

Evaluation of Medication Errors Detected in Private Health Sector Prescriptions in Asuncion, Paraguay

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Abstract— The aim of the present research, performed in the National University of Asuncion, is to determine the prevalence of Medication Errors in prescription orders at the Private Health Sector Pharmacy in Paraguay. **Methods:** This is a retrospective observational study, whose main variable was the error in prescriptions, and its secondary variables were the number of patients reached by the errors and the type of error detected. A simple random sampling technique was used to obtain 670 cases among the universe of prescriptions made during the study period. Prescription errors were grouped according to the type of errors found. **Results:** 56.2% of the prescriptions received at the Pharmacy sector have between 1 to 5 errors, and only in 43.8% of the cases, the prescriptions were complete. The most prevalent error was the omission of the patient's name, representing 51.58% of the total errors. The second most frequent type of error was the omission of the date of the prescription (20.18%), followed by errors in the pharmaceutical form (either by omission or by error) with 8.42%. Other types of errors represent percentages less than 8%. The prevalence of prescription of medications by their generic name reached only 0.14 of the total prescriptions evaluated. **Conclusion:** In-depth training of prescribers of the Private Health Sector in Paraguay is necessary. Encouraging the development of technical skills in conjunction with active pharmaceutical care could improve the quality of the prescription and reduce the amount of medical errors in the Paraguayan private health sector.

Keywords— Prescription errors, drugs, practices.

I. BACKGROUND

A medication error is usually defined as any preventable event that may cause or lead to inappropriate medication use or cause harm to the patient or consumer. These events may be related to professional practice, health care products, procedures and work systems, including activities such as prescription, communication of medical orders, labelling, packaging, drug preparation, dispensing, distribution, supply, education and monitoring in the use of medicines.¹

Medication errors occur mostly at the hospital level, and fluctuate from country to country².

There is a marked tendency towards a greater use of medicines. Only in Spain, for example, it has been estimated that patients receive up to 15 different medications a day while they are hospitalized, while outpatients were dispensed with more than 661 million prescriptions a year among 3 million beneficiaries of the National Health System³.

There are multiple ways to classify an adverse event due to prescriptions errors. One of the most useful classification regard to the definition of ethical, criminal, civil and

administrative responsibility of drug prescription or utilization is the one that divides the adverse event into preventable and non-preventable ones. The non-preventable adverse event is the complication that cannot be avoided given the current state of knowledge; on the contrary, the preventable adverse event is the poor result of the attention that can be avoided with the state of knowledge.

According to the American Society of Health-System Pharmacists, medical errors are classified in⁴: Omission, Prescription, Time, Dose, Presentation, Preparation, Administration technique, Monitoring, Non-compliance by the patient.

Regarding to the health professional, prescription errors could be classified into three main groups. On the one hand, we have *Administrative errors*. Including: name of the drug omitted; missed or wrong pharmaceutical formulation; administration route omitted, presentation of the drug that does not coincide with the prescribed dose; lack of readable signature or seal of the prescribing physician; name of the patient omitted; lack of start date and duration of treatment; and illegible prescription, which lends itself to broad interpretations. The second group are those referred to *dosing errors* including missed or missed dose; duration of treatment omitted or erroneous; management considerations omitted or erroneous. Finally, the *therapeutic errors*, that encompasses: interactions; contraindications; and therapeutic duplications.

Other typologies classify the errors according to the process: related to the prescription, to the order processing, to the dispensation, to the administration, to the manufacturer, to the environment, and compliance errors.

Although each process is usually the responsibility of a specific health professional, in practice, many of them usually involve several people (doctors, pharmacists, nurses, assistants, administrators, caretakers, patients, etc.) depending on the organization and procedures of work of each institution. This is an important aspect that involves a cultural change in health professionals, who must understand and assume their competences and functions, as well as advocate their interdependence with those of the rest of those involved in the chain⁵

Medication safety must be the core value of health organizations and individual professionals, particularly pharmacists. Preventing and providing maximum safety conditions to patients requires a great collaboration of all those actors involved in the health care system.

