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Pharmaceutical care in a school pharmacy: from consultation to resolution of drug-related problems

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ABSTRACT. This study aimed to provide pharmaceutical care for the general community served by Pharmacy students from the Pharmacy School of the State University of Maringá [*Universidade Estadual do Maringá*] (UEM). Pharmacotherapeutic follow-up was performed with the identification, classification and resolution of drug-related problems (DRPs) through pharmaceutical consultations. A descriptive analysis was conducted. A total of 59 patients were interviewed; they were mostly women (75%) with average age of 63 years, and each of them was taking 8 medicines on average. The most frequently mentioned drugs were classified according to the Anatomical Therapeutic Chemical Code and related to cardiovascular system (28%), alimentary tract and metabolism (23%), and nervous system (20%). An average of 1.49 DRP per patient was detected (88), and treatment non-compliance was the most frequent DRPs found (45%). In view of this, 63 pharmaceutical interventions were carried out, with most of them (52%) being related to patient education on the treatment; approximately 20% of the patients were referred to another health professional. Information supplied by this study shows the relevant role of pharmacists face the lack of pharmacotherapeutic follow-up of polymedicated patients.

Keywords: pharmaceutical services; pharmaceutical care; pharmacy education; drug therapy.

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Introduction

Pharmaceutical consultation is the means by which pharmacists can prescribe medications, selecting and documenting pharmacotherapy and other necessary interventions related to patient healthcare (Brasil, 2013a; 2013b).

A rational, safe and cost-efficient pharmacological therapy depends on proper diagnosis, proper prescription, as well as on treatment comprehension and compliance by patients (Adusumilli & Adepu, 2014). With the aim of improving medication usage, pharmaceutical care may cure, eliminate or reduce symptoms, or illness complications (Hepler & Strand, 1990).

Evidence has shown the role of pharmacists in identifying and solving drug-related problems (DRPs), improving behavior as to medication compliance through adequate strategies for health education, decreasing the incidence of adverse events, thus reducing costs and time related to the condition (Adusumilli & Adepu, 2014; Al Rahbi, Al-Sabri, & Chitme, 2013).

DRPs are any unwanted event experienced by patients that involve or is thought to involve drug therapy, interfering with expected results (Strand, Morley, Cipolle, Ramsey & Lamsam, 1990). In more recent publications, the terminology DRPs has been replaced by drug therapy problems (Cipolle, Strand, Morley, 2012). Some studies covering DRPs are being conducted around the world.

American pharmacists have conducted a study in Texas, where they performed 531 pharmaceutical interventions, which were analyzed as to number, type, clinical importance, time for intervention recommendation, and medical acceptance. The medical acceptance rate was high (87%), and the most frequent DRPs were: need for additional pharmacotherapy (29.8%), low dosage (21.1%) and high dosage (8.3%) (Vinluan, Jabalie, Navarrete, & Padilla, 2018).

In the Netherlands, a study evaluated the collaboration between community and hospital pharmacists to address drug-related problems. For the 152 patients, a total of 745 DRPs were identified. The most common

problems found were the need for additional education or recommendations (36.1%), compliance issues (16.4%) and inadequate drug selection (11.7%), and the majority of DRPs were solved. Collaboration between hospital and community pharmacists is important to improves the quality of care and patient safety (Ensing, Koster, Dubero, van Dooren, & Bouvy, 2019).

The World Mental Health Survey was carried out in more than 30 countries, and results for Brazil led to the conclusion that drug treatment for psychiatric disorders here is inferior compared to other countries where the same methodology was employed. In addition, there are people receiving inadequate treatment. Surprisingly, a significant portion of the interviewees reported having undergone drug therapy without diagnosis of disorders (Campanha et al., 2015).

In Brazil, public policies have been encouraging pharmaceutical care promotion to patients, but few studies have been published. In this scenario, the present research aims to provide pharmaceutical care for the general community, identifying, classifying and solving DRPs by pharmaceutical intervention.

