

Influence of Community Pharmacists' Attitudes on Antibiotic Dispensing Behavior: A Cross-sectional Study in Portugal

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ABSTRACT

Purpose: The emergence of microbial resistance is widely associated with inappropriate antibiotic use. Self-medication with antibiotics acquired directly from pharmacies without a medical prescription has been reported by several European countries as being an important cause of such inappropriate use. The goal of this study was to identify and evaluate community pharmacists' attitudes toward and knowledge of antibiotics and microbial resistance and to assess what influence, if any, these attitudes might have on their propensity to dispense unprescribed antibiotics.

Methods: We conducted a cross-sectional study covering all community pharmacists registered with the Official College of Pharmacists in Portugal's Central Region. A self-administered questionnaire on attitudes toward microbial resistance and antibiotic use was mailed to 1197 pharmacists. Responses ranged from 0 (total disagreement) to 10 (total agreement). Logistic regression was used to model the association between respondents' attitudes and their propensity to dispense antibiotics without an earlier medical prescription.

Findings: The overall response rate was 64.8%. Agreement with the dispensing of unprescribed antibiotics was highest in the case of dental diseases and ailments, followed by urinary tract infections. Although none of the sociodemographic data were associated with a propensity to dispense antibiotics without a medical prescription, the attitudes shown to be significantly associated with this propensity were complacency about patients, responsibility of others, and precaution or fear.

Implications: Because the attitudes of community pharmacists can influence their readiness to dispense

unprescribed antibiotics, educational interventions addressing such attitudes should be implemented to improve antibiotic use. (*Clin Ther.* 2015;37:168–177) © 2015 Elsevier HS Journals, Inc. All rights reserved.

Key words: antibiotics, attitudes, community pharmacists, microbial resistance, Portugal.

INTRODUCTION

Microbial resistance to antibiotics is an emerging public health issue worldwide and has been pinpointed as a major consequence of the inappropriate use of antibiotics.^{1–3} The emergence of microbial resistance has had a significant impact on patient morbidity and mortality, as well as on the increase in health care costs.^{4–6} Most antibiotics are consumed by outpatients,⁷ and nonprescription antibiotic consumption, obtained directly from pharmacies (even in countries where it is illegal) or with leftovers from previous courses of treatment, has been identified in several European countries.^{8–17} The use of unprescribed antibiotics could increase the risk of microbial resistance^{18,19} because it is associated with incorrect self-diagnosis,⁸ inappropriate selection of antibiotics and doses, and shorter courses of treatment.^{19–21}

Similar to other countries, Portugal has a high rate of outpatient antibiotic use,^{2,22} and some studies have identified instances of nonprescription antibiotic

Accepted for publication November 7, 2014.

<http://dx.doi.org/10.1016/j.clinthera.2014.11.006>

0149-2918/\$ - see front matter

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consumption.^{23–26} Despite the fact that the sale of antibiotics without a prescription is illegal in Portugal, a recent study reported that ~23% of respondents found it fairly easy to acquire antibiotics without a prescription from a community pharmacy.²⁶ Although pharmacists play a key role in preventing access to unprescribed antibiotics, there is a lack of research into their reasons for dispensing these drugs without a medical prescription. Accordingly, the aim of the present study was: (1) to estimate the percentage of pharmacists who have a propensity to dispense antibiotics without a medical prescription; and (2) to assess what attitudes and knowledge affect such behavior. Identification of factors that influence the propensity to dispense unprescribed antibiotics would enable specific purpose-designed intervention strategies to address this problem.

SUBJECTS AND METHODS

Study Setting and Population

The study was conducted in the area covered by Portugal's Central Regional Health Administration (Administração Regional de Saúde do Centro IP). To practice their profession, all community pharmacists in Portugal are required to be registered members of the Official College of Pharmacists. The study population thus comprised all community pharmacists (N = 1197) who were formally registered with the Official College of Pharmacists of the Central Region in September 2011 and had their address situated within the regional health administration's designated catchment area.

Community pharmacists in Portugal are divided into 3 categories: technical director, assistant pharmacist, and pharmacist. The technical director is the person in charge of the pharmacy and is replaced by the assistant pharmacist in his or her absence. Until August 2007, the owner of a pharmacy had to be both a pharmacist and the technical director. Hence, in most pharmacies, the technical director is also the owner.

