Prescription and patient-care indicators in healthcare services

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Abstract

Objective
To describe the therapeutic practice of allopathic physicians and to evaluate the outpatient care provided to patients in healthcare facilities.

Methods
The study was conducted in Ribeirão Preto, southeastern Brazil. World Health Organization drug use indicators were used as a methodological basis. Our sample comprised 10 healthcare facilities, with 6,692 prescriptions written by clinicians and pediatricians for the analysis of prescription indicators and 30 patients of each facility for the analysis of patient care indicators. The number of facilities varied according to each indicator. We used statistical tests for the comparison of proportions.

Results
The mean number of drugs per prescription was 2.2, which is compatible with data from the literature. The generic name of the medication was used in 30.6% of prescriptions, a proportion considered as low. Antibiotics were prescribed in 21.3% of prescriptions, with greater percentage among pediatricians (28.9%). Injections were prescribed in 8.3% of prescriptions, with greater proportion among clinicians (13.1%). The drugs prescribed in 83.4% of prescriptions were part of the List of Standardized Drugs, indicating the acceptance of this list by healthcare professionals. Mean duration was 9.2 minutes for appointments and 18.4 seconds dispensation, both considered as insufficient for effective patient care. 60.3% of all drugs prescribed were supplied. 70.0% of patients interviewed had adequate knowledge of how to take the medication prescribed.

Conclusions
The care provided to patients is insufficient. Qualitative studies are necessary in order to evaluate the different factors involved and to plan future interventions.

INTRODUCTION

The synergy between the Nineteenth Century's biomedical-organicist vision and the Twentieth Century's technological innovations has had a range of consequences, which include an option for the part to the expense of the whole, the interposition of several factors in the physician-patient relationship, and the dehumanization of healthcare.

In this process, drugs assume a major role in healthcare, both in terms of system management policies and in the practice of the professionals involved, as well as in patients' emotional references.

A number of factors intertwine in the achievement of a rational use of medication – understood as a process encompassing the appropriate prescribing, availability and affordability, dispensation in adequate

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conditions, and consumption in the doses and periods indicated, as well as at defined time intervals, of efficacious, safe and high-quality medication.[11]

There is a large body of literature[1,2,14] on the range of factors acting upon the prescriber when deciding upon which therapeutic regime to adopt: his or her conceptions regarding the health-disease process; the quality of technical formation; the sociocultural and economic conditions of the population at hand; the availability of drugs in the facility; the sources of information to which the professional has had access; and the pressure of the pharmaceutical industry, among others.

Surveys conducted in different countries showed divergences that could not be explained by differences in patterns of morbidity and mortality, whereas other reports found variations in prescribing within a single country, often in response to identical clinical presentations.[9,14]

In order to discuss important aspects of the day-to-day practice of professionals, managers, and users of the healthcare system and to securely evaluate crucial aspects of pharmaceutical practice in the context of primary healthcare, the World Health Organization (WHO) has developed the selected drug use indicators.[7,13]

In the present study, we employ these prescribing indicators to describe the therapeutic practices of allopathic physicians, and evaluate patient care indicators.

METHODS

Ribeirão Preto, southeastern Brazil, is known for its importance as a regional reference center for different areas of healthcare, as well as for the formation of healthcare professionals. The city has a distinct socioeconomic scenario: despite its high per-capita income, a large share of the population has low purchasing power.

Medication management in the public network is done by the *Divisão de Farmácia e Apoio Diagnóstico* (Division of Pharmacy and Diagnostic Support - DFAD) of the Ribeirão Preto Municipal Secretariat of Health (RP-MSH). In 1996, pharmacists were allocated solely to the *Unidades Básicas e Distritais de Saúde* (Basic and District Healthcare Units - UBDS), supervising the pharmaceutical services of the various *Unidades Básicas de Saúde* (Basic Healthcare Units - UBS) within their area of action. Dispensation in the latter was done by administrative agents, nursing auxiliaries, and pharmacy auxiliaries.

The initial criterion for the inclusion of healthcare units was that these units must include, among their

staff, both clinicians and pediatricians working during the entire day shift (which yielded four UBDSs and 16 UBSs). Further criteria were adopted for each group of indicators as follows:

Prescribing indicators

We studied 10 of the initial 20 units (two UBDSs and eight UBSs). The other ten units were excluded due to infrastructure problems.