Material and methods

Design and sampling

This is a retrospective, descriptive, epidemiological study conducted in the School Pharmacy of the *Universidade Estadual de Maringá* (UEM), from January 2015 to August 2017. The assisted group involved servers, students and the general external community. The service was provided by pharmacists and Pharmacy professors and students.

This study is part of a Pharmaceutical Assistance project to improve the population's health and was approved by the ethics committee, with nº 8293/2007. The total sample was composed of 59 individuals aged 18 years old or over, of both sexes, who had at least one chronic illness or any complaint that compromised their health.

As inclusion criteria for participation in the study, the patients should report use of more than one medication or present an abnormal clinical condition (blood pressure, capillary blood glucose, cholesterol, etc.), a physical complaint or a drug-related complaint. The exclusion criterion was healthy individuals.

Study stages

After patient selection, the first consultation took place, which consisted of students filling out the questionnaire. After consultation, a review of the literature on illness, medication and treatment alternatives was performed. There were also clinical discussions about each case along with a Pharmacy student in order to check for DRPs. Afterwards, a new consultation was scheduled – two consultations when needed – to set the attention plan, with the implementation of proper pharmaceutical interventions.

Assessment instrument

The assessment instrument was designed by the institution and composed of open-ended and closed-ended questions about sociodemographic factors, clinical conditions and medication usage (access to medication, use of medication prescribed and not prescribed by doctors, form of medication usage, treatment compliance, report of adverse reactions and drug interactions, and DRPs), as well as about use of medicinal plants and other substances.

Medication analysis

Prescribed and unprescribed medications referred to by the interviewees were classified according to the Anatomical Therapeutic Chemical Code (ATC; World Health Organization [WHO], 2018); the organ or system through which the medication acts was considered, as well as its therapeutic and pharmacological properties. Classification encompassed the following levels: A (alimentary tract and metabolism), B (blood and blood forming organs), C (cardiovascular system), D (dermatologicals), G (genito urinary system and sex hormones), H (systemic hormonal preparations), J (antiinfectives for systemic use), L (antineoplastic and immunomodulating agents), M (músculo-skeletal system), N (nervous system), P (antiparasitics), R (respiratory system), S (sensory organs) and S (various).

To check whether there was compliance with the pharmacological treatment, the patient's report on observance of proper posology while using the medication was taken into account.

The DRPs were categorized in unnecessary drug therapy, needs additional drug therapyineffective drug, dosage too low, adverse drug reaction, dosage too high), and adherence (noncompliance) (Cipolle et al., 2012). Pharmaceutical interventions consisted of actions aimed at solving DRPs, as well as health education actions. Pharmaceutical interventions were categorized as per classification proposed by Sabater, Fernandez-Llimos, Parras, and Faus (2005; Figure 1). When needed, patients were referred to a doctor or another health professional to assess the patient's situation and take the most appropriate action.

Results were compiled on Microsoft Excel 2007. Frequencies (n and %) for the investigated variables were calculated.

Results

Table 1 shows frequencies as to gender, age and information on medication usage referred to by the interviewees.

In the study sample (n = 59), the average age was 63 years, and most participants (60%) were aged between 51 and 80. Women accounted for 75% (n = 44) of the sample, while men were 25% (n = 15).

Access to medication for most interviewed participants (97%) occurred by means of community pharmacies, popular pharmacies, basic health units of the Brazilian Unified Health System [*Sistema Único de Saúde*] (SUS), free samples/donations, health insurance, or imports, but 3% reported they could not purchase medicines due to the high prices.

