than the amount ordered by the prescriber. (Doses beyond ±10% of the prescribed dose).
Unauthorized drug error	The administration of a medication to a resident for which the physician did not write an order or the administration of a medication that is not authorized by a legitimate prescriber. This category includes a dose given to the wrong resident, dose given that was not ordered, administration of the wrong drug or a discontinued drug, and doses given outside a stated set of clinical parameters or protocols.
Extra dose error	The administration of duplicate doses to a resident or administration of one or more dosage units in addition to those that were ordered. May include administration of a medication dose after the order was discontinued (which could also be considered an Unauthorized Drug Error).
Wrong route	The administration of a medication to a resident by a route other than that ordered by the physician or doses administered via the correct route but at the wrong site (e.g., left eye instead of right eye).
Wrong administration technique	Use of an inappropriate procedure or improper technique in the administration of a drug. Examples of wrong technique errors include: incorrect manipulation of inhalers, failure to maintain sanitary technique with medications, not wiping an injection site with alcohol, failure to use proper technique when crushing medications, failure to check nasogastric tube placement or flushing NG tube before and after administration of medication, failure to wash hands or improper hand washing technique used. Incorrect technique of administration included wrong route and wrong rate of administration.
Wrong rate error	The incorrect rate of administration of a medication to a resident may occur with intravenous fluids or liquid products.
Wrong dosage form	The administration of a medication in a dosage form different from the one that was ordered by the prescriber. This could include crushing a tablet prior to administration without an order form the prescriber.
Wrong time error	The failure to administer a medication to a resident within an hour before or after the scheduled administration time.

Chart review form

Physician order (prescription) in the patient's MAR:
Medication name(trade and generic)
Dose
Dosage form
Route
Time
With/out meal
Frequency of administration
Discontinued DC
Transcription notes:
Medication name (trade and generic)
Dose
Dosage form
Route
Time
Frequency of administration
Physician note (discontinued, DC)
Pharmacy label
Quantity dispensed
comments

تقييم الاخطاء الدوائية لمرضى المستشفى: التجربة الأردنية

زينه هلال سليمان[1]، سليم حمادي[1]، نذير عبيدات[2]، إيمان بشيتي [3]

[1] كلية الصيدلة جامعة البترا، عمان، الأردن.

[2] كلية الطب الجامعة الأردنية، عمان، الأردن.

[3] كلية الصيدلة، جامعة العلوم التطبيقية، عمان، الأردن.

ملخص

تهدف الدراسة إلى تقييم معدل وتكرار وشدة الأخطاء الدوائية المكتشفة وبالإضافة إلى تحديد عوامل الخطر المرتبطة بحدوث هذه الأخطاء.

هذه الدراسة من النوع المنهجي المستقبلي لدراسة الأخطاء الدوائية باستعمال طريقتي الملاحظة المباشرة المقنعة ومراجعة ملفات الأدوية الموصوفة. أجريت كلتا الطريقتين في قسم الطب الباطني بين يونيو وديسمبر 2013 والتي اشتملت على مراقبة جميع مراحل عملية إعطاء الأدوية وبشكل يومي وتسجيلها من قبل الصيدلي السريري. وتم توثيق عدد وأنواع الأخطاء الدوائية. ثم تم استكشاف عوامل الخطر المرتبطة بالمزيد من الأخطاء. تم إدخال جميع البيانات التي تم جمعها في SPSS وتحليلها وفقا لذلك.

خلال فترة الدراسة، كشفت النتائج عن مجموع (803) أخطاء دوائية من خلال تحليل (6396) فرص للأخطاء الدوائية (12.6%). منها 739(20.2%) أخطاء دوائية في عملية الإعطاء، 40 (1.5%) أخطاء في عملية نسخ الوصفات، 21 (0.8%) أخطاء في صرف العلاج و3 (0.1%) أخطاء في الوصفات الطبية. وكانت عوامل الخطر المرتبطة بعدد الأخطاء الدوائية المكتشفة بسبب قصر تجربة الممرضة في الردهة (R2 = 0.456، P <0.042) والمرضى الذين يعانون من ارتفاع عدد الجرعات المقررة (R2 = 0.451، P <0.025)

كشفت هذه الدراسة أن الأخطاء الطبية التي اكتشفت في مستشفى تعليمي تحدث بشكل رئيس في إعطاء الدواء ونسخ الوصفات الطبية خلال مراحل عملية استخدام الدواء. قصر تجربة الممرضة يمكن أن يؤدي إلى ارتفاع معدل الأخطاء الدوائية. رفع وعي العاملين الطبيين في الردهة بشأن الأخطاء الطبية، خاصة للمرضى الموصوف لهم عدد كبير من الجرعات الدوائي، يمكن أن يقلل من نسبة الأخطاء الدوائية.

الكلمات الدالة: الأخطاء الدوائية، الوصفات الطبية، إعطاء الأدوية، نسخ الوصفات الطبية، والأردن، الصيدلي السريري.

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