We analyzed 6,692 prescriptions written in May 1998, of which 3,326 were written by general clinicians and 3,366 by pediatricians. Regarding the period studied, although there may have been an influence of seasonal diseases in prescribing patterns, WHO considers that a sample obtained at a given moment will show basically the same results as another one involving a longer time period.[13]

We studied the prescriptions of physicians who saw patients for more than two days at the facility during the entire period and who wrote more than 30 prescriptions. Physicians whose work shift began as late as 4 p.m. were included in the study, since more than 50% of their working time took place within the defined period (day shift).

We excluded prescriptions written by physicians who performed both outpatient and emergency care in the same unit, as well as prescriptions lacking date, signature, or seal.

In order for a medication to be considered as prescribed by generic name, we used as a reference the *Denominação Comum Brasileira* (Common Brazilian Denomination - DCB) and, in case of omission, the International Nonproprietary Names for Pharmaceutical Substances (INN), as determined by current healthcare regulations.[4,10]

Prescriptions employing the commercial name of the medication but which contained the generic name in parentheses and prescriptions in which the generic name was spelled incorrectly were accepted.

Prescriptions containing the expression '*solução fisiológica*' (physiological saline) were was not considered as generic prescriptions (*prescrição*). The DCB indication[10] – 0.9% sodium chloride – was adopted instead, for both nasal and injectable solutions. We also did not accept prescriptions of B-complex vitamins and multivitamins as generic prescriptions.

Following WHO recommendations,[12,13] sulfa drugs, but not metronidazole, were considered as antibiot-

ics. Drug associations in which one of the drugs was an antibiotic were considered as antibiotics regardless of their pharmaceutical form.

The *Lista de Medicamentos Padronizados* (list of standard medications - LMP) employed was that of the RP-MSH valid in May 1998. Medications indicated in the pharmaceutical form and with defined dosages were accepted as prescriptions, regardless of whether commercial or generic names were used.

There were losses during data entry due to the presence of prescriptions lacking pharmaceutical form, or in which the form provided was inexistent. In these cases, the specific medication was disregarded, but the remaining medications included in the prescription were considered.

Data were entered into a prescription control database developed especially for the present study. Proportions were compared using chi-squared tests, and associations with p=0.05 were accepted.

Patient care indicators

Indicators *average consultation time, average dispensing time, percentage of patients´ knowledge of correct dosage* were collected in 1996. The *percentage of drugs actually dispensed* was calculated based on prescriptions written in 1998.

The number of patients was defined according to WHO recommendations and, complying with the central limit theorem, showed normal distribution with a 95% confidence interval.[3,13]

The percentage of drugs adequately labeled was not measured, given that the procedure was not yet standardized in the DFAD.

Average consultation time

We accompanied 480 appointments in two UBDSs and 14 UBSs (15 appointments with general clinicians and 15 with pediatricians in each unit). Time was measured using a stopwatch, and the amount of time the patient spent in the consultation room was recorded in minutes.

For patient selection, we divided the desired number of appointments (30) by the number of physicians at work in the unit on the day of collection. Following WHO recommendations, we included the first patients seen by each prescriber.

Data collection was possible only in facilities in which

the physical infrastructure allowed us to distinguish the exact moments in which the patients were called to and left the consultation room. In case the prescriber left the room temporarily during the appointment, the watch was stopped until the prescriber returned.

In order to better evaluate and compare the results obtained, we established a classification based on Statute no. 3,046 of the Brazilian Ministry of Health and on WHO, both of which recommend 15 minutes as the appropriate duration for an appointment.[18] This is the time frame employed by RP-MSH when scheduling physicians' daily appointments.

According to this classification, we considered appointment durations between 11.4 and 15.0 minutes as excellent; 7.6-11.3 minutes as good; 3.8-7.5 minutes as regular; and 0.1-3-7 minutes as poor.

Average dispensing time

Average dispensing time was measured in four UBDSs and five UBSs, in which 15 patients were accompanied in each period of the day (morning/afternoon), totaling 270 dispensations. This indicator was investigated only in units whose structure allowed the investigator to listen to the dialogue between patient and clerk.

The definition of the first timing to be done in each period was done at random, since timings began only after the measurement of appointment durations was concluded. After the first timing, all subsequent timings were done consecutively.

The time consumed with writing on files or with subjects unrelated to the drug being dispensed was not considered. A stopwatch was used and time was recorded in seconds.

Percentage of drugs actually dispensed

In order to calculate the percentage of medication dispensed, we used the same prescriptions used for calculating prescribing indicators. In total, 16,386 drugs were dispensed.

Medications were considered as dispensed when the standard DFAD stamp was present on the prescription or when, in the absence of this stamp, a written statement conforming to the unit's dispensation model was present. Dispensed medications identified as free samples were not included.

