



Analysis of antimicrobial prescriptions in Primary Healthcare*

Análise de prescrições de antimicrobianos na Atenção Primária à Saúde

Análisis de prescripciones antimicrobianas en Atención Primaria de Salud

How to cite this article:

Carvalho HEF, Sousa AFL, Almeida CAPL, Moura MEB, Andrade D, Valle ARMC. Analysis of antimicrobial prescriptions in Primary Healthcare. Rev Esc Enferm USP. 2020;54:e03607. doi: <https://doi.org/10.1590/S1980-220X2018046903607>

-  Herica Emilia Félix de Carvalho^{1,2}
-  Álvaro Francisco Lopes de Sousa^{2,3}
-  Camila Aparecida Pinheiro Landim Almeida⁴
-  Maria Eliete Batista Moura¹
-  Denise de Andrade²
-  Andréia Rodrigues Moura da Costa Valle¹

* Extracted from the dissertation: "Prescrição de antimicrobianos na Atenção Básica". Programa de Pós-Graduação em Enfermagem, Universidade Federal do Piauí, 2018.

¹ Universidade Federal do Piauí, Departamento de Enfermagem, Teresina, PI, Brazil.

² Universidade de São Paulo, Escola de Enfermagem de Ribeirão Preto, Ribeirão Preto, SP, Brazil.

³ Universidade Nova de Lisboa, Instituto de Medicina e Higiene Tropical, Lisboa, Portugal.

⁴ Centro Universitário Uninovafapi, Teresina, PI, Brazil.

ABSTRACT

Objective: To evaluate prescription receipts for antimicrobial prescriptions prescribed in primary healthcare units in a capital city in the Northeast region of Brazil. **Method:** An evaluative, analytical study. Information from the central distribution of essential medicines and the receipts of antimicrobial prescriptions were used. **Results:** There were 2,232 prescription receipts analyzed, in which metronidazole (250 mg) was prescribed in 28% of the evaluated prescription receipts, the "pill" pharmaceutical form in 30.7%, and the "oral" administration form in 78.2%. In the prescriptions prescribed by nurses, 80.7% were intended for users with sexually transmitted infections. With the exception of the pharmaceutical form, only 34.7% of the prescriptions were in accordance with the Nursing protocol recommendations. There is still no information on the concentration (43.7%), the dosage (39.9%) and the treatment time (36.8%). **Conclusion:** The evaluated receipts of antimicrobial prescriptions do not accurately follow the guidelines of Resolution No. 20/2011, nor of the instituted Nursing protocol.

DESCRIPTORS

Anti-Infective Agents; Prescription Drugs; Infection Control; Primary Care Nursing.

Corresponding author:

Herica Emilia Félix de Carvalho
Escola de Enfermagem de Ribeirão Preto,
Departamento de Enfermagem Fundamental.
R. Prof. Hélio Lourenço, 3900 – Vila
Monte Alegre, Ribeirão Preto – SP
CEP: 14040-902 – Ribeirão Preto, SP, Brazil.
herica_emilly@hotmail.com.br

Received: 11/04/2018

Approved: 11/28/2019

INTRODUCTION

The irrational prescription of antimicrobials in Primary Healthcare (PHC) has significantly contributed to the phenomenon of antimicrobial resistance (AMR), since the consumption of these drugs has considerably increased in the last decades in the community⁽¹⁾. Professionals responsible for the prescription do not always do it with all the necessary clinical rigor and routinely prescribe antimicrobials for infections which are not caused by bacteria⁽¹⁻²⁾, thereby intensifying this process. PHC prescriptions still involve other errors, such as: duration of the wrong treatment; prescription omissions; and non-compliance by the user with the guidelines contained in the prescriptions, among others⁽²⁾.

The seriousness of this situation in Brazil culminated in a stance by the National Health Surveillance Agency (*ANVISA – Agência Nacional de Vigilância Sanitária*) to issue Collegiate Board Resolution (*RDC*) no. 20/2011 with the aim of promoting actions to control antimicrobials in the context of PHC, which links the sale and dispensing of these medications to retaining special control prescription receipts in two copies (from the user and the health unit that dispensed the medication)⁽³⁾.

Following this trend, the Ministry of Health (MoH), supported by Law No. 7.498, of June 25, 1986 (Law of Professional Nursing Practice), issued Ordinance No. 2.488/2011 in the same year, which reaffirms prescription of specific medications within the PHC as a specific attribution of nurses, provided that it occurs according to “protocols or other technical regulations established by the Federal, State, Municipal or Federal District manager”⁽⁴⁾.

