REVIEW ARTICLE

REVISTA ENFERMAGEM ATUAL IN DERME

QUALITY OF PRESCRIPTIONS IN PRIMARY CARE: WE NEED TO TARGET THAT

QUALIDADE DAS PRESCRIÇÕES NA ATENÇÃO PRIMÁRIA: PRECISAMOS FALAR SOBRE ISSO

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ABSTRACT

Aim: To identify errors in drug prescriptions and its causes in a primary healthcare center. **Method:** Cross-sectional study carried out in a primary healthcare center in northeastern Brazil. A total of 707 drug prescriptions were analyzed using an instrument with pre-established criteria, according to the country's legal provisions regarding drug prescription. An Ishikawa diagram was created to identify the possible causes for the identified errors. **Results:** A total of 138 drug prescriptions (19.5%) presented information failure or inadequacy. From the errors found, 116 (16.41%) were related to information on dosage. The Ishikawa diagram showed opportunity for improvement in management, training, and technical/professional qualification. **Conclusion:** The errors seen on drug prescriptions at a primary healthcare center were related to illegibility, absence of dosage, and absence of mandatory patient information. Organizational, technical, scientific, and political factors were identified as the roots of the identified errors.

Keywords: Medication errors; Drug prescriptions; Risk management; Primary Health Care; Patient Safety.

RESUMO

Objetivo: Identificar erros na prescrição de medicamentos e suas causas em uma unidade básica de saúde. **Método:** Estudo transversal realizado em uma unidade básica de saúde do Nordeste do Brasil. Foram analisadas 707 prescrições de medicamentos por meio de instrumento com critérios pré-estabelecidos, de acordo com as disposições legais do país quanto à prescrição de medicamentos. Um diagrama de Ishikawa foi criado para identificar as possíveis causas dos erros identificados. **Resultados:** Um total de 138 prescrições de medicamentos (19,5%) apresentou falha ou inadequação de informação. Dos erros encontrados, 116 (16,41%) estavam relacionados a informações sobre posologia. O diagrama de Ishikawa mostrou oportunidade de melhoria na gestão, treinamento e qualificação técnico / profissional. **Conclusão:** Os erros observados na prescrição de medicamentos em unidade básica de saúde foram relacionados à ilegibilidade, ausência de dosagem e ausência de informação obrigatória ao paciente. Fatores organizacionais, técnicos, científicos e políticos foram identificados como as raízes dos erros identificados

Palavras-chave: Erros de Medicação; Prescrição; Gestão de Riscos; Atenção Primária à Saúde.

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INTRODUCTION

Concerns about the quality of services offered in healthcare facilities have been widely discussed, mainly due to the alarming rates of adverse events that cause harm to patients at different healthcare levels[1-2]. There is a contemporary trend in a worldwide discussion on patient safety. In Brazil, public healthcare is provided by the Unified Health System (SUS in Portuguese), which offers universal access to integral care by means of a national health. There is an increasing concern about patient safety and care quality in facilities in the SUS system due to society's dissatisfaction with bad practices of care offered in such facilities[3-5]. Despite the widespread dissemination of patient safety studies developed in the hospital environment, it is known that there are gaps regarding this theme in primary healthcare centers or facilities[4,6].

Medication errors affect care in a very dangerous way, generate unnecessary costs, extend the duration of treatments and the patients' length of stay, and can lead to litigious actions[7-8]. This can result in discrediting of the professionals' performance and of the institutions involved. It is also known that safe behaviors are associated with the reduction of adverse events[2,9-10].

In view of the relevance of the theme, this study aimed to identify errors in drug prescriptions and its causes in a primary healthcare center, taking into account the country's legal provisions regarding drug prescription.

MATERIAL AND METHODS

A cross-sectional study was developed in a primary healthcare center in northeastern Brazil. Patients who attend to this center receive medications to use at home. The medications are dispensed in the center's pharmacy for patients carrying prescriptions ordered by a health professional (nurse, physician, or dentist) from the center. A copy of each prescription is retained in the center's archive. This study analyzed prescriptions retained in the center.

