Analysis of medical prescriptions dispensed at health centers in Belo Horizonte, Minas Gerais, Brazil

Avaliação de prescrições médicas aviadas em centros de saúde em Belo Horizonte, Minas Gerais, Brasil

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Abstract

This article focuses on medical prescriptions dispensed at health centers under the Municipal Health Department in Belo Horizonte, Minas Gerais State, Brazil. The study analyzed 4,607 prescriptions from March to April 1999, grouped according to origin (internal or external). The analysis focused on information written on medical prescriptions. The main findings were: (a) an average of 2.4 drugs per prescription in both groups; (b) prescriptions filled out with 4 or more drugs accounted for 18.0% of internal and 17.6% of external prescriptions; (c) 84.3% of internal and 85.5% of external prescriptions provided no instructions for use of medication; (d) information on dosage regimen varied from 51.2% to 97.6% for internal and 57.9% to 96.5% for external prescriptions; (e) generic names were specified for 51.9% and 28.4% of all drugs on internal and external prescriptions, respectively; (f) prescriptions containing standard drugs from the Municipal Health Department accounted for 88.7% of internal and 76.4% of external prescriptions. Data analysis shows the need for continuing education of physicians and adoption of other methods to improve quality of prescriptions and promote rational use of drugs.

Drug Prescriptions; Service Evaluation; Health Services

Introduction

Drug therapies are the most common treatment in medical practice [1]. Drugs play an essential role in medical care and are used in virtually all medical specialties and for numerous health conditions [2]. Medical prescriptions are thus important documents; they are instructions provided by prescribers to dispensers and patients. Prescriptions summarize the physician's attitudes and expectations for the course of disease and the role drugs are expected to play in treatment [2]. Compliance with standards for rational prescription is thus a central part of health care. As a general policy for rational prescription, the World Health Organization (WHO) [3] recommends establishing national standards focusing on quality of prescription data; evaluating data on drug use in medical and pharmaceutical practices and reporting such information through a formal network; and educational programs for health care professionals. Drug use measurements have been applied as indicators of quality of prescriber behavior and to accredit health care organizations by assessing optimal drug use [4]. Analysis of prescription data could provide the basis for reviewing prescription practices and developing measures to promote the rational use of drugs and prevent drug-related problems [5]. According to the WHO [6], the rational use of drugs requires that patients receive medications ap-

propriate to their clinical needs, in doses that meet their own individual requirements, for an adequate period of time, and at the lowest cost to them and their community.

Studies on prescription are included among Drug Utilization Studies (DUS), which enable identification and analysis of problems related to drug use and their causes and consequences, establishing a more rational basis for solutions and assessment of subsequent actions [7]. Studies on prescription can be designed to achieve several objectives: to describe current treatment practices; to compare prescription procedures among similar institutions; to regularly monitor and supervise the procedures during the prescription and use of drugs; and to assess the results of an intervention designed to change the prescribing process [8].

Most studies on drug therapy and drug prescribing have been conducted in primary health care settings in developing countries and have shown that practitioners tend to prescribe too many drugs and ones that are too frequently ineffective [9]. Most countries often have to rationalize the use of medications and develop strategies to improve compliance and promote primary prevention [10]. According to Castro et al. [11], there has been a growing number of DUS in Brazil, addressing relevant public health aspects and providing useful knowledge to change the observed reality. The authors highlight some studies that address quality of medical prescription in Brazil, namely studies on the quality of outpatient prescription of benzodiazepines and nonsteroidal anti-inflammatory drugs in adults [12]; assessment of quality of medical prescription and drug use profiles in the hospital environment [13]; perception of prescription-related problems by pharmacy school undergraduate students [14]; and evaluation of factors influencing prescription of medicines for diarrhea in children [15].

In Belo Horizonte, Dutra et al. [16] analyzed aspects of outpatient prescription and dispensing of diazepam, and Castilho et al. [17] studied the prescription pattern of systemically used antimicrobial and analgesic/anti-inflammatory drugs in dental practice.