This publication allows state governments to establish protocols within the scope of PHC, a movement followed by the Municipality of Teresina, Piauí state, which created the Nursing Protocol in Primary Care and Outpatient Services in 2012, being composed of 10 subprotocols in several areas and constituting the Ministry of Health Manuals and Portals as reference⁽⁵⁾. This protocol issues local guidelines for nurses to prescribe antimicrobials within two subprotocols: Sexually Transmitted Infections (STI) and Child Health, being pointed out as an important strategy to streamline the care provided to these diseases in PHC.

Although in effect for some years, the impact and compliance of resolution 20/2011 have been little analyzed in the scientific literature produced in Brazil, in addition to an evaluation of protocol conformity in PHC, for which no studies have been found in Northeast Brazil. In view of the importance of the correct prescription of antimicrobials to reduce the impact of bacterial resistance, the objective of this study was to assess the adequacy of receipts for antimicrobial prescriptions retained in PHC health units in the city of Teresina-PI, with the guidelines of RDC no. 20/2011 for all prescribing professionals (doctors, nurses and dental surgeon) and the Nursing protocol in primary healthcare used by the Municipality.

METHOD

STUDY DESIGN

This is a cross-sectional analytical study with retrospective data collection.

SCENARIO

The study was conducted in the city of Teresina-PI, Brazil. One used the central distribution of essential medicines database linked to the Pharmaceutical Care Management of the Teresina Municipality, together with the receipts for antimicrobial prescriptions retained in the municipal health units which are composed of the Basic Health Units (*UBS – Unidades Básicas de Saúde*) and the Psychosocial Care Centers (*CAPS – Centros de Atenção Psicossocial*).

The UBS are subdivided into zones, namely: the east/southeast area, which comprises 36 UBS; the northern zone, with 25 UBS; and the south zone, with 27 UBS. CAPS are referral and treatment centers for people with psychological distress and are divided into three models, each with its own particularities: 4 (four) CAPS II; 1 (one) CAPS III; 1 (one) CAPS AD (alcohol and drugs); and 1 (one) CAPS I⁽⁶⁾. Data were collected from January to March 2017.

In view of the lack of records on the number of antimicrobial prescription receipts retained in the health units of the Municipality under study, it was necessary to operate with a viable record, and therefore the data referring to the units of the distributed medicine were used for the sample calculation. Based on this, the inclusion criterion would be based on the health units which retained the second receipt copy of the prescription with at least one prescribed antimicrobial drug unit to consolidate the sample of prescription receipts to be evaluated in the study.

The study population consisted of data referring to the distribution of antimicrobial drug units between June 2015 and July 2016 (14 months); and to receipts of antimicrobial prescriptions retained in health units within the same time interval. The time frame for data collection (January 2017) is based on Ordinance GAB/SMS No. 07/2015 of August 18, 2015⁽⁷⁾, which determines that the minimum time for filing a prescription for control purposes is two years.

The quantity referring to the distribution of antimicrobial drug units dispensed monthly from June 2015 to July 2016 was used for calculating the sample size (1,651,516 units distributed), the distribution in the UBS according to the zone – east/southeast (617,810), south (581,483) and north (438,716), and by the CAPS models presented in the city which received antimicrobial medication units in the indicated period, namely: II (6,825), alcohol and drugs (5,090) and III (1,592). It is noteworthy that only the CAPS for children and adolescents of the four CAPS models did not receive antimicrobial medication units during the studied period. Therefore, CAPS II, III and AD models were part of the study.

SELECTION CRITERIA

The study included UBS and CAPS which had retained the second receipt copy of prescriptions with at least one antimicrobial medication unit prescribed in the period from June 2015 to July 2016, and those which received more units of this medication according to each zone; as well as CAPS, according to service modality. UBS and CAPS which started retaining prescriptions less than two years ago were excluded,

as well as prescriptions corresponding to health protocols for leprosy and tuberculosis, as they present different formalities for requesting antimicrobials.

SAMPLE DEFINITION

The sample was obtained from the formula based on the estimate of the population average for infinite populations:

$$n = \left(\frac{z \cdot \sigma}{E} \right)^2$$

Multistage sampling was applied based on Hulley⁽⁸⁾, in which stratified sampling proportional to the demand for antimicrobial medication units distributed in UBS (east/southeast, south and north) and for each type of CAPS (II, III and AD) was initially used. The sample consisted of 2,232 units of antimicrobial drugs. This sample was obtained by establishing a minimum of 1 (one) antimicrobial medication unit for the receipts retained in the health units.

