

## Determinants of antibiotic dispensing without a medical prescription: a cross-sectional study in the north of Spain

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**Objectives:** Antibiotic resistance is a major public health concern and is greatly exacerbated by inappropriate antibiotic use at a community level. The aim of this study was to ascertain which attitudes of community pharmacists were related to inappropriate antibiotic dispensing.

**Methods:** We conducted a cross-sectional study of community pharmacists in a region situated in northern Spain ( $n=393$ ). Personal interviews were conducted using a self-administered questionnaire. The degree of agreement with each item of knowledge and attitude was measured using an unnumbered, horizontal visual analogue scale, with replies being scored from 0 (total disagreement) to 10 (total agreement). The data were analysed using logistic regression.

**Results:** Of the total of 286 pharmacists (72.8%) who completed the questionnaire, 185 (64.7%) acknowledged having undertaken dispensing of antibiotics without a medical prescription (DAwMP). Attitudes such as *patient complacency*, *external responsibility*, *indifference* and *insufficient knowledge* were shown to be related to DAwMP. In contrast, no association was found with any of the pharmacists' personal or professional traits.

**Conclusions:** This study confirms that, albeit unlawful, DAwMP is a common practice in Spanish pharmacies. DAwMP was seen to be usually associated with some of the attitudes evaluated.

**Keywords:** antimicrobial resistance, pharmacists, antibiotic usage

### Introduction

Antibiotic resistance has become one of the most important public health problems worldwide due to morbidity and mortality and healthcare costs.<sup>1,2</sup> Abusive and inappropriate antibiotic use exacerbates the phenomenon.<sup>3</sup> Spain has one of highest rates of antibiotic use per inhabitant.<sup>4</sup> Although the Spanish National Health System (SNHS) has a population coverage of almost 100%, 30% of all antibiotic use occurs outside the SNHS and is largely due to the dispensing of antibiotics without a medical prescription (DAwMP).<sup>5</sup> Although this practice is unlawful,<sup>6</sup> it is common in Spain,<sup>7</sup> favoured by the fact that it is not a punishable offence. This, in turn, means that dispensing depends on the attitude of the individual pharmacist.

This study sought: (i) to estimate the percentage of pharmacists who employ DAwMP; and (ii) to identify such pharmacists'

personal and professional traits, as well as their knowledge and attitudes, in view of the potential link between these and the practice of DAwMP.

### Methods

#### Ethics statement

Although we were undertaking an observational study, the Ethics Committee for Clinical Research of Galicia was informed and approval was granted (N° 2007/107).

#### Study setting and population

We carried out exhaustive sampling of the study population, which comprised all community pharmacists from a region in north-western Spain in September 2012 (183 pharmacies and 393 pharmacists).

## Measures

A self-administered questionnaire was used (available as Supplementary data at JAC Online). The statements were classified into three blocks: (i) personal and professional information; (ii) knowledge of and attitudes to antibiotics and antibiotic resistance; and (iii) DAwMP in four situations (urinary, dental and upper respiratory tract infections, and cases where the patient promised to bring the prescription at some later point in time). In this last block, respondents were given three options for each of the situations: no/yes/only if the patient is someone known to the pharmacist. Agreement with the statements was measured using an unnumbered, horizontal visual analogue scale 7 cm long,<sup>8</sup> with replies being scored from 0 (total disagreement) to 10 (total agreement).

## Questionnaire design, validity and reliability

The questionnaire was based on a previous qualitative focus group study conducted by our research group. (i) All the focus groups were recorded and transcribed. (ii) Data were analysed and grouped into categories (*complacency, insufficient knowledge, indifference and external responsibility*). (iii) These categories were transformed into statements, based on expressions used by the participants in the focus groups. (iv) The content and face validity was reviewed with the aid of pharmacology, psychology and public health experts. (v) The structure of the questionnaire was revised, and both the wording and the content of these items were improved. (vi) To assess the reproducibility (the degree of agreement among answers), a pilot test was conducted on 30 pharmacists. The questionnaire was delivered twice to each pharmacist, with an interval of 4 weeks.