Given that prescription analysis provides some of the most accurate indicators of medical knowledge and quality of health services [18], and considering organizational conditions, this paper aims to analyze drug prescriptions filled at health center dispensaries under the Municipal Health Department in Belo Horizonte.

Recently, there has been a significant increase in the consumption of medicines through Municipal Health Department health centers. Although the budget of this Department for purchase of medicines has increased since 1996, it has not been sufficient to fully supply the system's demands. In addition, the lack of criteria and suitable instruments to control the flow of medicines in health centers makes monitoring of consumption impossible. It thus became evident that standardized procedures among health departments were necessary to ensure access by the population to medicines in a rational and organized fashion. In 1998, the Municipal Health Department issued an administrative ruling for this purpose and recommended that prescriptions be filled out in duplicate. One copy of the prescription was kept in the service as evidence of dispensation. Apart from the administrative aspect, this process facilitated drug surveillance and drug use studies. A previous study conducted at health centers under the Municipal Health Department had already indicated some prescribing problems related to dosage and duration of treatment with diazepam [16]. The present study attempted to expand the knowledge on quality of medical prescriptions in these services, aimed at establishing information and educational measures to help optimize treatment.

Material and methods

Belo Horizonte is the third largest city in Brazil, with approximately 2.2 million inhabitants. It is divided into nine political and administrative areas. There is a health department in each administrative area to manage its own health services. The technical coordination of health departments is centralized in the Municipal Health Department of Belo Horizonte, Minas Gerais, Brazil.

The Municipal Health Department includes 126 health centers with similar characteristics. This study was carried out in a sample of 63 randomly selected centers. Field work was done from March 1 to April 15, 1999, and each service was investigated for one week. All prescriptions containing at least one of the eight selected drugs (medroxyprogesterone acetate, amitriptyline, carbamazepine, glibenclamide, haloperidol, insulin, methyldopa, and nifedipine) and dispensed at these services during this period were collected and included in the

study. These drugs were selected due to their increased consumption in previous years and to institutional interest in pharmacotherapeutic aspects of their use, such as inappropriate selection of medicines, inadequate dosage schedule, and duration of treatment, excessive number of drugs per prescription leading to increased risk of drug interactions and adverse reactions, and lack of recommendations for use. These pharmacotherapeutic issues are the object of other specific studies and will not be addressed in this article. The present study will focus on features related to quality of these prescriptions in the sample.

Two groups of prescriptions were established by origin. One group consisted of internal prescriptions from the Municipal Health Department health centers, filled out in the Service form. The other group consisted of prescriptions filled out by physicians from other public health centers, private centers, and charitable services.

After a training program, data were gathered using a previously tested standardized form. An instruction manual was prepared to guide the data collection process. Eight pharmacists were responsible for the data collection. Data were gathered in copies of prescriptions filed during the dispensing process at each health center during the study period.

Legal and general aspects of prescriptions were taken into account, in accordance with Brazilian legislation [19] and WHO recommendations [20]. The following indicators were used in this study to assess quality of prescriptions: (a) average number of drugs per consultation, indicating the degree of polypharmacy (or concurrent administration of numerous medicines for treatment of the same disease); (b) average number of drugs prescribed by generic name, identifying the trend towards use of these terms; (c) percentage of drugs prescribed in compliance with a list of essential drugs or formulary; (d) patient record and prescriber identification; (e) number of drugs prescribed and dispensed; (f) recording of administration route; (g) recording of pharmaceutical form; (h) recording of dosage and frequency; (i) recording of duration of treatment and; (j) recording of important recommendations for each drug.

