

Evaluation of Errors in the Distribution System and Control of Drugs: The Case of a Private Hospital

Lourdes Diaz¹, Mabel Maidana², Lupe Marin³, Lourdes Samaniego², Olga Maciel², Zully Vera², Gladys Lugo², Gustavo H. Marin³

¹Pharmacovigilance Sector, Regent Private Hospital, Asuncion, Paraguay, ²Department of Pharmacy, Faculty of Chemistry Sciences, National University of Asuncion, San Lorenzo, Paraguay, ³Department of Pharmacology, Faculty of Medicine, CIC-CONICET-National University, La Plata, Argentina

ABSTRACT

Introduction: Medication errors may arise during the process of prescribing, transcribing, dispensing, preparation, and administration of any drug. The objective of this study was to quantify the detectable incidence of medication errors that occur in the distribution system and control of drugs administration. **Methods:** A descriptive non-experimental cross-sectional investigation was performed. The data collection instrument consisted on a system of voluntary and anonymous reporting methods. **Results:** The particularity of the study was that of the total number of tickets under study, only 25 had errors (0.56%). The error incidence rate obtained in this institution result much lower than a previous study conducted by us, in the subsector of Social Security of Paraguay (6.3% vs. 0.56%). The most prevalent error was due to incorrect business name (64%), while the one with the lowest prevalence was referred to the wrong patient and medication unsolicited (4%). Most of the errors detected occurred during transcription (56%). 80% of the errors were detected by pharmacy technicians, 12% by nurses, and 8% by attendees. The particular organization of the hospital and the control carried out in different instances keep a relatively low level of medication errors. The consequences of the errors and the importance of the pharmacist's role in the detection, prevention, and resolution of these problems were crucial factors in the case studied. **Conclusion:** Determining the incidence and type of medication error in the different parts of an interaction chain process, allows to analyze its causes, and to make changes where these errors are detected, in order to provide the users of the health system a better care service. Since the commitment of the different health actors involved is decisive to avoid medical errors, it is important to encourage them to support surveillance actions to strengthen good prescription practices.

Key words: Error rate, medication errors, report systems

INTRODUCTION

Medication errors (MEs) depend on multifactorial and multidisciplinary factors. They may appear during the processes of prescription, transcription, dispensing, preparation, and administration of any drug. ME can reduce the patient's quality of life, increase the necessary medical attention, increase the chances of leading patients to hospitalization, prolong their stay in the hospital,

and even lead to the patient's death.^[1,2] Based on its negative effects, errors in the dispensing of medicines are currently gaining greater visibility in countries around the world, although they still need to be established as a major problem for public health. Accordingly, some public policy actions are being taken for preventing some causal elements ME, but there is still a need to improve security practices, which should be established in all developed and underdeveloped countries.^[1,2]

Address for correspondence:

Dr. Gustavo H. Marin, Faculty of Medicine, CIC-CONICET-National University, La Plata, Argentina.
E-mail: gmarin2009@gmail.com, Dr. Mabel Maidana, Faculty of Chemistry Sciences, National University of Asuncion, San Lorenzo, Paraguay. E-mail: glamaida73@gmail.com

© 2020 The Author(s). This open access article is distributed under a Creative Commons Attribution (CC-BY) 4.0 license.

International literature describes a large number of drugs that may cause MEs because they resemble each other either visually or phonetically (this phenomenon is called LASA). The poor knowledge of the names of the pharmaceutical products among the health personnel, along with some particular characteristics of the drugs market, such as the new products available in the market with similar packaging, labeling, clinical uses, dosage and frequency of administration, the lack of rigorous risk assessments, and the similar registered trademarks, favors errors in pharmaceutical treatment.^[3,4]

The errors in the process of medicines usage in health institutions depend on the medical area, nursing staff, and the pharmacy service.^[2] Before the administration of any medicine, a series of stages should occur in the so-called “drug chain” among which the dispensation stands out. In the dispensing of medicines, the human resource is of vital importance and requires adequate physical conditions, as well as education and readiness for work, all under the supervision of the regent to achieve success in his efforts.^[5]

In the supply of drugs in pharmacy services, errors are likely to occur during the process of distribution and control of medicines; however, this situation may change according to the type of health institution and between the public and private health sectors.^[6-9]

The detection and evaluation of the errors associated with the medication have been carried out during the process of distribution, prescription, transcription and dispensing of the medicines in a private health institution. Accordingly, the study also establishes the consequences of these errors and the importance of the pharmacist’s role in the detection, prevention and resolution of these problems.

