ABSTRACT

Objective: To identify and quantify the most frequent prescription errors in inpatients’ medical prescriptions. Methods: A survey of prescription errors was performed in the inpatients’ medical prescriptions, from July 2008 to May 2009 for eight hours a day. Results: At total of 3,931 prescriptions was analyzed and 362 (9.2%) prescription errors were found, which involved the healthcare team as a whole. Among the 16 types of errors detected in prescription, the most frequent occurrences were lack of information, such as dose (66 cases, 18.2%) and administration route (26 cases, 7.2%); 45 cases (12.4%) of wrong transcriptions to the information system; 30 cases (8.3%) of duplicate drugs; doses higher than recommended (24 events, 6.6%) and 29 cases (8.0%) of prescriptions with indication but not specifying allergy. Conclusion: Medication errors are a reality at hospitals. All healthcare professionals are responsible for the identification and prevention of these errors, each one in his/her own area. The pharmacist is an essential professional in the drug therapy process. All hospital organizations need a pharmacist team responsible for medical prescription analyses before preparation, dispensation and administration of drugs to inpatients. This study showed that the pharmacist improves the inpatient’s safety and success of prescribed therapy.

Keywords: Medication errors/prevention & control; Prescriptions, drug; Inpatients

INTRODUCTION

Nowadays, medication errors are an unfortunate reality in most healthcare institutions. Approximately 30% of problems occurring during hospitalization are related to medication errors, resulting in a great economic impact and serious morbidity and mortality rates. In 1993, a total of 7,391 American citizens died as a consequence of medication errors, and 2 to 14% of these deaths occurred among inpatients. A study carried out in the United States identified the main medication errors including wrong time of administration, missing dose, wrong dose and administration route. In recent years, a considerable increase in the number of studies about patient’s safety led to greater knowledge about the topic, thus confirming its importance as a global problem.
Drug therapy may not be successful if the process of prescription, preparation and administration is not appropriately performed\(^\text{(9)}\). Based on the observation of previous studies in this area, it was noticed that several errors originate at the moment of drug prescription and transcription. Kuiper et al. report that interpretation and transcription, reading and entry of the medical orders into an electronic system are responsible for approximately 12% of medication errors\(^\text{(8)}\). They may occur at different time points, such as the physician’s handwriting and the interpretation of prescription information. There are other factors, such as poor transcription of an indication, non-consultation of healthcare protocols or information manuals regarding the use of the drug, night shifts, among others\(^\text{(6)}\).

Some techniques may be used aiming to optimize prescription process. For example, the use of technology in the management of drug therapy is associated with reductions of potential errors\(^\text{(9)}\). Computerized prescription provides better arrangement and legibility thus increasing safety of prescribed items. However, today few prescriptions are electronically performed\(^\text{(10)}\).

Among the most common problems during prescription process are telephone and verbal orders. Pronunciation and phonetic components may lead to an interpretation error by the professional who is receiving the order; names of drugs with similar sounds (sound-alike) are important sources of error, and the environment also has the potential to interfere with comprehension and veracity of telephone and verbal orders received\(^\text{(10)}\).

Because of all these factors, the presence of pharmacists is essential to mediate the prescription process and drug receipt by patients. At Hospital Israelita Albert Einstein, a Prescription Center (CAP, acronym in Portuguese) was implemented in 2001, where the pharmacists evaluate the medical prescription after it has been transcribed by the administrative agent (transcriber) to the electronic system. This analysis consists in verifying some aspects, such as dose, frequency, administration route, dosage, compatibilities and allergies, with the purpose of helping the work of clinical pharmacists during the drug treatment follow-up of inpatients, thus identifying and preventing possible errors in the prescription to assure the success of the therapy applied.

**OBJECTIVE**

This study aimed at identifying and quantifying the types of the most frequent prescription errors found in medical prescriptions of inpatients.