The following criteria were established for data collection and analysis:

- The variable *Date* was considered present if month, day, and year were recorded;
- As to dosage regimen, the following were considered: (a) *Administration route* was present when the following expressions were recorded: oral, sublingual, intravenous, intramuscular, rectal, vaginal, subcutaneous, intradermal, or topical administration. The abbreviation P.O. and expressions similar to "internal use" were not admitted as proper recording of the administration route; (b) *Pharmaceutical form* was considered present when the following terms were legibly written – tablets, capsules, coated tablet, solution, syrup, elixir, emulsion, suspension, ointment, cream, paste, vaginal tablets, gel, jelly – and/or the appropriate abbreviations used. The abbreviation *comp.* for *comprimidos* (tablets) was allowed. However *cp* or *cps* were not allowed because they do not permit differentiation between *comprimidos* and *cápsulas* (capsules); (c) *Duration of treatment* – expressions such as "continuous use" or "used as directed" were not allowed, because they potentially induce patients to believe they can use the prescription for an indefinite period, with no medical follow-up or adequate control; and (d) illegible information was classified as absent.
- Fixed-dose combinations were considered as one single drug;
- *Generic name*: Brazilian Common Names enacted by an administrative ruling were used as the reference. Although not included in this list, NPH insulin and nifedipine were allowed because of their widespread usage;
- *Selected drug*: the List of Selected Drugs adopted by the Municipal Health Department was used as the reference. This list included 192 drugs, of which 67.2% were included in the National List of Essential Drugs (RENAME);
- Three categories were established to summarize the results related to the drugs prescribed: *all drugs* – all drugs prescribed presented the characteristic studied; *some drugs* – at least one of the drugs prescribed presented the characteristic studied; *no drugs* – none of the drugs prescribed presented the characteristic studied.

EpiInfo version 6.04 was used to analyze the percentage differences between internal and external prescriptions. Chi-square test was conducted with a p value of 0.05.

Results

This study included 2,207 internal and 2,400 external prescriptions. The majority (70.9%) of external prescriptions were from private health services.

As for prescriber data and legibility of prescription, more than 90% of the prescriptions contained the information required by law: *Signature, Legible name, Regional Medical Board Registration Number*, and *Date*. The results were similar for internal and external prescrip-

tions (Table 1). Most drugs were legibly prescribed in both groups (internal = 97.3%; external = 98.3%).

Table 2 shows the percentage of dosage regimen recorded in the prescriptions. More than 95% of both internal and external prescriptions showed *Dosage* and *Frequency* for all drugs prescribed. *Dosage, Frequency*, and *Duration of treatment* were specified more frequently in internal prescriptions. On the other hand, *Administration route, Pharmaceutical form*, and *Units of measure* were specified more regularly in external prescriptions. *Duration of treatment* was considerably more frequent on internal prescriptions (75.1%) as compared to external prescriptions (58.6%). This could be related to public health service guidelines that require recording this information. A certain percentage in both groups of prescriptions failed to specify the *Pharmaceutical form* (in 30.9% of internal prescriptions and 29.8% of external prescriptions). Similar results were found for *Units of measure* (28.1% of internal and 20.3% of external prescriptions).

Table 3 shows the recording of prescribed quantity. Prescriptions showing quantities prescribed for all drugs corresponded to 69.7% of internal and 57.8% of external prescriptions. There was no information on quantity in 19.3% of internal and 32.6% of external prescriptions ($\chi^2_{2gl} = 106.17$ and $p = 0.000$).

Table 4 shows the total number of drugs per prescription. Most prescriptions (72%) in both groups included up to three drugs. Prescriptions with only one drug were more frequent in the external group, demonstrating a statistically significant difference ($\chi^2_{3gl} = 10.37$ and $p = 0.016$). The mean number of drugs per prescription was 2.4 in both groups.

Table 5 displays the use of generic names in prescriptions. Internal prescriptions contained the generic name more often (51.9%) than external prescriptions (28.4%) ($\chi^2_{2gl} = 347.18$ and $p = 0.000$). External prescriptions with no generic name were approximately twice as frequent as for internal prescriptions.

Focusing on prescription of selected drugs, we observed that all the drugs prescribed were included in the Municipal Health Department's List of Selected Drugs in 88.7% of the internal and 76.4% of the external prescriptions (Table 6). There was a statistically significant difference between the two groups ($\chi^2_{2gl} = 118.30$ and $p = 0.000$). However, only 49.8% of internal and 47.9% of external prescriptions were fully dispensed.