	Intervention	Definition
To intervene on the quantity of the drug	To change the dose	Adjustement of the quantity of drug being administered right away.
	To change the dosing	Change of frequency and/or duration of treatment.
	To change the administration schedule (redistribution of the quantity)	Change of the scheme in which the doses of drug are distributed for one day.
To intervene on pharmacological strategy	To add one or more drugs	Addition of a new drug that was not in use by the patient.
	To withdraw one or more drugs	Abandon of the administration of a specific drug(s) among those used by the patient.
	To replace one or more drugs	Replacement of any drugs among those used by the patient by others with different composition or of different pharmaceutical form or administration route.
To intervene on the patient's education	To reduce the involuntary noncompliance (educate in the use of the drug)	Education about instructions and warnings for the correct use and administration of the drug.
	To reduce the voluntary noncompliance (change of behavior towards the treatment)	Emphasis on the importance of patient's acceptance of the treatment.
	To educate about non-pharmacological measures	Education of the patient about all hygienic and dietetic measures that can help to reach the therapeutic objectives.
*Pharmacist's intervention is defined as the proposed action on the treatment and/or the action on the patient aimed at finding a solution for or preventing a negative clinical outcome of the pharmacotherapy		

Figure 1. Classification of Pharmaceutical Interventions according to Sabater et al. (2005). Source: Types of pharmacist intervention in pharmacotherapy follow-up.

Table 1. Gender and age frequencies, and information on medication usage referred to by the interviewees (n = 59).

Variables	N (%)
Gender	
Female	44 (75%)
Male	15 (25%)
Patients' average age (years)	63
Age group (years)	
20-50	13 (22)
51-80	35 (60)
81 or +	09 (15)
No answer	02 (03)
On medication usage	
Patients who had access to medication	57 (97%)
Average number of medication used per patient	08
Number of patients using prescribed medication	59 (100%)
Number of patients using unprescribed medication	31 (53%)
Patients using alternative therapy	26 (44%)
Total medication	480

Each interviewee took on average 8 medications; the minimum was 3 products, while the maximum was 18. All patients said they took at least one prescribed medication, and 53% claimed the use of at least one unprescribed medication, resulting in 480 drug therapies assessed.

Figure 2 shows health problems reported by patients at the first pharmaceutical consultation (n = 279). There was an average of 5 health problems per interviewee, with the most frequent chronic health conditions being: cardiovascular problems (23%), digestive problems (12%), rheumatic problems (8%), depression and diabetes (7% each). The least frequent problems were included in group 'others' (20%): anxiety, hypothyroidism, thrombosis, labyrinthitis and respiratory problems.

As shown in Table 2, prescribed and unprescribed drug therapies used and reported by the interviewees amounted to 480, with the most frequently mentioned medications being for the cardiovascular system (28%), followed by alimentary tract and metabolism (23%), and nervous system (20%).

About medicinal plants, 26 (44%) interviewees reported having used them. The most common plants were: chamomile (16%), lemon balm (10%), fennel (10%), mint (6%) and others (concentrate of medicinal plants, forskohlii, cinnamon, *espinheira-santa* (*Maytenus ilicifolia*), hibiscus, maté and clove).

As for DRPs, an average of 1.49 was detected per patient (n = 88). Non-compliance was the most frequent DRPs found (45%) in the interviewees' therapies, followed by unnecessary drug therapy (19%) and adverse drug reaction (17%) (Table 3).

Figure 3 presents the pharmaceutical interventions performed.