**METHODS**

The preparation of this article involved a survey of prescription errors in the inpatients’ medical prescriptions, from July 2008 to May 2009, for eight hours a day. Taking into account that there were four pharmacists at the CAP during the time period considered in the survey, the mean number of prescriptions analyzed by the pharmacist was calculated to determine the sample.

All patients whose medical prescriptions presented some type of non-conformity were included in the study. Therefore, prescriptions of adult, pediatric and geriatric patients affected with several different conditions were analyzed. It should be mentioned that both complete prescriptions arriving at the CAP and changes made by physicians along the day were included in this survey.

Data collection was based on identification of a non-conformity found at the moment of pharmaceutical analysis, i.e., after the prescription was done by the physician or by the nursing staff, or through telephone or verbal orders, and after being transcribed by administrative agent to the system. Non-conformity included any wrong or dubious piece of information related to the drugs prescribed.

To check the data about drugs, such as the maximum recommended dose, dosage and indication, the Micromedex database\(^\text{(12)}\) and specific literature\(^\text{(13)}\) were checked.

Prescription errors were categorized as follows:

1. illegible prescription: any item of medical prescription in which information was illegible or dubious;
2. prescription with duplicate item: one or more drugs prescribed more than once to the same patient taking the dosage into account;
3. drugs with the same indication: prescription of two or more drugs with the same indication taking into account the respective mechanisms of action;
4. wrong transcription: wrong entry of the prescription information into the electronic system. These included wrong transcriptions of route, dose, entry of a wrong drug product, and of an inadequate pharmaceutical formulation, considering, in the last one, the administration route and the patient’s age;
5. wrong frequency: prescription of a drug with a frequency not indicated in literature;
6. unspecified allergy: prescription with indication of an allergy, but without allergen specification. It is important to mention that all prescriptions, in which the patient reports some type of allergy at the time of admission, are marked with a red label written “allergy”;
7. allergy related to a prescribed drug: prescription including a prescribed drug to which the patient is allergic;
8. drug without administration route: prescription of a drug with no information on administration route;
9. drug with an inappropriate/wrong route: prescription of a drug with an inappropriate or wrong route, according to the literature and how the drug is supplied;
10. drug without doses: prescription of a drug without a specified dose or dosage;
11. dose higher than recommended: prescription of a drug at a dose higher than the one recommended in literature;
12. inappropriate dilution and/or time of infusion: prescription of a drug with inappropriate dilution and/or time of infusion;
13. wrong drug: prescription of a wrong drug;
14. wrong dose: prescription of a drug with inexistent dose, according to the literature;
15. wrong telephone or verbal orders: prescription performed by the nursing staff through telephone or verbal orders with any non-conformity;
16. interactions: prescription with potential interactions or incompatibilities. In this case, the interactions between the drugs infused in mixture or incompatibility of drugs and diluents prescribed were analyzed. It was not possible to analyze all drug-to-drug interactions or incompatibilities, since this activity is carried out by the clinical pharmacist at the admission ward with the aid of information contained in the patient’s chart.

RESULTS

A total of 3,931 prescriptions were analyzed during the study period. After analysis of pharmaceutical interventions carried out in the prescriptions, a total of 16 types of errors were detected, as described in the mentioned methods. The total number of errors detected during the study was 362, considering one error per prescription. This represents 9.2% of prescriptions with some potential error.

A total of 24 illegible medical prescriptions (6.6%) was found. Absence of information was also detected, such as 66 prescriptions without doses (18.2%) and 26 with no information on administration route (7.2%). Drugs with a wrong or inappropriate route were prescribed in 6.4% (23) of occurrences.

Errors related to dilution and/or infusion of drugs represented 5.3% (19) of cases; 7 prescriptions (1.9%) had a wrong drug prescribed, 9 (2.5%) had wrong information about frequency of administration and 33 (9.1%) had wrong prescribed dose.

Abnormalities related to allergies, with 29 prescriptions (8.0%) not having the patient’s allergy specified and 3 prescriptions (0.8%) contained drugs to which the patient had reported to be allergic, were also detected.

