Original Article

QUALITY OF PRESCRIPTIONS IN A MUNICIPALITY OF MINAS GERAIS, BRAZIL: A PHARMACOEPIDEMIOLOGIC APPROACH

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ABSTRACT

Objective. To assess the quality of prescriptions filled at community pharmacies.

Methods. We conducted a cross-sectional descriptive study to assess the prescriptions. Eight hundred prescriptions were collected from four community pharmacies in the municipality of Muriaé (state of Minas Gerais, Brazil). Prescriptions were evaluated based on the prescribing indicators of the WHO, their legibility, and the presence of basic information.

Results. A mean number of 2.2 drugs was prescribed per simple prescription form. The percentage of antibiotics prescribed was 22.1%. Drugs were prescribed using their generic name in 33% of the prescriptions. Of the medication prescribed, 46.5% were included in the National List of Essential Drugs (RENAME). Thirty-two percent of the prescriptions we barely legible, 36% were illegible, and only 32% were legible. There was lack of basic information regarding pharmaceutical form (64%), concentration (47%), dose (22%), interval between doses (63%), duration of treatment (30%), and route of administration (84%).

Conclusion. The prescriptions assessed in the present study do not provide all information necessary for a correct and safe use of medications; most of them are not legible, contain a high percentage of trade names, which are rarely included in the RENAME, and many antibiotics.

Key Words: Pharmacoepidemiology. Drug prescriptions. Community pharmacy services. Drug monitoring.

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Introduction

There has been increasing concern about health problems related to medication among health professionals.[1] Several factors are associated with the achievement of a rational use of medication. Therefore, it is important to understand the use of medications as the process that comprises appropriate prescribing, timely availability and affordability, appropriate conditions of prescription filling, consumption according to the doses and period of time indicated and at the time intervals defined for efficient, safe, and high-quality medications.[2]

Advances in research of new drugs, together with their commercial promotion, created an excessive belief in the power of medications. Thus, drug prescriptions became almost mandatory during medical visits and physicians are evaluated by the patient based on the number of drugs prescribed. Therefore, drug prescription has become synonymous with good medical practice, which explains its enormous demand.[3]

As a result, the quality and quantity of drug consumption are directly influenced by the prescription. On the other hand, prescriptions are influenced by countless factors such as provision of products, patients' expectations, and marketing campaigns released by drug manufacturers.[4]

A recent study on medication errors found that the level and consequences of these events are unacceptable and reported that each patient admitted to U.S. hospitals are exposed to one medication error per day.[5] Prescribing errors are the most serious medication errors occurring during the use of drugs.[6]

According to the Guide to Good Prescribing of the World Health Organization (WHO),[7] after selecting the drug treatment and writing the prescription, physicians must inform patients about: (a) short-term (or long-term) objectives of the treatment; (b) how, when, and for how long to take the medication; (c) benefits and risks (drug interactions or drug-food interactions, adverse reactions, poisonings); (d) procedures to follow if there are adverse effects; (e) how the drug should be stored; and (f) what to do with left-over drugs. On the other hand, while filling the prescription, pharmacists are responsible for respecting the user's right to be aware of the drug that is being dispensed and take decisions on his/her health and well-being, informing and advising the patient on the correct use of the drug.[8]

In this process, medication becomes an important factor in the health sector both for the policies of management system

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and health professionals' practice and for the patients' emotional reference.

In the health sector, drugs are an essential tool for problem-solving capacity of the services offered, accounting for the second largest expense within the Unified Health System (SUS), second only to human resources.[9,10]

In order to streamline health care resources and ensure access to medications, countries have developed their own drug policies. In Brazil, the drug policy aims at ensuring the safety, efficacy and quality of medications, promoting the rational use and access to essential medications.[5] This policy encourages the use of medications that can guide the actions aimed at solving health problems related to drugs.

The objective of the present study is to assess the quality of prescriptions filled at community pharmacies of a medium-sized municipality in the state of Minas Gerais, Brazil. Thus, this study is intended to provide pharmacoepidemiologic data to health services of medium-size municipalities.