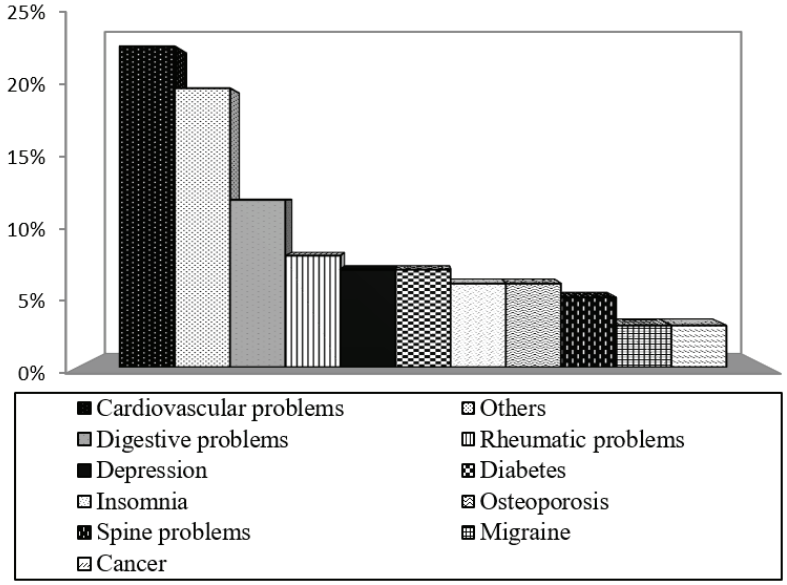

Figure 2. Frequency of health problems reported by patients (n = 279).

Table 2. Distribution of prescribed and unprescribed medications reported by the interviewees, according to the ATC classification (WHO, 2017) (n = 480).

ATC System Main Anatomical Groups	ATC Code	N(%)
Alimentary tract and metabolism	A	108 (23)
Blood and blood forming Organs	B	29 (6)
Cardiovascular system	C	134(28)
Dermatologicals	D	07 (2)
Genito urinary system and sex hormones	G	03 (1)
Systemic hormonal preparations	H	15 (3)
Antiinfectives for systemic use	J	07 (2)
Antineoplastic and immunomodulating agents	L	04 (1)
Musculo-skeletal system	M	48 (10)
Nervous system	N	94 (20)
Antiparasitics	P	03 (1)
Respiratory system	R	14 (3)
Sensory organs	S	01 (0)
Various	Sv	13 (3)

A total of 63 pharmaceutical interventions were performed, with the main ones being related to patient education on the treatment (n = 33; 52%), including: educating on non-pharmacological measures (n = 16; 25%), changing behaviors towards the treatment (n = 4; 6%), and educating on medication usage (n = 13; 21%). Educating on non-pharmacological measures included counseling on health food habits (such as eating whole grain bread, fruits and vegetables, and avoiding salt, animal fats, sugar and preservatives), hygiene habits, health practices (behaviors related to sleep, exercise and leisure), positive mental attitudes (such as avoiding extreme emotions, stress, tension and depressive situations), and preventive behaviors (compliance with recommendations, regular medical follow-up, and search for health-related information).

Interventions related to pharmacological strategy represented 21% (n = 13), consisting of addition (n = 1; 2%), exclusion (n = 3; 4%) or substitution (n = 9; 14%) of medication(s) by composition, pharmaceutical form or administration means, in cases of non-prescription drugs. Only 6% (n = 4) of the interventions performed were related to changes in medication amount, characterized by changes in dosage (n = 2; 3%), posology (n = 1; 2%) and frequency of administration (n = 1; 2%). A total of 21% (n = 13) of the patients were referred to another health professional or health service.

Discussion

Analyzing the profile of followed-up patients, there was a predominance of women (75%) aged between 51 and 80 years (60%). This profile is similar to those of studies conducted in many countries, which have shown that sex (female) and age (older) are sociodemographic characteristics most consistently associated with medication consumption (Ensing et al., 2019; Maes, Hersberger, & Lampert, 2018).). Due to the predominantly older age group, the analysis of medications and health problems presented confirms the prevalence of cardiovascular problems, alimentary tract problems and nervous system problems finding in others studies (Kari, Kortejärvi, Airaksinen & Laaksonen, 2018). and require special care on the part of professionals.

Table 3. Drug-related problems (DRPs) found in the patients' pharmacological therapy (n = 88).