A retrospective analysis of 707 drug prescriptions was carried out. These prescriptions were dispensed from August to November 2017. A form was developed and used for analyzing the content of the prescriptions, with pre-established criteria from the legal provisions of the Brazilian Decree No. 74.170/74, Ordinance No. 344/98, and Resolution No. 357/01. The main regulations include the following: (a) being written in Portuguese and in ink; (b) being legible (the prescription is readable, easy to understand, and does not lead to a dispensing error); (c) inclusion of the patient's name and address; (d) use of the official nomenclature of the drug or trade name; and (e) being complete, i.e., must include: the pharmaceutical form, drug dosage, presentation and method of administration, the duration of treatment, prescription's date

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of issue and validity, and the prescriber's name, registration number, signature and stamp. The presence of erasures or amendments was also observed.

The form had questions about prescription quality indicators, such as: data about the patient (sex and age), prescriber profession, date of prescription, legible or illegible handwriting and, finally, general information about the drugs (name, quantity, therapeutic class, drug administration route, and time and frequency of administration). The prescriptions were read and analyzed by three researchers, separately, and after their interpretation the data were compared for a more detailed assessment.

Data were computed in a Excel spreadsheet and then analyzed with the Epi Info™ statistical software 7.2.1.0 version (CDC, Atlanta, USA). Descriptive and inferential statistical were used to analyze the collected data. The Pearson's chi-square was used to verify the existence of link among the categorical variables. A Kolmogorov-Smirnov normality test was performed to determine if the data were normally distributed. Considering the non-parametric nature of the variables, the Mann-Whitney test was used to compare the ranks of quantities of prescribed drugs. A 0.05 significance level was stabilized for all analyses.

Ishikawa diagram

An Ishikawa diagram was created to identify the “root causes” for the identified errors. A root cause is a fundamental reason for the occurrence of a problem. This method is proposed not only to find root causes, but to find solutions and to prevent new episodes (other errors) from happening. The diagram is a graphic representation that illustrates the relations between a specific result and its causes.

In the present study, the Ishikawa diagram was created to identify the main causalities that could be related to the occurrence of errors or inadequacies in the filling of drug prescriptions. The diagram was the result of a focus group meeting between the researchers and 55 professionals from primary healthcare teams and community health agents, to obtain better and more detailed information about the work environment and relationships. The identified causes were grouped into 6 (six) categories: personal factors, organizational factors, external factors, patient factors, work/environment factors, and other factors.

Ethical Procedures

The study was approved by the Research Ethics Committee of the University of International Integration of the Afro-Brazilian Lusophony - UNILAB (CAAE No. 62673716.6.0000.5576, opinion No. 2,522,957).

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RESULTS

A total of 707 prescriptions were analyzed. Altogether, 1314 drugs were prescribed. The average number of drugs per prescription was 1.8. Table 1 provides an overview of the variables related to the analyzed prescriptions.

Table 1 - Distribution of variables related to drug prescriptions in a Primary healthcare center, Brazil, 2017.

VARIABLES	n	[%]	Confidence Interval [95%]
Gender (n = 667)			
Male	235	[35.23]	31.70 - 38.93
Female	432	[64.77]	61.07 - 68.30
Prescriber profession (n = 698)			
Physician	526	[75.36]	72.03 - 78.41
Nurse	172	[24.64]	21.59 - 27.97
Number of drugs per prescription (n = 707)			
One	300	[42.43]	38.84 - 46.11
Two	249	[35.22]	31.79 - 38.81
Three	113	[15.98]	13.47 - 18.87
Four	27	[3.82]	2.64 - 5.50
Five	14	[1.98]	1.18 - 3.30
Six	04	[0.57]	0.22 - 1.45
Therapeutic class - Prescription 1 (n = 696)			
Analgesic	115	[16.52]	13.95 - 19.46
Antimicrobial	208	[29.28]	26.60 - 33.39
Anti-inflammatory	58	[8.33]	6.50 - 10.62
Antihypertensive	148	[21.26]	18.39 - 24.46
Antiglycemic	20	[2.87]	1.87 - 4.40
Digestive Drugs	31	[4.45]	3.16 - 6.25
Bronchodilators / Antispasmodic	01	[0.14]	0.03 - 0.81
Anti-Cough / Flu medicines	02	[0.29]	0.08 - 1.04
Antianemic	19	[2.73]	1.75 - 4.22
Antiparasitic	58	[8.33]	6.50 - 10.62
Others	36	[5.17]	3.76 - 7.08
Administration route - Prescription 1 (n = 681)			
Oral	651	[95.72]	93.96 - 96.99
Topic	30	[4.28]	3.01 - 6.04
Readability (n = 707)			
Unreadable	136	[19.24]	16.50 - 22.30
Readable	571	[80.76]	77.70 - 83.50
Information quality (n = 707)			
Compromised	138	[19.52]	16.77 - 22.60
Non compromised	569	[80.48]	77.40 - 83.23
Compromised information (n = 707)			
Patient Name	31	[4.38]	3.11 - 6.11

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Dosage	116	[16.41]	13.86 - 19.32
Route of Administration	07	[0.99]	0.48 - 2.03

Source: The authors.