The rational use of medicines may contribute significantly to the well-being of people, as beneficiaries of the health system, and therefore to that of society. This is not an easy goal to achieve and maintain since some factors, such as cultural practices, external interests, medical or pharmaceutical experiences might show great heterogeneities that lead to an inappropriate use of drugs⁶

II. INTRODUCTION

A medication error consists in any avoidable event that occurs during the process of prescribing, preparing, dispensing or administering a medication, regardless of whether it causes injury or the potential for injury is present. It differs from the adverse reaction in the fact that these last ones cannot be prevented.

Medication errors are a critical component of the quality of health care and patient safety⁷. According to the World Health Organization (WHO) more than 50% of medicines are prescribed, dispensed or sold inappropriately, and half of the patients do not take them correctly. In the same sense, it is estimated that more than 50% of the countries do not apply basic policies to encourage the rational use of medicines⁷.

Irrational prescription is a worldwide problem. Numerous studies describe characteristics that include poly-medication, usage of medications that are not related to the diagnosis prescription by Brand name or self-medication.

Pharmacists should review electronic or paper prescriptions received, taking into account the therapeutic, social, economic and legal aspects of the prescribed indications before dispensing the medication to the patient.

Some authors described as the main, and more extended prescriptions errors the illegibility of the written order, the lack of information about the patients, and the lack of dosage information, administration schedule or duration of treatment³.

Other studies found that incidence of medication errors, were due in prescriptions (16%) in transcription / validation (27%); in preparation / dispensing (48%), and in preparation or administration of the drugs (9%)⁴.

In all hospitals, most errors occur in the dispensation, except for those hospitals that has electronic prescription where the incidence of errors is lower⁸.

Medication errors constitute one unwanted event of drug therapy, which due to their magnitude and transcendence is recognized as a real public health problem. Thus, to palliate medication errors constitutes a challenge for the pharmaceutical profession that has been working for many years and advocating improving the safety of the use of medicines.

As errors that occur in the medication chain are potentially harmful to the patient, should be studied, prevented, avoided and corrected. For this reason, to end with medication errors is not only an obligation of the physician who prescribes the medication, it must also be the result of the joint effort with the pharmaceutical professionals involved in patient care, intervening in every topic related to the medication.

That is why the World Health Organization (WHO) recommended, through Resolution WhA 55.18, to adopt

patient safety as a matter of high priority in the policy agenda of member countries⁹

The quality of the prescription is now a social and political requirement, and efficiency of the prescription and rationalization of pharmaceutical expenditure, is demanded by several Societies¹⁰⁻¹².

In order to demonstrate the frequency and type of medications errors this study, performed in Asuncion, Paraguay, examines the prescriptions received at pharmacies, corresponding to the private health sector.

III. MATERIALS AND METHODS

This is a retrospective observational study, whose main variable was the errors in prescriptions, and the secondary variables were the number of patients reached by some error and the type of error found. The object of investigation were documents: the archived medical prescriptions of the Pharmacy

Data collection period: Two-year period of data collection was considered (2011 to 2013).

Prescriptions included were all those received at the Pharmacy Office (drugs from Essential Medicines List of the Ministry of Public Health and Social Welfare).

In the absence of data at the national level on the prevalence of errors in prescriptions, the sample size was calculated taking into account the less favourable situation: that is, half of the prescriptions do not comply with errors. Taking into account the "sample size estimate for descriptive studies of dichotomous variable" sample size was estimated at 670 prescriptions (expected proportion (p1) equal to 0.5; amplitude (w) equal to 0.10 and 95% confidence level). The type of sampling technique used was probabilistic, choosing a random systematic selection method. The sample was chosen from a universe of 12,000 prescriptions registered during the period of analysis 2011-2013; therefore, the medical notes were taken following a constant of 18.

It was determined whether or not the prescriptions presented errors of one of these types: lack name of the patient, date in appropriate format, name of the medically readable; use of generic; specification of presentation of the drug, error in abbreviation, specification in pharmaceutical form; presence of registration number and signature of the attending physician. Once each error was identified, the number of errors was counted and a level of prescription compliance was established, being complete (9/9), fairly complete (8/9) and incomplete (<7/9).