Very few prescriptions met all the selected recommendations for drug use (Table 7). Some

Table 1

Presence of prescriber data and date, by origin of prescription. Belo Horizonte, Minas Gerais, Brazil, 1999.

Variable	Prescription (%)	
	Internal (n = 2,207)	External (n = 2,400)
Signature	98.6	98.8
Legible name	93.2	94.7
Physician registration number	93.6	94.3
Date	95.3	94.4

Table 2

Record of dosage regimen for drugs prescribed by origin of prescription. Belo Horizonte, Minas Gerais, Brazil, 1999.

Variables	Prescription*	
	Internal	External
Administration route	(n = 2,206)	(n = 2,400)
All drugs (%)	74.8	79.4
Some drugs (%)	2.4	2.0
No drugs (%)	22.8	18.6
Pharmaceutical form	(n = 2,195)	(n = 2,396)
All drugs (%)	61.0	64.0
Some drugs (%)	8.1	6.2
No drugs (%)	30.9	29.8
Formulation: number	(n = 2,207)	(n = 2,400)
All drugs (%)	75.2	72.9
Some drugs (%)	20.2	21.5
No drugs (%)	4.6	5.6
Formulation: units of measure	(n = 2,207)	(n = 2,399)
All drugs (%)	51.2	57.9
Some drugs (%)	20.7	21.8
No drugs (%)	28.1	20.3
Dosage	(n = 2,199)	(n = 2,398)
All drugs (%)	97.3	96.5
Some drugs (%)	1.3	0.9
No drugs (%)	1.4	2.6
Frequency	(n = 2,204)	(n = 2,397)
All drugs (%)	97.6	95.2
Some drugs (%)	1.0	2.0
No drugs (%)	1.4	2.8
Duration of treatment	(n = 2,203)	(n = 2,395)
All drugs (%)	75.1	58.6
Some drugs (%)	7.4	8.0
No drugs (%)	17.5	33.4

* absolute numbers (in parentheses) vary due to exclusion of prescriptions with unavailable information

Table 3

Prescriptions with specification of quantity of drug prescribed, by origin of prescription. Belo Horizonte, Minas Gerais, Brazil, 1999.

	Prescription (%)		χ^2_{2gl}	p*
	Internal (n = 2,207)	External (n = 2,400)		
All drugs	69.7	57.8	106.17	0.000
Some drugs	11.0	9.5		
No drugs	19.3	32.7		

* statistically significant

Table 4

Total number of drugs per prescription* by origin of prescription. Belo Horizonte, Minas Gerais, Brazil, 1999.

Number of drugs	Prescription (%)		χ^2_{3gl}	p*
	Internal (n = 2,207)	External (n = 2,400)		
One	27.5	31.5	10.37	0.016
Two	29.9	29.0		
Three	24.6	21.8		
Four to Nine	18.0	17.6		

* mean number of drugs per prescription = 2.4 (for both groups)
** statistically significant

Table 5

Drugs prescribed by generic name, by origin of prescription. Belo Horizonte, Minas Gerais, Brazil, 1999.

	Prescription (%)		χ^2_{2gl}	p*
	Internal (n = 2,207)	External (n = 2,400)		
All drugs	51.9	28.4	347.18	0.000
Some drugs	28.3	29.0		
No drugs	19.8	42.6		

* statistically significant

84.3% of internal and 85.5% of external prescriptions had no recommendations for use.

Discussion

The results of this study allowed for an assessment of prescription orders dispensed at Municipal Health Department centers in Belo Horizonte. Guidelines and recommendations provided in both the literature and the pertinent legislation were not properly complied with, which could lead to errors in both dispensation and drug use. By and large, the indicators demonstrated more favorable results in internal prescriptions. However, some problems related to quality were observed in both types of prescriptions.

