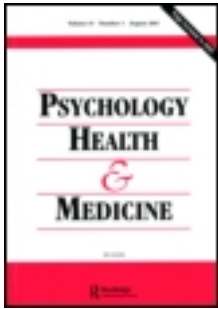


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### What do Spaniards read about the prudent use of anti-microbial agents and what do they really do?

J.J. Mira <sup>a</sup>, I. Navarro <sup>b</sup>, B. Huttner <sup>c</sup>, L. Ortiz <sup>d</sup>, V. Pérez-Jover <sup>a</sup>, P. Ramón-Pardo <sup>e</sup> & J. Rodríguez-Marín <sup>a</sup>

<sup>a</sup> Health Psychology Department , Universidad Miguel Hernández , Elche , Spain

<sup>b</sup> Economy Department , Universidad Miguel Hernández , Elche , Spain

<sup>c</sup> Infection Control Programme , Geneva University Hospitals and Faculty of Medicine , Geneva , Switzerland

<sup>d</sup> Mathematics Department , Universidad Miguel Hernández , Elche , Spain

<sup>e</sup> Pan American Health Organization , Washington , DC , USA

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## What do Spaniards read about the prudent use of anti-microbial agents and what do they really do?

J.J. Mira<sup>a\*</sup>, I. Navarro<sup>b</sup>, B. Huttner<sup>c</sup>, L. Ortiz<sup>d</sup>, V. Pérez-Jover<sup>a</sup>, P. Ramón-Pardo<sup>c</sup> and J. Rodríguez-Marín<sup>a</sup>

<sup>a</sup>Health Psychology Department, Universidad Miguel Hernández, Elche, Spain; <sup>b</sup>Economy Department, Universidad Miguel Hernández, Elche, Spain; <sup>c</sup>Infection Control Programme, Geneva University Hospitals and Faculty of Medicine, Geneva, Switzerland; <sup>d</sup>Mathematics Department, Universidad Miguel Hernández, Elche, Spain; <sup>e</sup>Pan American Health Organization, Washington, DC, USA

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**Objectives:** The prudent use of antibiotics (PUA) is promoted not only by public information campaigns, but also in the printed media and on websites. This study assesses the correspondence between PUA information in the Spanish printed media and on websites and the messages put out by national campaigns. Spaniards' use of antibiotics following the campaigns was also analysed. **Methods:** A two-phase descriptive study was carried out. First, antibiotics-related news in the Spanish printed media (January 2007–May 2009) and institutional and news media websites (March–May 2009) were systematically reviewed using a data collection tool. In addition, a telephone survey on antibiotics-related knowledge and behaviours was carried out with a random sample of 1526 people living in Spain who had recently received medical care. **Results:** In total, 29 news items containing nine different messages were identified. All the messages were similar to those promoted by the campaigns. The survey showed that even after the campaigns, relevant gaps in knowledge about the PUA persist, particularly among men ( $p = .005$ ), those living in rural areas ( $p = .02$ ) and the elderly ( $p < .001$ ). Keeping left-over antibiotics was associated with ignorance about the association between antibiotic use and resistance (OR 3.1, 95% CI 2.3–4.2). Also, patients who ask their doctor about drug interactions are less likely to self-medicate ( $p = .04$ ). **Conclusions:** The information reaching the Spanish public via the media seems to be similar to the messages transmitted by public information campaigns. Nevertheless, there appears to be considerable room for improvement. Promoting an active role in patients might reduce self-medication.

**Keywords:** antibiotics; drug use; health education; healthcare-associated infections

### Introduction

Inappropriate antibiotics use constitutes a major public health problem (Arnold & Straus, 2005; Belongia & Schwartz, 1998; Campos et al., 2007; Caminal & Rovira, 2005; Díaz et al., 2010; Dryden, Johnson, Ashiru-Oredope, & Sharland, 2011; Earnshaw et al., 2009; Goosens, Ferech, Stichele, Elseviers, & The ESAC Project Group, 2005; Grigoryan et al., 2007; Martínez-Martínez & Calvo, 2010; Nyquist, Gonzales, Steiner, & Sande, 2008). One response to this situation has involved public information campaigns to promote their prudent use (Campos, Pérez-Vázquez, & Oteo,

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\*Corresponding author. Email: jose.mira@umh.es

Table 1. Information campaigns by the Spanish ministry of health and consumer affairs.