Drugs prescribed with the same indication were identified in one prescription (0.3%) and drugs prescribed twice were present in 30 medical prescriptions (8.3%).

Transcription errors were shown to occur at a considerable frequency, representing 12.4% (45) of all cases; 19 prescriptions (5.3%) had errors in the telephone or verbal order received; 4 prescriptions (1.1%) contained interactions or potential incompatibilities and in 24 prescriptions (6.6%) a dose higher than that recommended in the literature was observed. The data described are organized in table 1.

<table>
<thead>
<tr>
<th>Type of error</th>
<th>Quantity</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illegible prescription</td>
<td>24</td>
<td>6.6</td>
</tr>
<tr>
<td>Prescription with a duplicate item</td>
<td>30</td>
<td>8.3</td>
</tr>
<tr>
<td>Drugs with the same indication</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Wrong transcription</td>
<td>45</td>
<td>12.4</td>
</tr>
<tr>
<td>Wrong frequency</td>
<td>9</td>
<td>2.5</td>
</tr>
<tr>
<td>Unspecified allergy</td>
<td>29</td>
<td>8.0</td>
</tr>
<tr>
<td>Allergy related to a prescribed drug</td>
<td>3</td>
<td>0.8</td>
</tr>
<tr>
<td>Drug without administration route</td>
<td>26</td>
<td>7.2</td>
</tr>
<tr>
<td>Drug with a wrong/inappropriate route</td>
<td>23</td>
<td>6.4</td>
</tr>
<tr>
<td>Drug without a dose</td>
<td>66</td>
<td>18.2</td>
</tr>
<tr>
<td>Dose higher than recommended</td>
<td>24</td>
<td>6.6</td>
</tr>
<tr>
<td>Inappropriate dilution and/or time of infusion</td>
<td>19</td>
<td>5.3</td>
</tr>
<tr>
<td>Wrong drug</td>
<td>7</td>
<td>1.9</td>
</tr>
<tr>
<td>Wrong dose</td>
<td>33</td>
<td>9.1</td>
</tr>
<tr>
<td>Wrong telephone or verbal orders</td>
<td>19</td>
<td>5.3</td>
</tr>
<tr>
<td>Interactions</td>
<td>4</td>
<td>1.1</td>
</tr>
<tr>
<td><strong>Total numbers of errors</strong></td>
<td><strong>362</strong></td>
<td><strong>100.0</strong></td>
</tr>
</tbody>
</table>

For it is a quantitative study, the clinical cases found during the survey will not be described. A qualitative analysis with descriptions of the most important interventions may be further carried out in another study.

It was not possible to include in this study some data, such as treatment duration and times of drug administration by the nursing staff since the patient medical charts could not be consulted. Data shown here were extracted exclusively from medical prescriptions. Additionally, it was also not possible to calculate the errors in 100% of prescriptions analyzed at the CAP during the established period, since the pharmaceutical analysis is carried out 24 hours a day, involving different teams of pharmacists who did not participate in the study.
DISCUSSION

There is a growing concern about medication error due to the number of events and high morbidity and mortality rates in hospitalized patients, in addition to the important economic impact in healthcare institutions(14).

Non-conformities in prescriptions represent an expressive percentage of medication errors and, very often, these events are not detected, resulting in deficient treatment(6).

Observing these data, one perceives that the errors found involved the healthcare team in the most varied situations. Some of the most frequent errors showed absent information in the prescription, such as dose and administration route. This revealed a potential risk to the patient; hence, these pieces of information were duly checked before preparation and administration of the drug. Pote et al. identified prescriptions with incomplete information, but with a considerably lower number than that found in this survey(2). Devine et al. also reported the absence of dose and administration route in the prescriptions analyzed and also obtained values lower than those collected in this study(15). This difference might be due to different samples and diverse variables considered in both studies.