Methods

The present study was conducted in Muriaé, located in the Zona da Mata of the state of Minas Gerais, Brazil. This municipality has about 100,000 inhabitants according to the 2009 IBGE census.[11] It has approximately 50 commercial pharmacies or community pharmacies.

We evaluated drug prescriptions filled at four pharmacies. Prescriptions from these pharmacies located in different regions of the municipality were collected. Upon customer's consent, prescriptions were photocopied for further analysis. Two-hundred prescriptions were collected from each pharmacy. Prescriptions were randomly selected using as inclusion criterion the fact that the prescription was filled. Randomization was performed by collecting three prescriptions per hour during two hours a day in at least two pharmacies. The study was conducted during the months of March, April, and May 2008.

Regarding the study period, although prescribing pattern can be influenced by seasonal diseases, the WHO considers that for these purposes a sample collected at a given time shows basically the same results as another sample involving a longer time period.[10]

Prescriptions were evaluated according to six variables or group of variables, which were as follows:

1. Legibility: the drugs prescribed were categorized into legible, barely legible, or illegible;
2. Presence of basic information on the prescription: the presence of information about the pharmaceutical form, concentration, dose, interval between doses, duration of treatment, and route of administration was analyzed;
3. Mean number of drugs prescribed per prescription;
4. Percentage of drugs prescribed using their generic names;
5. Percentage of drugs prescribed included in the RENAME;
6. Percentage of antimicrobial agents prescribed.

These indicators were selected by observing similar studies and quality standards set by health organizations.

In 1993, the WHO[10] suggested the use of selected indicators of drug use as a tool to assess the impact of implementing a program of essential medications or interventions related to these drugs. The indicators are intended to qualify, in a reproducible manner, behavioral aspects of health care providers in health centers. The last four indicators studied in the present study are included in these WHO guidelines.

In order for a medication to be considered as prescribed by its generic name, we used the Brazilian Common Denomination (DCB) and, in cases of omission, the International Nonproprietary Name (INN), according to the legislation in force at the time of the study.[12]

To implement the legibility criterion of the prescription, we used the classification suggested by Rosa et al.,[13] establishing that each word should be examined and evaluated separately, trying to avoid interpretation or inference. Therefore, we agreed that the prescription should be understood and not interpreted, being classified in terms of legibility:

- Legible: defined as a prescription that can be easily and quickly read. In this classification, there should not be doubts about the meaning of all words, numbers, symbols, and abbreviations;
- Barely legible: a prescription that requires longer time to understand the prescription, with doubts about the fact that all words, numbers, symbols, and abbreviations were correctly understood. In this type of classification there is often a partial understanding of what is written when there is doubts about 75% of the items including drugs;
- Illegible: prescriptions that, regardless of the time spent trying to read them, cannot be understood. Analyzing the body of the prescription, it will be considered illegible if at least 50% of the text cannot be understood.

Prescriptions were assessed by two newly graduated pharmacists who had no professional experience working at commercial pharmacies. Prescriptions were jointly analyzed by these professionals. This procedure was necessary to ensure that the evaluation was free of prescription reading defects.

Those prescriptions classified as illegible were not evaluated regarding all criteria defined above because of lack of information accuracy.

The present study assessed writing prescribing errors according to the classification suggested by Dean et al.,[14] i.e., errors related to the elaboration process of the prescription instead of decision errors, which are related to knowledge about the drugs prescribed. However, any error could lead to problems and doubts regarding prescription filling and use of drugs and jeopardize the patient's entire therapeutic process.

The present study was approved by the Research Ethics Committee of Universidade Federal de Juiz de Fora, under the protocol no. 195/2009.

Results

We analyzed 800 prescriptions containing 1,156 medications and 1,253 different active ingredients. These prescriptions included 282 (35%) simple prescription forms, 289 (36%) controlled substance prescription forms (white), and 229 (29%) controlled substance prescription forms (blue). Of the 1,156 medications, 645 (56%) were included in simple prescription forms, 282 (24%) in the controlled substance prescription forms (white), and 229 (20%) in the controlled substance prescription forms (blue). Regarding the number of active principles, the data collected showed that 734 (59%) active ingredients were included in simple prescription forms, 290 (23%) in the controlled substance prescription forms (white), and 229 (18%) in the controlled substance prescription forms (blue).