Of the total 707 prescriptions analyzed, 40 did not presented the patient's gender and name (5.66%). Among the 667 prescriptions that presented this information, 235 (35.2%) corresponded to male patients and 432 (64.5%) to female patients. Regarding the readability, 136 prescriptions (19.2%) presented information that was impossible to be read by the data collection team. The route of administration was absent in 26 prescriptions (3.7% of the total).

Regarding the content and quality of the information, 138 (19.5%) prescriptions were compromised, which means that they presented information inadequacies (use of unusual acronyms, abbreviations, lack of time/frequency of use, etc.). Within this compromised information, 116 (16.41%) were about drug dosage or how to use the medications (time and quantity of medication to be used). Table 2 addresses the main factors associated with the prescribers' professional category.

Table 2 - Factors associated with prescribers' professional category in a Primary healthcare unit, Brazil, 2017.

Prescriber	**Readability**		Statistic [p-value]
	Readable [%]	Illegible [%]	
Prescriber			
Physician	401 [76.24]	125 [23.76]	0.000[1]
Nurse	167 [97.09]	05 [2.91]	
	Information quality		
	Non compromised	Compromised	
Prescriber			
Physician	399 [75.86]	127 [24.14]	0.000[1]
Nurse	167 [97.09]	05 [2.91]	
	Information: Patient's Name		
	Non compromised	Compromised	
Prescriber			
Physician	495 [94.11]	31 [5.89]	0.000[1]
Nurse	172 [100.0]	00 [0.00]	
	Information: Dosage		
	Non compromised	Compromised	
Prescriber			
Physician	420 [79.85]	106 [20.15]	0.000[1]
Nurse	167 [97.09]	05 [2.91]	
	Information: Route of Administration		
	Non compromised	Compromised	

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Prescriber			
Physician	519 [98.67]	07 [1.33]	0.203[2]
Nurse	172 [100.0]	00 [0.00]	

[1]Pearson's chi-square test; [2]Fisher's exact test.
Source: The authors.

Most prescriptions were ordered by physicians (76.2%). However, this category was also the one that made most mistakes related to readability (approximately 24% versus 3% illegible prescriptions made by nurses). Regarding the integrity of the information, physicians accounted for 24.1% of the compromised information, whereas nurses accounted for 2.91%. About 31 prescriptions did not have the patient's name, and all of them were written by physicians.

Table 3 shows a comparison of the number of drugs prescribed according to the prescribers' professional category and the patients' gender. There was a significant difference in the amount of drugs prescribed by physicians and nurses, being higher among physicians. However, there was no statistically significant difference between the number of drugs prescribed, and patients' gender.

Table 3 - Comparison of number of drugs prescribed according with prescribers' professional category and patients' gender, Brazil, 2017.

GROUPS	Quantity of prescribed drugs					Statistic [p-value][1]
	n	Average	[SD]	Median	Mean Rank	
Prescriber (n = 698)						
Physician	526	1.93	[1.01]	2.0	359.43	0.015
Nurse	172	1.72	[0.89]	2.0	319.14	
Patients' Gender (n = 667)						
Male	235	1.87	[1.00]	2.0	332.82	0.901
Feminine	432	1.88	[0.98]	2.0	334.64	

[1]Mann-Whitney non-parametric test

Source: The authors.

Ishikawa diagram

Professionals from the primary healthcare center listed the main problems that they face in the service that may cause prescription errors. They provided the root causes through lived reports and from the verbalized experiences. Thus, the diagram was assembled with the help of all professionals who participated together (Figure 1).

