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Prevalence of antibiotics stored in the Catalan households

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carles.llor@gmail.com**ABSTRACT**

Introduction. The aim of the study was to estimate the prevalence of in-home antibiotic storage among Catalan citizens by means of a telephone-based question. As a secondary objective we compared two types of questions.

Material and methods. A prospective descriptive study was set out in an urban primary care centre. The first three patients aged 18 or more on the appointment lists of two practices held on working days from September to December in 2014 were collected. In one practice the general practitioner used the common question of asking their patients if they stored any package of antibiotic. The patients listed in the other practice were asked in an otherwise non-judgmental way preceded by the following remark: 'Nearly everybody stores antibiotics at home'.

Results. Of the 435 respondents, 166 (38.2%) claimed to have antibiotics stored at home. The percentage of people admitting to having antibiotics at home was slightly higher when the non-judgmental approach was used (41.9% vs 34.7%, $p=0.07$). The most frequently stored antibiotics were amoxicillin and clavulanate, amoxicillin and fosfomicin trometamol.

Conclusions. The number of antibiotics stored in the Catalan households is still very high. Even though statistical differences were not observed, as in studies on adherence, when physicians ask a question in a manner that makes the patient feels less guilty, the answer seems to be more freely and honestly given.

Key Words: Anti-Bacterial Agents; Self Medication; Drug Adherence; Household Products

RESUM

Introducció. L'objectiu de l'estudi era conèixer la prevalença de llars catalanes on es desen antibiòtics mitjançant una enquesta telefònica d'una sola pregunta, tot comparant dos tipus de preguntes.

Material i mètodes. Estudi descriptiu prospectiu realitzat en un centre de salut urbà. Es recolliren els 3 primers pacients d'almenys 18 anys en els llistats de la història clínica informatitzada dels dies feiners des de setembre a desembre de 2014. En una consulta s'emprà la forma normal de preguntar pels antibiòtics desats a casa. En canvi, als pacients de l'altra consulta es preguntà d'una forma en què no s'enjudiciava a l'individu procedint a la pregunta normal la següent consideració: 'Gairebé tot el món guarda antibiòtics a casa'.

Resultats. De les 435 persones enquestades, 166 (38,2%) van admetre desar antibiòtics al seu domicili. El percentatge va ser lleugerament més alt quan la pregunta es formulà de forma no amenaçant (41,9% vs 34,7%, $p=0,07$). Els antibiòtics més freqüentment emmagatzemats van ser amoxicil·lina i àcid clavulànic, amoxicil·lina i fosfomicina trometamol.

Conclusions. El nombre d'antibiòtics desats als domicilis catalans segueix essent molt elevat. Encara que no s'observaren diferències estadísticament significatives, a l'igual que en els estudis de compliment, quan els metges pregunten de forma que el pacient no se sent amenaçat, la resposta tendeix a ésser més lliure i més honesta.

Mots clau: Antibiòtics; Automedicació; Compliment terapèutic; Productes domiciliaris.

INTRODUCTION

Self-medication with antibiotics occurs among the population in Europe, particularly in Southern and Eastern countries¹. Antibiotics available at home have been found to be an important risk factor for this practice², and leftover medication may later be considered for self-medication, leading to inappropriate usage of these drugs and contributing to antibiotic resistance, which is reaching alarming levels in some European countries^{3,4}.

Measurement of the storage of drugs in households is often underestimated, since most studies are based on telephone or electronic surveys with the use of simple questions. In a previous study published in 1997 the prevalence of antibiotic storage in Spanish households was 42%⁵. Nine years later the same group reported storage of 37%⁶. The authors used the same questions in both studies, asking if packages of antibiotics were stored in the home. Physicians assume that individuals provide honest answers and we usually believe their responses. Similarly to studies measuring adherence, those evaluating the prevalence of antibiotics kept in households may often provide inaccurate estimates. The use of a non-judgmental approach might be more recommended, preceding the question with a remark such as the following: "People often store antibiotics at home", or "Nearly everybody store antibiotics at home".

In the present study, we examined the current prevalence of antibiotics kept in the households, based on a one-question telephone survey, comparing the usual question of asking whether or not people keep antibiotics at home with another question made with a non-judgmental approach.

