Medbiotech Journal

MBTJ, 1(2): 60-64, 2017

Research Paper

Investigation of Medication Errors in a Teaching Psychiatric Hospital using Chart Reviews

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Received: 06 November 2017 Accepted: 19 November 2017 Published: 10 December 2017

Abstract

This study was conducted for the purpose of determining the frequency of medica¬tion errors (MEs) occurring in a teaching psychiatric hospital in the city of Tehran, Iran. Medication errors were defined by using widely accepted criteria. A cross-sectional prospective study using chart reviews to detect medication errors. Rates of error in prescribing, ordering, transcribing, administering and monitoring were determined. The frequency of these errors was analysed and reported using SPSS-21 software. The study was conducted on six patient care units (n=182). We followed patients for two weeks from the first day of admission in any of the six units. All of 20674 doses were studied in the wards in order to detect prescribing, ordering, transcribing, administrating and monitoring errors. In chart review, we detected a total of 1375 errors in 20674 opportunities for errors (6.7%). In each stage, the frequency of medication errors was: Prescribing: 2.4 %, Ordering: 12.5 %, Transcribing: 3.7 %, Administration: 81.1 %, and finally Monitoring: 0.3 %. The most common types of error throughout the medication process were: wrong dose, omission of dose, unordered dose. There is a need for quality improvement as almost 50% of all errors in the medication process were caused by missing actions. We assume that the number of errors could be reduced by simple changes to existing procedures or by implementing automated technologies in the medication process. Clear guidelines must be written and executed to reduce the incidence of medication errors.

Keywords: Medication errors; Iran; Prescribing; Transcribing; Drug administration; Hospital; Inpatient; Patient safety;

How to cite the article:

A. Mehrabifar, A. Mansouri, K. Gholami, P. Ghaeli, M. Javadi Investigation of Medication Errors in a Teaching Psychiatric Hospital using Chart Reviews Medbiotech J. 2017; 1(2): 60-64, DOI: 10.22034/MBT.2017.60369

1. Introduction

Medication error is a worldwide health problem which is a preventable cause of adverse drug reactions [1]. A comprehensive definition of medication error is as "any preventable event that may cause or lead to inappropriate medication use or patient harm while the medication is in the control of the health care professional, patient, or consumer." (US National Coordinating Council for Medication Error Reporting and Prevention: NCC MERP) [2]. One to two percent of UK and US hospitalized patients are estimated to be harmed by medication errors [3]. Rothschild et al. reported the frequency of preventable adverse drug events or medication errors as making up 13% of all adverse drug events had occurred [4]. Another study of 36 hospitals in the United States showed that 19% of administrations contained at least one error [5]. Medication error can cause many complications for patients; hence it is most important to detect and prevent medication errors [6].

There are many studies in the field of medication errors. One of which, reported by Harvard University, on hospitalized patients showed 3.7 % of the hospitalized patients were affected by medical errors. It is shown that nineteen percent of such errors are related to medication error [7]. Similar studies were conducted around the world in Australia, Canada and other states of the United States, which showed 5-10% of patients, experience preventable adverse drug reactions [8-10].

Second generation psychotherapeutic agents, which have been in most of the prescriptions, have

potential for medication error problems, along their beneficial profile for treatment. In the field of psychiatry, there is not enough research on medication error prevalence among psychiatric hospitalized patients [11]. Regarding the different definition and methods for detecting medication errors, it is difficult to determine exact and consistent rate for medication error in diverse studies [12-16].

Possible reasons for the limited research in this field may be the high patient vulnerability and the difficulties with the informed consent process. We investigated the five stages (Prescribing, Ordering, Transcribing, Administrating and Monitoring) of possible errors in a teaching psychiatric hospital, for the first time in Tehran Province, Iran.

2. Materials and Methods

The design utilized is a cross-sectional prospective study conducted on a total of 182 hospitalized patients in all six wards of the psychiatric hospital of Tehran during April 2013 to March 2015. The patients selected were referred from the Emergency Department and admitted in any six units. Patients were followed for 2 weeks, while those released before 2 weeks were excluded.

In this study, we used the definition of a medication error established by the National Coordinating Council for Medication Error Reporting and Prevention [2]. Medication errors were categorized by type [prescribing, ordering, transcribing, administrating, and monitoring] errors. Pharmacy student had previously received training in the general ward for two months on the principles and methods of error collection by a clinical pharmacist.