After reviewing the prescriptions for legibility, 368 (32%) prescriptions were considered legible, 367 (32%) were barely legible, and 421 (36%) were illegible. Those prescriptions classified as legible did not require extra time to understand what was written; those prescriptions considered barely legible were allocated in this category because the text was partially understood; and the illegible prescriptions had only half of their text understood. The results described above are shown in Table 1.

Regarding the lack of information on the prescriptions, we analyzed data on medications, such as pharmaceutical form, concentration, dose, interval between the doses, total duration of treatment, and route of administration. The results of missing information on the prescriptions are shown in Table 2.

In addition to the analyses mentioned previously, we found that 136 (35%) drugs were prescribed using generic names and 253 (65%) using trade names in the simple prescription forms. In the controlled substance prescription form (white), 58 (29%) drugs were prescribed using generic names (active ingredient) and 141 (71%) using trade names. In the controlled substance prescription form (blue), 45 (31%) drugs were prescribed using generic names (active ingredient) and 102 (69%) using trade names. Considering the three types of forms, the final result in terms of use of generic or trade name was that 239 (33%) drugs were prescribed using generic names (active ingredient) and 496 (67%) using trade names. This assessment took into account 735 legible and barely legible drugs.

We also evaluated whether or not the drugs prescribed were included in the RENAME.[15] It is important to emphasize that 1,156 drugs were evaluated, however, to assess the inclusion in the RENAME,[15] we considered 1,156 (total) minus 421 (illegible), resulting in 735 legible and barely legible drugs containing 833 active ingredients. In the simple prescription forms, 244 (51.05%) active ingredients prescribed were included in the RENAME, in the white prescription form, 79 (38.16%) were in

Table 1 - Evaluation of the prescriptions collected according to the number of prescriptions, number of drugs per prescription, mean number of drugs per prescription, and medications considered illegible

Types of formss	Number of prescriptions		Total number of drugs in the prescriptions		Mea number of drugs per prescription	Illegible drugs	
Simple form	289	36%	645	56%	2.2	256	40%
Controlled substance prescription form (white)	282	35%	282	24%	1	83	29%
Controlled substance prescription form (blue)	229	29%	229	20%	1	82	36%
TOTAL	800		1,156			421	34%

Table 2 - Evaluation of lack of information on prescriptions. The results are described according to the number and percentage of missing information regarding the drugs (1,156) contained in the prescriptions

Information	Simple form		Controlled substance prescription form (white)		Controlled substance prescription form (blue)		TOTA	
Pharmaceutical form	393	61%	185	66%	165	72%	743	64%
Concentration	401	62%	53	19%	89	39%	543	47%
Dose	87	13%	59	21%	108	47%	254	22%
Interval between doses	317	49%	205	73%	208	91%	730	63%
Treatment duration	254	39%	47	17%	45	20%	346	30%
Route of administration	503	78%	239	85%	229	100%	971	84%

the RENAME, and in the blue prescription form, 64 (43.54%) were part of the list. Considering the total number of prescription forms, 387 (46.5%) active ingredients prescribed were included in the RENAME.

We also evaluated the body system to which the drug was intended and concluded that, in the simple prescription forms, five (1.3%) drugs were indicated to treat the central nervous system, 11 (2.8%) to the digestive system, 0 (0%) to the renal system, one (0.3%) to the reproductive system, 130 (33.4%) were prescribed to treat pain and inflammation, 14 (3.6%) to the cardiovascular system, 86 (22.1%) were anti-infective drugs, and 142 (36.5%) were related to other systems. This aspect was only evaluated in the simple prescription forms because in the other types there was an absolute prevalence of drugs prescribed to treat the central nervous system.