DATA COLLECTION

An instrument was used to collect the characteristics contained in the antimicrobial prescription receipts which presents categories based on Chapter III of RDC No. 20/2011, which discusses the prescription of antimicrobial drugs. Thus, its variables were subjected to the process of semantic analysis content validation to guarantee information reliability. The variables of interest were: identification data of the health units, elements characterizing the prescriptions and the drugs prescribed in the prescription.

A group of evaluators was selected in the content validation process, being composed of expert judges trained to analyze the content, presentation, clarity and understanding of the instrument. Seven judges participated to validate the research instrument. From the 23 items of the instrument, 5 (five) were not considered validated by the judges, as they obtained a Content Validity Index less than or equal to 80%; 3 were excluded; and 2 (full name of the user and prescribed antimicrobial) remained, as they are not mandatory items in the RDC.

Regarding the receipts of the antimicrobial prescriptions performed by nurses, characteristics included in the PHC protocol of the municipality were verified for the nurse's performance (prescribed antimicrobials, section of the Primary Healthcare protocol, dose, concentration, pharmaceutical form, posology, interval between administrations, treatment time and type of treatment).

After validating the instrument based on RDC 20/2011, a pilot study was carried out in a UBS in the east/southeast area with 112 prescription receipts, corresponding to 5% of

the sample. These receipts were not included in the study sample. The inclusion and exclusion criteria of UBS and CAPS were followed after conducting the pilot study.

Three UBS participated in the study, one from each zone, and three CAPS models. A total of 835 prescription receipts were collected in the UBS in the east/southeast zone, 786 in the UBS in the south zone, 593 in the UBS in the north zone, 9 in the Southeast CAPS, 2 in the CAPS III and 7 in the CAPS AD, respectively, totaling the 2,232 prescription receipts. The systematic sampling technique was used in each health unit for the receipt selection.

The prescription receipts were initially organized within the medication dispensing units of each UBS according to the months (June 2015 to July 2016), arranged side by side. The 1st (first) prescription was removed from each month, then the 11th (eleventh), then the 21st (twenty-first), and so on, until the number of prescriptions to be evaluated in each health unit ends, respecting the cut-off used so that the prescription receipts were collected from all months.

DATA ANALYSIS AND PROCESSING

Two databases were produced, one for the information collected by the instrument that evaluates the prescription receipts according to Chapter III of the RDC no. 20/2011, and another database for the data which analyzes the antimicrobial prescription receipts according to the PHC protocol of the municipality the nurses work in. The data were processed in SPSS version 22.0, and descriptive statistics were calculated. The Kolmogorov-Smirnov test was performed to verify the data normality for the inferential analysis, and the Pearson's Chi-Squared test was used to associate qualitative variables.

ETHICAL ASPECTS

The study followed the principles of Resolution 466/12 of the National Health Council, approved on November 4, 2016, under Opinion No. 1.806.553/16, of the Universidade Federal do Piauí.

RESULTS

There were 2,232 prescription drug receipts analyzed based on substances classified as antimicrobials dispensed in UBS (99.2%) and CAPS (0.8%) units with regard to the patient, the prescriber and the medication. Thirteen (13) antimicrobials were described in the evaluated prescription receipts, in which metronidazole (250mg) was the most prescribed antimicrobial (Table 1).

Table 1 – Characterizing elements of prescriptions for prescribing antimicrobials related to the patient, prescriber and medication – Teresina, PI, Brazil, 2017.

Element	M	SD	n	%
Patient name				
Complete			1667	74.7
Incomplete			43	1.9
Abbreviated			513	23.0
Absent			9	0.4

continue...

...continuation

Element	M	SD	n	%
Patient age*	23.4	15.1		
Informed			5	0.2
Not informed			2227	98.8
Gender				
Female			1547	69.3
Male			676	30.3
Absent			9	0.4
Prescription emission date				
Informed			2195	98.3
Not informed			37	1.7
Prescriber				
Doctor			1358	60.8
Nurse			443	19.8
Dental surgeon			292	13.1
Absent			139	6.2
Medications in the prescription	2.4	1.1		
Antimicrobials in the prescription	1.1	0.3		
Prescribed antimicrobial				
Amoxicillin 500			471	19.3
Amoxicillin 250			195	8.0
Benzylpenicillin 1,200,000			33	1.3
Benzylpenicillin 600,000			24	1.0
Cephalexin 500			59	2.4
Cephalexin 250			19	0.8
Erythromycin 500			2	0.1
Erythromycin 250			5	0.2
Metronidazole 100			481	19.7
Metronidazole 200			385	15.7
Metronidazole 250			685	28.0
Sulfamethoxazole + Trimethoprim 200+40			23	0.9
Sulfamethoxazole + Trimethoprim 400+80			64	2.6
Quantity of antimicrobial (dose)	12.9	12.7		
Mass/volume of medium (concentration)				
Pill	272.1	78.5		
Suspension	497.6	36.4		
Capsule	255.7	492.8		
Cream	80.0	34.6		
Pharmaceutical form				
Pill			752	30.7
Suspension			678	27.7
Capsule			534	21.8
Cream			481	19.7
Absent			1	0.1
Dose per administration (Posology)	4.7	2.7		
Interval between administrations	13.6	27.5		
Treatment time	7.3	2.1		
Type of treatment				
Short treatment (< 30 days)			2432	99.4
Longer treatment (> 30 days)			9	0.4
Absent			5	0.2
Administration form				
Oral			1913	78.2
Topical			476	19.5
Injection			57	2.3
Total			2,232	100.0