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Slogan “Using them right today, they’ll protect us tomorrow” (*Usándolos bien hoy, mañana nos protegerán*)

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*Messages*

Do not self-medicate

Do not take antibiotics when they are unnecessary. Antibiotics are not effective against colds, chills and flu

Adhere to the treatment prescribed by the doctor (with regard to both dosage and duration)

Do not recommend antibiotics to other people

Do not to keep antibiotics at home

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Source: <http://www.msc.es/campannas/campanas06/antibioticos6.htm>, <http://www.msc.es/campannas/campanas07/antibioticos7.htm>

967 TV announcements, 452 radio announcements, 50 messages in the press and 7200 on billboards in 2007.

2010; Eurosurveillance editorial team, 2011). Campaigns in high-income countries have been analysed (Goosens et al., 2006; Goossens et al., 2008; Hemo et al., 2009; Huttner, Goosens, Verheij, & CHAMP Consortium, 2010; McNulty, Boyle, Nichols, Clappinson, & Daveyet, 2007; Sabuncu et al., 2009). In Spain, the Health Ministry launched mass-media information campaigns in 2006–2007 and 2007–2008 (Campos et al., 2010; Huttner et al., 2010) (Table 1), focusing on the need to reduce antibiotic use without prescription (Campos et al., 2007; Commission européenne, 2010; European Commission, 2010; Huttner et al., 2010; van de Sande-Bruinsma et al., 2008).

The media (press, radio, TV, internet, etc.) represents another channel of public information. However, there is as yet no analysis on whether messages transmitted by the media are coherent with those of institutional campaigns. This study assessed whether the information available in the Spanish print media and on websites coincides with the messages in antibiotics campaigns, and also described antibiotic use habits reported by Spanish patients after the campaigns.

## Methods

This descriptive study had a two-phase structure; first, a review of information in the Spanish print media and on websites; and second, a survey of a randomly selected cohort of Spaniards that had recently received medical care.

### Press

We used the Segured<sup>©</sup> tool to search for news (from 1 January 2007 to 31 May 2009) and content analysis for analysing news about appropriate antibiotics use. We used “antibiotics” and its combination with: use, consumption, abuse, prescription and doctor’s prescription. We discarded news items about costs or forms of dispensing medication. The newspapers selected were those with the largest readership in Spain (Table 2). We used number of copies of the newspaper sold that day as a measure of each item’s impact.

### Websites

To locate information on Internet, we carried out (March–May 2009) a search using Google, Live Search, Lycos and Yahoo!, the engines most widely used in Spain (Mira, Llinás, & Pérez-Jover, 2008) and covering Spain-based websites of health authorities,

Table 2. Spanish newspapers reviewed.

National level	El País, El Mundo and La Razón
Regional or provincial level	Levante, Diario Información, La Voz de Asturias, Hoy Extremadura, La Nueva España, Faro de Vigo, La Opinión-El correo de Zamora, Diario de Mallorca, Alerta, Ideal de Granada and La Opinión de Granada, La Opinión de Málaga and El Comercio
Most relevant city-based newspapers	El Faro de Ceuta, La Voz de Almería and 20 minutos Bilbao

hospitals, scientific societies or similar organisations, newspapers, pharmaceutical companies and private initiatives. Websites in Spanish from other countries were excluded. Search keywords were: “antibiotics campaigns” and “correct use of antibiotics”. Message content was described and its frequency was analysed according correspondence with the pre-defined categories.

### *Survey on the use of antibiotics*

To ascertain the frequency of certain behavioural habits in antibiotic use, we carried out telephone interviews, between 1 and 30 September 2009, with a random sample of 1526 Spanish-speaking over-18s who had visited health institutions within the previous six weeks. Sample size was determined for a sampling error of less than 3% for  $p = q = .50$ , and for a 95% confidence level.