Completeness of *prescriber data* and *date* information were high in both groups, although insufficient considering the Municipal Health Department guidelines, which forbid dispensing drugs with prescriptions that do not contain these data. Incomplete prescriptions indicate problems in linkage between prescription and dispensation in the services. Moreover, these data are required by law and can be used if further contact with the prescriber is needed for clarification [21]. Likewise, illegible prescriptions are still found, although they are obviously incompatible with both proper dispensation and usage. Legible prescribing is a legal responsibility and is fundamental for avoiding errors in dispensation and drug use.

Considering dosage regimen, data concerning *administration route, pharmaceutical form, units of measure,* and *duration of treatment* were absent from numerous prescriptions in both groups. These data are essential for prescriptions to provide key information about treatment, fostering suitable dispensation and increased treatment compliance. The results clearly demonstrate that an educational intervention is needed to raise the awareness of prescribers concerning the importance of recording this information [22,23].

The average number of drugs per prescription is used as an indicator to determine the level of polypharmacy. The use of multiple drugs to treat the same condition is extremely common and has been associated with adverse reactions, medication errors, and increased risk of hospitalization [24]. This study demonstrated an average of 2.4 drugs per prescription, an intermediate result in comparison to other studies carried out in Brazil (ranging from 1.8 to 3.0 drugs per prescription) [25,26] as well as in other

countries, ranging from 1.4 to 2.8 [22,23]. Considering that the more the drugs prescribed, the more likely the drug interactions, and that a maximum of three drugs is recommended, the average number shown in this study can be considered satisfactory.

The use of *generic names* was relatively low and was observed more often in internal prescriptions (that is, prescriptions originating inside the Municipal health centers). Another study in Brazil [25] reported the recording of generic names on prescriptions in 32.7% to 81.0% of cases. Use of generic names is recommended by the WHO and regarded as an important factor for promoting rational use of drugs. Furthermore, the use of generic names contributes to cost reduction and provides more alternatives for drug purchases. The use and advantages of generic names have been widely discussed in several studies [3,20,25]. Although the present study shows a greater trend towards use of generic names in internal prescriptions, the results are still not satisfactory, since according to Brazilian law, all prescriptions filled out at Unified Health System (SUS) units should contain the generic name. The inconsistent use of generic names could be explained by the fact that prescription using the brand name is highly influenced by marketing strategies developed by the pharmaceutical industry and targeted at physicians. Such strategies focus more aggressively on the private sector; however, many Brazilian physicians work in both public health services and in private practice and are therefore prone to such influence.

Both groups displayed a high percentage of prescriptions containing only drugs included on the Municipal Health Department's List of Selected Drugs. Another study in Brazil [26] reported prescription of selected drugs ranging from 44.8% to 89.5%. The results observed in this study may indicate that the Municipal Drug List meets the needs of the population or that physicians choose the selected drugs due to their availability at Municipal Health Department units. Although 82.6% of the prescriptions analyzed presented only drugs included on the Municipal Drug List, we observed that only 48.3% of them were completely dispensed. This result may be associated with the irregular supply experienced by the service during the early months of 1999. This situation demonstrates the need to implement mechanisms to ensure regular inventory and distribution of selected drugs to municipal services in order to avoid constrained demand.

The high percentage of lack of information on *recommendations for use* in prescriptions is also a worrisome factor in both groups. Instructions for use are an essential part of prescriptions and should be written in legible, objective, and accurate fashion [21]. Such information can influence treatment compliance and should be written on the prescription and explained verbally during the appointment. The main objective of these recommendations is to ensure safe use of medication and therefore fewer complications and adverse events.

This study has some limitations: it was restricted to health care services under the Municipal Health Department of Belo Horizonte, included only eight products from the Municipal Drug List, and did not assess pharmacotherapeutic aspects of prescription. Nevertheless, identifying some features of prescriptions dispensed at health center pharmacies under the Municipal Health Department highlighted the need to implement actions for better quality provision. Thus, such characteristics could be useful for orienting measures aimed at the rational use of drugs in municipal services and evaluation of future interventions.