Patients´ knowledge of correct dosage

We carried out 600 interviews, following 30 pa-

tients (15 from the morning shift and 15 from the afternoon shift) in each of the 16 UBSs and four UBDSs. All interviews were carried out after the patient's consent was obtained.

The choice of patients was random, subjects being approached upon leaving the pharmacy. We evaluated patients' knowledge of the dosage and timing of medication intake using a specific questionnaire. Knowledge was not evaluated for drugs included in the prescription but which were not dispensed by the pharmacy.

In order to better evaluate the results, we established the following classification: a) Excellent: 76% to 100%; b) Good: 51% to 75%; c) Regular: 26% to 50%; d) Poor: 0,1% to 25,0%.

Indicators were calculated based on the following ratios:

a) Average number of drugs per appointment (prescription) = total drugs prescribed/prescriptions used.
b) Percentage of drugs prescribed by generic name = total generic drugs prescribed/total drugs prescribed x 100.
c) Percentage of appointments (prescriptions) in which antibiotics were prescribed = prescriptions in which at least one antibiotic was prescribed/total prescriptions x 100.
d) Percentage of appointments (prescriptions) in which an injection was prescribed = prescriptions in which at least one injection was prescribed/total prescriptions x 100
e) Percentage of drugs prescribed included in the LMP = total drugs prescribed included in the LMP/total drugs prescribed x 100.
f) Average consultation time = sum of all consultation times/total no. of consultations.
g) Average dispensing time = sum of all dispensing times/total no. of samples.
h) Percentage of drugs actually dispensed = drugs dispensed/drugs prescribed x 100.
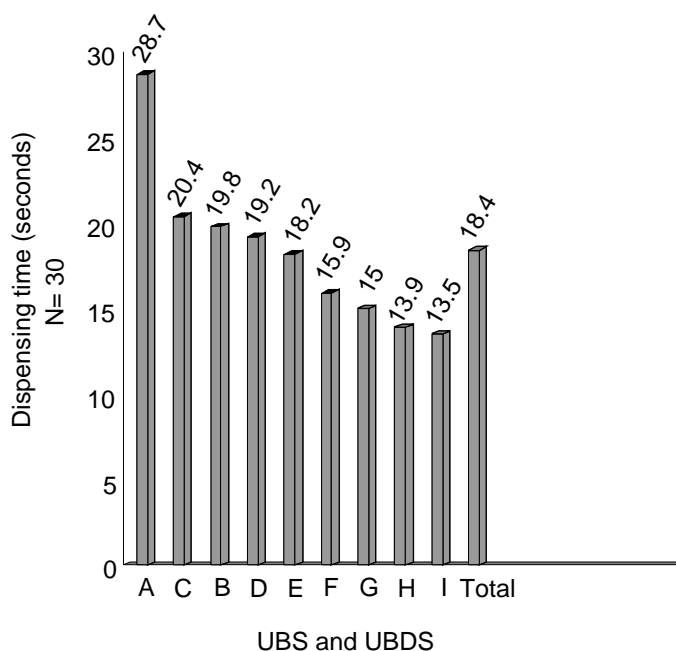i) Percentage of patients aware of the correct dosage

Figure - Mean duration of dispensation. Basic Healthcare Unit (UBS) and Basic and District Healthcare Unit (UBDS), municipality of Ribeirão Preto, Brazil, 1996.

= patients with correct knowledge of the dosage of all drugs dispensed/patients interviewed x 100.

RESULTS

There was no significant difference between clinicians and pediatricians with respect to the average number of drugs per prescription form.

There was a significant association between being a clinician and prescribing medications by generic name, injectable drugs, and LMP drugs.

The prescription of antibiotics was significantly associated with being a pediatrician (Table).

Average consultation time was 9.2 minutes for the entire sample, 8.3 minutes for clinicians, and 10.2 minutes for pediatricians. The analysis of individual units shows that, with respect to appointment durations, 31.3% of units were classified as 'regular' and 68.7% as 'good' or 'excellent'.

Table - Prescribing indicators according to medical specialty, basic healthcare units and basic and district healthcare units. Municipality of Ribeirão Preto, Brazil, 1998.