We used a simple random sample proportional to patients’ profiles and size of the health centre or hospital catchment area.

Interview questions were related to key messages from the Spanish antibiotics campaigns (see Tables 1 and 7). Binary logistic regression with simultaneous inclusion of all the variables was employed to determine the influence on self-medication behaviour of information about prudent antibiotics use and extent of patients’ asking the doctor, given its association with better health outcomes and safer practices (Jahng, Martin, Golin, & DiMatteo, 2005; Mira et al., 2008).

## **Results**

### *Press*

In total, 29 news items met the specified criteria, three of which were repeated in different newspapers. The majority (21; 81%) are related to initiatives for informing the public about correct use of antibiotics (Table 3), and referred to inappropriate habits, common forms of non-adherence and self-medication risks. Just one item referred specifically to the paediatric population. Finally, there were no news items including incorrect information on antibiotics use.

### *Websites*

The information from 32 pages of 25 different institutions (Table 4) was coded. Analysis revealed nine different key messages (Table 5) targeting the general public and appearing 59 times.

### *Survey on antibiotic drug use habits*

A total of 2035 patients were contacted, 1526 agreeing to participate (participation rate of 75%; 64.1% women). Median age was 41 years (IQR 31–63). Hospital patients

Table 3. Principal messages about the PUA in news items from Spanish newspapers.

Category	<i>n</i>	%	Circulation
<i>Messages containing information on the prudent use of antibiotics</i>			
For antibiotics to be effective it is necessary to complete the treatment course and adhere to the dosage as prescribed by the doctor	13	50.0	417,033
Excessive indiscriminate use of antibiotics generates resistance, leading to the danger of their becoming ineffective	5	19.2	540,131
Illnesses such as colds and flu cannot be cured with antibiotics	4	15.4	1544,422
Antibiotics are not useful for treating all infections	1	3.8	10,000
<i>Messages containing instructions on the prudent use of antibiotics</i>			
Do not self-medicate	3	11.5	78,632

Notes: *N*=26.

Period of study: January 2007 to May 2009.

Circulation: Sum of number of copies distributed and sold of the newspapers that published the news.

Source: Seguired<sup>®</sup>.

Table 4. Description of the content of the websites visited.

Information source	<i>N</i> (%)	Content description or link to
Public institutions	8 (23)	4 (50) corresponded to pages with news; 2 (25) links to scientific articles; 1 (12) link to documents written by the entities themselves; 1 (12) link to the Ministry of Health and Consumer Affairs campaign on the appropriate use of antibiotics
Healthcare-related professional associations	20 (57)	11 (55) referred to the prudent use of antibiotics; 5 (25) links to scientific articles; 4 (20) links to documents written by the entities themselves
News providers, health websites, pharmaceutical companies or consumer associations (private initiatives)	7 (20)	3 (43) links to scientific articles; 2 (29) documents written by the entities themselves; 2 (29) information on the prudent use of antibiotics

accounted for 53.1% (826) and 45.9% (700) had seen a health centre doctor (Table 6).

Almost a quarter (23.1%) were unaware that the abuse of anti-microbial agents contributes to the generation of resistance (Table 7). This ignorance was greater among men ( $p = .005$ ), patients discharged from hospital ( $p < .001$ ), those living in rural areas ( $p = .02$ ) and the elderly ( $p < .001$ ).

Twenty-seven per cent keep antibiotic doses left over from a previous course of treatment. This custom of keeping left-over doses is not influenced by a person's knowledge that the inappropriate use of antibiotics can generate resistance ( $p = .3$ ).

Around 6% of respondents admit that they take antibiotics without a doctor's prescription. Rate of reported self-medication is greater (15%) when patients present symptoms similar to those of a previous occasion when they used the same antibiotics. Frequency of self-medication is similar in men and women ( $p = .3$ ) and across age groups ( $p = .9$ ).

Table 5. Key messages about the PUA most often repeated on the Spanish websites analysed.

