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Antibiotic identification, use, and self-medication for respiratory illnesses among urban Latinos

Timothy F. Landers, PhD, FNP[Postdoctoral Research Fellow], **Yu-hui Ferng, MPA[Project Manager]**, **Jennifer Wong McLoughlin, BS, RN[Data Manager]**, **Angela E. Barrett[Research Coordinator]**, and **Elaine Larson, RN, PhD, FAAN, CIC[Professor and Director]**
Center for Interdisciplinary Research to Reduce Antimicrobial Resistance (CIRAR), Columbia University School of Nursing, New York, New York

Abstract

Purpose—The purpose of this study was to describe the extent to which antibiotic and nonantibiotic medications commonly used for upper respiratory infections (URIs) were correctly identified by a sample of urban dwelling Latinas and the association of medication identification with antibiotic use and self-medication.

Data sources—One hundred women completed an interview and were asked to identify whether a list of 39 medications (17 antibiotics, 22 nonantibiotics) were antibiotics or not, whether anyone in the household had used the medication, their ages, and the source of the medication.

Results—Overall, participants correctly identified 62% of nonantibiotics and 34% of antibiotics. Seventy three (73%) women in the study reported antibiotic use by at least one member of the household in the past year. Among users, self-medication was reported in 67.2% of antibiotics for adults, but in only 2.4% of children. There was no difference in antibiotic recognition between those who self-medicated and those who did not, but antibiotic self-medication was associated with a significantly lower recognition of nonantibiotics ($p = .01$).

Implications for practice—Measures to improve antibiotic utilization should address self-medication and consider the cultural and social context in which antibiotic use occurs.

Keywords

Antibiotic resistance; epidemiology; infectious disease; Latino; antibiotics

Antibiotic resistance is a recognized and emerging public health threat. Among other factors, it is known that inappropriate use of antibiotics contributes to the emergence of antibiotic resistance (Dagan et al., 2008; Friedman & Whitney, 2008; Goossens, Ferech, Vander Stichele & Elseviers, 2005; Larson, 2007). Educational campaigns have been directed at both patients and clinicians in order to improve antibiotic utilization. For example, the Centers for Disease Control and Prevention's (CDC's) "Get Smart: Know When Antibiotics Work" campaign has aimed to increase patient awareness of appropriate antibiotic use. Specifically, this campaign reinforces not taking antibiotics for viral infections in order to decrease patient demand and encourages patients to use antibiotics

Correspondence Timothy F. Landers, PhD, FNP, College of Nursing, The Ohio State University, 1585 Neil Avenue, Columbus, OH 43210. Tel: 614-292-0309; Fax: 614-292-7976; landers.37@osu.edu.

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appropriately (not skipping doses, not saving antibiotics, and not taking antibiotics prescribed for someone else (*CDC – get smart*).

The aim of this study was to assess the extent to which antibiotics and nonantibiotics commonly used for upper respiratory infections (URIs) were correctly recognized by a sample of urban-dwelling Latinas and to determine if correct classification by respondents was associated with antibiotic use within the household or self-medication with antibiotics. Self-medication was defined as obtaining an antibiotic from any source other than a prescription from a healthcare provider.

Methods

This was a cross-sectional survey of randomly selected participants in a larger clinical trial.

Sample and setting

The survey included a sample of participants from a longitudinal randomized clinical trial (Stopping Upper Respiratory Infections and Flu in the Family: The Stuffy Trial [STUFFY] funded by CDC, 1U01CI000442-01) to examine the role of nonpharmaceutical interventions (education, hand hygiene, and masks) to reduce transmission of URIs in households. The study was conducted in the Washington Heights neighborhood of northern Manhattan, which has a predominantly Latino population, a large proportion of whom are first-generation immigrants. Households were included in the trial if they included at least three persons with at least one child under 5 years. In each household, an informant, who was generally the female head of household, had to speak English or Spanish, have a telephone available, be willing to allow home visits, and provide written consent.

A total of 509 households participated in the 19-month STUFFY trial. Participants in the trial received bimonthly visits from a trained staff member, which included written education materials on medications used for the treatment of URIs, prevention measures, and information about antibiotics that were not appropriate for the treatment of URIs. From families participating in the parent study, a subset of 100 households was randomly selected to participate in a survey of antibiotic identification. These included 50 households in which participants initially reported antibiotic use and 50 households, which did not initially report antibiotic use.

