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Antibiotic knowledge and self-care for acute respiratory tract infections in Mexico

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Abstract

Objective. To examine knowledge of and self-treatment with antibiotics among medically-insured adults in Mexico. **Materials and methods.** We conducted a cross-sectional, interviewer-administered survey among 101 adult patients seeking care for acute respiratory tract infections in a family medicine clinic in Mexico. Knowledge scores were calculated as a composite of correct, incorrect and don't know responses. Factors associated with antibiotic knowledge and antibiotic self-treatment were explored with bivariate analyses. **Results.** 47% of participants were taking antibiotics prior to the visit, 20% were self-treating. Antibiotic knowledge was highly variable. Many participants believed common non-antibiotic treatments for colds and coughs were antibiotics, such as ambroxol (45%), *Desenfriol* (45%) and paracetamol (44%). Older participants (>40 years) had better knowledge scores. **Discussion.** Self-treatment with and misperceptions about antibiotics are common among medically insured adults seeking medical attention in Mexico.

Key words: Antibiotics; respiratory tract infections; self-care; Mexico

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Resumen

Objetivo. Examinar el conocimiento y automedicación de antibióticos en adultos asegurados en México. **Material y métodos.** Llevamos a cabo un estudio transversal mediante la administración de un cuestionario a 101 pacientes adultos que solicitaban atención médica por infección respiratoria aguda en una clínica de medicina familiar en México. La puntuación de conocimiento estuvo compuesta por respuestas correctas, incorrectas y "no sé", los factores asociados con conocimiento y automedicación de antibióticos fueron explorados mediante análisis bivariado. **Resultados.** 47% de los participantes tomaron antibióticos previamente y 20% fueron automedicados. La puntuación de conocimiento fue muy variable. Muchos de los participantes creyeron que tratamientos comunes para resfriado y tos eran antibióticos, como ambroxol (45%), *Desenfriol* (45%) y paracetamol (44%). Los participantes con mayor edad (>40 años) obtuvieron mejores puntuaciones de conocimiento. **Discusión.** Las percepciones erróneas sobre antibióticos y su automedicación son comunes en adultos que buscan atención médica en México.

Palabras clave: antibióticos; infecciones respiratorias; autocuidado; México

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Community-acquired infections caused by antibiotic-resistant microbes are a major and growing threat to global public health. To help reduce the rate of antibiotic-resistant bacterial infections, there is an urgent need to curb excess antibiotic use.[1-5] Acute respiratory tract infections (ARIs) account for a large share of community antibiotic use in many countries,[6-8] although frequently the antibiotics prescribed for ARIs are unnecessary.[9] In response, national and international campaigns are promoting judicious antibiotic use, particularly for ARIs.[10-12]

Multifaceted educational strategies have shown promise in reducing unnecessary antibiotic use, but their effectiveness may vary across different populations.[13-18] One subgroup of particular concern consists of persons who use antibiotics without a prescription –such as leftover antibiotics or antibiotics purchased in the community. Studies have highlighted a common practice of self-treatment of ARIs with antibiotics in Mexico, among immigrant Latino populations living in the US and in other countries.[7,19-22] Self treatment with antibiotics is a concern not only because the antibiotics are frequently unnecessary, but also because patients may take these antibiotics sporadically (which breeds resistance), and –in cases when they actually need antibiotics– they may be taking the wrong antibiotic. Access to doctors and prescription medications is likely to be a key factor related to self-medication with antibiotics, although other social and cultural factors have been implicated as well.[22-24]

To control for lack of access to health care as a confounding factor among patients who self-treat with antibiotics, we conducted a study among primary care patients with health insurance who were seeking medical attention for ARIs in a Mexican integrated health care delivery system. In this study, we examined knowledge, attitudes and behavior related to antibiotic use for ARIs, and specifically examined the relationship between antibiotic knowledge and self-treatment with antibiotics.

Materials and methods

An interviewer-administered patient survey was conducted in July and August 2009 at the Family Medicine Clinic in the Mexican Institute of Social Security (*IMSS – Instituto Mexicano del Seguro Social*) in Cuernavaca, Morelos, Mexico. The IMSS is a combined employer, State and worker sponsored, integrated health care delivery system that provides care to roughly 40% of the Mexican population. Being the main health system in Mexico, it provides services to formally employed workers and their families.