Legend: M: mean; SD: standard deviation; *: n=5 (informed)
 Note: (n=2,232)

Table 2 shows the verification of prescription receipts based on RDC No. 20/2011⁽³⁾. All mandatory prescription

receipt data were covered in only 1 (0.1%) of the 2,232 assessed receipts.

Table 2 – Mandatory criteria for medicine prescription receipts based on substances classified as antimicrobials, according to RDC No. 20/2011 – Teresina, PI, Brazil, 2017.

Criteria	N	%
Contains all mandatory data		
No	2231	99.9
Yes	1	0.1
Patient identification		
Incomplete	2218	99.4
Absent	9	0.4
Present	5	0.2
Antimicrobial data		
Incomplete	1153	51.7
Present	1079	48.3
Prescriber identification		
Present	2093	93.8
Absent	139	6.2
Emission date		
Present	2197	98.4
Absent	35	1.6
Total	2,232	100.0

Note: (n=2,232)

According to the characterization of the antimicrobial prescription receipts performed by nurses, they were the prescribers of 443 (19.8%) prescriptions, containing a total of 524 (100.0%) antimicrobials. Most nurses prescribe in the Sexually Transmitted Infection (423 – 80.7%) and Child Health (74 – 14.1%) sections.

For the comparison with the recommendations proposed by the Nursing protocol, it was found that information on the antimicrobial was absent in the items on concentration (229 – 43.7%), posology (209 – 39.9%) and treatment time (193 – 36.8%) (Table 3).

Table 3 – Characteristics of antimicrobials prescribed by nurses according to the Nursing protocol section – Teresina, PI, Brazil, 2017.

Elements	n	%
Primary Healthcare Protocol Section		
STI	423	80.7
Child health	74	14.1
No protocol	27	5.2
Protocols for STI*		
Discharge	401	94.8
Cervicitis	22	5.2
Comparison with the protocol dose		
In accordance	240	45.8
Higher	120	22.9
Lower	62	11.8
Not specified by the protocol	73	13.9
Missing data	29	5.5
Comparison with the protocol concentration		
In accordance	217	41.4
Lower	5	1.0
Not specified by the protocol	73	13.9
Missing data	229	43.7
Comparison with the protocol pharmaceutical form		
In accordance	492	93.9
Missing data	32	6.1
Comparison with the protocol posology		
In accordance	176	33.6
Higher	65	12.4
Lower	1	0.2
Not specified by the protocol	73	13.9
Missing data	209	39.9

continue...

...continuation

Elements	n	%
Comparison with the protocol interval		
In accordance	130	24.8
Higher	248	47.3
Lower	9	1.7
Not specified by the protocol	73	13.9
Missing data	64	12.2
Comparison with the treatment time protocol		
In accordance	147	28.1
Higher	93	17.7
Lower	18	3.4
Not specified by the protocol	73	13.9
Missing data	193	36.8
Total	524	100.0

Legend: STI: Sexually transmitted infection; *: n=423.

Note: (n=524)

The association test between the mandatory data for antimicrobial prescription contained in RDC No. 20/2011⁽³⁾ and the professional revealed a statistical difference between the presence of complete information about antimicrobials and the prescribing professional ($p < 0.001$) (Table 4).

Table 4 – Association between mandatory data and prescriber in the assessed prescription receipts – Teresina, PI, Brazil, 2017.

Antimicrobial	Prescriber*						P-value
	Doctor		Nurse		Dental surgeon		
	n	%	N	%	n	%	
Patient identification							0.361
Absent	6	0.3	3	0.1	1	0.1	
Present	1	0.1	2	0.1	0	0.0	
Incomplete	1351	64.5	438	20.9	291	13.9	
Antimicrobial data							<0.001
Present	755	36.1	137	6.5	133	6.4	
Incomplete	603	28.8	306	14.6	159	7.6	
Prescriber identification							0.763
Absent	1	0.1	0	0.0	0	0.0	
Present	1357	64.8	443	21.2	292	14.0	
Prescription receipt emission date							0.643
Absent	18	0.9	8	0.4	3	0.1	
Present	1340	64.0	435	20.8	289	13.8	
Total	1358	64.9	443	21.2	292	14.0	

Legend: *n=2,093 (prescription receipts with prescriber identification); p: significance of the Pearson's Chi-Squared Test.

