Patient Knowledge of Upper Respiratory Infections: Implications for Antibiotic Expectations and Unnecessary Utilization

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BACKGROUND. Upper respiratory infections (URIs) account for many of the visits in primary care and are commonly treated with ineffective antibiotic therapy. The purpose of this study was to examine patient beliefs in the effectiveness of antibiotics and the likelihood of seeking care for normal presentations of URIs.

METHODS. We conducted a survey of 961 adults (≥18 years of age) from an undifferentiated patient population in a university-based family practice residency clinic in metropolitan Kentucky, a private internal medicine practice in nonmetropolitan Kentucky, and, in metropolitan Louisiana, an emergency department and a convenience sample from the community.

RESULTS. Seventy-two percent of the sample reported that they would seek care with a condition of 5 days' duration with cough, sore throat, and discolored nasal discharge. Sixty-one percent of the sample expressed their belief that antibiotics are effective for a condition of 5 days' duration with cough, sore throat, and clear nasal discharge; 79% said that they believed antibiotics are effective when there is discolored discharge (P=.0001). Medicaid recipients were most likely to seek care across the symptom complexes. Higher education was related to a decreased belief in the effectiveness of antibiotics for the scenario with clear discharge (P.001), but to an increased belief in the effectiveness of antibiotics in the scenario with discolored discharge (P=.003). The strongest predictor of both likelihood of utilization and belief in effectiveness of antibiotics was usual use of antibiotics for the URI symptom complexes.

CONCLUSIONS. Patients lack understanding of the normal presentation of a URI and the effectiveness of antibiotics as a treatment. A confusion about the meaning of discolored nasal discharge is particularly evident, and past antibiotic use may contribute to inappropriate utilization and expectations for antibiotics.

KEY WORDS. Respiratory tract infections; antibiotics; physicians, family; patient education. *(J Fam Pract 1997; 45:75-83)*

Upper respiratory infections (URIs) are common acute infections and are one of the five most common diagnoses in ambulatory care physician office visits.[1] Although URIs are mild, self-limited, and of short duration, they are a leading cause of acute morbidity and industrial and school absenteeism.[2-4] Recent research focusing on ipratropium bromide[5] and zinc gluconate[6] have shown some promise, but few successful treatments have been identified for URIs.[7]

The overwhelming majority of URIs are caused by viruses[28]; thus, antibiotics are not indicated for the treatment of URIs.[9] A recent study[10] attempted to isolate "bacterial colds" for which antibiotics might be effective treatments. The findings of this study, however, are not universally accepted.[11] Nevertheless, antibiotics are widely prescribed for URIs.[12-14] A recent study in a Medicaid population showed that 60% of cases of acute nasopharyngitis (ie, common cold) were treated with antibiotics.[12] Overprescribing antibiotics for unnecessary purposes has become the focus of a particularly pressing public health problem. The overuse of antibiotics in conditions for which antibiotics are neither effective nor indicated (eg, infections caused by

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viruses) has played a significant role in the development of drug-resistant bacteria.[15-18] Consequently, several authors have voiced urgent calls for changes in the clinical use of antibiotics.[19,20]

Evidence suggests that many patients do not enter the therapeutic encounter for an uncomplicated URI with the expectation that specific agents such as antibiotics will be prescribed[21,22]; rather, they hope to get some clarification of their symptoms. The few data available suggest that patients are seeking care to determine whether the URI is actually something serious. Physicians may interpret these patient behaviors as indicative of a desire for antibiotics.[23] The issue for delivery of care and treatment, therefore, concerns patient understanding of what is a "cold" or URI. Although URIs are the reason for a great number of physician visits,[1] in a survey of young adults, 94% agreed that "it is not necessary to go to a doctor for treatment of a cold."[24]

Although the implications for both managing health resources and decreasing the use of antibiotics for predominantly viral URIs are significant, little information exists regarding patient knowledge of the normal presentation and course, as well as appropriate treatment, of an uncomplicated URI. Thus, the purpose of this study was to examine patient knowledge of the normal presentation of URIs, patient expectations for health services, and patient belief in the effectiveness of antibiotics as a treatment modality.

METHODS

The data come from a survey of adults (18 years of age or older) in Kentucky and Louisiana. An undifferentiated patient population was used in this study because a sampled population composed of persons seeking care for a URI has by definition selected individuals who utilize professional health care for the treatment of a URI. The present design will therefore provide a better understanding of the general population, including both those who do and those who do not seek professional care for URIs according to differences in symptoms.