Survey instrument

In the parent study, informants were asked during home visits whether any member of their household took medications for URI symptoms and to identify the name of each medication. A list was generated of all medications reported by household informants to have been used for symptoms of URI or influenza during the course of the study. The list included 17 antibiotics and 22 over-the-counter cough and cold medications. The survey instrument then listed each drug name, whether the respondent thought it was an antibiotic (yes, no, don’t know), if any of the household members had taken the medications within the past year (yes, no, don’t remember), age of the household member who took the medication (0–5, 6–11, 12–17, 18–40, 41–64, >64 years), and where the medication was acquired (local store or bodega, local pharmacy, outside of United States, from a family member or friend, prescribed, or don’t remember). The instrument was translated into Spanish by a certified translator and then back-translated into English to assure accuracy of the words and phrases.

The survey instrument was then pilot tested by two experienced, native Spanish-speaking research assistants to determine the time required and to assure that each item was clear and nonambiguous. The same research assistant also role-played administering the survey to two other Spanish-speaking members of the research team prior to conducting the study interviews.

Procedure

This study was approved by the Institutional Review Board of the study institution. Households randomly selected to participate in the survey were contacted by the trained research assistant to determine their willingness to have a home visit and complete the survey. At the home visit, which required approximately 30–60 min, informed consent was obtained and the questionnaire was administered by interview in Spanish. Participants received compensation of $10.

Data analysis

All statistical analyses were performed using SPSS 16.0 for Windows (SPSS, Inc., Chicago, IL). Frequency distributions were computed for demographic variables. For each medication, a percentage was calculated of respondents who correctly identified it as an antibiotic or not. Respondents were then categorized by whether or not they reported household use of an antibiotic and the source of the antibiotic (e.g., prescribed by a healthcare provider, obtained from a friend or family member, local store or bodega, or local pharmacy without prescription). Those who reported use of an antibiotic not available in the United States were included with individuals who had self-medicated.

The percentage of correctly identified medications was calculated for each respondent. We also calculated the percent correct by class of medication for each respondent, that is, the percent of nonantibiotics correctly identified and percent of antibiotics correctly identified. In addition to the percent correct, a total identification score was calculated by adding the number of correctly identified medication names (+1 for each drug correctly identified) and subtracting the number of incorrect responses (−1 for each drug incorrectly identified) with no points for “don’t know” responses (+0). Using this method, a subscore was calculated for nonantibiotic and antibiotic identification. Scores were compared for users versus nonusers of antibiotics and for those who used only prescribed antibiotics versus those who self-medicated.

Univariable logistic regression was used to assess predictors of antibiotic use and of self-medication. Predictor variables included informant age, education, months in the parent study, and recognition scores. A multivariable model was then developed to identify predictors of self-medication among antibiotic users by including all variables significant at $p < .10$ on the univariable regression.

Results

Surveys were completed with 100 household informants. Demographic characteristics of participants are shown in Table 1. The mean age of the respondents was 33.7 years and the majority (68.4%) were homemakers. Nearly half (46%) had completed less than high school. Participants had been enrolled in the parent study for a mean of 15.1 months prior to completing the medication recognition survey.

One hundred and ninety-one household uses of antibiotics were reported. Of those, 45 of 191 (23.6%) were self-medicated. Self-medication with antibiotics was rare among children (97.6% of reported antibiotic use in participants under 18 was by prescription), but common among participants over 18, where 43 of 64 (67.2%) instances of antibiotic use were by self-medication. Non-U.S. versions of antibiotics in our population accounted for 25 of 191 (13.1%) of all the reported antibiotics in this study. For example, Ampitrex (a brand of ampicillin manufactured in the Dominican Republic, Figures 1 and 2) was a non-U.S. antibiotic used in 14% of households in the study.

Medications were correctly identified in 49.3% of instances (1,923/3,900). Nonantibiotics were properly identified in 62% (1,354/2,200) of responses and antibiotics were properly identified 34% (569/1,700) of the time. As shown in Table 1, the mean total identification score for all participants was 15.8 (possible score −39 to +39). The mean antibiotic score was 3.3 (possible score −17 to +17) and the mean nonantibiotic score was 12.5 (possible score −22 to +22). Education, months in the trial, and occupation were not associated with significant differences in identification scores. Rates of identification for each drug are listed in Table 2.