## Procedure

A research team member (M. Z.-C.) personally delivered and retrieved the questionnaires. Pharmacy visits took place from 19 December 2012 to 1 February 2013. Pharmacists who were not at the pharmacy at the time of the visit were not included in the study.

## Definition of variables

The dependent variable was created from the fourth statement in the third block.

Participants who replied 'yes' or 'only if the patient is someone known to the pharmacist' in at least one of the four scenarios were classified as DAwMP.

## Statistical analysis

The reproducibility of the questionnaire was assessed using the intraclass correlation coefficient (ICC), based on the results obtained for the first and second answers from each pharmacist. The ICC was considered 'fair to good' when the ICC was  $>0.4$ .<sup>9</sup> Associations between the independent variables and DAwMP were modelled by multiple logistic regression. To take into account the distribution of the independent variables, we calculated the interquartile odds ratio (OR), which is the effect of the exposure change from the 25th to the 75th percentile. When the OR was  $<1$ , we calculated the inverse interquartile OR (1/interquartile OR), which is the effect when the exposure changes from the 75th to the 25th percentile.

## Results

In the pilot study, all scale items had an ICC  $>0.4$ . Of the pharmacies visited, 22 (12.0%) refused to participate in the study. Of the 286 pharmacists (72.8%) who completed the questionnaire, 185 stated that they carried out DAwMP (64.7%). None of their

personal and professional traits showed any relationship with DAwMP (Table 1). Table 2 shows the degree of agreement with the attitudes and their influence on DAwMP. The changes in exposure from the 25th to the 75th percentile increased the probability of DAwMP by 14% (95% CI 1%–30%) for *insufficient knowledge*, 119% (95% CI 42%–236%) for *external responsibility (health system)*, 46% (95% CI 11%–92%) for *indifference* and 484% (95% CI 235%–915%) for *complacency*. In the case of *external responsibility (investigation)*, a change from the 75th to the 25th percentile in the assessment of this opinion would mean an 80% increase (95% CI 19%–170%) in the probability of DAwMP.

**Table 1.** Influence of personal and professional traits on DAwMP

Traits	DAwMP, n (%)		Analysis <sup>a</sup>	
	no	yes	OR (95% CI)	P
Gender				
female	79 (78.2)	145 (78.4)	1.00	
male	20 (19.8)	35 (18.9)	1.01 (0.48–2.14)	0.974
MD	2 (2.0)	5 (2.7)	—	
Age (years) <sup>b</sup>				
<39	27 (26.7)	58 (31.4)	1.00	
39–48	34 (33.7)	55 (29.7)	0.70 (0.22–2.25)	0.546
>48	27 (26.7)	60 (32.4)	0.81 (0.31–2.16)	0.680
MD	13 (12.9)	12 (6.5)	—	
Work status				
owner	56 (55.4)	86 (46.5)	1.00	
staff	43 (42.6)	98 (53.0)	0.85 (0.42–1.71)	0.639
MD	2 (2.0)	1 (0.5)	—	
Population				
rural	47 (46.5)	89 (48.1)	1.00	
semi-rural	20 (19.8)	29 (15.7)	0.67 (0.31–1.43)	0.298
urban	32 (31.7)	65 (35.1)	0.69 (0.27–1.78)	0.444
MD	2 (2.0)	2 (1.1)	—	
Years of experience as community pharmacist <sup>b</sup>				
<11	28 (27.7)	58 (31.4)	1.00	
11–20	38 (37.6)	67 (36.2)	0.99 (0.29–3.42)	0.989
>20	26 (25.7)	49 (26.5)	0.83 (0.31–2.21)	0.705
MD	9 (8.9)	11 (5.9)	—	
Medication dispensed per day <sup>b</sup>				
<80	21 (20.8)	56 (30.3)	1.00	
80–150	39 (38.6)	74 (40.0)	1.11 (0.41–3.06)	0.837
>150	15 (14.9)	33 (17.8)	0.82 (0.35–1.94)	0.658
MD	26 (25.7)	22 (11.9)	—	
Antibiotics dispensed per day <sup>b</sup>				
<5	24 (23.8)	54 (29.2)	1.00	
5–10	35 (34.7)	88 (47.6)	1.40 (0.46–4.28)	0.554
>10	14 (13.9)	23 (12.4)	1.74 (0.72–4.20)	0.220
MD	28 (27.7)	20 (10.8)	—	

MD, missing data.