The process of properly selecting and prescribing drugs for each individual patient has

Table 6

Selected drugs prescribed by origin of prescription. Belo Horizonte, Minas Gerais, Brazil, 1999.

	Prescription (%)		χ^2_{2gl}	p*
	Internal (n = 2,207)	External (n = 2,400)		
All drugs	88.7	76.4	118.30	0.000
Some drugs	11.1	23.2		
No drugs	0.2	0.4		

* statistically significant

Table 7

Recommendations for usage, by origin of prescription. Belo Horizonte, Minas Gerais, Brazil, 1999.

	Prescription (%)		χ^2_{2gl}	p*
	Internal (n = 2,207)	External (n = 2,400)		
All drugs	2.3	0.8	17.74	0.000
Some drugs	13.4	13.7		
No drugs	84.3	85.5		

* statistically significant

become increasingly complex, aiming at quality improvement and cost reduction. Pharmacists have been encouraged to collaborate with physicians to make the prescription process more efficient, cost-effective, and safe [27]. Thus, the adoption of educational strategies for the prescription and rational use of drugs, geared at health care professionals (especially prescribers) and patients, could be of great help for improving drug use. In the medium term, and considering a broader context, the educational actions related to rational treatment should be emphasized in undergraduate courses preparing future prescribers.

In health services, raising the awareness of prescribers concerning their fundamental role in promoting the rational use of drugs, as well as in developing continuing education programs for health care professionals and monitoring, are actions that may result in greatly improved prescription practices and quality of drug use.

In conclusion, the rational use of drugs depends on the political will of public authorities, teaching institutions, consumer groups, and health care professional councils. The National Drug Policy recently enacted in Brazil addresses many of the issues discussed above, including consolidation of the use of generic drugs, emphasis on user education, adjustment of undergraduate course content for health care professionals, training of prescribers and dispensers, regulation of drug advertising based on ethical guidelines, and implementation of pharmacoepidemiology measures in the Unified Health System, including studies on drug use, evaluation of medical prescription, post-marketing surveillance, etc. Preparing a National Drug List is another essential task. The List is currently being prepared under an agreement between the Ministry of Health and the National School of Public Health, Oswaldo Cruz Foundation. Effective implementation of this policy will be a major step towards rational use of drugs in the country.

Resumo

Este trabalho avalia prescrições médicas aviadas em farmácias de unidades de saúde da Secretaria Municipal de Saúde de Belo Horizonte (SMS-BH), Brasil. Foram analisadas 4.607 prescrições, no período de março a abril de 1999, agrupadas segundo sua origem. A análise enfocou informações que deveriam constar em uma prescrição médica. Os principais resultados encontrados foram: (a) número médio de 2,4 medicamentos/prescrição para os dois grupos; (b) prescrição de quatro ou mais medicamentos em 18,0% das prescrições internas e 17,6% das externas; (c) ausência de recomendações de uso em 84,3% das prescrições internas e 85,5% nas externas; (d) presença de dados posológicos variando de 51,2% a 97,6% nas prescrições internas e de 57,9% a 96,5% nas externas; (e) utilização do nome genérico para todos os medicamentos em 51,9% nas prescrições internas e 28,4% nas externas e (f) prescrição com todos os medicamentos padronizados pela SMS-BH em 88,7% das internas e 76,4% das externas. A análise dos dados demonstra necessidade de educação continuada dos prescritores e adoção de outras medidas para melhoria da qualidade de prescrições, na perspectiva de promover o uso racional de medicamentos.

Prescrição de Medicamentos; Avaliação de Serviços; Serviços de Saúde

Contributors

F. Acurcio, E. Perini, and S. M. S. Magalhães contributed to the study design, data analysis and interpretation, text, critical review, and approval of the final version of the article. L. G. Vieira Terceiro, J. M. Vieira Filho, K. E. O. M. Coutinho, K. V. Caldeira, L. H. P. Cabral, M. C. F. Santos, P. M. Abrantes, S. A. Vale, and M. C. Souza participated in the data collection, analysis, and interpretation, text, and approval of the final version of the article.

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