Households in which antibiotics were used had a small, but statistically significant, higher mean respondent age (34.9 years vs. 30.7 years for nonhousehold users, $p = .03$). As shown in Table 1, there was no difference in months in the study, occupation, or education between antibiotic users and nonantibiotic users. Total identification and antibiotic and nonantibiotic scores were similar between users and nonusers. Individuals who reported household use of a specific antibiotic correctly identified that drug in 91.0% instances versus correct identification in 43.1% observations in which that drug was not used ($p < .01$).

Among individuals who reported household antibiotic use, individuals who self-medicated had significantly lower nonantibiotic identification scores (9.2 vs. 13.5, $p = .01$) than individuals who did not self-medicate. Individuals who self-medicated correctly identified a similar proportion of antibiotics (91.8%) compared to those antibiotic users who did not self-medicate (94.4%) and had similar antibiotic identification scores. Households that reported self-medicating with antibiotics also reported a higher mean number of antibiotics taken (3.2 vs. 1.3 drugs/household, respectively; $p < .001$). In univariable logistic regression, higher scores for nonantibiotic identification were associated with lower odds of self-medication (OR 0.92, 95% CI, 0.85–0.99, $p = .03$). Multivariable logistic regression analyses were performed but did not change the study results and therefore are not presented here.

Discussion

Participants in this study demonstrated recognition of the names of antibiotics similar to what would be expected by guessing. We found no other studies that addressed the extent to which antibiotics are identified by other populations, and were therefore unable to compare our results with others. Nevertheless, the level of medication identification was lower than expected given that participants in the parent study received culturally appropriate, written and verbal education about medications commonly used for URIs during bimonthly home visits and that participants had been enrolled for a mean of 15 months prior to completing the survey.

Low levels of medication identification have important implications for nurse practitioners. Correctly identifying medications is an important component of Medication Management Capacity (MMC), or the ability to self-administer a medication regimen (Farris & Phillips, 2008; Kripalani et al., 2006). Low MMC may also correlate with poorer adherence to prescribed therapy. For example, in a small study examining HIV patients' ability to identify a photograph of antiretroviral medication on a Pill Identification Test (PIT), 62% of patients who were nonadherent to treatment had poor PIT scores compared to 14% of adherent patients (Parienti et al., 2001).

In one survey of Latinos, higher levels of medication knowledge was associated with education, higher confidence that they can succeed, and higher patient satisfaction (Burge et al., 2005). Patients with inadequate literacy were able to identify significantly fewer of their own medications compared to those with adequate literacy (76.9% and 99.2%, respectively) (Kripalani et al., 2006). In this sample, we did not find that education correlated with higher levels of medication knowledge as measured by an identification of the names of antibiotic and nonantibiotic drugs. However, there was little variation in the education level of these participants, which may account for this finding.

Determinants of self-medication with antibiotics

In this population, antibiotics were often obtained without prescription and a majority of antibiotics taken by adults were taken by self-medication. This is consistent with the results of a survey in the same neighborhood in which antibiotics were available in all 34 surveyed independent stores (Larson & Grullon-Figueroa, 2004). Mainous et al. (2005) found that 19.2% of participants in a Latino community in South Carolina had obtained antibiotics in the United States without a prescription, and, in another survey, that respondents obtained antibiotics from family members living in Mexico (Mainous, Diaz, & Carnemolla, 2008).

Pylypa (2001) describes self-medication with antibiotics in Mexican women as a function of symptom-based “comparative reasoning” in which patients compare their current health relative to their personal and familial experiences as a basis for choosing treatment. The importance of previous experience in self-medicating with antibiotics has been shown to be a recurrent theme in the literature on antibiotic utilization in Latinos (Mainous et al., 2008). Thus, patients may choose to obtain and use an antibiotic based on their prior experience with similar symptoms or for similar severity of illness. Other common themes include higher comfort using medication from one’s own country and barriers to care that encourage self-medication (Céspedes & Larson, 2006).