Survey Sites. Four different sites were used for data collection: (1) a university-based family practice residency clinic in a metropolitan area of Kentucky, (2) a private internal medicine practice in nonmetropolitan Kentucky, (3) an emergency department of a hospital in metropolitan Louisiana, and (4) a community convenience sample from metropolitan Louisiana.

Survey Subjects. On days when data collection occurred, all adults in the waiting room in the health care centers were approached for participation. To qualify, these adults did not have to be seeking care; they could be accompanying a family member. Multiple and diverse sites were used for data collection because of the differences in the patient populations who used the various health care delivery sites (eg, residency vs private practice).[25,26] In particular, emergency departments are used for primary care by a segment of low-income patients.[26] The community sample was drawn from persons approached at two church functions, thereby representing people who were not accessed in formal medical settings. The use of diverse sites provides access to persons who might be missed through other methods that are income-dependent, such as telephone surveys.

Survey Instrument. The questionnaire focused on three primary areas: knowledge of the normal presentation of a URI, effectiveness of treatments, and health care utilization. First, we assessed subjects' knowledge of the normal presentation and course of an uncomplicated URI. Two illness scenarios were presented to the subjects.

Survey Scenarios. Both scenarios represented normal presentations of an uncomplicated URI.[2,27-29] The scenarios were not identified with any diagnostic label, either conventional medical or lay (eg, URI, cold). The scenarios were: (1) "You have had an illness for *five* days with the following symptoms: sore throat, cough, and runny nose with clear discharge"; and (2) "You have had an illness for *five* days with the following symptoms: sore throat, cough, and runny nose with discolored discharge (yellow, green, brown)." The subjects were told to respond to a condition with only the provided symptoms. The subjects were not asked for their diagnosis of the condition.

Second, following the presentation of each scenario, the subject was requested to report on a 5-point Likert-type scale how likely he or she was to seek care from a physician for the illness (1=very likely; 5=very unlikely). Further, the subject was asked to indicate whether he or she had sought care from a physician for the condition in the past year. Third, following each scenario, the subject rated the effectiveness on a 5-point Likert-type scale (1=very

effective; 5=not effective at all) of a variety of treatments for the presented URI. Because past use of treatments, particularly physician-prescribed treatments, may influence perceived effectiveness, the subjects were also asked which treatments they normally use if they have the presented illness.

The questionnaire was pretested with both a sample of physicians and a sample of patients before administration. The questionnaire required less than 5 minutes to complete, was available only in English, and was designed for self-administration; reading assistance was provided, however, if requested by the subject.

Survey Response Rate. Of the 1126 persons approached for participation, 961 (85%) provided usable data. Within the groups the response rates were as follows: family practice residency, 85% (534/630); private practice internal medicine, 86% (130/151); emergency department, 81% (85/105); and community sample, 88% (212/240). Data were collected in June, July, and August of 1996.

ANALYSIS

The results are based on completed responses for each variable. Less than 5% of responses to any of the analyzed variables was missing. Because of the conceptual nature of the outcomes, the assessments of likelihood of utilization and effectiveness were analyzed in two ways. First, since they were measured on 5-point Likert-type response scales, they were analyzed as continuous variables by means of *t* tests. Second, likelihood was collapsed by combining "somewhat likely" or "very likely" into one category to compare with those who were not likely. Similarly, "very effective" and "somewhat effective" were collapsed into one category. These categorical variables were analyzed by chi-square cross-classification analysis.

Bivariate Analyses. Bivariate analyses were computed between the likelihood of seeking care and the perceived effectiveness of antibiotics in relation to patient demographic characteristics. Analyses were computed for each of the scenarios; *t* tests were computed for variables with two categories, ANOVA was used for variables with more than two categories, and Pearson correlations were computed for the relation of interval level variables with likelihood of seeking care and perceived effectiveness of antibiotics.