Discussion

A drug prescription is a medical instruction to the pharmacist with the purpose of offering the patient his/her drug therapy. Missing information on prescriptions can interfere with the communication between health professionals, impairing it and leading to medication errors. Incomplete prescriptions hinder the efficiency of the drug dispensing process, putting the quality of patients' pharmaceutical care at risk.

Winterstein et al.[16] showed that 72% of medication errors were initiated during the prescription, followed by administration (15%), dispensing (7%), and transcription (6%).

In Brazil, little is known about this topic. A few articles have been published on some specific aspects of the problem and there is no public or private institution directly involved with this matter.[13]

According Cassiani et al.,[17] some articles have shown the presence of deletions in the prescriptions (18%), drugs banned (17%), and lack of information, drug form, time (9%), and route of administration (82%).

The results of the present study were compared with those described in the literature in order to demonstrate the magnitude of these results in relation to the actual situation in other settings.

As for the mean number of drugs per prescription, which aims to assess the degree of polymedication, the value found in our study was 2.2 in the simple prescription forms, which is consistent with the results reported by Aldrigue et al.,[8] with a value of 1.9. In studies conducted at other health care facilities, the results are similar to those found by Cunha et al.[18] (2.3); Lopes et al.[6] (2.2), and Pepe[19] (2.16). However, the WHO[10] recommends a mean of two medications per prescription, showing that the value found in the present study is slightly above this recommendation. Even so, it demonstrated the rationality of the prescribers in the prescriptions assessed regarding the excessive indication of drugs, protecting the population from possible interactions and adverse reactions that can occur when there is concomitant use of several medications. However, we cannot state that the patients use only the prescribed drugs; therefore, it is important to emphasize the rationality of the prescription and the consequences of prescribers' attitude with regard to the safety of users.

Prescriptions using the generic name of the drug occurred in 33% of drugs prescribed in the present study, a value far below that observed by PAHO[9] (84.2%) but similar to those found in studies by Carneiro et al.[20] (33.9%) and Santos & Nitrini[21] (30.6%). These results are a reason of concern because the use of trade names is influenced by marketing campaigns and great pressure from the pharmaceutical industry on the prescribers. In addition, because of international criteria in the rational use of medications, generic names should be the most frequently used.

The WHO[10] recommends that 10% of the prescriptions are based on the list of essential medicines. In the present study, 46.5% of drugs prescribed were included in the RENAME.[15] This finding demonstrates the prescribers' little concern over the use of official lists. We did not expect a result of 100% because the drugs were not consumed within the SUS context; however, less than half of them were not included in the RENAME, which exists as a response to the needs of the pharmaceutical and health sector to improve access, equity and quality, as well as efficiency of health systems by reducing unnecessary costs. The use of drugs not included in the official lists is expected in cases of therapeutic failure, unavailability, special needs of the patient, among others, but the numbers in the municipality investigated are very low when compared to other studies in Brazil.[19,21] Essential medicines are considered basic and extremely important to treat most of the health problems of the population.

However, essential medicines must be accompanied by quality pharmaceutical services, because, based on the difficulty in understanding the prescribed therapy, patients go through early returns for medical visits, performance of further tests, worsening of clinical pictures, and possible sequelae.[14] In this context, the legibility of the prescriptions is a key factor to ensure proper understanding and compliance with the therapy.

Of the 389 legible drugs in the simple prescription forms, 22.1% were antibiotics, a percentage close to that considered ideal by the WHO, which is 20.0% or less.[10] The value found is similar to that demonstrated by Aldrigue et al.[8] in a community pharmacy (17.4). Studies conducted at other health facilities showed the following results: Santos & Nitrini[22] (13/21.3%), Colombo et al.[23] (7/12.5%), Naves & Silver[21](14/26.4%), Carneiro et al.[20] (31,3)%.