MATERIALS AND METHODS

A descriptive non-experimental cross-sectional investigation was performed. The variables explored were drug prescribed, nursing transcription, administration, and drug monitoring; day and time of drug distribution; frequency; and type of errors. The institution selected was the Regent Private Hospital in Paraguay with 98 beds, an average occupancy of 90% and 2400 monthly dispensations. Period of study: The study duration was from November 1 to December 31, 2019.

The prescription data were obtained from the patient’s file and also from the file transcription made by nurses. Data from distribution, dispensing administration, and monitoring process were provided by the Internal Pharmacy Service of the hospital.

Errors were classified according to the American Society of Hospital Pharmacists criteria,^[10] while the severity of the

errors was defined following the parameters of the National Coordinating Council for ME Reporting and Prevention.^[11]

The data collection instrument consisted of an anonymous notification MEs formulary distributed by the pharmacy service [Table 1]. Sampling was not probabilistic for convenience. To record and quantify the errors detected, a ME registration program was created using an Excel form.

All prescriptions were performed by medical doctors. The medical orders were received by pharmacy technicians, who processed the requests, printed the order tickets, prepared the medications, and distributed them. The assistant nursing verifies the agreement of the order with the printed ticket and signed a duplicate. The dispensation was performed by a nurse from the institution. Subsequently, during the process, health personnel of the hospital are urged to complete a voluntary notification form. All these forms were collected by the pharmacist of the hospital pharmacy service customizing the analysis in each case.

For the analysis and interpretation of data collected, results were summarized by graphical representation through frequency shown in tables and graphs, taking into account, the variables under study, and the objectives of the research.

RESULTS

During the period studied, a total of 4500 medical orders were dispensed by the internal pharmacy of Regent Hospital. Of the total number of verified tickets, only 25 (0.56%) presented errors.

Once the evaluation was completed, these errors were classified as follows causes:

1. Unsolicited medicine
2. Incorrect business name
3. Wrong pharmaceutical formula
4. Incorrect dose (major or minor)
5. Similarity of packaging
6. Drug preparation
7. Medication dispensing
8. Wrong route of administration
9. Wrong patient
10. Expired/deteriorated medication
11. Labeling/leaflet/packaging
12. Other (specify)

When classifying the errors, it was found that 64% of the 25 tickets with errors were associated with an incorrect commercial name and 4% were due to wrong identification of the patient and an unsolicited medication [Figure 1].

Table 1: Voluntary notification form “medication error”

**VOLUNTARY NOTIFICATION FORM
"MEDICATION ERROR"**

TYPE OF MEDICATION ERROR

1. Unsolicited medication	2. Incorrect Commercial Brand Name	3. Wrong Pharmaceutical Formulation	
4. Incorrect dose (major or minor)	5. Similarity of packaging	6. Preparation of medicines	
7. Medication dispensing	8. Wrong route of administration	9. Wrong patient	
10. Expired / impaired medication	11. Labeling / leaflet / packaging	12. Otro (especificar). Other (specify).	

STAGE IN WHICH THE MEDICATION ERROR OCCURRED

1. Prescription	2. Transcription	3. Transcription	4. Storage	
5. Preparation / Handling	6. Administration	7. Monitoring	8. Other (specify)	

Who detected the error?

Nursing		Pharmacy Technician	
Nursing assistant		Other	

Regarding the process of drug administration, 56% of the errors were detected in the transcription stage and 4% during the preparation of the medical order [Figure 2].

About 80% of the errors were made by pharmacy technicians, 12% by nursing staff, and 8% by assistants [Figure 3].

When comparing the tickets by months, it was found that the frequency of errors in the month of November was greater than in the month of December, 0.7% and 0.4%, respectively. It should be noted that in both months, the types of errors found were different since during the month of November, 75% were errors by incorrect trade name, while in December, 55.6% were due to dispensing errors [Table 2].

Among the transcription errors, it can be observed that the most frequent errors were those related to an incorrect trade name or unsolicited medication.

DISCUSSION

Errors detected during the study indicate although they are infrequent, these errors may occur at any point in the therapeutic circuit. The most frequent types of errors were those of incorrect commercial name (75%) followed by dispensing (55.6%) and similarity of packaging (12.5%).