Variables: Date of admission. Date of discharge. Age. Sex. Origin. Number. Type. Dose of medicines dispensed. Type of administration. Type and quantity of medical errors. Variables studied were calligraphy, legible or illegible of letter; presence or lack of signature & stamp of the doctor; presence or lack of date; paper prescription with/without letterhead or institution stamp; concentration of the pharmaceutical form; omission of the pharmaceutical form; prescription by trade name; amendments in medical instructions.

All prescriptions were photocopied for visual proof of the mistakes made.

Statistical analysis: The statistical analysis was performed with the EPI INFO 7.0 statistical software, each variable was coded for the programme management, with its description and its categories. This programme allows expressing the results in frequency and percentage of each study variable.

Ethical aspects: this work was carried out according to international standards for biomedical research in human beings proposed by the Council of International Organizations of Medical Sciences (CIOMS) where the confidentiality of data obtained from patient records is respected (Authorization code number (CEI N°88). For this, the project was presented to the Research Ethics Committee of the Faculty of Chemical Sciences, National University of Asuncion (UNA) Paraguay Republic and each patient was asked to sign an informed consent for this purpose.

IV. RESULTS

A random sample of 670 prescriptions received at the Pharmacy was include in the study. The search for medication errors was carried out, taking into account the types of errors described in the theoretical framework. These errors were classified as follows: 1. Lack of Patient Name; 2. Lack of Date; 3. Unreadable writing; 4. Lack of doctor's signature; 5. Lack of registration number; 6. Prescription by Generic Name; 7. Abbreviation Error; 8. Lack of Presentation Specification; 9. Lack of specification of the pharmaceutical form.

Once the search for medication errors in the prescriptions was completed, they were grouped according to the amount of prescription errors found. The analysis showed that: 43.9% of prescriptions did not present errors, 32.7% present one error, 18.8% two prescription errors, 4% of prescriptions have three errors, and 0.29% represent both prescriptions with four and five errors. (Fig. 1).

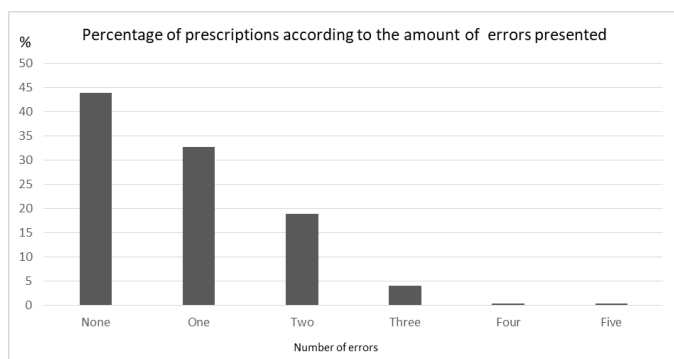


Figure 1. Percentage of prescriptions according to the amount of errors detected

The prescriptions were rated according to the amounts of errors and classified as a) Completed, if they did not present an error, b) Mildly completed, if an error occurred, or c) Uncompleted, when two or more errors were presented. (Table 1).

TABLE 1: Level of fulfilment of the prescription according to the score achieved.

Type of Error	%
Completed	43,9
Mildly Completed	32,7
Uncompleted	23,4

Of the total prescription cases, 56.2% (more than half) were moderately complete or incomplete, presenting more than two prescription errors.

The errors found were typified and segregated as: Name of the patient omitted, signature of the doctor omitted, omission of the professional record of the doctor, illegible writing, error of abbreviations, date omitted, absence of specification of the pharmaceutical form and of the presentation of the drug, use or not of the generic name (Table 2).

TABLE 2: Types of prescription errors recorded, their respective amounts and percentages taking into account the total number of errors.

Type of Error	Quantity	%
Patient name	294	51,58%
Date	115	20,18%
Unreadable text.	38	6,67%
Signature of the doctor	21	3,68%
Registration Number	18	3,16%
Generic name	0	0%
Abbreviation Error	21	3,68%
Presentation Specification	15	2,63%
Pharmaceutical formulation	48	8,42%
Total	570	100,00%

Among the errors identified, the most frequent was the omission of patient's name, which constitutes important data to ensure that the medication is for the correct patient. This type of mistake represented 51.58% of the total errors.