One surprising finding of this study is that house-holds in which antibiotic self-medication was reported had lower identification scores than households in which antibiotic self-medication was not reported, particularly for nonantibiotics. A possible explanation is that individuals who have higher knowledge of over-the-counter medications for symptomatic relief were less likely to self-medicate with antibiotics because they were aware of more symptomatic treatment options in lieu of antibiotics.

Self-medication with antibiotics has also been reported as a public health concern and as a risk factor for the emergence of antibiotic resistance (Larson, 2007; Li & Wang, 2005). In one European study, 41% of antibiotic users had obtained their medication without a prescription (Vaananen, Pietila, & Airaksinen, 2006). Pharmacy dispensing practices (dispensing exact number of tablets required for a course of therapy) and higher gross domestic product were associated with higher rates of antibiotic utilization in one multinational study (Grigoryan et al., 2008). Individual attitudes toward use of antibiotics, knowledge of indications for use of antibiotics, and nonawareness of antibiotic resistance have been associated with higher rates of self-medication (Grigoryan et al., 2007). Two cultural characteristics, perceived power distance between the clinician and patient and desire to avoid uncertainty, have also been found to be associated with antibiotic utilization (Deschepper et al., 2008; Harbarth & Monnet, 2007). While we did not measure these characteristics in this study, this may be a fruitful approach for future research.

In addition to patient knowledge and attitudes as important determinants of the use of antibiotics, patient expectations and preference have also been associated with antibiotic utilization (Ebert, 2007). Failure of clinicians or pharmacists to provide health information has been associated with an increased risk of patients retaining left-over antibiotics (Kardas, Pechere, Hughes, & Cornaglia, 2007).

Approaches to improve judicious use of antibiotics

While education about inappropriate antibiotic use has been called the "cornerstone" of antibiotic stewardship programs, these educational strategies have typically been directed to clinicians and not the general public. Traditionally, antibiotic stewardship programs have emphasized the role of the clinician in appropriately utilizing antibiotics (Fishman, 2006), but because antibiotics are readily obtained in this population, strategies to control antibiotic utilization must also address the cultural, social, and information environment in which antibiotics are obtained and used.

While the content of an ideal education program and the efficacy of education reducing inappropriate use remains unclear, there is an evidence that mass media campaigns can reduce misconceptions and improve knowledge and healthcare utilization (Grilli, Ramsay, & Minozzi, 2002). Prior studies suggest that among this population, significant misconceptions exist about the role of antibiotics in treating viral illness (Corbett et al., 2005; Larson et al., 2008). Further, major sources of health information reported by a group of urban Latinas included family members and mass media such as television (Larson, Dilone, Garcia, & Smolowitz, 2006). Other studies have suggested that public education campaigns may be effective in reducing misconceptions, especially if targeted to a specific population (Cummings, Rosenberg, & Vugia, 2005). From a marketing perspective, the Direct-To-Consumer-Advertising (DTCA) model cites awareness, recall, and recognition as key steps to increase adherence through patient empowerment and knowledge balanced with consumer rights and protection (Harker & Harker, 2007). It has been suggested that current oversight of DTCA by the Food and Drug Administration is inadequate to provide regulation of the estimated $4.24 billion spent each year by the pharmaceutical industry in DTCA (Donohue, Cevasco, & Rosenthal, 2007). Although antibiotics comprise a relatively small proportion of DTCA spending, several antimicrobial agents have been among the top 20 most heavily advertised drugs (Frank, Berndt, Donohue, Epstein, & Rosenthal, 2002) and drug promotion contributes to unnecessary antibiotic use (Mintzes, 2005).

The results of this study highlight the importance of considering sociocultural influences on antibiotic use patterns and suggest that nonantibiotic knowledge, among other things, may be an important component of antibiotic use that has been previously recognized (Gonzales, Corbett, Wirtz, & Dreser, 2008). It has been proposed that in the United States, patient education about appropriate antibiotic use may be a more important component of antibiotic stewardship interventions (Ranji et al., 2006) than in other countries, but the validity of this recommendation for specific cultural groups has not been studied.