The stage most evolved in the treatment process (56% of all errors) was when the drug order is interpreted by the nurses (known as transcription stage) followed by prescription stage (28%) which means the time when the medical doctor indicates the drug selected to be part of patient’s treatment. Many times, the use of abbreviations, the illegibility of the medical order, as well as the orthographic and phonetic similarity of many drugs influence the correct transcription.^[12]

The most frequent dispensing error was the omission of the dispensation followed by the dispensing of more drug units than those prescribed. The lack of drug concentration reference is one of the reasons that influence the number of units dispensed. The confusion of the type of drug is very frequent since the same laboratory labels its products with the same design and color, being important, therefore, to have well-labeled, identified, and classified the drawers and shelves where the drugs are stored.^[12]

Another factor to consider is the type of error that affects the patient since it is very important from the point of view of severity. Thus, prescription errors, transcription errors, and dispensing errors can always be detected before the patient is reached, but nothing can be done when the administration/ dispense error has already taken place. In our study case, there is no pharmacist to control the act of giving the medication to the patient by the nurse, which makes the error irreversible once it has occurred.

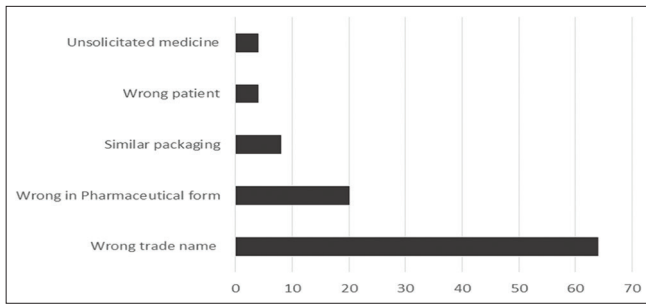


Figure 1: Type of medication errors

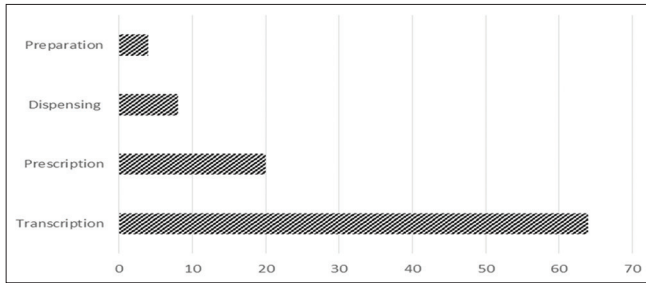


Figure 2: Stage where the error was seen

Table 2: Frequency and type of errors per month.

Data per month of study		November (n=2350)		December (n=2150)	
		n	%	n	%
Frequency	Presence of errors	0.7	16	0.4	9
	Absence of errors	99.3	2334	99.6	2141
Type of errors	Wrong business name	75.0	12	44.4	4
	Unsolicited medication	6.3	1	0.0	0
	Wrong patient	6.3	1	0.0	0
	Similarity of packaging	12.5	2	0.0	0
	Dispensing	0.0	0	55.6	5

As regards the method of error detection, it must be said that techniques such as voluntary anonymous communication and the method of observation are the most frequent techniques that have been used in many studies for the detection of ME. However, voluntary communication implies that the person who has made the mistake or has detected it has to notify the team of health workers, which could involve the management of a large number of reports. The literature indicates that the most accurate detection method is the observation method performed by Barket in the Harvard Medical Practice Study. Although this method of observation may be the best, it is

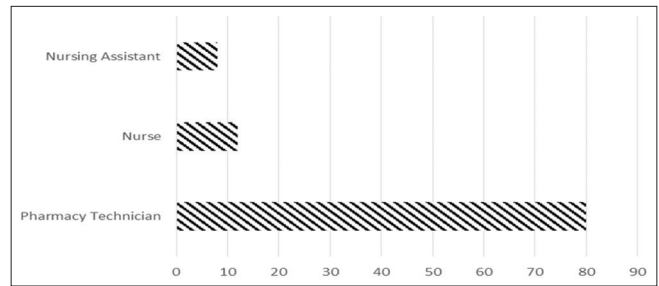


Figure 3: Health agent that detected the error

also the most expensive since the presence and effort of several health personnel is necessary.

The incidence rate of ME detected in our case (0.56%) is much lower compared to other studies (around 5%), since in most studies, where the detection technique was observation, the supervisors of each plant were involved and there were many collaborating people who were dedicated to observe all the administrations that occurred during the day. Although comparisons cannot be made between the results of other international studies and those found in this work, due to the particular working conditions, study time, scope, and personnel involved were very different. In a previous study conducted by us in the subsector of Social Security of Paraguay, which was carried out with a similar methodology, it was detected that the errors were clearly superior to those found in this study carried out in a private institution (6.3% vs. 0.56%),^[13] which has led us to point out the role of the internal organization and characteristics of the medical and pharmaceutical work team to prevent ME.