The sample size in this study is calculated based on the incidence of medication errors in Haw et al article. (n=182)

$$N= 2(Z1-\alpha/2)2 * P (1-P) / d2$$

$$Z1-\alpha/2= 1.96, P= 0.29, D= 0.1$$

Patients' demographic information, history of disease and medication, chief complaint, diagnosis, tests, and physicians' prescription (name of medications, dosage forms, medication doses, route of administrations and dosages frequency) were recorded at the time of admission and the patients' conditions were monitored.

The total number of errors detected was calculated, as were the error rates within rating categories and the rate for each category as a percentage of the total errors.

In order to analyse the data, prescribing errors, ordering errors, transcribing errors, administrating errors, and monitoring errors were entered into the statistical software separately. Entered data were processed using SPSS-21 software (SPSS, Chicago, IL). Percentage and mean ± standard deviation was used to present the discreet and continuous variables, respectively.

3. Results and Discussion

A total of 182 patients (111 males and 71 females) with a mean age of 37.50 ± 11.52 years were studied over a 2-year period. The total number of prescriptions ordered for these patients was 20,674 doses with a mean number of 113.59 medications prescribed to each patient. Of the total number of medications prescribed, the highest frequency error pertained to the group of antipsychotics (74.0 %), drugs related to cardiovascular system (9.0 %), drugs related to Alimentary tract and metabolism (5.6 %). Overall of the 20,674 medication doses, 177 errors were related to Lorazepam. Respectively, 129, 110 and 95 errors were recorded for Clonazepam, Risperidone and Biperiden in all of 20,674 opportunity for error.

Most medication errors were detected through orally (92.0 %) and then parenteral (6.3 %) route of administration. The frequency of errors in different pharmacological categories is presented in Table 1. Overall, of the 182 patients studied 171 (94.0 %) had experienced at least one ME, and of the 20,674 medication doses, 1375 (6.7 %) errors were recorded, making the rate of errors 7.6 per patient-day.

The frequencies of each type of error were; administrating error (81.1%), Ordering error (12.5%), Transcribing error (3.7%), Prescribing error (2.4%), Monitoring error (0.3%).

The frequency rate of errors is presented in Table 2 by general and categorical distinctions. The rate of MEs is reported as the frequency of errors occurred. Administrating error had the highest rate (81.1% of errors). In addition, of the variety of administrating errors made, the highest frequency of errors pertained to wrong dose (30.0 %) and omission of dose (29.7%), in respective order.

Table 1 Frequency of errors in different pharmacological categories by Chart Reviews.

Drug category	Frequency of error	Percentage of error
Antipsychotics	1018	74.0
Cardiovascular	124	9.0
Alimentary tract and metabolism	77	5.6
Musculo-skeletal system	42	3.1
Antibiotics	37	2.7
Drug related to blood	28	2.0
Hormonal preparation	15	1.2
Respiratory	12	0.9
Dermatological	10	0.7
Vitamins & minerals	8	0.6
Anti-parasitic	2	0.1
Ophthalmic	2	0.1
Total	**1375**	**100**

Table 2 Frequency of errors in different stages

Type of error	Frequency of error	Percentage of error
Administrating error		
wrong dose	412	30.0
omission of dose	409	29.7
unordered dose	100	7.3
unauthorized drug	93	6.8
wrong time	46	3.3
wrong name	15	1.1
wrong route	15	1.1
wrong form	13	0.9
lack of ID control	9	0.7
wrong technique	3	0.2
Ordering error		
PRN without time interval	58	4.2
PRN without indication	41	3.0
omission of dose	22	1.6
dose change without DC previous order	20	1.5
omission of form	13	0.9
omission of route	8	0.6
omission of regimen	3	0.2
wrong regimen	2	0.1
illegible	2	0.1
omission of treatment time for antibiotics	1	0.1
omission of rate	1	0.1
omission of name	1	0.1
wrong name	0	0.0
Transcribing error		
discrepancy in regimen	29	2.1
not transcribed	9	0.7
discrepancy in omission	6	0.4
discrepancy in dose	3	0.2
discrepancy in route	2	0.1
discrepancy in form	1	0.1
discrepancy in unordered	1	0.1
discrepancy in name	0	0.0
allergy is not documented on order sheet	0	0.0
Prescribing error		
interaction	13	0.9
Incorrect dosage form	9	0.7
incorrect dose selection	8	0.6
incorrect period for treatment	2	0.1
incorrect route	1	0.1
incorrect rate	0	0.0
incorrect drug selection	0	0.0
Monitoring error		
omission of follow up	4	0.3
omission of lab tests	0	0.0
wrong test ID	0	0.0
Total	**998**	**908**

Overall, in this study, the rate of MEs was found to be 6.7% by chart review. The frequency of errors differs between categories. The rate of administrating, ordering, transcribing, prescribing and monitoring errors were 81.1%, 12.5%, 3.7%, 2.4%, and 0.3% respectively.