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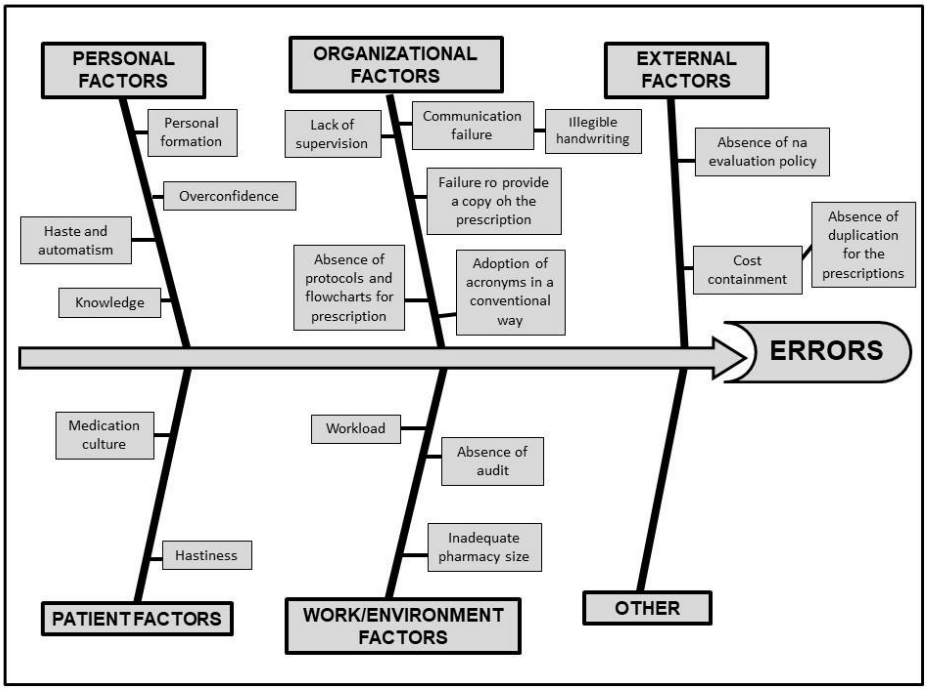
Figure 1 - Ishikawa diagram of the causes of drug prescriptions errors.



Source: The authors.

DISCUSSION

Before any reflection, it is important to understand the complex nature of human errors. Errors are part of human nature and will always exist. However, systems in which the production, preparation and dispensing of drug prescriptions takes place must follow well-structured work routines to promote actions aimed at minimizing errors, and thus, reducing damage to the patients. Driven by an intense concern with the quality of the services offered in healthcare, many researchers have discussed what are the main barriers faced by professionals to engage a safety culture in health services, in line with a search for tactics to be used to prevent adverse events[11].

In this scenario, there is a need to identify the causal factors involving medication prescription errors. The occurrence of these errors is directly related to the technical quality of the prescription, mainly with its legibility and completeness[12]. According to the study findings, approximately 20% of the prescriptions still have problems in this aspect due to not readable handwriting. Historically, prescribers' handwriting has been cited as an element that compromises the proper use medications, and consequently, patient safety[13-15].

In addition to identifying weaknesses present in the stage of prescribing, it is essential to adopt safety models, some in the form of assistance protocols, in order to make the production of care and communication a systematic and equally knowledgeable act[16]. With regard to the medication process, all

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stages are of unparallel importance, however the prescription itself deserves special attention considering that it can be compared to a generating mechanism and guiding commands, which will lead “what”, “how”, “where”, “when”, and on “whom” interventions will be carried out[17-18].

In this study, the legibility criterion was established when observable words or expressions were written in an understandable way, allowing a clear understanding of the prescription without the need for deduction or supposition. It is known that people are more likely to use deductions when they read a prescription with a bad handwriting. This form of decoding (using purely deductive reasoning) carries with it a degree of imprecision with harmful repercussions[19]. Bad handwriting and the existence of incomplete information are factors that predispose to harmful medication errors[20-21].

When considering a significance level of 5%, the comparison made using the chi-square test between the two categories of prescribing professionals in relation to legibility, quality of information, and presence of the patient's name and dosage showed that the physicians were more likely to make mistakes.

According to the study findings, 138 prescriptions (approximately 20%) had some abbreviation or acronym. The inappropriate use of acronyms and the non-standardization of the nomenclature of medicines also lead to difficulties in the understanding of prescriptions[14]. These difficulties can be associated with the massive variety of drugs currently available on the market, linked to the fact that many of them have very similar trade names[16,22].