Classification	DRP Type	N (%)
Unnecessary drug therapy	01	17 (19)
Needs additional drug therapy	02	6 (7)
Ineffective drug	03	01 (1)
Dosage too low-	04	04 (5)
Adverse drug reaction	05	15 (17)
Dosage too high	06	05 (6)
Non-compliance	07	40 (45)

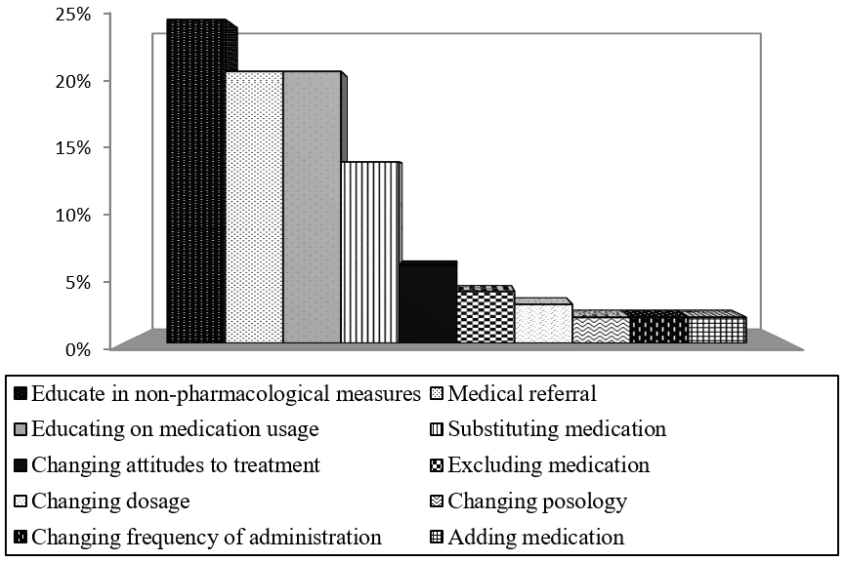

Figure 3. Type of Pharmaceutical Interventions Performed (n = 63).

The average number of DRPs identified per patient (1.49) was lower to that found in a study developed by Ensing et al. (2018) (4.9 DRP per patient). Clinical circumstances that may trigger a DRP are linked to the medication itself, to the patient, the prescriber, the pharmacist or the healthcare system. The most common DRP category was non-compliance (45%), results found in Australian by (Rao, Gilbert & Srand, 2007). Many factors can affect patient compliance with the treatment, such as poor understanding of the disease/treatment, inappropriate techniques, lifestyle issues, and anxiety about treatment (Rao et al., 2007). Kari et al. (2018) found higher frequence of the intentional than unintentional non-adherence (13 and 9 respectively). Intentional non-adherence includes cases in wich the patient does not follow the instructions given, and not take the prescribed drug. Unintentional non-adherence includes situations where the drug is used for wrong purpose, inappropriate timing of administration, wrong way, and when the patient has misunderstood the instructions.

Pharmaceutical care can result in improved recognition of drug therapy problems confronting patients (Rao et al., 2007). Interprofessional team work, medication reviews, patient□centred care, and patient involvement could result in fewer DRPs and better drug therapy outcomes (Kari et al., 2018).Because of the population's lack of knowledge about the risks and benefits of using medications, most pharmaceutical interventions performed (52%) were related to patient education, and about 20% of the patients were referred to another health professional. That said, pharmacists, through consultations, helps to improve the assistance provided to patients; far from substituting medical consultation, they join efforts to ensure a pharmacotherapy that is adequate to polymedicated patients (Conselho Federal de Farmácia, 2016).

Conclusion

This study revealed that medication usage was higher in women and older individuals. Most of the patients reported use of a high number of medications simultaneously and required pharmaceutical interventions, with the main interventions being related to patient education on the treatment.

The information provided by this study showed a poor pharmacotherapy follow-up for polymedicated patients, resulting in a high number of drug-related problems.

By providing pharmaceutical care, pharmacists play a relevant role in improving pharmacotherapy along with other health professionals. These actions can help to reduce morbidity and mortality for patients and communities, besides reducing costs for health services.

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