Note: (n=2,093)

The association between the mandatory data and the evaluated municipality area revealed a statistical difference between the prescriptions by the medical professional and the regional east/southeast (28.5%) and south (26.9%); as well as the prescriptions of the professional nurse and the northern region (10.0) (Table 5).

Table 5 – Association between mandatory data and prescriber in the assessed receipts in each zone – Teresina, PI, Brazil, 2017.

Zonas (UBS*)	Prescriber						P-value
	Doctor		Nurse		Dental surgeon		
	n	%	N	%	N	%	
East/Southeast	591	28.5	104	5.0	57	2.7	<0.001
South	558	26.9	131	6.3	70	3.4	
Central/North	192	9.3	207	10.0	165	8.0	
Total	1341	64.6	442	21.3	292	14.1	

Legend: UBS: Basic Health Unit; *n=2,075 (health unit prescription receipts); p: significance of Pearson's Chi-Squared Test.

Note: (n=2,075)

DISCUSSION

The official recommendations (RDC no. 20/2011⁽³⁾ and the Nursing protocol⁽⁴⁾ in PHC) are not strictly followed in antimicrobial prescription receipts. The private prescriptions of the health establishment presented a lot of missing data, constituting essential information for the purpose of creating the RDC and the Nursing protocol, namely the control of drugs based on substances classified as antimicrobials and legally qualified prescriptions by nurses as a PHC professional, respectively.

Only one prescription receipt within the total of 2,232 followed all the recommendations proposed by the RDC; and more than 50% of the prescriptions prescribed by the professional nurses were not in accordance with the protocol guidelines. This inadequacy to local recommendations is also pointed out by a multicenter study carried out in 53 countries with these same professionals⁽⁹⁾.

Regarding the elements which characterize the patient's identification, the percentage of prescription receipts which presented the full name (74.7%) and age (0.2%) were much less than ideal (100%). In the context of patient safety, correct identification is essential in handling medication, since the chances of other errors occurring (e.g., dose, administration

route, medication and wrong patient) are maximized in the absence of the patient's name in a legible manner⁽¹⁰⁻¹¹⁾.

The percentage (98.3%) with regard to the issue date of the prescription receipt was close to the ideal (100%), although still lower than that recorded (99.3%) in a study conducted in Minas Gerais state, Brazil⁽¹²⁾. On the other hand, information on the pharmaceutical form was absent on only one prescription receipt, and the treatment time was absent in five, with this finding being common in the national literature⁽¹³⁻¹⁴⁾. Still, the prescriber identification was high (93.7%), of which the majority was prescribed by doctors (60.8%), followed by nurses (19.8%), corroborating information of another national study⁽¹²⁾.

Metronidazole was the most prescribed antimicrobial on the prescription receipts (63.4%), which goes against the national and international literature, which cite amoxicillin as the most prescribed antimicrobial⁽¹⁴⁻¹⁶⁾. Regarding the prescriptions prescribed by professional nurses based on the Nursing protocol in Primary Healthcare and Outpatient clinics in the studied municipality⁽⁴⁾, it is clear that the antimicrobials were mostly destined for the STI protocol (80.7%), which is an important area of Nursing practice, with 94.8% of these being related to the treatment of vaginal discharge, thus meeting the protocol competency requirements of the studied municipality.

Bacterial vaginitis, trichomoniasis and vulvovaginal candidiasis⁽¹⁷⁻¹⁸⁾ are among the causes of vaginal discharge in women of childbearing age. The first two can be treated in PHC with metronidazole in the form of a pill or vaginal cream. This drug needs to be monitored, as it induces the selection of resistant *Trichomonas vaginalis* strains, and this resistance occurs in 4% to 10% of cases⁽¹⁹⁻²⁰⁾. Therefore, the importance of the correct prescription is once again signaled, especially by nurses since they present a considerable amount of prescriptions for STIs, as observed in this study.

Regarding the characteristics of the prescribed antimicrobials and taking into account compliance with the items recommended in each Nursing subprotocol (STI and Child health), it was shown that only 45.6% were in agreement with the protocol dose and 41.4% in accordance with the indicated concentration. A considerable number of prescription receipts (43.7%) still lacked the "concentration" data, which is extremely worrying.