Participants gave their consent to participate in the study after reading a cover letter with a detailed explanation of the study in which they were informed that all data are confidential. The completing and mailing of the questionnaire were completely voluntary, with no counterparties. Authorization for this study (permit no. 2886/2013) was obtained from the

Portuguese Data Protection Authorities (Comissão Nacional de Proteção de Dados).

Data Collection

A self-administered questionnaire, complete with a prepaid, self-addressed return envelope and pencil, was mailed to the 1197 registered community pharmacists. Also included were 2 cover letters: 1 from our research group outlining the study objectives and stressing the importance of participating, and another from the chairman of the Central Region's Official College of Pharmacists endorsing the study and encouraging participation. To boost the response rate, questionnaires were re-sent to nonrespondents up to a maximum of 4 times (at 4- to 8-week intervals).²⁷

The questionnaire was designed on the basis of results from a previous qualitative study, which consisted of 6 focus group sessions with a total of 32 pharmacists.²⁸ The final questionnaire was printed on a single sheet (2 pages), divided into the following 5 sections: section 1 contained a box with instructions on how to complete the form; section 2 contained 17 statements (scale items) regarding knowledge of and attitudes regarding antibiotic resistance and the antibiotic dispensing process, followed in each case by a continuous visual analog scale (VAS) for respondents to mark with a cross; section 3 contained an assessment of situations in which antibiotics would sometimes be dispensed without the necessary medical prescription provided that the patients were known, followed in each case by a continuous VAS for respondents to mark with a cross; section 4 contained sociodemographic data, such as age, sex, workplace, job function, and mean number of antibiotics dispensed; and section 5 contained a request to professionals to make suggestions about antibiotic use and microbial resistance.

The attitude and statement scale items in sections 2 and 3 of the questionnaire were measured by using a horizontal, continuous, unnumbered, 8-cm long VAS. Visual analogue scales (VAS) are derived from the Likert scale, are reputed to be highly sensitive for detecting small differences, and are also believed to be possibly more reliable and valid than Likert scales.²⁹ The position of the cross placed against each question by the respective participants was scored in a range from 0 (total disagreement) to 10 (total agreement), with a precision of 0.5. Face and content validity (ie, language, organization, appropriateness and logical sequence of statements, accuracy, clinical terminology, completeness

and meaning of items, comprehension of the questionnaire) were assessed by experts in the respective fields, resulting in small amendments to the text.³⁰

To evaluate reliability and reproducibility, a pilot (test–retest) study was conducted on a sample of 41 community pharmacists, with questionnaires being delivered to each pharmacist twice, at intervals of 2 to 4 weeks.³⁰ Cronbach's α (internal consistency) for section 3 of the questionnaires was 0.716. Reproducibility (degree of agreement among answers), as shown by the intraclass correlation coefficient (95% CI), ranged from fair to good to excellent for sections 2 and 3 of the questionnaire.

Statistical Analyses

Logistic regression was used to model the association between independent variables and pharmacists' propensity to dispense antibiotics without a prescription (dependent variable). The dependent variable was determined by using section 3 of the questionnaire (situations in which pharmacists acknowledged that, in cases in which patients were known, antibiotics would sometimes be dispensed without a medical prescription). A propensity to dispense antibiotics without a medical prescription was presumed to exist in any case in which a pharmacist awarded a VAS score of ≥ 5 to at least 1 of the 4 situations identified in section 3 of the questionnaire (S1, dental diseases and ailments; S2, upper respiratory tract infections; S3, urinary tract infections; or S4, any infection in which the patients undertakes to bring in a prescription).

Statistical Models

A multivariate model was constructed, using variables of exposure (sociodemographic and professional [eg, age, sex, job function, years of experience in community pharmacies, hospitals and other areas]) and potential confounding. This model was adjusted for the effects of any potential confounder having a statistical significance <0.2 in the bivariate model. Results were expressed as odds ratios (ORs) with their 95% CIs, which indicate the increase/decrease in the probability of dispensing antibiotics without a prescription for every increase of 1 unit on the continuous VAS (score range, 0–10). To consider the incremental exposure corresponding to the interquartile range of any given attitude, the interquartile OR (IqOR) was calculated taking into account the distribution of

independent variables among all participants. Because some of the ORs register values lower than unity, we calculated the inverse of the IqOR ($1/\text{IqOR}$), which can be interpreted as the increase in the probability of a propensity to dispense antibiotics without a medical prescription when the $1/\text{IqOR}$ decreases from the 75th to the 25th percentile of the sample.