Indicators	Prescribers			χ^2	
	Medical clinicians N=3,326	Pediatricians N=3,366	Overall N=6,692		
Average number of drugs per prescription	2.2	2.3	2.2	χ^2 =0.07	p=0.79
Prescription by generic name (%)	33.6	27.7	30.6	χ^2 =27.64	p=0.00
Prescription of antibiotic (%)	13.7	28.9	21.3	χ^2 =230.05	p=0.00
Prescription of injection (%)	13.1	3.5	8.3	χ^2 =203.18	p=0.00
Prescription by LMP (%)	84.4	82.5	83.4	χ^2 =4.43	p=0.03

LMP: List of Standardized Medications

Overall average dispensing time was 18.4 seconds. The average time in the different units ranged between 13.5 and 28,7 seconds (Figure).

The mean percentage of drugs actually dispensed provided was 60.3%, ranging between units from 7.85% to 75.1%.

The mean percentage of patients aware of the correct dosage was 70%, ranging between units from 43.3% to 93.5%. Awareness of the correct dosage was classified as 'regular' in two units (10%) and as 'good' in 13 units (65,0%).

DISCUSSION

Although there were losses in the number of units investigated due to administrative and infrastructure problems, we understand that this does not invalidate the results obtained, and that this study provides important subsidy for the evaluation of the healthcare provided to the population.

With regard to the mean number of medications per prescription – which is intended to evaluate the degree of polypharmacy – the value found in the present study (2.2 drugs per prescription) is compatible with the results of other Brazilian studies by Cunha et al[6] (2.3); Lopes et al[8] (2.2); Pepe[14] (2.16); Simões & Fegadolli[15] (1.8); Simões & Motta[16] (1.9); and Simões & Soler[17] (2.5).

In a series of studies conducted in other countries, the highest and lowest values found were 3.8 medications per encounter in Nigeria and 1.3 in Ecuador and Tanzania, respectively.[7] Differences in terms of healthcare system characteristics, socioeconomic profile, and morbidity and mortality characteristics in the population prevent inferences from being made regarding the divergences observed. This pattern will repeat itself whenever international data are analyzed, as will be the case for the next indicators.

Considering that, within the Brazilian *Sistema Único de Saúde* (Unified Healthcare System - SUS), medical and dentistry prescriptions must be done exclusively using the drug's generic name,[4,5] the 30.6% of prescription by generic name found in the present study was considered as low. The result is similar to the 32.7% found by Simões & Soller,[17] but is lower than the values found in other studies (43.7% by Simões & Fegadolli,[15] 72.0% by Simões & Mota,[16] 74.0% by Lopes et al,[8] and 84.3% by Cunha et al[6]).

These divergences may reflect the use of different criteria by different researchers, as well as a different profile of behavior of prescribers in the different regions studied. As to the diversity observed between the present study and that of Simões & Mota,[16] both of which were conducted in Ribeirão Preto, this may be due to the use, by these authors, of prescriptions from a specialized outpatient clinic.

An important interfering factor is the existence, in the Brazilian pharmaceutical market, of medications including a large number of associations. This may pose a difficulty to the physician when prescribing – be it due to deficiencies in training or to the impossibility of consulting the DCB – thus inducing physicians to prescribe medications by their fantasy names.

In the present study, the prescription of antibiotics was more frequent among pediatricians (28.9%) than among clinicians (13.7%). The overall rate in the present study (21.3%) was higher than those found in Araraquara[15] (15.1%) and Ribeirão Preto[16] (10.1%), and lower than those found in Campo Grande[6] (27.4%) and Fortaleza[8] (37.0%). Studies indicate that antibiotic prescription rates are highest in Sudan (63.0%) and lowest in Bangladesh (25%) and Ecuador (27,0%).[7]

Concerning the prescription of injections, the rates obtained were higher among clinicians (13.1%) than among pediatricians (3.5%), with an overall rate of 8.3%. This rate is similar to that found in Araraquara (7.4%).[15] The rates found in Fortaleza[8] and in Campo Grande[6] were was 11.0% and 10,2%, respectively. Studies from other countries show a wide gap between maximum (48.0%) and minimum values (0.2%).[7]

For both these indicators, the lack of a defined standard value hinders a critical analysis of the differences observed between the results of the present and of other studies. This is furthered by the impossibility of establishing a relationship between the prescription studied and patients' clinical status.

The main problem with respect to antibiotics and their abusive prescription and use is the development of microorganisms potentially resistant any type of treatment, bringing severe and potentially lethal consequences to the patient.

As to injections, as important as these may be in situations requiring emergency therapy or for the absorption of substances in their active form, these drugs may lead to severe consequences if erroneously prescribed or administered. Potential consequences such as anaphylactic shock, tissue necrosis, or infections due to poor asepsis must be carefully considered. This procedure is still especially prone to the influence of cultural characteristics. One must therefore consider aspects such as the population's atti-

tude towards injections and how much this attitude may influence prescription patterns. Children are particularly resistant to the use of injections due to the pain involved in the procedure.