Regarding the pharmaceutical form and protocol posology, 93.9% and 33.6% of antimicrobials were in agreement, respectively. However, high absence of posology in the prescription was found in 39.9% of the receipts. The time interval in hours was longer than recommended by 47.3%, and the treatment time was not included in 36.8% of the prescriptions.

With regard to the association between the mandatory elements of the medication and the prescribing professional, it was found that being a "doctor" increased the likelihood of a prescription with the presence of data on the medication, as reported by the international literature⁽²¹⁾. Doctors are the professionals who prescribe the most both in Brazil⁽¹²⁻¹⁴⁾ and in other countries⁽¹⁵⁻¹⁶⁾. The prescription of medications is intrinsic to the medical professional, so that their training

represents a consubstantial basis which justifies the greater number of prescriptions of these medications. Therefore, mistakes made by these professionals have an important bearing on patient safety due to the volume and importance of prescriptions.

The medication prescriptions by professional nurses are limited to public health programs and routines which have been previously approved in health institutions (public or private), supported by the Professional Exercise Law and are additionally in all Protocols or Booklets of PHC which reaffirm the medication prescriptions as the nurse's assignment. Medication prescription by nurses occurs in other countries such as the United Kingdom, Sweden, the United States of America, Canada, Australia and Ireland⁽²²⁾.

A recent documentary study on rules, guidelines, policies and institutional support for nurses to prescribe medications also highlights the existence of few studies which have analyzed medication prescriptions by nursing professionals. However, they emphasize that nurses' autonomy has been widely reaffirmed by the Nursing class entities and in the PHC protocols adopted by the Ministry of Health, with arguments about the prescription being based on three categories: autonomy and competence for prescribing medications; corporate policies which compromise the full exercise of Nursing; and transformation of health and nursing care in PHC⁽²³⁾.

Corroborating the study above and reflecting on prescription expansion by nurses in Brazil, in fact expanding prescriptions increases the access of medicines to users. However, this expansion must be seen from the perspective of the dimension of comprehensive user care. That said, one supports implementation of the Systematization of Nursing Care (SNC) to the protocols published by the Ministry of Health as guiding evidence-based practice and as a guide for nurses' actions in the context of PHC.

The findings of this research provide evidence that Nursing prescription, as well as that of the other health professionals evaluated in this study, need in-depth and continuous analysis, especially in the case of specific prescription for antimicrobials, which has a potential negative impact, especially in the increase of AMR.

This study has some limitations. With regard to the adopted method, cross-sectional studies do not enable a scope for conducting a follow-up of the investigation object, which would provide identification of the antimicrobial therapy used according to the patient's medical diagnosis. However, the method used in this study achieves the listed objectives. In addition, the protocol's conformity assessment was only possible for Nursing because only this category had its specific protocol in the municipality under study.

CONCLUSION

The antimicrobial prescription receipts dispensed in the PHC of the municipality under study do not precisely follow the recommendations of either RDC No. 20/2011 or the local Nursing protocol. It is noteworthy that the failure to comply with the recommendations analyzed herein

demonstrates a failure in the system in providing quality services and patient safety as a whole.

Non-systematized prescription of antimicrobials can lead to incorrect, exacerbated or inferior use to that recommended for the drug, causing consequences to the health system. The problem is alarming, and this study confirms the need for interventions aimed at PHC, in which the contingent of prescription receipts is greater

and there is difficulty in ensuring the quality and correct use by the community as there is no control system.

It is recommended to create a single prescription format for prescription which follows the guidelines established for that purpose; the use of a prescription control system integrated with SUS; the use of prescriptions in electronic format; and the qualification of prescribing professionals.

RESUMO

Objetivo: Avaliar receitas com prescrição de antimicrobianos retidas nas unidades de saúde da Atenção Primária de uma capital da região Nordeste do Brasil. **Método:** Estudo avaliativo, analítico. Foram utilizadas as informações da central de distribuição de medicamentos essenciais e as receitas com prescrição de antimicrobianos. **Resultados:** Foram analisadas 2.232 receitas, nas quais o metronidazol (250 mg) foi prescrito em 28% das receitas avaliadas, a forma farmacêutica “comprimido” em 30,7% e a forma de administração “oral” em 78,2%. Nas receitas prescritas por enfermeiros, 80,7% destinavam-se para usuários com infecção sexualmente transmissível. Com exceção da forma farmacêutica, somente 34,7% das receitas estavam em concordância com as recomendações do protocolo de Enfermagem. Há, ainda, inexistência de informações sobre a concentração (43,7%), a posologia (39,9%) e o tempo de tratamento (36,8%). **Conclusão:** As receitas com prescrição de antimicrobianos avaliadas não seguem com precisão as orientações da Resolução nº 20/2011, e nem do protocolo de Enfermagem instituído.

