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Evaluating the effects of medication reconciliation by pharmacists on patient safety in hospitalized patients

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Abstract: *Backgrounds: Medication errors are one of the most common errors that are associated with adverse effects on patients and may even lead to mortality. One of the methods for determining patient safety in hospitals is assessing the prevalence of medication errors. In this regard, medication reconciliation is used to improve drug safety in the treatment process. The present study was conducted on 7564 patients in the emergency department of one of the hospitals in Tehran, Iran.*

Methods: In total, 256 adult patients with a mean of 45 years, who had been admitted to the emergency department of a hospital in the past six months and had used at least three drugs before admission, were entered into the study. In this study, the effect of medication reconciliation on admitted patients was assessed to prevent drug errors at the time of admission by pharmacists. The main outcome measure was Type and Frequency Percentage of Drug Differences Observed during Medication Reconciliation were measured.

Results: According to the results, the presence of a trained pharmacist was significantly effective in medication reconciliation for enhancing patient safety and treatment process accuracy. In addition, it was concluded that age, the condition of hospitalization, and medical center personnel had a direct relationship with the frequency of medication discrepancies.

Conclusion: The presence of a trained pharmacist to perform the medication reconciliation process significantly affected the improvement of patient safety and the accuracy of the treatment process.

Keywords: *medication reconciliation; pharmacists; patient safety*

INTRODUCTION

Medication errors are quite prevalent and are the fourth leading cause of death all over the world. These errors may occur through dug prescription, preparation, distribution, or administration [1, 2, 3]. Some patients like the elderly, are at higher risk of medication errors because they always suffer from different comorbidities and use complex drug regimens [4]. A study in one of our teaching hospitals indicated the high rate of medication errors especially the missed dose errors [5]. It is one of the most important goals of all health care systems to prevent different types of medication errors.

The medication reconciliation process is a method to identify the most accurate list of all medications a patient is taking, to improve patient safety. It is always performed on

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admission, to compare patient drug history with what is ordered in the hospital, and discharge as well as transferring from one ward to another [6]. It was first incorporated as a National Patient Safety Goal (NPSG) in 2005 by the Joint Commission. WHO and collaborators have designed a project for its implementation in a range of countries [7]. This process can effectively reduce the rate of different types of medication errors in hospitals [8, 9, 10]. It can also decrease the rate of readmission and its related costs [10].

Medication reconciliation is known as an important tool to prevent drug-related problems and their related burden. This process includes four stages, as follows:

• Preparing and recording the medication history of patients upon admission

• Comparing the medication history of patients with drug orders in the hospital and identifying and resolving discrepancies

• Providing a written list of medications upon the discharge of patients

• Teaching drug regimens to patients upon discharge [11].

Evaluating the medication reconciliation process supports the role of pharmacists as key members dealing with patients' medications, and collaboration between pharmacists and other healthcare team members is crucial in preventing drug-related errors and promoting patient safety especially in high-risk patients [12]. Medication reconciliation is a difficult and time-consuming process and is affected by factors like drug resources, the discharge process, and hospital policies. Distinguishing different barriers will contribute to the improvement of the exact drug information available between different health care settings [13].

Considering the impact of the medication reconciliation process on patient safety and the fact that this process used to be managed by doctors, medical interns, or nurses in our hospitals and is recently reformed with emphasis on the role of pharmacists, we designed this study to evaluate the following objectives in one of the hospitals in Tehran:

• Determining the difference between drug history taken by pharmacists and nurses

• Determining the frequency of identified errors in the reconciliation process

• Determining the frequency of identified errors related to dangerous medications (high risk)

• Determining the time spent for each medication reconciliation (time of comparison of BPMH and the current medication prescription inserted into the patients' file by the physician), resources used for history taking, the mean amount of medications used before admission, and time spent for corrective measures.

Ethics Approval

This study was approved by the Guilan University of Medical Sciences Ethics Committee.

MATERIALS AND METHODS

The impact of admission medication reconciliation by pharmacists on the rate of medication errors was assessed in this study.

During the six months from September 2019 to March 2019, 256 patients who were admitted to the emergency department of one of the general private hospitals in Tehran, were included in this study. The hospital had 350 approved beds and 300 active beds with an admission rate of 50 % in the emergency ward.

Inclusion criteria:

- Age over 45 years old,

- History of taking at least 3 medications at home

Medication reconciliation was conducted by trained hospital pharmacists from 8 a.m. to 8 p.m. each day. Patients who were admitted after 8 pm were visited by pharmacists the following day.

During the study period, all patients who were admitted to the emergency department were referred to the pharmacist for medication reconciliation if met the inclusion criteria. The pharmacist collected the best medication history (BPMH) from the patients or their caregivers as well as other information sources like patient GP or local pharmacy if required, using effective communication skills. Information sources were specified in medication reconciliation forms (MRFs). Insurance company records were also used to determine the details about drugs that were covered by insurance. Patients were also asked to bring all the medications they were using at home, if there were any, to provide more details. All the following information were entered in medication reconciliation forms:

• History of chronic diseases (e.g., diabetes, hypertension, hyperlipidemia, metabolic and genetic disorders, seizure, history of myocardial infarction (MI), and stroke)

• Any weight loss or weight gain diet and related medications

• Any herbal drugs in the form of topical, tea, and distillates

• Any prescribed and non-prescribed drugs

• Any high-risk medication as an anticoagulant, chemotherapy, antic arrhythmia, anti-convulsion, immunosuppressant, insulin

• Generic and brand name, dosage, frequency, and route of administration as well as how long days were on that medication were specified about each medication.