The use of abbreviations, a widely adopted practice by health professionals, can lead to confusing or misinterpretations[18,23]. In Brazilian primary healthcare services, drugs are obtained in the same center were consultations are carried out, but patients are free to purchase them via commercial channels. Depending on the service, the form of acquisition of medications, or even by professionals' convenience, prescriptions can be interpreted dubiously. This can be made worse if the handwriting is hard to be read[1-2,4].

The use of abbreviations needs to be avoided as much as possible, especially in primary healthcare services in which patients leave the center carrying out the prescriptions. An acronym may be usual for a health professional but may not be clear and known to the patient. Thus, professionals should avoid abbreviating information about the pharmaceutical form to be used, the route of administration, doses, quantities, and intervals of intake[8,12,24]. A study carried out in primary healthcare services in Sweden, involving clinical-pharmaceutical recommendations, identified 349 problems related to medication intake caused by difficulties in identifying guidelines in prescriptions. The authors have highlighted

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the importance of rigor in properly filling in information about the correct intake of drugs[25].

One of the foundations of the safety culture is the adequate identification of the patient at all times, and in the case of assistance provided by primary care services (in which the patient takes the prescription with him to his home), this is even more important[26-27]. Frequently, there is more than one person in Brazilian homes being treated for chronic or degenerative diseases. Arterial hypertension, for example, has extremely different pharmacological therapies. In the present study, the patient's name was missing in 31 prescriptions. The correct identification of the patient is essential for the implementation of a duly safe assistance[14-15,27-28].

Ishikawa diagram

Regarding the Ishikawa diagram, the Personal factors category included the main causes that compromised patient safety, such as personal training, excess of self-confidence, haste/automatism, and finally, insufficient knowledge. Professional training is an attitude to be performed by everyone who enters a specific type of service, combined with permanent education[14]. Self-confidence combined with automatism in the performance of functions enhances the probability of errors[29].

In the following category, Organizational factors, we pointed out the lack of supervision, failures in communication (illegible handwriting), and the absence of protocols or flowcharts for prescription. For a safe practice, it is necessary to use and implement protocols that support the work routine[19,29-30].

In the third category, External factors, the absence of a permanent evaluation policy and the containment of expenses were evidenced. External evaluation and monitoring policy are important tools for maintaining a minimum acceptable standard[15-16]. This policy must involve analyzes of compliance with conducts.

In category No. 4, Patient factors, medication culture and hastiness were listed. The fifth category, Work/environment factors, workload, the absence of auditing, and the inadequacy of the size of the pharmacy room were the root causes for the prescribing errors[30]. The existence of quality standards in the provision of care depends on periodic inspections and an audit policy[12]. Clinical audits, for example, work as a systematic analysis of clinical procedures aimed at improving the quality and results of care. In addition, the existence of regulatory inspections is important to control and verify procedures, observing if they are in compliance with all legal requirements[9,12,31]. Professionals must understand the importance of audits and the adherence to protocols as a way to ensure patient safety and quality of care[9,18].

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Limitations

The main limitation of this study concerns the relatively small number of healthcare workers who were able to participate. Some professionals were interested in participate but were not available due to their busy schedule and this factor, particularly for physicians, might have limited our findings. This study is also limited by the use of only one primary healthcare unit.

Implications

Through the use of the Ishikawa diagram we were able to ascertain which were the most likely causal factors for the occurrence of prescription errors at a primary healthcare center, and also in the identification of needs for improvements in management, professional training/improvement, use of resources, and ongoing training of the health teams.

CONCLUSIONS

The study made it possible to assess that the main errors involving drug prescriptions in primary healthcare were related to handwrite illegibility and lack of information such as drug dosage and patients' name, reflecting on the quality of the information entered in the prescriptions. The physicians' category was associated with a greater occurrence of errors.

The construction of the Ishikawa diagram allowed the identification of root causes of the observed errors. They were more directly related to organizational factors, personal factors and service-related factors. However, the results must be analyzed with caution, since this is a cross-sectional study, carried out in a predetermined period and, therefore, cannot be universally representative.

This study provides subsidies for future research. New studies should be carried out aiming at a better understanding of which factors (including professional training and permanent training) contribute to the effectiveness of drug prescription practices and the accuracy of information. Findings from this study can be used to set goals to improve the quality of services in relation to prescribing errors, providing critical reflection and, consequently, strengthening the public health system.

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