The second type of error was the omission of the date of the prescription (20.18%), which is essential to take into account the period of validity of the medical recipe.

The third type of error detected was the omission or erroneous registration of pharmaceutical form, presenting 8.42% of all errors.

The other types of errors were unreadable writing 6.67%, errors in abbreviation 3.68%, lack of doctor's signature 3.68%, lack of doctor's registration number 3,16%, lack of specification of the drug presentation 2,63%.

An important finding of the study, is that it was detected a prevalence of only 0.14% in the prescription of medicines by their generic name, which indicates that only a single prescription of the 670 total was prescribed according to the legislation in force in Paraguay, all the others contained exclusively the commercial names of the medicines.

V. DISCUSSION

Most prescription errors detected were severe since for example the patient's name was omitted, which can lead to switch medication between patients and expose them to severe and unnecessary adverse effects.

One of the well-known measures to avoid prescription errors and to improve patient safety by avoiding confusion due to misinterpretation of the doctor's note is the implementation of electronic prescription systems, and prescription forms indicating the data to be filled in the recipes. Based on the results of the study, we extended the digital electronic prescription in order to avoid these errors.

However, other errors in the prescription could not be avoid with this type of technology. Although the legislation in our country regulates the prescription of drugs by generic

name, this study demonstrates the almost total absence of prescriptions effectively stating their generic name. It is presumed that it is due to ignorance of the implementation of the law, considering the the legal reform has less than 10 years of validity, or due to the pressure that doctors are submitted by the Laboratories and Pharmaceutical Representatives.

The prescription of a drug is not an isolated act, it is part of a medical act that relates to the doctor's drug indication related to other professionals, who are the ones who dispense and administer the medication and to the patient who receives the drug prescribed it. In addition to the medical doctor, the pharmacist and pharmacy staff who validate and dispense the nurse or the patient they administer or take the medication are also involved in drug's usage. The pharmacist has the professional and legal responsibility to ensure that the prescriptions he receives are complete and correct, so it is very important to know how to identify prescription errors to provide patient safety and avoid legal problems in cases where the patient suffer some damage to your health because of prescription errors.

When comparing the results obtained in this work with the results presented in other studies previously carried out in different countries, we can find similarities linked to in the presence of a high rate of prescription errors, but also particularities: in Paraguay those errors are even higher, may be due to the poor implementation of the electronic prescription, control, and due to sociocultural factors present in health care system.

VI. CONCLUSION

The results of this study demonstrated that exist a high percentage of prescription errors, the majority of them are related to the omission of important data in doctor's prescription note, like the name of the patient, date of the prescription and often his/her own signature, the illegible calligraphy or errors in the specifications of the pharmaceutical form or the presentation of the drug.

All data must be considered in the prescription to ensure that the correct medication is dispensed, to the correct patient, and that it is prescribed by a professional qualified to do so, in order to provide safety conditions to patients.

A relevant fact obtained in this study in the aforementioned pharmacy is the almost total absence of the prescription of the drugs using the generic name; this is worrisome since data reveals that in most cases the patients tend to obey rather commercial criteria when some drug is prescribed.

To illustrate that, for example, we've found health professionals of all the areas of care services available to the sanatorium located near a particular pharmacy, both emergency doctors and conventional doctors of different paediatric specialties adopt the criterion of prescribing medicines with its commercial name, without minimally taking into account the economic condition of the patient.

The medical prescription is a complex act, which requires knowledge, professional experience, specific skills, a great sense of responsibility and an ethical attitude. It should be remembered that the prescriber assumes legal responsibility

for the implications of the prescription. The pharmacist therefore assumes the great responsibility of correctly dispensing the prescription.

The attitude of the pharmaceutical professional is essential when receiving prescriptions with error. It is a complicated task but not impossible to solve when the pharmacist takes a position in this situation, focusing his knowledge of pharmaceutical care, with a mastery of practice that leads to a great teamwork together with the treating medical professional.