• History of smoking, alcohol, and narcotics

• Pregnancy and breastfeeding status

• History of any drug and food allergy

Then MRFs were compared with the medication history recorded in patient's files who were routinely taken by nurses. It was also compared with doctor's drug orders on admission. Any differences observed at this stage that required correcting the doctor's order were considered as clinical interventions.

The time spent by pharmacists and nurses to provide the BPMH were also recorded for each patient,

Finally the following were evaluated

• The differences between medication histories taken by the pharmacists and nurses

• The frequency of medication errors during the reconciliation process

• The frequency of medication errors related to high-risk drugs

• The time spent on each medication reconciliation

• Information sources used to take the medication histories and an average number of medications used before admission.

RESULTS

About 46% of our study population were male and 54% were female with a mean age of 61 (±16) years, they were taking 3- 10 medications before hospital admission (average of 6 drugs). Our results showed that from 256 patients who entered the study, 92 patients required some kind of clinical intervention. These interventions were approved by medical doctors in 87 cases, that 15.2% of these interventions were related to high-risk drugs.

In addition, we observed at least one difference between MRFs and medication history by nurses in 98.7% of cases. (1025 cases) which 13.4 % of these differences were related to high-risk drugs. Details about these differences are described in Table 1. Drug omission was the most prevalent difference we observed in this study. The second and third most prevalent differences were about dose and frequency of drug administration.

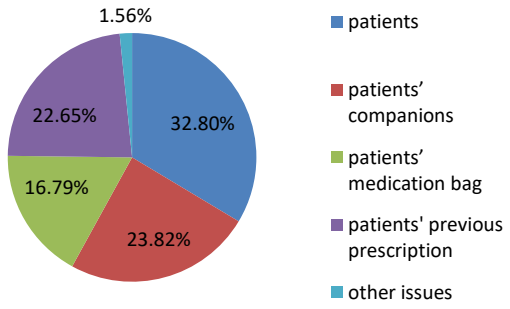
Table 1: Type and Frequency of differences Observed between MRFs and nurses medication histories

Type of observed medication error	Frequency percentage of error
Drug omission	48%
Dose	21%
Drug regimen	20%
Drug name	5%
Drug duplication	3%
Dosage form	2%
Other cases	1%

Regarding the time spent taking BPMH, we observed that pharmacists spent an average of half an hour to feel an MRF compare to 3 minutes, for taking a medication history, by nurses. In addition, the average time spent on comparing MRFs with doctors' drug orders was 12 minutes and it took a median of 9 minutes for pharmacists to complete their clinical intervention.

Information regarding medication reconciliation was obtained from the patients in 84 cases (32.8%), their caregivers in 61 cases (23.82%), patients' home medication bags in 43 cases (16.79%), their insurance records in 58 cases (22.65%) and other sources in 4 cases (1.56%) (Figure 1).

Figure 1: Source of information for medication reconciliation



DISCUSSION

The impact of medication reconciliation by pharmacists on the rate of medication errors was evaluated in this study. Our results showed that medication histories taken by pharmacists were more comprehensive than routine drug histories taken by nurses. We also observed that pharmacist interventions can have a positive impact on the rate of medication errors.

Results of various studies indicate the high that rate of different types of medication errors and related burden in hospitalized patients especially through admission or discharge process as well as transferring from one unit or facility care to another. These errors are mainly the result of miscommunication and lack of required information and can lead to serious complications [5, 14, 15, 16]. Our results showed a high rate of medication errors in our study population, especially during the discharge process. We observed that errors related to the dose of patient medications were the most common errors. While in some other studies various types of medication errors, as well as errors in drug administration, were observed with almost the same frequencies [19].

Medication reconciliation, as a method for identifying and correcting medication errors, is widely used in health care settings in different countries [17]. The results of a systemic review showed that medication reconciliation can significantly decrease the frequency of different types of medication errors (17 from 17 studies), and drug side effects (2 from 2 studies) [18]. Different studies indicate that a large number of patients admitted to hospitals, experience medication discrepancies that can be prevented by careful medication reconciliation by pharmacists [20, 21]. We also observed in the present study, that different types of medication errors can be avoided by performing a careful medication reconciliation by a trained pharmacist especially when a patient is admitted to the hospital. This can prevent any discrepancies between what has been taken at home and what is ordered in the hospital.

About two-thirds of the complications that occurred after discharge are due to medication-related problems. Generally, medication reconciliation at discharge could be a strategy to reduce medication errors and improve patient safety even after discharge from the hospital [22].

CONCLUSION

In the present study, the impact of medication reconciliation by a pharmacist, on the rate of medication errors was evaluated. The results showed a significant difference between the history taken by the pharmacists and nurses. It should be noted that although the process of medication reconciliation by pharmacists is time-consuming and need considerable human and financial resources that may be difficult to afford now, its positive impact on direct and indirect costs of medication errors cannot be dismissed. Our findings also indicated that the involvement of a trained pharmacist in patients' treatment teams can significantly improve their safety profiles.

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Conflict of interests

The authors have no conflicts of interest to declare.

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