The overuse of antibiotics creates unnecessary expenses with hospitalization of patients with adverse drug reactions (ADRs) and hypersensitivity reactions, and overuse as well as unnecessary use lead to the development of multiresistant bacteria and may complicate treatment of future infections, causing worsening of the disease.[9]

The results regarding illegibility of drug information on the prescriptions showed that most of them were barely legible (32%) and illegible (36%), and only 32% were legible. These results are lower than those found in the study by Rosa,[13] in which

Table 3 - Percentage of missing information in the prescriptions analyzed in the present study compared with data from other studies

Missing information	Present study	Rosa[13]	Aldrigue[8]
Pharmaceutical form	64%	84%	0.5%
Concentration	47%	62%	20%
Dose	22%	17%	0.5%
Interval between doses	63%	12%	1%
Treatment duration	30%	Not assessed	55%
Route of administration	84%	13%	Not assessed

53.3% were legible, 24.5% were barely legible, and 22.2% were illegible.

Regarding the Brazilian legislation on the subject, the article 35 of Law No. 5.991/73[24] states that "only the prescription that is written in ink, in the vernacular language, in words, and in a legible manner, complying with the terminology and current measurement system will be dispensed" and the Code of Medical Ethics states that "physicians should not provide a prescription or medical certificate that is illegible." It does not matter how accurate or complete a prescription is if it cannot be read. Therefore, legibility affects communication and can stop or alter the patient's health care process, causing harmful consequences to the patient. Undoubtedly, illegible handwriting is recognized as a cause of medication errors.

Lack of information on the prescription complicates the patient's treatment and can put his/her life at risk. Nevertheless, missing information on prescriptions is relatively frequent. This study identified the absence of several key information on prescriptions, with some percentages higher than those found in the studies by Rosa[13] and Aldrigue,[8] such as lack of information on dose, interval between the doses, total duration of treatment, and route of administration. Results are showed in Table 3 in comparison with other studies previously described.

During drug dispensing, especially regarding antibiotics, it is of paramount importance to have adequate information on the drug prescribed, such as: correct use, especially by means of compliance with dosages and intervals between doses and duration of treatment.

Regarding the assessment of prescriptions, we found that the legal procedures related to the prescriptions are not adequately met, requiring the implementation of strategies to enhance the benefit of a correct prescription. Lack of adequate information complicates the patient's treatment and can put his/her life at risk.

The analysis of the drug prescriptions in the present study demonstrates that such prescriptions show low quality with regard to legibility, names, most of the drugs being prescribed using the trade name, inclusion in the RENAME, and presence of essential information. Our findings suggest that measures should be taken to raise the prescribers' awareness about the importance of providing clear, accurate, and complete prescriptions to ensure safe use of medicines and, as a consequence, quality of health and pharmaceutical care.

The present study was conducted during only three months; however, as mentioned before, the WHO considers that for these purposes a sample collected at a given time shows basically the same results as another sample involving a longer time period.[10] Regarding the number of pharmacies investigated, we believe that the four pharmacies evaluated can represent the reality of the municipality because there is not a monopoly, i.e., large drugstore chains, but small pharmacies spread in the municipality. Furthermore, the four pharmacies selected are located in the major districts of the municipality and cover a large area.

Conclusion

The prescriptions assessed in the present study do not provide all information necessary for a correct and safe use of medications; most of them are not legible, contain a high percentage of trade names, which are rarely included in the RENAME, and many of them are antibiotics. These indicators are in line with or below other national studies, being always below the standards set by the WHO.