	<i>n</i>	%
<b>Messages targeting the general public</b>		
<i>Messages containing information on the prudent use of antibiotics</i>		
Related to the increase in antimicrobial resistance resulting from inappropriate use of antibiotics	16	25
Related to the fact that antibiotics are not effective against viruses, so that they should not be used for symptoms of colds or flu	8	12.5
Related to the abuse of antibiotics in food, and how this affects people's health	5	7.8
Reminding people of how important it is to consult health professionals over any doubts one might have concerning medicines, how to use them, what they are for, when to take them, etc.	3	4.7
<i>Messages containing instructions on the prudent use of antibiotics</i>		
Referring to the need to avoid inappropriate use because of its harmful effects, and the need for behaviour change in patients	10	15.6
Related to the importance of avoiding self-medication	12	18.7
Focusing on the importance of good therapeutic adherence, i.e. taking the dose prescribed by the doctor and completing the course of treatment stipulated	5	7.8
<b>Total</b>	<b>59</b>	<b>100</b>

Notes: Number of sites visited: 25.

Total number of pages of the sites visited that contain information or links related to antibiotics: 32.

Total number of different messages: 9.

*N* number of times the same message was found across the different sites visited.

Period of study: March to May 2009.

Table 6. Patient sample.

	<i>n</i>	%
<i>Residence of interviewee visiting primary care service</i>		
Urban area	349	50
Rural area	50	7
Mixed (rural-urban) area	301	43
	700	100
<i>Hospital size where interviewees had received care as inpatients</i>		
Less than 500 beds	554	67
Between 500 and 900 beds	272	33
	826	100

Thirty per cent (irrespective of sex) of respondents never ask about potential drug interactions when prescribed a course of antibiotics. Older patients adopt the most passive role, and 33.2% ask no questions ( $p = .006$ ), while 34% of parents taking their children to the paediatrician fail to inquire about possible interactions ( $p = .002$ ). In general, patients in urban areas are more likely to ask their doctor about such interactions (76.5%,  $p < .001$ ).

### ***Predictors of self-medication***

Correct information about inappropriate antibiotics use and resistance does not reduce self-medication ( $p = .4$ ) (Table 8). Self-medication is more common among those who are unaware that antibiotics can generate resistance (20.8% vs. 13.6%,  $p < .001$ ), and

Table 7. Habits of antibiotic use reported by patients interviewed, by sex and age.

	N (1526)	Men					Women					P-value
		%	Under age 30	30–50	51–70	Over 70	Under age 30	30–50	51–70	Over 70		
<i>Knowledge/Information one needs</i>												
Knows that if one uses antibiotics a lot they can generate resistance and be less effective in the future	1.172	76.9	76.2	77.8	73.2	59.2	72.9	87.6	80.1	62.8	<.001	
<i>Behavioural habits</i>												
Uses antibiotics without prescription	95	6.2	6.8	7.8	7.0	5.8	7.5	6.0	5.1	4.1	.577	
If experiencing the same symptoms as previously, uses the same antibiotic that worked before	231	15.2	12.9	18.1	16.7	18.6	17.8	14.8	13.1	11.7	.386	
Asks one's doctor if other drugs can interfere with the proper functioning of the antibiotic	1.070	70.4	70.7	66.5	79.5	64.1	70.4	68.4	77.8	68.7	.130	
Keeps antibiotics left over for use in case someone falls ill	414	27.2	30.6	37.1	20.3	29.1	30.8	28.4	17.0	20.1	.003	

Note: Data in %.

Table 8. Results of the binary logistic regression analysis. Knowledge and patient's attitude as predictors of the use of antibiotics without prescription.

	Self-medication ( <i>N</i> =49)		Self-medication when experiencing same symptoms as on a previous occasion ( <i>N</i> =231)	
	OR	95% CI for exp ( $\beta$ )	OR	95% CI for exp ( $\beta$ )
Does not know that if one uses antibiotics a lot they can generate resistance and be less effective in the future	.8	.5–1.4	1.8	1.3–2.5
Does not ask one's doctor if other drugs can interfere with the proper functioning of the antibiotic	1.5	.9–2.4	1.4	1.1–1.9
Keeps antibiotics left over for use in case someone falls ill	2.6	1.7–4.0	3.1	2.3–4.2
Age of interviewee	1.0	.9–1.0	1.0	.9–1.0
Sex of interviewee	1.2	.8–1.8	1.0	.8–1.4

Notes: Dependent variable: self-medication; CI indicates confidence interval; and OR, odds ratio.

also among those who keep left-over doses ( $p < .001$ ), with no observable interaction effect of the variables: age, sex or type of healthcare service used previously. Patients who ask their doctor about potential drug interactions are less likely to keep left-over doses ( $p < .001$ ).