Errors involving drugs with inappropriate dilution and/or time of infusion were also found and reflected an important risk to patients during treatment. This type of error, if not timely detected, may lead to injuries to patients, including therapeutic inefficiency depending on the drug pharmacokinetics and pharmacodynamics. Villalobos et al. also detected errors in the drug dilutions(6), thus emphasizing the real occurrence of these errors in the practice of drug administration.

Prescriptions with wrong doses are among the most frequent errors mentioned. Doses higher than those recommended in the literature comprised important data. Villalobos et al. identified errors in calculation of doses with considerable frequency(6). A study carried out by Pote et al. showed frequency of dose higher than the recommended, with a value similar to the results obtained in this study(2). In these cases, the importance of checking manuals containing information about drugs, in order to assure safety of the prescribed item, was noticed. This practice in general is hindered by lack of time, excessive work and other interferences to which the professionals involved are subject to(1-5).

Errors related to patient’s allergy also deserve considerable attention. Part of the prescriptions did not point the item causing the allergy described at the time of pharmaceutical analysis. In these circumstances, the risk of administering a drug that may cause an adverse reaction to a patient is increased. There were also cases, in which a prescribed drug was reported as an allergen. Timely intervention by healthcare professionals was decisive in such cases to assure patient’s safety through contact with the prescriber so that the contraindicated drug could be replaced by a different one. The literature does not provide much data related to allergies to the items prescribed or identification of allergies in prescriptions. Devine et al. and Pote et al. reported that 1.3% of the prescriptions analyzed presented allergy to a prescribed drug, a value that was comparable to the values found in this present analysis(2-15).

Equally important, the errors related to telephone or verbal orders require intervention by a multidisciplinary team. According to Koczmaro et al., telephone orders tend to show more errors than written orders due to several variables, which do not exist when the orders are written directly by the prescriber(11). Orders that are incompletely written down, such as the absence of administration route and dose, or wrong orders, were found in the prescriptions analyzed here. Some occurrences observed pointed to noting down a wrong drug probably due to the problem already mentioned of drug names with similar sounds, among other reasons(10). Other studies did not contain data about errors in telephone or verbal orders for comparison. This shows that, despite the great importance and impact in safety related to the prescriptive act, this variable is still not seen as critical to the point of being relevant for researchers to collect data about it.

Transcription errors were also found at a high frequency. Such errors included entry of a wrong drug in the electronic system, wrong transcription of doses, administration routes and entries of inappropriate formulations, for example, a drug in tablets was entered to be administered through catheters when the same drug could be found as a suspension or solution in the institution. In all such cases, the pharmacist in charge of the prescription analysis instructed the transcriber about the best management and the corrections to be made. Gimenes et al. reported a study in which 6% of medication errors started during transcription(10). Since the existence of a transcription professional is a reality in several institutions having a clinical pharmacy, these data, added by the ones found in this survey, reinforce the attention to be given to this variable in the process of analyzing the medical prescriptions.

Drugs prescribed more than once were also detected during the pharmaceutical analysis. The duplicate items differed amongst themselves in terms of frequency or dose; however, their duplicate prescription to the patient was not justified. Bustos et al. found duplicate drugs in 3.8% of the prescriptions analyzed(16). As mentioned
before, the differences in the compared data might be due to sample differences.

From all the aspects approached in this article, it is clear that the joint efforts of physicians, nursing staff and pharmacists are important to reduce injuries to patients and to prevent medical prescription errors that still occur in the daily routine. Studies such as this one are important in the detection and analysis of problems related to medical prescriptions and the possible actions to correct them in a timely manner. Humans are subject to committing errors and the identification of these events cannot be attributed to an action of punishment, but rather to improvement of care provided by health professionals. Bearing that in mind and with responsible attitudes of all professionals involved, the process of patient care becomes a complete and efficient circle.

**CONCLUSION**

Based on this study, it was observed that prescription errors occurred in a considerable number and regarding important variables, involving all healthcare professionals working in patient care. Most errors can cause important injuries to inpatients, thus evidencing the need of constant evaluation of these events in order to prevent them and assure greater safety and success in therapy.

**REFERENCES**