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References

1. Hepler CD, Segal R. Preventing medication errors and improving drug therapy outcomes: a management systems approach. Boca Raton (FL): CRC Press; 2003.
2. Aspden P, Wolcott J, Bootman JL, Cronenwett LR, Committee on Identifying and Preventing Medication Errors. Preventing medication errors. Quality Chasm Series (Hardcover). Washington (DC): National Academies Press; 2007.
3. Barber N, Rawlins M, Dean Franklin B. Reducing prescribing error: competence, control, and culture. Qual Saf Health Care. 2003;12(Suppl 1):i29-32.
4. Organização Pan-Americana de Saúde (OPAS). Rapid pharmaceutical management assessment: an indicator-based approach. Washignton (DC): PAHO; 1995.
5. Ministério da Saúde. Portaria GM 3916 de 30 de outubro de 1998. Aprova a política nacional de medicamentos. Brasília (DF): Diário Oficial da União: 10 nov 1998. Seção 1, p.18-22.
6. Lopes AEC, Teixeira ACA, Gurgel MLF, Miranda MCC. Drug use of evaluation in health services in Fortaleza, Brasil. INRUD News. 1996;6:17. [cited 2010 ago]. Available from: http://www.inrud.org/documents/upload/INRUD-News-v6i1-February-1996.pdf.
7. Organização Mundial da Saúde (OMS). Guia para a boa prescrição médica. Porto Alegre: Artmed; 1998.
8. Aldrigue RFT, Correr CJ, Melchiors AC, Pontarolo R. Análise da completude de prescrições médicas dispensadas em uma farmácia comunitária de Fazenda Rio Grande - Paraná (Brasil). Acta Farm Bonaer. 2006; 25(3):454-9.
9. Organização Pan-Americana de Saúde (OPAS). Avaliação da assistência farmacêutica no Brasil. Brasília (DF): Organização Pan-Americana da Saúde, Ministério da Saúde; 2005.
10. Organização Mundial da Saúde (OMS). Como investigar el uso de medicamentos en los servicios de salud. Indicadores seleccionados del uso de medicamentos. Ginebra; 1993.
11. Instituto Brasileiro de Geografia e Estatística. IBGE Cidades. Disponível em: http://www.ibge.gov.br/cidadesat/.
12. Ministério da Saúde. Portaria n. 1179 de 17 junho de 1996. Aprova as denominações comuns brasileiras, DCB.
13. Rosa MB, Neiva HM, Anacleto TA, Mendes DP, Freitas FO, Lage JB, Perini E. Legibilidade de prescrições médicas com medicamentos potencialmente

perigosos em um hospital de Belo Horizonte, MG. Rev. BRAFH 2003; (2):22-8.
14. Dean B, Barber N, Schachter V. What is prescribing error? Qual Health Care. 2000;9(4):232-7.
15. Ministério da Saúde. Relação Nacional de Medicamentos Essenciais (RENAME). Brasília (DF); 2006.
16. Winterstein AG, Thomas E, Rosenberg EI, Hatton RC, Gonzalez RR, Kanjanarat P. Nature and causes of clinically significant medication errors in a tertiary care hospital. Am J Health Syst Pharm. 2004;61(18):1908-16.
17. Cassiani SHB, Freire CC, Gimenes FRE. Computerized physician order entry in a university hospital: writing failure and user´s opinios. Rev Esc Enferm USP 2003;37(4):51-60.
18. Cunha MCN, Zorzatto JR, Castro LLC. Avaliação do uso de medicamentos na rede pública municipal de saúde de Campo Grande, MS. Rev Bras Ciênc Farm. 2002;38:217-27.
19. Pepe VLE. Estudo sobre a prescrição de medicamentos em uma unidade de atenção primária [dissertação]. Rio de Janeiro: Instituto de Medicina Social da UERJ; 1994.
20. Carneiro RM, Marques MCP, Simões MJS. Estudo das prescrições de medicamentos em crianças de 0 a 2 anos atendidas no serviço municipal de saúde de Américo Brasiliense-SP, 1999. Rev Ciênc Farm. 2000; 21:229-48.
21. Naves JOS, Silver LD. Evaluation of pharmaceutical assistance public primary care in Brasília, Brazil. Rev Saude Publica 2005;39:223-30.
22. Santos V, Nitrini SMOO. Indicadores do uso de medicamentos prescritos e de assistência ao paciente de serviços de saúde. Rev Saude Publica. 2004;38:819-26.
23. Colombo D, Helena ETS, Agostinho ACMG, Didjurgett JSMA. Padrão de prescrição de medicamentos nas Unidades de Programa Saúde da Família de Blumenau. Rev Bras Ciênc Farm. 2004;40:.
24. Brasil. Lei 5.991, de 17 de dezembro de 1973. Dispõe sobre o controle sanitário do comércio de drogas, medicamentos, insumos farmacêuticos e correlatos, e dá outras providências. Diário Oficial da República Federativa do Brasil, Brasíla (DF), 19 de dezembro de 1973.

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