DESCRITORES

Anti-Infeciosos; Medicamentos sob Prescrição; Controle de Infecções; Enfermagem de Atenção Primária.

RESUMEN

Objetivo: Evaluar recetas con prescripción de antimicrobianas retenidas en las unidades de salud de la atención primaria de una capital de la región Nordeste de Brasil. **Método:** Estudio evaluativo, analítico. Fueron utilizadas las informaciones de la central de distribución de los medicamentos esenciales y las recetas con prescripción de los antimicrobianos. **Resultados:** Fueron analizadas 2.232 recetas, en las cuales lo metronidazol (250 mg) fue prescrito en 28% de las recetas evaluadas, la forma farmacéutica “comprimido” en 30,7% y la forma de administración por vía oral en 78,2%. En las recetas prescritas por los enfermeros, 80,7% eran para usuarios con infección sexualmente transmisibles. Con excepción de la forma farmacéutica, solo 34,7% de las recetas estaban en concordancia con las recomendaciones de lo protocolo de Enfermería. Todavía hay inexistencia de informaciones acerca de la concentración (43,7%), la posología (39,9%) y el tiempo del tratamiento (36,8%). **Conclusión:** Las recetas con prescripción de antimicrobianos evaluadas no siguen con precisión ni las orientaciones de la resolución nº 20/2011, ni del protocolo de Enfermería instituido.

DESCRIPTORES

Antiinfeciosos; Medicamentos bajo Prescripción; Control de Infecciones; Enfermería de Atención Primaria.

REFERENCES

- Martínez-González NA, Coenen S, Plate A, Colliers A, Rosemann T, Senn O, et al. The impact of interventions to improve the quality of prescribing and use of antibiotics in primary care patients with respiratory tract infections: a systematic review protocol. *BMJ Open*. 2017;7(6):e016253. DOI: <http://dx.doi.org/10.1136/bmjopen-2017-016253>
- Ayukekbong JA, Ntemgwa M, Atabe AN. The threat of antimicrobial resistance in developing countries: causes and control strategies. *Antimicrob Resist Infect Control*. 2017;6(1):47-54. DOI: <http://dx.doi.org/10.1186/s13756-017-0208-x>
- Brasil. Ministério da Saúde; Agência Nacional de Vigilância Sanitária. RDC nº 20 de 05 de maio de 2011. Dispõe sobre o controle de medicamentos à base de substâncias classificadas como antimicrobianos, ou uso sob prescrição, isoladas ou em associação [Internet]. Brasília; 2011 [citado 2018 set. 25]. Disponível em: http://portal.anvisa.gov.br/documents/33880/2568070/rdc0020_05_05_2011.pdf/fa3ec1c1-8045-4402-b17f-ed189fb67ac8
- Brasil. Ministério da Saúde. Assistência farmacêutica na atenção básica: instruções técnicas para sua organização [Internet]. Brasília; 2006 [citado 2018 set. 25]. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/cd03_15.pdf
- Teresina. Prefeitura Municipal; Fundação Municipal de Saúde. Protocolo de Enfermagem na Atenção de Saúde e Ambulatórios [Internet]. Teresina; 2016 [citado 2018 set. 25]. Disponível em: http://www.fms.teresina.pi.gov.br/system/downloads/docs/133/original_protocolo_enfermagem.pdf?1531745297
- Lima HKS, Carvalho HEF, Sousa AFL, Moura MEB, Andrade D, Valle ARMC. Antimicrobial distribution and costs in primary care. *Acta Paul Enferm*. 2018;31(1):95-101. DOI: <http://dx.doi.org/10.1590/1982-0194201800014>
- Teresina. Secretaria Municipal de Saúde. Portaria GAB/SMS n. 07/2015. Dispõe sobre questões técnicas e administrativas relacionadas à prescrição e dispensação de medicamentos no âmbito das unidades públicas pertencentes à rede municipal de saúde de Teresina [Internet]. Teresina; 2015 [citado 2018 set. 25]. Disponível em: <https://www.jusbrasil.com.br/diarios/DOM-THE/2015/07/17>
- Hulley SB, Cummings SR, Browner WS, Grady DG, Newman TB. *Delineando a pesquisa clínica*. 4. ed. Porto Alegre: Artmed; 2015.
- Yusuf E, Versporten A, Goossens H. Is there any difference in quality of prescribing between antibacterials and antifungals? Results from the first global point prevalence study (Global PPS) of antimicrobial consumption and resistance from 53 countries. *J Antimicrob Chemother*. 2017;72(10):2906-9. DOI: <http://dx.doi.org/10.1093/jac/dkx236>
- Bagnasco A, Siri A, Aleo G, Rocco G, Sasso L. Applying artificial neural networks to predict communication risks in the emergency department. *J Adv Nurs*. 2015;71(10):2293-304. DOI: <http://dx.doi.org/10.1111/jan.12691>