The aforementioned classification of errors presented may be useful for analysing and evaluating medication errors with health authorities and emphasizing the importance of a good medical note preparation record, which allows greater responsibility of prescribers and guarantee the pharmacist's compliance with Good Dispensing Practices, in order to contribute to patient safety.

Irrational prescription is a worldwide problem. Numerous studies, both in developed and developing countries, describe features that include poly-medication, the use of drugs that are unrelated to diagnosis, unnecessarily costs paid for the same pharmaceutical product, inappropriate use of antibiotics, irrational self-medication or drugs frequently taken in insufficient doses. The problem in many developing countries is the lack of adequate regulation and inspection, which generally results in the purchase of a large proportion of medications acquired without a medical prescription.

The Pharmacist as a vital part of the health-care actor chain has the fundamental role in the detection of prescription errors. Errors can occur but the important thing is to detect them in time and prevent them from affecting the patient's safety. The interdisciplinary work of mutual help with other health professionals is crucial since the ultimate goal involves them all: to provide effectiveness and safety to the patient under treatment.

REFERENCES

- [1] Rosete Reyes A, Zavaleta Bustos M. Medication errors detected through incident reports. Does it contribute to the safe use of medications? *Revista Médica de Investigación Sur, México* 2008; 15,4:248-255. Available in: <http://www.medigraphic.com/pdfs/medsur/ms-2008/ms084a.pdf>
- [2] Torres Domínguez A. Medication errors: Function of the Pharmacist. 2005;39,2; 1-10. Available in: http://scielo.sld.cu/scielo.php?script=sci_arttext&pid=S0034-75152005000200011
- [3] Otero López M.J. New Initiatives to improve the safety of the use of medicines in hospitals.. *Revista Española de Salud Pública.* 2004; 78,3: 323-339.
- [4] AllanE, Barker k. Fundamentals of medication error research *American Journal of Hospital Pharmacy* 1990; 47, 3, 555-571
- [5] Sousa A. Medication Errors in Hospital Pharmacy. 2009; 8.1: 30-65. Available in: <https://www.doccity.com/pt/erros-de-medicacoes-em-farmacia-hospitalar/4708528/>
- [6] Otero MJ, Codina C, Tamés MJ, Pérez M Update medication classification errors. *Farm Hosp* 2008; 32: 38-52.
- [7] Lacasa C, Humet C, Cot R Accidents with medications. Concepts, classification and detection methods. Medication errors Prevention, diagnosis and treatment. 1st edition. Barcelona: Editorial EASO, 2001:15-22.
- [8] Institute of Medicine (US) Committee on Quality of Health Care in America; Kohn LT, Corrigan JM, Donaldson MS, editors. *To Err is*



- Human: Building a Safer Health System. Washington (DC): National Academies Press (US); 2000. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK225182/> doi: 10.17226/9728
- [9] De Bortoli Cassiani S et al. Identification and analysis of medication errors in six brazilian hospitals. *Cienc. enferm.* 2010; 16,1:85-95. Available in: https://scielo.conicyt.cl/scielo.php?script=sci_arttext&pid=S0717-95532010000100010&lng=es&nrm=iso
- [10] Lavalley VA, Payro ChTJ, Martínez CKA, Torres NP, Hernández DL, Flores NG The medical error in the prescription of medications and the impact of the educational intervention. *Bol Med Hosp Infant Mex.* 2007; 64,1: 83-90. Available in: <http://www.medigraphic.com/pdfs/bmhim/hi-2007/hi072c.pdf>
- [11] Ragam AS, Acharya S, Holla R. Assessment of drug use pattern using World Health Organization prescribing indicators in a tertiary care hospital in Mangalore: a cross-sectional study. *National Journal of Physiology, Pharmacy and Pharmacology.* 2017;7(10):1026.
- [12] Ploch T., Klazinga N.S. Community-based integrated care: myth or must?, *International Journal for Quality in Health Care,* 2002; 14,2: 91–101.