MATERIAL AND METHODS

We performed a prospective descriptive study conducted over the last four months of 2014 by telephone survey in Tarragona, Catalonia. The first three patients aged 18 or more on the appointment lists of two practices held on working days from September to December in 2014 were collected. Repetitions, relatives living in the same household, respondents different from those on the list, individuals living in residences or institutionalized, those taking antibiotics at the time of the interview and those who did not respond (up to 3 calls per case) were all excluded. All these cases were replaced by the following patients recorded on the lists.

The survey consisted of only one question. In both practices the same introduction was carried out: 'I am your GP and I'm collaborating in a study about the rational use of antibiotics'. In one of the practices all the subjects were asked the following question: 'Could you check if you have any antibiotics at home at present? And if so, could you tell me their names (including tablets, capsules, pills, lozenges, bags,

syrops, ointments, eye drops, etc.)?'. In the other practice the question was: 'Nearly everybody stores antibiotics at home; could you check if you have any at home at present? And if so, could you tell me their names (including tablets, capsules, pills, lozenges, bags, syrops, ointments, eye drops, etc.)?'. In both cases consent was requested to use the results obtained. Descriptive analysis of the results was carried out. Chi-square tests and t Student-Fisher were also performed, considering differences with p-values<0.05 as significant statistically.

Table 1. Main characteristics of the patients questioned according to the type of question asked.

	Question 1	Question 2	Total	p
n	225	210	435	
Male gender, n (%)	112 (49.8)	93 (44.3)	205 (47.1)	0.147
Age, years (SD)	55.3 (19.3)	54.4 (18.5)	54.9 (18.9)	0.330
Households with antibiotics, n (%)	78 (34.7)	88 (41.9)	166 (38.2)	0.073

Question 1: I am your GP and I'm collaborating in a study about the rational use of antibiotics. Could you check if you have any antibiotics at home at present? And if so, could you tell me their names (including tablets, capsules, pills, lozenges, bags, syrops, ointments, eye drops, ear drops, etc.)?

Question 2: I am your GP and I'm collaborating in a study about the rational use of antibiotics. Nearly everybody stores antibiotics at home; could you check if you have any at home at present? And if so, could you tell me their names (including tablets, capsules, pills, lozenges, bags, syrops, ointments, eye drops, ear drops, etc.)?

SD: standard deviation.

RESULTS

In total, 444 respondents were interviewed. A total of two patients refused to answer the question and seven more respondents who failed to identify what was an antibiotic or did not understand the question were excluded from the analyses. Out of 435 valid answers, 166 (38.2%) claimed to have antibiotics stored at home at the time of the survey. Five more respondents admitted storing antibiotics at home but failed to provide their names, considering them as not having antibiotics. A total of 205 respondents were male (47.1%). The mean (SD) age of participants was 54.8 (18.2) years, ranging from 18 to 90 years (Table 1). No differences were observed in the percentage of antibiotic stored at home and the gender and age of the respondents.

Of the 225 patients in whom the first question was formulated, 78 reported having antibiotics at home (34.7%). Of the 210

who were asked the second question, 88 answered affirmatively (41.9%; $p=0.07$). A total of 16 respondents admitted having two or more boxes of antibiotics in their households. The most frequently saved antibiotics were amoxicillin and clavulanate (35 cases), followed by amoxicillin (21 cases) and fosfomicin trometamol (16 cases). **Table 2** shows the antibiotics stored.

Table 2. Type of antibiotics stored in the households.

Name of the antibiotic	Number (%) of households with antibiotics	Number (%) of antibiotic boxes*
Amoxicillin plus clavulanate	35 (21.1)	44 (23.8)
Amoxicilin	21 (12.7)	24 (13.0)
Fosfomicin	16 (9.6)	16 (8.6)
Cloxacillin	14 (8.4)	14 (7.6)
Eyedrops with antibiotics	11 (6.6)	12 (6.5)
Norfloxacin	11 (6.6)	11 (5.9)
Azithromycin	10 (6.0)	10 (5.4)
Ciprofloxacin	10 (6.0)	10 (5.4)
Spiramycin	10 (6.0)	10 (5.4)
Levofloxacin	9 (5.4)	9 (3.2)
Ointments with antibiotics	9 (5.4)	15 (8.1)
Clarithromycin	4 (2.4)	4 (2.2)
Clindamycin	4 (2.4)	4 (2.2)
Josamycin	1 (0.6)	1 (0.5)
Penicillin V	1 (0.6)	1 (0.5)
Total number of antibiotics	166 (100)	185 (100)

*Respondents claimed to have more than one package of antibiotic in 16 households

DISCUSSION

A total of 38.2% of respondents claimed to store antibiotics in their households, the most frequently encountered categories being broad-spectrum beta-lactams in accordance with findings from studies carried out in the same country over the last two decades. The percentage of people admitting to having antibiotics at home was higher when the non-judgmental approach was used even though statistical significant differences were not observed.