The study population consisted of a convenience sample of patients with ARIs over 13 years of age who were seeking medical attention for their illness. Potential participants (patients seeking care for ARIs) were identified by clinic staff and referred to study personnel for explanation of the study. Eligible patients were selected through consecutive sampling among those who fulfilled inclusion criteria.

The study was approved by the institutional review boards (Ethics and Research) of IMSS, the National Institute of Public Health, Mexico, the University of California, San Francisco, and Simon Fraser University, Canada.

The survey instrument consisted of 24 questions (a combination of 45 closed and open-ended items) related to age, sex, education, children in household, illness features, health care seeking behaviors, self-care (including antibiotic use), and knowledge about antibiotics. The instrument was refined following pilot testing with 25 clinic patients. After obtaining verbal informed consent from participants or parents for those less than 18 years of age, study personnel administered the survey instrument and documented all patient responses verbatim. Each survey took approximately 10 to 5 minutes to administer.

We restricted our analysis to patients presenting with upper ARI symptoms (nasal discharge, nasal obstruction, sneezing, sore throat, cough, and ear pain), headache, malaise or fever, of $\leq$ 21 day. Exploratory analyses were performed on key variables to assess the distribution of responses. We created an overall summary score for accurate antibiotic knowledge related to which medications are and are not antibiotics (see list in Table II). Participants received a score of +1 for correct identification of the medication, a score of -1 for incorrect identification, and a score of 0 if they answered "don't know". The list included four true antibiotics, and eight non-antibiotics. Thus, maximum and minimum scores were $\pm$ 12, $\pm$ 8 and $\pm$ 4 for all medications, non-antibiotic medications and antibiotic medications, respectively. Antibiotic knowledge scores were compared between groups of age, sex, and prior antibiotic use by using unpaired t-test, and across different strata of education level, and self-treatment using ANOVA. All analyses were performed using SAS version 9.s (Cary, North Carolina).

Results

One-hundred one patients fulfilled inclusion criteria and completed interviews. Study population characteristics are shown in table I. The average age of participants was 41 years, two-thirds were female and a minority (39%)

Table I
Study population characteristics, Cuernavaca, Mexico, July - August 2009

(n=101)	*Percent*
Age, years	
13-19	6
20-29	23
30-39	20
40-49	20
50-59	20
> 60	11
Gender (n=100)	
Female	67
Male	33
Education	
< middle school	61
High school	13
> college	26
Illness duration, days	
mean (SD)	4.4 (4.3)
Illness symptoms	
Sore throat	67
Cough	53
Nasal congestion	36
Headache	34
Fever	33
General malaise	26
Prior doctor visit	29
1 Private practice	5 (18)
2 Retail pharmacy	3 (11)
3 IMSS or ISSSTE*	18 (64)
4 Local health center‡	2 (7)

* IMSS and ISSSTE (Institute of Security and Social Services for Governmental Employees) are the largest public health institutions for formal workers and their families in Mexico

‡ Belonging to Ministry of Health

had received more than a middle school education; 30% were illiterate or having only elementary school. A variety of symptoms was present among participants, most commonly sore throat (67%) and cough (53%). Almost one-third reported a previous doctor visit for the present illness—the vast majority within the same delivery system.

Participants' knowledge about which medications are antibiotics is shown in table II. There was wide variation in accurate knowledge across a range of cough and cold medications, including medications that are not medically indicated for ARI management such as captopril (anti-hypertensive) and pravastatin (cholesterol lowering medication). Cold remedies commonly used in Mexico were frequently identified as antibiotics, such as ambroxol (45%), *Desenfriol* (45%) and paracetamol (44%).

We found that participants scored across the entire spectrum of antibiotic knowledge scores (figure 1). Inaccurate knowledge was more common for non-antibiotics than for antibiotics, as shown by the distribution of scores less than zero. Over two-thirds (69%) reported incorrectly that at least 1 of the non-antibiotic medications was an antibiotic, and almost half (48%) identified 3 or more non-antibiotics incorrectly. In contrast, with regard to the four true antibiotics on the list, almost three-fourths of participants (74%) correctly classified the four true antibiotics on the list (or stated they did not know); and only 23% incorrectly classified 1 true antibiotic as a non-antibiotic.

Overall knowledge scores were substantially lower among participants younger than 40 years of age compared with older adults, but did not vary significantly by sex or education level, although there is a trend for higher score among higher educated patients (table III). Knowledge scores also did not vary among persons using and not using antibiotics prior to the visit, nor among those self-treating with antibiotics (although sample sizes are quite small for these comparisons).