There were several limitations in this study. Because we did not collect baseline data, we were unable to determine the impact of the educational intervention on medication identification. Furthermore, we were unable to correlate self-reported use with actual medication consumption. It is possible that household informants were not aware of medication usage by all members of the household. It is also possible that some informants under-reported antibiotic use because they were participating in the parent study and receiving educational materials regarding judicious antibiotic use. Even with this potential for social desirability bias, however, it was impressive that many participants still reported self-medication with antibiotics.

In summary, this study demonstrated that Hispanic households commonly self-medicated with antibiotics. Despite targeted intervention, knowledge, as measured by identification of drug names, regarding antibiotics and nonantibiotics was low. This suggests that educational interventions alone may not be as important cultural factors in influencing antibiotic utilization. Future studies should investigate this finding in different settings with different patient populations. Clinicians should carefully assess patient's knowledge levels and prior therapy when planning patient interventions. In particular, self-medication with antibiotics should be assessed when considering initiation of antibiotic therapy because prior exposure to antibiotics may increase the risk of resistant infections. Measures to improve antibiotic utilization should address self-medication and consider the cultural and social context in which antibiotic use occurs.

Useful Websites

CDC "Get Smart: Know When Antibiotics Work" contains patient and clinician education materials on appropriate use of antibiotics and treatment of viral illness.

http://www.cdc.gov/drugresistance/community/index.htm

AHRQ "Closing the Quality Gap: A critical Analysis of Quality Improvement Strategies: Volume 4—Antibiotic Prescribing Behavior" reviews evidence on strategies to improve antibiotic utilization.

http://www.ahrq.gov/clinic/tp/medigaptp.htm

Center for Interdisciplinary Research to Reduce Antimicrobial Resistance is an interdisciplinary research effort of interventions to improve antimicrobial usage. Site includes project summaries and investigator profiles.

http://www.cumc.columbia.edu/dept/nursing/CIRAR/

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Figure 1.
Ampitrex, an antibiotic manufactured and distributed in the Dominican Republic (outer package).

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Figure 2.
Ampitrex, an antibiotic manufactured and distributed in the Dominican Republic (package contents).

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Table 1

Informant characteristics, all participants and by self-reported antibiotic use and self-medication in the household in the previous year

		Antibiotic use mean (SD)			Source of antibiotics among users (n = 73)		
	Total sample (n = 100) mean (SD)	**Nonusers (n = 27)**	**Users (n = 73)**	***p***	**Users of self-medication (n = 29)**	**Nonusers of self-medication (n = 44)**	***p***
Age of informant	33.7 (8.7)	30.7	34.9	.03	33.5 (6.7)	35.8 (9.7)	.27
Months in STUFFY	15.1 (2.54)	15.3 (2.04)	14.9 (2.71)	.52	15.1 (2.5)	14.9 (2.9)	.71
	n (%)	*n* (%)	*n* (%)				
Occupation*				.63			.61
Homemaker	67 (68.4)	20 (74.1)	47 (66.2)		20 (71.4)	27 (62.8)	
Other	31 (31.6)	7 (25.9)	24 (33.8)		8 (28.6)	16 (37.2)	
Education				.26			.63
< High school	46 (46)	15(55.6)	31 (42.5)		11 (37.9)	20 (45.5)	
≥ HS grad.	54 (54)	12 (44.4)	42 (57.5)		18 (62.1)	24 (54.5)	
	mean(SD)	mean(SD)	mean(SD)		mean(SD)	mean(SD)	
Antibiotic score	3.3	3.3	3.3	.99	4.0	2.9	.30
−17 to +17	(4.4)	(4.4)	(4.6)		(4)	(4.6)	
Nonantibiotic score	12.5	11.8	14.5	.08	9.2	13.5	.01
−22 to +22	(6.8)	(7.4)	(4.5)		(9.7)	(4.8)	
Total score	15.8	15.1	17.8	.12	13.2	16.4	.09
−39 to +39	(7.8)	(7.9)	(7.1)		(9)	(6.0)	

*Two subjects had missing occupation data.

Score calculated as correct +1, incorrect −1, unsure 0.