## Discussion

The information reaching the public via the press and institutional websites seems to maintain a common structure, without contradictory messages. Although from the present study we cannot rule out the possible distortion of these messages by those receiving them, we can confirm that they focus on key aspects related to the most common errors in antibiotic use in Spain (Grigoryan et al., 2007; Huttner et al., 2010; Llor & Cots, 2009).

The emphasis in these messages is in line with recommendations made in other European countries (Goosens et al., 2005; Huttner et al., 2010), though they address self-medication in particular. We found scarcely any examples of information on the prudent use of antibiotics (PUA) aimed specifically at parents (paediatric population), which has been a key target population for most other campaigns (Lecky et al., 2011; Rodríguez, González, García, & Campos, 2011), since antibiotic use in this age group is particularly high (Hemo et al., 2009).

Although from our assessment of knowledge and antibiotics-use behaviour we cannot establish a causal relationship with information campaigns, our results show that 25% of the population are unaware that antibiotics use produces resistance. This is in line with other studies (Campos et al., 2007) and the Eurobarometer (European Commission, 2010) (14% more interviewees than the reference figure for the European mean thought they were effective against colds and flu). Based on our results, ignorance about the perils of inappropriate antibiotic use seems more common in people from non-urban areas and the elderly, so that campaigns could consider targeting these groups specifically.

Eighty-eight per cent of Spaniards consider themselves well-informed about antibiotics, 5% higher than the European mean (European Commission, 2010), but this does not translate into their more prudent use.

The effectiveness of information campaigns positively correlates with the perception of real risk among citizens (Ditter et al., 2005). In the case of antibiotics, mere information is probably insufficient (Dryden et al., 2011), since perceived risk is very low, especially among patients with higher socio-economic and educational status (Mistretta, Grosso, Contarino, & Sciacca, 2008).

In our study, the self-medication rate is more than double the figure indicated by the European Commission (Commission européenne, 2010). The percentage reporting that they keep left-over doses is similar to that found in a study from Ankara, Turkey (28%) (Ilhan et al., 2009). This tendency for self-medication in Spain has been reported by several studies (Grigoryan et al., 2010; Väänänen, Pietilä, & Airaksinen, 2006), and is most likely related to the easy availability of antibiotics without prescription (Skliros et al., 2010) (despite this being inadequate). Some therefore advocate the dispensation of exact tablet quantities in pharmacies (Grigoryan et al., 2010).

These data suggest that when patients adopt an active role, they are more likely not to self-medicate. In the specific case of those living in rural areas, we have found that they more commonly adopt a more passive role in interactions with doctors, and have fewer opportunities to modify their antibiotics-use habits. This suggests the advisability of GPs in these areas stressing more actively the ineffectiveness of anti-microbial drugs for colds and flu (Tonkin-Crine et al., 2011).

The present study has some limitations. We do not have information about website hits, making it difficult to judge how many people these websites reached. The impact indices mentioned do not ensure that readers or web surfers assimilate the information. Causal relations between the variables were analysed and self-medication cannot be inferred. The sample of patients recruited is not representative of all Spaniards.

Some ideas could be useful for the European context. First, there is clearly a need for messages to be adapted for the knowledge and habits prevailing in the elderly and the rural population; second, GPs and hospital doctors have an important role in transmitting information for modifying habits that can lead to self-medication; third, it is important to work on changing the habit of keeping left-over doses; and fourth, information campaigns on prudent antibiotic use need to strike the right balance between clarifying the consequences of resistance and still maintaining trust in the healthcare system and antibiotic treatment where necessary.

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