<sup>a</sup>Adjusted for the effects of the other variables included in the table.

<sup>b</sup>Categorized by tertiles of the total sample.

**Table 2.** Influence of attitudes to and opinions about DAWMP

Attitudes	Percentiles			OR (95% CI)	Interquartile OR (95% CI)	Inverse interquartile OR (95% CI)	P
	25	50	75				
(1) Antibiotic resistance is an important public health issue. <sup>a</sup>	9.0	10.0	10.0	1.14 (1.01–1.30)	1.14 (1.01–1.30)	—	0.041
(2) The fact that an antibiotic is prescribed to a patient will not influence the appearance of resistance. <sup>a</sup>	1.0	3.8	7.5	0.96 (0.89–1.02)	—	1.35 (0.86–2.13)	0.193
(3) The prescription of antibiotics is less strict under private insurance than under the Galician Health Service ( <i>Servizo Galego de Saúde—SERGAS</i> ). <sup>b</sup>	0.5	2.0	5.5	1.17 (1.07–1.27)	2.19 (1.42–3.36)	—	<0.001
(4) When dispensing antibiotics, I warn the patient about the importance of correct therapeutic compliance. <sup>a</sup>	10.0	10.0	10.0	0.94 (0.71–1.27)	—	1.00 (1.00–1.00)	0.711
(5) When dispensing, possible interactions between the antibiotic and other drugs that the patient is taking should be evaluated. <sup>a</sup>	9.5	10.0	10.0	1.00 (0.83–1.21)	—	—	0.988
(6) Antibiotics are sometimes dispensed without medical prescription because the patient is known to have difficulty in gaining access to a doctor. <sup>c</sup>	0.9	4.5	7.0	1.33 (1.22–1.46)	5.84 (3.35–10.15)	—	<0.001
(7) The main cause of the appearance of antibiotic resistance is inappropriate use by patients. <sup>b</sup>	8.0	9.5	10.0	0.98 (0.89–1.08)	—	1.04 (0.85–1.27)	0.693
(8) The wrong antibiotic is sometimes knowingly dispensed by pharmacists because there is no time to explain why it is not the correct one. <sup>d</sup>	0.5	1.0	3.3	1.15 (1.04–1.27)	1.46 (1.11–1.92)	—	0.007
(9) I am convinced that new antibiotics will be developed to solve the resistance issue. <sup>b</sup>	4.9	5.5	9.5	0.88 (0.81–0.96)	—	1.80 (1.19–2.70)	0.005
(10) The use of antibiotics on animals is an important cause of the appearance of new resistance. <sup>b</sup>	5.0	7.5	10.0	1.04 (0.95–1.13)	1.20 (0.79–1.83)	—	0.381
(11) If patients feel that they need an antibiotic and it is not dispensed, they will try to obtain it at another pharmacy. <sup>c</sup>	2.5	5.5	9.5	1.17 (1.09–1.26)	3.04 (1.82–5.10)	—	<0.001
(12) The phenomenon of resistance to antibiotics is mainly a problem in hospital settings. <sup>a</sup>	1.0	2.5	5.8	1.06 (0.98–1.15)	1.32 (0.92–1.92)	—	0.132

<sup>a</sup>Insufficient knowledge.<sup>b</sup>External responsibility.<sup>c</sup>Complacency.<sup>d</sup>Indifference.

## Discussion

The results of this study indicate that pharmacists' knowledge and attitudes are strongly associated with DAWMP. *Indifference, complacency, external responsibility* and *insufficient knowledge* have all been identified as attitudes that increase the risk of DAWMP. However, no association was found with personal and professional traits. Since attitudes are potentially modifiable, these results would indicate that educational strategies specifically aimed at changing certain attitudes could substantially improve antibiotic dispensing.