RESULTS

There was an overall response rate of 64.8% ($n = 770$); of the 1197 questionnaires sent, 8 were returned due to change of address and 7 were excluded for lack of evidence to show that the respondents were community pharmacists (Figure). The sociodemographic data of the final study sample ($n = 763$) are shown in Table I. No multivariate analysis was performed because no potential confounders were found.

Propensity to Dispense Antibiotics Without a Medical Prescription

Table II shows the degree of agreement expressed by the study population with situations in which antibiotics would sometimes be dispensed without a medical prescription if the patient was known to the pharmacist. Agreement with the dispensing of unprescribed antibiotics was highest in the case of dental diseases and ailments, followed by urinary tract infections.

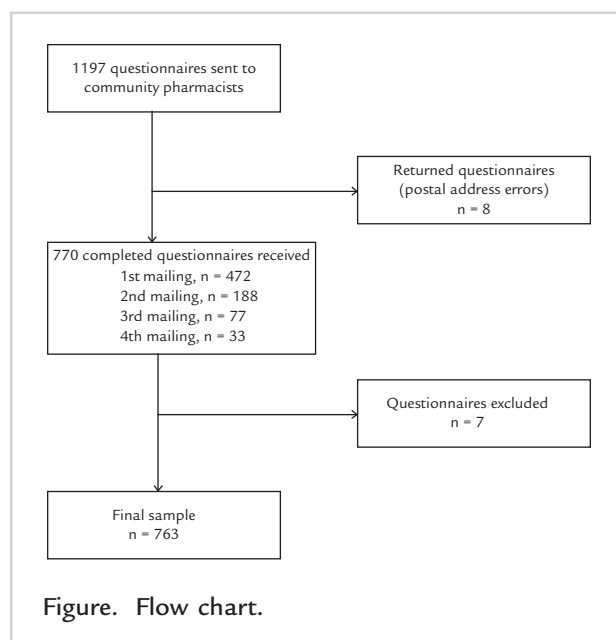


Figure. Flow chart.

Table I. Influence of sociodemographic characteristics on pharmacists' propensity to dispense antibiotics without an earlier medical prescription.

Characteristic	% (n)	Propensity to Dispense Antibiotics Without Medical Prescription		OR (95% CI)	P
		Yes (n)	No (n)		
Age, y					
<30	29.2 (225)	112	113	1	
30–40	35.8 (276)	131	144	1.038 (0.726–1.485)	0.837
≥41	33.5 (258)	126	132	0.953 (0.678–1.339)	0.782
Sex					
Male	19.0 (145)	75	70	1	0.396
Female	80.6 (615)	294	321	1.170 (0.814–1.680)	
Job function					
Technical director*	36.2 (272)	135	145	1.033 (0.747–1.428)	0.844
Assistant pharmacist†	40.4 (308)	151	157	0.987 (0.671–1.450)	0.945
Pharmacist	21.6 (165)	79	86	1	
Years of experience in community pharmacy					
<5	33.4 (255)	123	132	1	
≥5	65.0 (496)	241	255	0.986 (0.729–1.334)	0.927
Experience in other areas					
Hospital pharmacist	5.4 (41)	16	25	1.511 (0.794–2.879)	0.209
Other	8.5 (65)	33	32	0.974 (0.586–1.619)	0.918

OR = odds ratio.

*Person in charge of the pharmacy.

†Replaces the technical director in the latter's absence.

Table II. Propensity of pharmacists to dispense antibiotics without an earlier medical prescription: calculation of dependent variable.

In cases in which the patient is known to the pharmacist, antibiotics are sometimes dispensed without a medical prescription in the following situations:	Percentile			
	25th	50th	75th	Scores ≥ 5*
1. Dental diseases and ailments (eg, dental abscesses)	0.5	2.0	6.5	293 (38.4%)
2. Upper respiratory tract infections (eg, otitis media, pharyngitis)	0.5	0.5	2.5	112 (14.7%)
3. Urinary tract infections (cystitis)	0.5	2.5	5.5	276 (36.2%)
4. Any infection in which the patient undertakes to bring the prescription	0.5	0.5	1.0	65 (8.5%)
At least 1 of the preceding statements (dependent variable)				371 (48.6%)

*Where the cross was placed at or above the 5-point mark on the continuous visual analog scale.