Because of the different definitions and the variety of error detection methods, it is difficult to compare statistics reported on the incidence of errors in different studies [16]. On the other hand, Because of the difficulties in this area, there is not any same study, which was conducted in psychiatry field in Iran. But it is comparable to other studies which had been done in Iran that can be due to the same cultural context and integrated healthcare system.

In a study conducted by Benjamin C. Grasso et al on MEs recorded in a fully accredited 103-bed state psychiatric hospital in central Maine, a review team was assigned to retrospectively review 31 patients' records. The team detected 2,194 medication errors. Administration errors accounted for more than half of the total (66%), followed by Transcribing (23%) and Prescribing (11%) errors. It is shown that administrating error has a much higher rate, and in this category, wrong dose error (61.9%) and unauthorized drug error (29.1%) are the most common errors, respectively. Benjamin C. Grasso et al. results strongly support the benefits of the chart review method for detection of medication errors [17].

The proportions of medication errors in each category in our study— prescribing, ordering, transcribing, administrating, and monitoring — are very close to Grasso's study. In our study, the rate of ordering errors was significantly lower, and the rate of administration errors was much higher. The similarity of administration error in both studies might be related to the same method of error detection. On the other hand, the higher rate of administration error in our study may been related to being prospective since the retrospective studies may miss some items through reviewing. The prescribing error is less frequent in our study than Grasso's study. It may be related to the range of medications, which were used in our hospital. Most of the medications were psychiatric drugs but in Grasso's study, a greater variety of drug types was prescribed.

In a study conducted by Ann Lykkegaard Soerensen et al on MEs recorded in 3 psychiatric wards at Aalborg University Hospital, using 3 methods including chart review; It showed 189 errors were detected in 1082 opportunities for error (17%). The frequency of errors was, prescribing (5%);

dispensing (10%); administration (75%) and discharge summaries (10%).

The type of errors that had been investigated are different from our study but the administration error also has higher rate among errors.

The psychotropic drugs were the most drug category, which have been associated with these errors. The non-psychotropic drugs constituted 9% of harmful errors in that study. The similarity of the results in both studies might be due to higher use of antipsychotic drugs in the studied plot. Based on these both studies, it is needed to set further education for nurses regarding psychotropic drugs. It should be planned to hold tutorials for nursing staff periodically and then assess the effectiveness of the course. Nursing practice is one of the most factors, which is associated with administration error; so further studies are needed to evaluate the nurses influence on medication safety [18].

In a study conducted by Haw et al on MEs recorded in a UK 450-bed psychiatric hospital, a retrospective review of records showed that administration errors were more frequent than prescribing or transcribing errors just as we found. Psychotropic medications were involved in 85 percent of errors and nonpsychotropics in 15 percent [19].

In our study, this proportion was 74% and 26% respectively. Psychotropic medications were significantly more likely than expected to be involved in administration errors. The similarity of the results in both studies could be due to likeness of the population number and department under observation. It should be mentioned that the average age of patients and the opportunity for error were similar in the two studies.

In the Haw et al. study the most frequent types of errors were administration of a wrong dose (31%), wrong drug (21%), and dose omission (17%). In our study, the most frequent types of errors were wrong dose (30%) and dose omission (29.7%), the same study mentioned. The limitations of our study were the lack of the investigation the clinical aspects of prescribing errors and were simply limited to only the parameters comprising a physician order.

Conclusion

In this study, 94.0 % of patients had experienced at least one ME. This is alarming and requires the implementation of policies to minimise MEs as much as possible. Among the various medication use processes, administration had the highest rate of errors, and among administrating errors, most common errors were wrong dose errors.

Studies have been performed to evaluate the role of pharmacist in medication error rate reduction. There are many aspects to be improved by the presence of pharmacist; Chart reviewing could be so helpful for clues that an error has occurred like dose miscalculation, Direct observation on drug administrating to match the physician order with the process, Education of nurses and updated their knowledge regarding the drug preparation and points related to drug devices and … . The pharmacy students also could have a useful role in ME prevention [20].

It appears that the presence of a clinical pharmacist in the hospital wards for the purpose of providing consultation to the physicians and responding to the nurses' questions about medications can play a decisive role in the prevention and reduction of MEs. Further research to identify the flaws in the system and implementing interventions to block the MEs propagation at a very early stage are needed.

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