11. Silva AMB, Bim LL, Bim FL, Sousa AFL, Domingues PCA, Nicolussi AC, et al. Patient safety and infection control: bases for curricular integration. *Rev Bras Enferm*. 2018;71(3):1170-7. DOI: <http://dx.doi.org/10.1590/0034-7167-2017-0314>
12. Costa MM. Análise das prescrições de antimicrobianos: farmácia pública da Prefeitura de Carmo do Cajuru, Minas Gerais, Brasil. *Rev Saúde Desenvolv [Internet]*. 2016 [citado 2016 nov. 20];9(5):73-84. Disponível em: <https://www.uninter.com/revistasaude/index.php/saudeDesenvolvimento/article/view/525/309>
13. Nascimento PS, Magalhães IRS. Análise da prescrição de antimicrobianos dispensados em uma rede de drogarias da região Norte do Brasil. *Rev Bras Farm [Internet]*. 2013 [citado 2016 nov. 20];94(3):211-8. Disponível em: <http://www.rbfarma.org.br/files/rbf-v94n3-03.pdf>
14. Polisel CG, Bergê RS. Avaliação da conformidade de prescrições médicas e dispensação de antimicrobianos. *Rev Bras Prom Saúde [Internet]*. 2014 [citado 2016 nov. 20];27(1):21-8. Disponível em: <https://periodicos.unifor.br/RBPS/article/view/2394/pdf>
15. Adisa R, Fakeye TO, Aindero VO. Evaluation of prescription pattern and patients' opinion on healthcare practices in selected primary healthcare facilities in Ibadan, South-Western Nigeria. *Afr Health Sci*. 2015;15(4):1318-29. DOI: <http://dx.doi.org/10.4314/ahs.v15i4.35>
16. Covvey JR, Johnson BF, Elliott V, Malcolm W, Mullen AB. An association between socioeconomic deprivation and primary care antibiotic prescribing in Scotland. *J Antimicrob Chemother*. 2014;69(3):835-41. DOI: <http://dx.doi.org/10.1093/jac/dkt439>
17. Isac S, Ramesh BM, Rajaram S, Washington R, Bradley JE, Reza-Paul S, et al. Changes in HIV and Syphilis prevalence among female sex workers from three serial cross-sectional surveys in Karnataka State, South India. *BMJ Open*. 2015;27(3):e007106. DOI: 10.1136/bmjopen-2014-007106
18. Venugopal S, Gopalan K, Devi A, Kavitha A. Epidemiology and clinico-investigative study of organisms causing vaginal discharge. *Indian J Sex Transm Dis AIDS*. 2017;38(1):69-75. DOI: <http://dx.doi.org/10.4103/0253-7184.203433>
19. Schwebke JR, Barrientes FJ. Prevalence of trichomonas vaginalis isolates with resistance to metronidazole and tinidazole. *Antimicrob Agents Chemother*. 2006;50:4209-10. DOI: <http://10.1128/AAC.00814-06>
20. Ghosh AP, Aycok C, Schwebke JR. In vitro study of the susceptibility of clinical isolates of trichomonas vaginalis to metronidazole and secnidazole. *Antimicrob Agents Chemother*. 2018; 62(4):e02329-17. DOI: <http://dx.doi.org/10.1128/AAC.02329-17>
21. Schmidt ML, Spencer MD, Davidson LE. Patient, provider, and practice characteristics associated with inappropriate antimicrobial prescribing in ambulatory practices. *Infect Control Hosp Epidemiol*. 2018;39(3):307-15. DOI: <https://doi.org/10.1017/ice.2017.263>
22. Martiniano CS, Coêlho AA, Latter S, Uchôa SAC. Medication prescription by nurses and the case of the Brazil: what can we learn from international research? *Int J Nurs Stud*. 2014;51(8):1071-3. DOI: <https://doi.org/10.1016/j.ijnurstu.2013.12.006>
23. Nascimento WG, Uchôa SAC, Coêlho AA, Clementino FS, Cosme MVB, Rosa RB, et al. Medication and test prescription by nurses: contributions to advanced practice and transformation of care. *Rev Latino Am Enfermagem*. 2018;26:e3062. <http://dx.doi.org/10.1590/1518-8345.2423-3062>

Financial support

Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES).



This is an open-access article distributed under the terms of the Creative Commons Attribution License.