Pharmacists' Attitudes to and Knowledge of Antibiotic Use

Pharmacists' degree of agreement with the respective attitude scale items is shown in percentile terms in [Table III](#). In general, pharmacists were in agreement (median, 10) with the statements S1, S3, S5, S7, S14, and S15. In contrast, pharmacists disagreed with the assertions of statements S8 and S12 (median, 0.5) and S6 (median, 1).

Factors Associated With a Propensity to Dispense Antibiotics Without a Medical Prescription

As can be seen in [Table I](#), none of the socio-demographic data were associated with a propensity to dispense antibiotics without a medical prescription. The relationship between knowledge/attitudes and a propensity to dispense unprescribed antibiotics is expressed statistically in [Table III](#). For every 1-unit increase in the VAS score (range of 0 [total disagreement] to 10 [total agreement]), this propensity was increased in several instances. First, in the case of complacency about patients, the propensity to dispense unprescribed antibiotics increased by 43% in response to "antibiotics are sometimes dispensed without medical prescription because the patient is known to have difficulty in obtaining a medical consultation," by 53% in response to "antibiotics are sometimes dispensed without medical prescription because the patient is known to have neither the time nor the money to see a physician," and by 18% in response to "if a patient feels that he or she needs antibiotics and these are not dispensed, he or she will easily manage to obtain them at another pharmacy." Second, propensity was increased in the case of the responsibility of others (patients), by 10% in response to "two of the main causes of the appearance of antibiotic resistance are patient self-medication and antibiotic misuse" and in the case of the responsibility of others (health care systems) by 9% in response to "dispensing antibiotics without prescription should be more closely controlled." Lastly, propensity to dispense unprescribed antibiotics increased in the case of fear/precaution by 8% in response to "if a patient feels that he or she needs antibiotics and these are not dispensed, he or she will easily obtain the prescription and could accuse us of having delayed treatment."

DISCUSSION

There have been few studies which identify knowledge and attitudes that might influence community pharmacists' propensity to dispense antibiotics without a medical prescription. However, many European studies¹¹⁻¹⁵ have found that it is possible to buy antibiotics directly from pharmacies without a prescription, even where this is a mandatory statutory requirement. Moreover, the opportunity to acquire unprescribed antibiotics from pharmacies has been identified as an important factor contributing to self-medication with these drugs,⁸ revealing the need to evaluate factors that could influence pharmacists' propensity to dispense antibiotics without a medical prescription.

Our results indicate that pharmacists' knowledge and attitudes could influence their propensity to dispense antibiotics without an earlier medical prescription. The attitudes that proved most significant in influencing this propensity were: complacency about patients, responsibilities of others (patients and the health care system), and fear or precaution. Socio-demographic characteristics, such as sex, age, job function, and years of experience, appeared to have no influence on the propensity to dispense unprescribed antibiotics. During the previous qualitative study,²⁸ the new generation of pharmacists was reported to be less closely associated with antibiotic dispensing without a medical prescription, but the present study detected no statistically significant difference between pharmacists with ≥ 5 years' and those with < 5 years' experience.

The clinical situations in which pharmacists registered the highest degree of agreement with dispensing without a medical prescription were dental diseases and ailments (38.4%), followed by urinary tract infections (36.2%), and, to a far lesser extent, upper respiratory tract infections (14.7%). In an European study involving 19 countries,⁸ the population was surveyed on their use of antibiotics without medical indication. The most commonly cited reasons for self-medication were throat symptoms, bronchitis, and tooth or gum complaints, followed by urinary tract infections. Because the Portuguese population was not included in this European study, it might be interesting to conduct a local survey in Portugal and compare the populations' stated intentions regarding self-medication with our results on pharmacists' propensity to dispense antibiotics without a medical prescription.

Table III. Influence of surveyed attitudes and knowledge on pharmacists' propensity to dispense antibiotics without an earlier medical prescription.