CONCLUSION

The frequency of MEs in the sample of a private health institution was lower than that reported in another investigation performed in the Public Social Security Hospitals (6.3% vs. 0.56%). Half of the MEs were performed by the nursing staff during the transcription process. Almost all MEs were detected by pharmacy technicians.

REFERENCES

1. Montaña SJ, Vilarasa LC, Muñoz MC, Sendra GR, Arce MV, Ruiz AB, et al. Detección y clasificación de errores de medicación en el hospital universitario Joan XXIII. Farm Hosp 2004;28:28-34. Available from: <http://www.sefh.es/fh/2004/n2/4.pdf>. [Last accessed on 2020 Jan 02].
2. Pedraza AM. Errors in the Process of Dispensing Medications in Hospital pharmacy; 2009. Available from: http://www.pediatría.gob.mx/cali_farma.pdf. [Last accessed on 2020 Jan 02].
3. World Health Organization. Medication errors. WHO recommendations ADECRA report. Revista ADECRA

- 2013;4:22-5. Available from: http://www.noble-arp.com/src/img_up/29042013.1.pdf. [Last accessed on 2020 Jan 02].
4. López MO, Jane CC, Alonso MT, Encina MP. Medication errors: Standardization of terminology and classification. *Hosp Pharm Magazine (Madrid)* 2003;27:137-49. Available from: <http://www.sefh.es/fh/2003/n3/2.pdf>. [Last accessed on 2020 Jan 02].
 5. Herrera LG. Errors in the medication dispensing process, description of a case with intervention. *Rev Fárm* 2005;18:6. Available from: <http://www.binasss.sa.cr/revistas/farmacos/v18n1-2/art1.pdf>. [Last accessed on 2020 Jan 02].
 6. Committee on Quality Health Care in America, Institute of Medicine. *Crossing the Quality Chasm: A New Health System for the 21st Century*. Washington, DC: National Academy Press; 2001. p. 23. Available from: <http://www.nap.edu/read/10027/chapter/1>. [Last accessed on 20 Jan 02].
 7. López MJ, Codina JC, Martín R, Robles MD. Medication errors and risk management. *Span Mag Public Health (Madrid)* 2003;77:527-40. Available from: http://www.scielo.isciii.es/scielo.php?pid=S1135-57272003000500003&script=sci_arttext. [Last accessed on 2020 Jan 02].
 8. Dominguez AT. Medication errors: Role of the pharmacist. *Rev Cubana Farm* 2005;39:1-10. Available from: http://www.scielo.sld.cu/scielo.php?pid=S0034-75152005000200011&script=sci_arttext. [Last accessed on 2020 Jan 02].
 9. American Society of Hospital Pharmacists. ASHP guidelines on preventing medication errors in hospitals. *Am J Hosp Pharm* 1993;50:122-36. Available from: http://www.ashp.org/s_ashp/docs/files/medmis_gdl_hosp.pdf. [Last accessed on 2020 Jan 02].
 10. National Coordinating Council for Medication Error Reporting and Prevention. Vol. 1. NCC MERP Taxonomy of Medication Errors; 1998. p. 1-19. Available from: <http://www.nccmerp.org/mederrortaxonomy.html>. [Last accessed on 2020 Jan 02].
 11. Dominguez FJ. New advances in the dispensing of medicines. *Rev Salud* 2011;7:1-12. Available from: <http://www.scholar.google.es/scholar?hl=es&q=errores+de+dispensacion+de+medicamentos+oms&btnG=&lr>. [Last accessed on 2020 Jan 02].
 12. Otero MJ. Continuing training for hospital pharmacists. In: Grupo F, Farma F. *The role of the Pharmacist in the Prevention of Medication Errors*. Vol. 3. Ch. 2. Spain; 2004. p. 10-4. Available from: <http://www.ismp-espana.org/ficheros/Fichero17.pdf>. [Last accessed on 2020 Jan 02].
 13. Gladys L, Cardozo J, Marin GH, Morinigo M, Samaniego L, Maidana M. Error detection in the process of dispensing of internal at a hospital pharmacy of social security. *Int J Life Sci Pharm Res* 2017;7:35-40.

How to cite this article: Diaz L, Maidana M, Marin L, Samaniego L, Maciel O, Vera Z, Lugo G, Marin GH. Evaluation of Errors in the Distribution System and Control of Drugs: The Case of a Private Hospital. *Asclepius Med Res Rev* 2020;3(1):1-5.