Our data confirm that the sale by pharmacies of antibiotics without a medical prescription continues to be widespread in Spain,<sup>7,10</sup> since over 60% of the pharmacists in our study acknowledged the practice. One possibility is that pharmacists feel competent to undertake DAWMP, particularly in the case of minor infections.<sup>11</sup> Our results indicate a much greater propensity to dispense in the case of urinary and dental infections than in the case of respiratory infections.<sup>7</sup> Some authors<sup>12</sup> have shown their agreement with the dispensing of antibiotics over the counter in cases such as minor urinary infections, although this is controversial.<sup>13</sup> When we performed a second analysis excluding dispensing for minor urinary infections, the influence of attitudes on dispensing habits was unchanged (data not shown).

When the pharmacist knew the patient (*complacency*), this increased the probability of DAWMP, which is consistent with another study conducted in the same setting.<sup>11</sup> Some pharmacists explain this practice by saying that they have regular customers and are familiar with their clinical history.<sup>14</sup> Since income depends on sales, this behaviour could nevertheless be motivated by the fear of losing a regular customer. Moreover, pharmacists who believe that patient would find the antibiotic at some other pharmacy increase the probability of DAWMP, probably to foster customer loyalty or for fear of losing the sale. Another factor that might influence DAWMP is the *pressure exerted by patients* to obtain an antibiotic. Medical prescribing is influenced by patients' expectations,<sup>15</sup> and a similar pattern of behaviour could well arise in the dispensing process, particularly in countries like Spain where patients are more prone to use antibiotics even for treating minor complaints and/or viral illnesses.<sup>16</sup> Pharmacists who felt that resistance is a major public health problem recognized DAWMP. This paradoxical effect can be explained because they give more importance to immediate efficacy or patient satisfaction (an individual point of view) over potential long-term antibiotic resistance in the population (a collective point of view).<sup>17</sup> *Responsibility to other professionals* (other pharmacists/medical staff, patients, the healthcare system or the use of antibiotics in animals) is another attitude associated with DAWMP and is common among health professionals.<sup>15,18</sup>

A possible limitation of this study is bias caused by those who did not respond. However, the level of participation was very high, to the extent of being one of the highest for this type of study (72.8%).<sup>19,20</sup> Another possible limitation is that the percentage of pharmacists who acknowledged DAWMP might be underestimated. However, this percentage is similar to others in Spain.<sup>5,7,11</sup> Such an acknowledgement could indicate that professionals placed trust in the anonymity of the questionnaire, presumably because it had been issued by an academic institution. Another possible study limitation was the difficulty of assessing the validity criterion, since there is no reference method for

measuring attitudes. However, the fact that knowledge and attitudes can discriminate between dispensing antibiotics with and without a prescription, supports the construct validity of these statements. The results of this study may not be applicable in environments where the legislative framework regarding DAWMP is stricter, as in the case of Northern Europe and North America.

## Conclusions

This study shows that DAWMP continues to be a common practice in Spain. Several attitudes strongly associated with the DAWMP were identified. The results of this study could be used to design interventions to improve antibiotic dispensing. These interventions could emphasize: (i) the high level of DAWMP (*responsibility*); (ii) the importance of resistance and its association with antibiotic use in outpatients (*insufficient knowledge* and *indifference*); and (iii) pharmacist-patient communication through health education (*complacency*).

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## Transparency declarations

None to declare.

## Author contributions

A. F. and P. L.-V. designed the study, and A. F., P. L.-V., A. L.-D., C. G.-G. and J. M. V.-L. drew up the questionnaire. The fieldwork was coordinated by E. S. and M. Z.-C. Data collection was carried out by M. Z.-C., who also undertook database management and statistical analysis. Interpretation of the statistical analysis was performed by M. Z.-C., A. F. and C. G.-G. The text was drafted by M. Z.-C. and A. F., and discussed in depth by M. Z.-C., A. F., C. G.-G., J. M. V.-L. and E. S.

## Supplementary data

The questionnaire is available as Supplementary data at JAC Online (<http://jac.oxfordjournals.org/>).

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