Attitude or Knowledge	Percentile			Units		Interquartile	
	25	50	75	OR (95% CI)	<i>P</i>	Interquartile OR (95% CI)	1/Interquartile OR (95% CI)
S1: Antibiotic resistance is an important public health problem of ours.	10	10	10	0.952 (0.845–1.071)	0.412	—	1
S2: The fact that a patient taking an antibiotic increases the risk of developing resistance.	5	7	10	0.974 (0.929–1.022)	0.286	—	1.14 (0.90–1.45)
S3: In all cases in which antibiotics are dispensed, it is essential that patients be advised about complying with the treatment.	10	10	10	1.003 (0.636–1.538)	0.989	1	—
S4: An important cause of the appearance of antibiotic resistance is long-term prescription of new molecular entities.	7	9	10	0.967 (0.985–1.022)	0.234	—	1.11 (0.94–1.05)
S5: When dispensing, possible interactions between the antibiotic and other drugs that the patient is taking should be assessed.	9	10	10	0.984 (0.891–1.087)	0.755	—	1.02 (0.92–1.12)
S6: Antibiotics are sometimes dispensed without a medical prescription because the patient is known to have difficulty in obtaining a medical consultation.	0.5	1	4.5	1.434 (1.338–1.537)	<0.0001	4.23 (3.2–5.58)	—
S7: Two of the main causes of the appearance of antibiotic resistance are patient self-medication and antibiotic misuse.	8.5	10	10	1.097 (1.024–1.175)	0.008	1.15 (1.04–1.27)	—
S8: Antibiotics are sometimes dispensed, even when it is known that they are not indicated, because there is no time to explain the reason why they are not called for.	0.5	0.5	1.5	1.03 (0.972–1.092)	1.319	1.03 (0.97–1.09)	—
S9: If a patient feels that he or she needs antibiotics and these are not dispensed, the patient will easily obtain the prescription and could accuse us of having delayed treatment.	0.5	4	7.5	1.078 (1.033–1.126)	0.001	1.69 (1.26–2.29)	—
S10: I am convinced that new antibiotics will be developed to solve the problem of resistance.	3.5	5.5	7.5	1.036 (0.982–1.093)	0.2	1.15 (0.93–1.43)	—

(continued)

Table III. (continued).

	Percentile			Units		Interquartile	
	25	50	75	OR (95% CI)	<i>P</i>	Interquartile OR (95% CI)	1/Interquartile OR (95% CI)
Attitude or Knowledge							
S11: The use of antibiotics in animals for human consumption is an important cause of the appearance of new resistance to pathogenic agents in humans.	7	9	10	0.982 (0.920–1.049)	0.596	—	1.06 (0.87–1.28)
S12: Antibiotics are sometimes dispensed without a medical prescription because the patient is known to have neither the time nor the money to see a physician.	0.5	0.5	3	1.527 (1.403–1.661)	0.0001	2.88 (2.33–3.56)	—
S13: If a patient feels that he or she needs antibiotics and these are not dispensed, the patient will easily obtain them at another pharmacy.	3.5	5.5	8.5	1.180 (1.122–1.241)	<0.0001	2.29 (1.78–2.94)	—
S14: Antibiotic prescribing should be more closely controlled.	9.5	10	10	0.904 (0.837–0.982)	0.017	—	1.05 (0.9–0.94)
S15: Dispensing antibiotics without a prescription should be more closely controlled.	9.5	10	10	0.879 (0.806–0.959)	0.004	—	1.07 (1.02–1.11)
S16: The phenomenon of resistance to antibiotics is mainly a problem in hospital settings.	1	3	6	1.045 (0.996–1.097)	0.075	1.25 (0.98–1.59)	—

OR = odds ratio.

Few pharmacists (8.5%) showed a propensity to dispense antibiotics without a medical prescription for any infection in which the patient undertook to bring the prescription, revealing more concern about legal consequences than public health issues. Acquiring antibiotics from pharmacies without a prescription, whether by direct purchase or by providing a prescription retrospectively, has been reported in several studies.^{11–15} Enforcement of the laws regulating the sale of antibiotics was identified as a potentially modifiable factor facilitating self-medication.³¹ In Portugal, there is no official control by the authorities of the number of antibiotics that are sold with and without a prescription. Pharmacists were largely in agreement with enforcing control of both the dispensing and the prescribing of antibiotics (statements S14 and S15), disclaiming their own responsibility and instead placing it on others.