83.4% of all drugs prescribed were included in the List of Standard Medications, which suggests that standardization based on the epidemiological profile of the region's diseases was adequate. However, another possibility is that the LMP may reflect the physicians' prescription profile more than population morbidity and mortality profiles. This phenomenon is defined by Pepe[14] as a "consensus between the selection criterion and 'culturally consolidated' prescription practices."

Average consultation time (9.2 minutes), despite being classified as 'good' according to the criterion adopted, is below the 15 minutes recommended. Although this duration is longer than that reported in the Brazilian literature, (5.8 minutes in Fortaleza, northeastern Brazil,[8] and 5.5 minutes in Campo Grande[6]), this does not necessarily mean that patients receive better care, since a number of factors may influence the results of this indicator. In the international literature, the mean duration was longest in Nigeria (6.3 minutes) and shortest in Bangladesh (54 seconds).[7]

WHO recommends that pharmacists spend at least 3 minutes in orienting each patient. Therefore, the duration of dispensation of 18.4 seconds found in the present study is inadequate for proper pharmaceutical orientation. Such inadequacy was also reported in the literature in Fortaleza[8] (17 seconds), Campo Grande[6] (55 seconds), Nepal (86.1 seconds), Tanzania (77.8 seconds), Nigeria (12.5 seconds), and Bangladesh (23 seconds).[7]

The duration found in the present study does not allow for the inclusion, during dispensation, of important information, such as emphasis on the fulfillment of the dosage, interaction with other medications, acknowledgement of potential side effects, and conditions for appropriate product storage.[11]

A follow-up of the activities of the Ribeirão Preto Municipal Secretariat of Health DFAD has shown that, in the last years, a number of interventions aimed at improving services have been implemented. Thus further studies are required in order to evaluate the results of these interventions.

The provision of medications by the public network is of great importance when analyzed from the medical-social standpoint. Brazil is a country with great social inequality. Estimates indicate that over 50 million Brazilians are excluded from the consumption of medication due to low purchasing power. Thus, even if diagnosis and prescription are successful, the patient may still not reach therapeutic success due to lack of access to the product.

In the present study, 60.3% of all drugs prescribed were provided. This indicator is calculated based on the prescription of all drugs and not only of those included in the LMP, which prevents a more in depth discussion. A different methodology, based on the evaluation of standardized medications only, may allow for a more qualified evaluation of service management.

The present result may not correspond to the reality of the healthcare services. Certain factors may have contributed to an underestimation of the actual level of dispensation, including lack of a seal or annotation even when dispensation is fulfilled; divergent patterns of annotation between staff members of a same pharmacy; and lack of knowledge of the correlation between fantasy name (in the prescription) and generic name (used in the service). On the other hand, the dispensation of non-standardized medications made available, for instance, by state or federal programs or through donation may bias this indicator upwards.

70% of patients were aware of the correct dosages for the medications received. Even though these results suggest that, according to the classification established by the authors, patients have good knowledge of the correct dosage, this is no guarantee that the drug will be used correctly, since the methodology used is restricted, and evaluates knowledge only partially.

In order for treatment to be effective, it is essential that the user receive information on different issues, including: a) potential side effects; b) interaction with other medications and foods; c) the importance of carrying out the treatment in its entirety – this is crucial, for instance, when antibiotics are used; and d) a correct understanding of the therapeutic scheme, including the intervals that certain medications require, such as for instance mebendazole and oral contraceptives.

Although the mean duration of dispensation observed is insufficient for adequate pharmaceutical orientation, the levels of patient knowledge of dosage were high. This indicates a need for qualitative studies, especially considering that the quality of the information provided to the patient is essentially dependent on multiprofessional work.

Even though data collection was performed in different years, we understand that this did not bias our

results, since these relate to different indicators and are discussed separately.

We therefore suggest the following measures: a) conducting multicenter studies in regions with similar epidemiological profiles, as a subsidy for the definition of standard values; b) stimulating the development of therapeutic guides; c) creating continued education programs that encourage prescribers towards more rational prescription and dispensation personnel towards better orientation; d) compliance with generic drug regulations, avoiding the writing of prescriptions not in accordance with the standards; e) quantitative improvement of network pharmacy personnel; f) developing qualitative studies in conjunction with healthcare services as a means of evaluating factors involved in the non-rational use of medication; g) introducing the labeling of the medication dispensed, thus contributing towards an improvement in the healthcare provided.

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