Approximately half (47%) of our sample had taken antibiotics for the illness for which they were seeking

Table II
Antibiotic knowledge: "Which medications are antibiotics?" Cuernavaca, Mexico, July - August 2009

Answer	*Percentage*											
	Ampicilin	*Ciprofloxacin*	*Erythromycin*	*Trimethoprim*	*Ambroxol*	*Aspirin*	*Captopril*	*Desenfriol**	*Naproxen*	*Paracetamol*	*Pravastatin*	*Ranitidine*
Yes	89	49	43	**50**	**45**	45	9	**45**	**37**	**44**	7	19
No	5	8	10	7	45	50	47	46	50	53	25	56
Don't know	6	43	47	44	11	5	44	9	14	4	68	25

* Desenfriol is a commonly used treatment for colds in Mexico, and contains paracetamol, phenylephrine and chlorpheniramine.
Boldface indicates a significant result

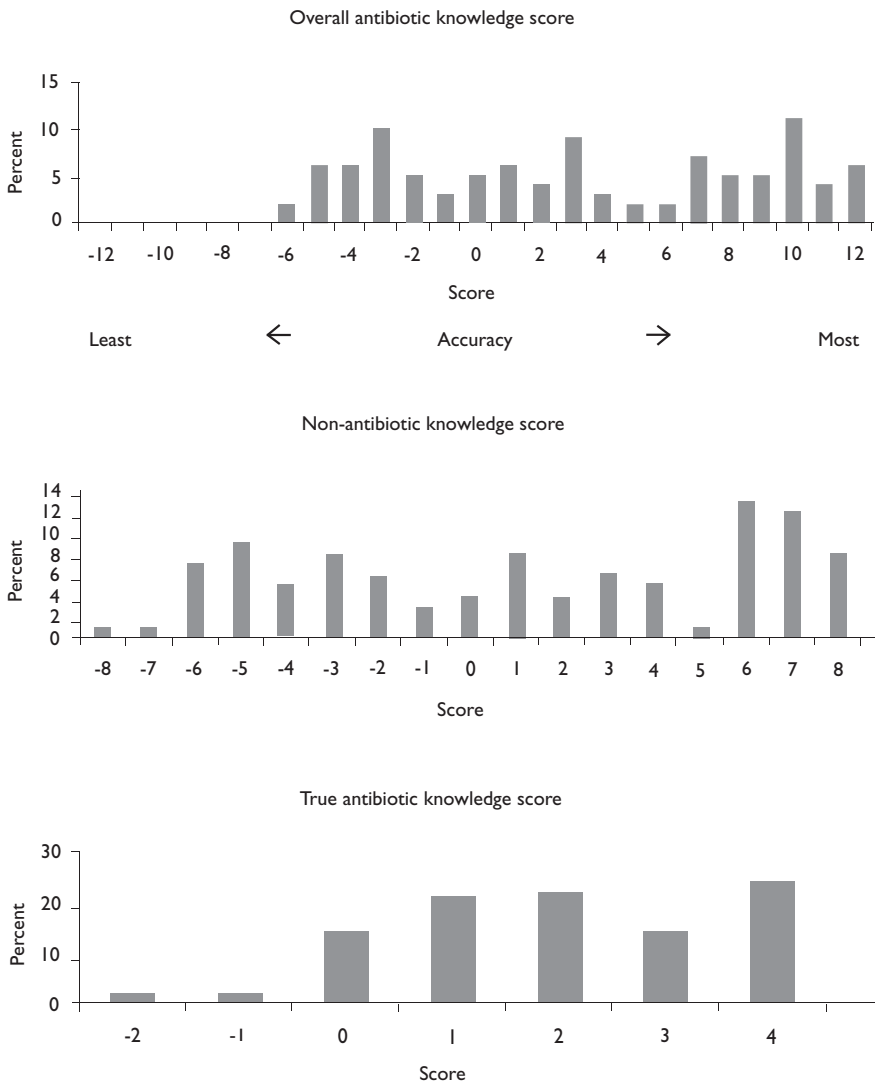

FIGURE 1. FREQUENCY DISTRIBUTION OF OVERALL (12 MEDICATIONS QUERIED), NON-ANTIBIOTICS (8 MEDICATIONS), AND TRUE ANTIBIOTIC (4 MEDICATIONS) KNOWLEDGE SCORES

care (data not shown). A doctor's recommendation accounted for only half of the antibiotics previously taken. Forty percent of participants taking antibiotics had initiated them on their own. In addition, a significant proportion of participants (26%) reported using antibiotics that were not actually antibiotics.