Difficulties in accessing health care, whether because of a lack of physicians or because patients have no money to pay fees, were identified as relevant determinants of self-medication.³¹ In some regions of Portugal, there are not enough general practitioners to manage the population, and access to the country's National Health System is not free of charge; therefore, patients view pharmacists as first-line health professionals for solving their problems, and they exert great pressure on these pharmacists to obtain what they think they need. In our study, pharmacists showed themselves to be complacent about patients precisely because they felt that patients had neither the time nor the money to see a medical physician. Complacency with patients strongly influences the propensity to dispense antibiotics, probably because patients exert great pressure to obtain these drugs. This is particularly true in the case of regular patients, when pharmacists know their clinical history and feel that they are competent to dispense antibiotics without a prescription for certain minor complaints.²⁸

Total agreement with statement S3 (“Antibiotic resistance is an important public health problem of ours”) revealed that pharmacists have a positive attitude from a collective point of view but, when faced by individual patients and customers, their behavior changes. However, when it came to information given to the patient, pharmacists not only had a positive attitude but were also unanimous regarding the need to advise patients about complying with treatment and to assess possible interactions between

the antibiotics prescribed and any other chronic medication being taken by patients. Indeed, therapeutic noncompliance has been described as having some impact on antibiotic resistance in the community.³² The paucity of studies evaluating the influence of pharmacists' attitudes and knowledge on antibiotic dispensing renders any possible comparison of results difficult. Nevertheless, some studies highlight the role of pharmacists in managing patients' medication in primary care.^{33,34}

One important limitation of our study is that the data were self-reported. The dependent variable (propensity to dispense antibiotics without a previous medical prescription) was calculated from self-reported, VAS-rated agreement with situations in which pharmacists considered that antibiotics were sometimes dispensed without a medical prescription. Responses were limited to 4 dispensing situations and did not explore all the possible situations that might lead a pharmacist to dispense antibiotics without a medical prescription. It must be noted, however, that the situations described were drawn from a previous qualitative study,²⁸ in which pharmacists recognized some upper respiratory tract infections, urinary tract infections, and dental diseases as constituting clinical scenarios in which antibiotics were sometimes dispensed without an earlier medical prescription. Other limitations of these types of studies include nonresponse bias and the fact that professionals may admit to less dispensing than they really engage in. Nevertheless, one of the strengths of this study was its high response rate, with no monetary inducements.

Our study found that both the dispensing of antibiotics without a previous medical prescription and the quality of the information given during the dispensing process may be related to pharmacists' attitudes. We feel that these attitudes should be discussed in all countries to clarify the role of pharmacists in managing patients' medicines and in promoting the appropriate use of such medicines and the health of their communities, both individual and public. The Portuguese authorities are currently discussing what should be included as pharmaceutical care in community pharmacies. The role of clinical pharmacists when it comes to interacting with physicians to solve urgent yet uncomplicated situations linked to infectious symptoms could serve to enhance antibiotic use, by reducing both the prescribing and the dispensing of these agents. Regular pharmacotherapy discussions

between pharmacists and physicians are reported to be one of the possible factors responsible for the comparative improvement in antibiotic use in the Netherlands compared with Belgium.³³

CONCLUSIONS

Antibiotic dispensing at community pharmacies may be influenced by pharmacists' attitudes in general, and by complacency about patients, the alleged responsibility of others, and precaution or fear in particular. It is therefore essential that educational interventions addressing such attitudes be designed and implemented to prevent the use of antibiotics without a medical prescription.

Such interventions will reinforce the importance of the correct use of antibiotics, the consequences of dispensing antibiotics without an earlier medical diagnosis, and ways of improving pharmacist–patient communication. The general population will be exposed to the interventions through flyers and posters about the correct use of antibiotics and the need to have a medical diagnosis before taking these drugs.

ACKNOWLEDGMENTS

This work was supported by Foundation for Science & Technology (Fundação para a Ciência e Tecnologia) grants (PTDC/SAU-ESA/105530/2008) and (Pest-OE/EGE/UI4056/2014) from the Portuguese Ministry of Science & Education.

F. Roque, L. Breitenfeld, A. Figueiras, M.T. Herdeiro are responsible for study design, F. Roque, S. Soares are responsible for data collection, F. Roque, A. Figueiras, M.T. Herdeiro are responsible for data analysis, F. Roque, is responsible for writing the paper and L. Breitenfeld, A. Figueiras, M.T. Herdeiro are responsible for revising the paper.

The authors express their sincere thanks to all pharmacists who agreed to participate in this study and to Paulo Fonseca, PharmD, and president of the Central Region's Official College of Pharmacists, when the study was performed. They also thank Maria Piñeiro Lama, of the Biomedical Research Consortium, Santiago de Compostela University Clinical Teaching Hospital, for her help with the statistical analysis.

CONFLICTS OF INTEREST

The funders had no role in study design, data collection and analysis, or in the writing of the article.

The authors have indicated that they have no conflicts of interest regarding the content of this article.

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