We acknowledge that there are several limitations in this study. First, the study sample may not be representative of the whole Catalan population, since individuals living in only one city and who had made an appointment with their GPs were considered. However, nearly 95% of the patients on a list attend their GPs at least once every two years in our country. In addition, the fact that we only included patients from two practices allowed the questions asked to the people studied to be uniform. Second, this was not a clinical trial. All the patients with appointments in one practice were asked

only one question whereas the whole sample of individuals of the other practice received the other question. Third, the results were based on participant response data. Since we could not verify the storage of antibiotics in person, the prevalence of in-home antibiotic storage was likely to be under-reported². Patients taking antibiotics at the time of the interview were excluded and at least some of them might have taken these drugs due to reasons other than a GP prescription, making this antibiotic storage underreporting likely. The fact that no eardrops including antibacterials were observed was surprising since some had eye drops stored at home but we are unable to compare these results with previous studies because forms other than oral antibiotics were not previously evaluated.

On the basis of the results of this study, the way in which the questions were asked also played a role in the quality of information received. To our knowledge the present study is the first to include two different ways of asking the same question. As in studies on adherence, phrasing the question in a non-judgmental way and asking for specific information has been found to be critical in obtaining information on whether they keep or not antibiotics at home⁷. Nearly all the patients surveyed accepted responding to the inquiry, which could possibly be explained by the fact that their own GPs requested the information, contrary to what occurred in the previous surveys carried out in our country^{5,6}. Previous research suggests that the use of National Surveys of Health is not appropriate to elicit unbiased answers from respondents⁸. Nonetheless, our results were similar to these two previous studies and were also comparable to the percentages observed in other non-European countries.

Different factors might explain the apparent hoarding of antibiotics in Catalan households. People's beliefs about the benefits of antibiotics may explain why these drugs are stored. This misunderstanding was recently reflected in the 2013 Eurobarometer survey, which found that although 84% of respondents were aware that taking too many antibiotics makes them ineffective, the main reason given by respondents for taking antibiotics is to treat flu or a cold, being greater in Southern countries⁹. Dispensing regulations can also explain why so many patients keep antibiotics. To reduce self-medication with leftover drugs, antibiotics prescribed should not be dispensed according to the package size¹⁰. Dispensing the exact number of antibiotic tablets in pharmacies as implemented in other European countries should be promoted throughout Europe. Another factor is the over-the-counter sale of antibiotics. Despite being illegal, these drugs are still freely available for purchase without a medical prescription in our country, thereby aggravating self-medication^{11,12}. Another factor is patients' non-adherence to antibiotic therapy. Our group observed an intentional non-adherence of 35% plus an unintentional non-adherence of 30% to antibiotic regimens for respiratory tract infections with the use of Medication Event Monitoring System (MEMS) containers¹³, resulting in the presence of some leftover drugs

that might be used on future occasions by the members of the household. In-home antibiotic storage could also increase the risk of self-prescription of antibiotics to families and friends.

Interventions aimed at preventing the hoarding of antibiotics and self-medication should include public education emphasizing the potential risks of self-medication and the inappropriateness of antibiotic therapy for mainly respiratory tract infections. This phenomenon is even more important, since the leading antibiotic kept in the Catalan households, amoxicillin and clavulanate, is associated with serious adverse events¹⁴. Other interventions should include the enforcement of regulations regarding the sale of antibiotics, implementing laws for dispensing exact tablet quantities prescribed in pharmacies, and encouraging adherence to antibiotic courses.

In conclusion, a high prevalence of antibiotic storage is still observed among citizens in Catalonia, with four out of ten individuals admitting to having packages of an antibiotic in their households when a non-judgmental question was asked. The risk of using antibiotics stored at home without medical consultation is of concern, and interventions addressed to reduce this should be promoted throughout Europe.

ETHICAL RESPONSIBILITIES

Data confidentiality. No data from patients are available in this paper.

Privacy and informed consent. Consent was requested to use the results obtained.

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