Table 2

Medication names, identification rates (all subjects), and identification by reported household use, all participants

	Identification				Correct identification by household use				
					Correct ID/users		Correct ID/nonusers		
Drug name	**Correct**	**Incorrect**	**Unsure**	**Household use**	***n***	**(%)**	***n***	**(%)**	***p***
Analgesics									
acetaminophen	73%	14%	13%	48%	43/48	(89.6)	29/51	(57.7)	.01
Tylenol	87%	10%	3%	86%	76/86	(88.4)	11/14	(78.6)	.31
ibuprofen	75%	9%	16%	47%	42/47	(89.4)	33/53	(62.3)	<.01
Advil	87%	9%	4%	75%	63/75	(84)	24/25	(96.0)	.01
Motrin	86%	12%	2%	91%	80/91	(87.9)	6/9	(66.7)	.08
naproxen	34%	7%	59%	13%	11/13	(84.6)	23/87	(26.4)	<.01
Cough & cold									
Alka- Seltzer	94%	3%	3%	43%	40/43	(93.0)	54/57	(94.7)	.72
Brotapp	40%	4%	56%	10%	9/10	(90)	31/90	(34.4)	
Chloraseptic	26%	7%	67%	3%	2/3	(66.7)	24/73	(24.7)	.10
Dayquil	78%	3%	19%	16%	13/16	(81.2)	65/84	(77.4)	.73
Dimetapp	86%	3%	11%	29%	27/29	(93.1)	59/71	(83.1)	.19
guiafenesin	27%	5%	68%	3%	3/3	(100)	24/97	(24.7)	<.01
Mucinex	24%	5%	71%	2%	1/2	(50.0)	23/98	(23.5)	.38
Robitussin	89%	5%	6%	50%	46/50	(92.0)	43/50	(86.0)	.34
loratadine	34%	2%	64%	7%	7/7	(100)	27/93	(29.0)	<.01
Nyquil	81%	6%	13%	26%	20/26	(76.9)	61/74	(82.4)	.54
Nasal spray (Vicks or Afrin)	89%	5%	6%	39%	33/39	(84.6)	56/61	(91.8)	.26
Sudafed	55%	3%	42%	12%	10/12	(83.3)	45/88	(51.1)	.04
Theraflu	90%	6%	4%	63%	56/63	(88.9)	34/37	(91.9)	.63
Triaminic	30%	6%	64%	2%	2/2	(100)	28/98	(28.6)	.03
Other drugs									
albuterol	46%	12%	42%	45%	32/45	(71.1)	14/55	(25.5)	.01
Tamiflu	61%	3%	36%	1%	0/1	(0)	61/99	(61.6)	.21
Antibiotics									

Drug name	Identification			Household use	Correct identification by household use				
					Correct ID/users		Correct ID/nonusers		
	Correct	Incorrect	Unsure		*n*	(%)	*n*	(%)	*p*
amoxicilina	82%	3%	15%	58%	55/58	(94.8)	27/42	(64.3)	<.01
ampicillin	84%	2%	14%	13%	13/13	(100)	71/87	(81.6)	.09
Ampitrex	49%	17%	34%	14%	14/14	(100)	35/86	(40.7)	<.01
Augmentin	9%	18%	73%	2%	2/2	(100)	7/98	(7.1)	<.01
penicilina	90%	5%	5%	18%	18/18	(100)	72/82	(87.8)	.12
terramicina	48%	30%	22%	7%	6/7	(85.7)	42/93	(45.2)	.04
tetracycline	45%	7%	48%	2%	2/2	(100)	43/98	(43.9)	.11
cefalexina	26%	13%	61%	1%	1/1	(100)	25/99	(25.3)	.09
cefdinir	8%	6%	86%	2%	2/2	(100)	6/98	(6.1)	<.01
Omnicef	82%	3%	15%	1%	1/1	(100)	2/99	(2.0)	<.01
Ceftin	16%	6%	78%	0%		–	–		–
Cefzil	6%	19%	75%	1%	1/1	(100)	5/99	(5.1%)	<.01
azithromicina	55%	8%	37%	3%	3/3	(100)	52/97	(53.6)	
Zithromax	15%	30%	55%	5%	3/5	(60.0)	12/95	(12.6)	<.01
Citromax	14%	33%	53%	6%	3/6	(50.0)	11/94	(11.7)	<.01
claritomicina	37%	9%	54%	5%	1/5	(20.0)	33/95	(34.7)	.04
Avelox	2%	18%	80%	0%		–	–		–