Discussion

Approximately half of the medically-insured adults seeking medical attention for ARIs in our study in Mexico was already receiving treatment with antibiotics prior to their doctor's visit, and forty percent of these patients were self-treating with antibiotics. This estimate is similar to studies with community-based samples. [21,25] Various studies have remarked on longstanding practices of self-medication of the public with antibiotics, the ready availability of antibiotics often without a prescription, attitudes endorsing use of antibiotics for a wide range of illnesses, and patterns of over-prescription and inappropriate prescription in Mexico and among Latinos in the US.[23; 26-30] In recent years, programs dedicated to

Table III
Antibiotic knowledge scores across sociodemographic factors and antibiotic use behaviors. Cuernavaca, Mexico, July - August 2009

	Mean (SD)	*P value**
Age		
< 40 years	1.10 (5.64)	<0.0001
> 40 years	5.49 (4.70)	
Sex		
Female	3.88 (5.81)	0.44
Male	2.93 (5.60)	
Education		
< middle school	2.65 (5.42)	0.31
High school	3.15 (6.72)	
> college	4.65 (5.51)	
Prior antibiotic use		
Yes	3.83 (5.73)	0.38
No	2.85 (5.49)	
Self-treatment with antibiotics		
Yes (n=20)	4.70 (5.40)	0.35
No (n=28)	3.43 (6.00)	
Not using Abx (n=53)	2.57 (5.50)	

* Student's t-test or ANOVA

controlling antibiotic resistance by the World Health Organization and other international organizations (and formal, intersectoral declarations that highlight such concern) aim to improve the knowledge, attitudes, and practices that underlie inappropriate antibiotic use.[31] Against that macro-level context, it is important to develop national and community-level programs, and to be effective, these should be based on understanding of current patterns of belief and use.

Our study found that the accuracy of the public's knowledge about which medications are antibiotics is particularly poor, particularly in the classification of non-antibiotic medications and symptomatic/combination cold remedies as antibiotics. The unreliability of self-reports of antibiotic consumption suggests that researchers should exercise caution in extrapolating from public reports of antibiotic use and consumption, and its pressure on development of antibiotic resistance.

Of the sociodemographic variables we could evaluate, only age was a significant predictor of antibiotic knowledge. Older participants (age > 40 years) had much greater overall knowledge about which antibiotics were and were not antibiotics than younger participants. This increased knowledge may be the result of greater lifetime experience with ARIs and medication management, since we do not see any significant correlation of education with antibiotic knowledge. The lack of association between antibiotic knowledge and prior antibiotic use or self-treatment with antibiotics also suggests that the factors that influence self-treatment with antibiotics are not driven by greater or lesser knowledge about which medications are antibiotics. This finding has interesting implications for the development of programs targeting consumers of these medications. It adds to the evidence that education-only programs that emphasize knowledge --such as the recent unsuccessful educational campaign in the US that was specifically designed to decrease self-treatment with antibiotics among Latinos– are not as effective as comprehensive, multi-faceted efforts.[32]

Our study's findings should be interpreted in light of its limitations. Our study population consisted of a convenience sample of patients, and may not fully reflect the broader population of adult Mexican primary care patients in IMSS. We also cannot be certain to what extent well-described research biases observed in Latino patients in US studies were also present in our study –such as simpatía (in which participants tend to give the socially desirable answer instead of the truth). If this were present, it is likely our study's estimate of self-treatment with antibiotics might have been even higher (for example, if patients over-reported how frequently the antibiotics they were taking were prescribed or recommended by a physician).

In conclusion, these findings suggest that antibiotic self-treatment of ARIs is common among medically insured primary care patients in Mexico. Educational efforts to promote appropriate antibiotic use, and to encourage antibiotic use only if a doctor prescribes it, will require broader-scaled strategies –such as education tailored to the community, directed at pharmacies, and addressing family influences on antibiotic self-treatment. Educational strategies will also need to ensure that the population understands which medications are actually antibiotics. Further studies are necessary for identifying antibiotic knowledge and self-treatment in other populations, such as those affiliated with different health institutions. In addition, it will be necessary to consider the new legislation recently established in Mexico that forbid the sale of antibiotics without medical prescription.

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Declaration of conflict of interests. The authors declare that they have no conflict of interests.

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