Multiple Regression Analyses. Multiple regression analyses were used to determine the independent effects of individual demographic characteristics on assessments of likelihood of seeking care and perceived effectiveness of antibiotics. For each scenario, a stepwise multiple regression was computed with the dependent variable of likelihood of utilization and the continuous independent variables of age and income, and the dummy variables of sex, race (coded as white, black, and other as the reference category), education (coded as >high school, high school graduate, and <high school as the reference category), and insurance status (coded as prepaid insurance plan, indemnity, Medicaid, and none/other as the reference category). Because utilization of the formal medical system for URIs may be influenced by the desire for treatment with a prescription (eg, antibiotics), the additional variable of normally using antibiotics for the condition (0=no, 1=yes) was also included in the list of independent variables. Multiple regressions were also computed for each scenario with the dependent variable being the belief in effectiveness of antibiotics.

RESULTS

The demographic characteristics of the total sample and each of the sites is shown in Table 1. Additionally, 29% of the sample were current cigarette smokers.

Forty-two percent of the subjects were either somewhat or very likely to seek care in the scenario that included clear nasal discharge, while 72% were somewhat or very likely to seek care in the scenario that included discolored nasal discharge (P=.0001).

When the evaluations of the scenarios were analyzed using response scores on the 5-point scale, a significant effect was yielded between the means (scenario 1, 3.1±1.5; scenario 2, 2.2±1.3; P=.0001). In regard to reported utilization in the past year, 31% of the subjects had sought care for the condition in scenario 1, and 35% had sought care for the condition in scenario 2 (P=.07).

Table 2 shows that for both scenarios, antibiotics were considered effective by a majority of those surveyed; in the case of scenario 2, the majority was four fifths. No differences were found between the scenarios for any of the other treatment regimens.

TABLE 1

Demographic Characteristics of Total Sample and Each of the Sites

Characteristic	Total N=961	FP n=534	PP n=130	ED n=85	CO n=212
Sex, %					
Male	35	26	44	37	51
Female	65	74	56	63	49
Race, %					
White	63	68	71	46	53
Black	31	26	21	52	39
Other	6	6	8	2	8
Age, y (mean±SD)	40.7±15.5	38.4±13.6	46.6±16.0	37.2±16.4	44.0±17.7
Education, %					
<High school	18	10	17	27	33
HS Graduate	30	28	32	32	35
>HS	52	62	51	41	32
Total family income, %					
≥ $20,000	59	73	80	46	43
Health insurance, %					
None	17	6	3	14	54
Medicaid	16	13	10	24	24
Indemnity	25	25	49	37	6
Prepaid plan	40	55	36	24	14
Other	2	1	2	1	2

FP denotes family practice residency; ED, emergency department; PP, private practice; CO, community.

Similar results were yielded for the normally used treatments for the conditions; scenario 2 showed a significantly greater likelihood of the respondents having received antibiotic therapy, but there was no difference between the scenarios on any other treatment (Table 3). For scenario 1, among respondents who believed antibiotics were effective, 67% reported usually using antibiotics as treatment, whereas of those who did not perceive antibiotics to be effective, only 13% usually used antibiotics for the symptom complex (P=.0001). For scenario 2, among those who believed antibiotics were effective, 81% reported usually using antibiotics as treatment, whereas of those who did not perceive antibiotics to be effective, 24% usually used antibiotics as treatment for the symptom complex (P=.0001).

The findings presented in Tables 4 and 5 show that some demographic characteristics of the respondents were related to the reported likelihood of seeking care and perceived effectiveness of antibiotics for the symptom complexes. Current cigarette smokers were more likely to seek care and believe that antibiotics are effective for the condition described in scenario 1. Higher education was related to a decreased likelihood of seeking care and lower perceived effectiveness for scenario 1. Education was not related to the likelihood of seeking care for conditions defined in scenario 2, but higher education was related to higher perceived effectiveness of antibiotics for scenario 2. Current cigarette smokers were more likely to seek care but were no more likely than nonsmokers to believe in the effectiveness of antibiotics in response to scenario 2. Medicaid recipients were found to be the most likely group with health care insurance to seek care for each of the scenarios.

TABLE 2

Percentage of Patients Who Reported That Different Treatments Were Somewhat or Very Effective, by Symptom Complex

Treatment Regimen	5 Days, Cough, Sore Throat, Clear Nasal Discharge*	5 Days, Cough, Sore Throat, Discolored Nasal Discharge†	*P* Value
Antibiotics	61	79	.0001
Antihistamines	62	62	.97
Decongestants	63	65	.36
Chicken soup	35	35	.91
Breathing steam	40	38	.40
Vitamin C	50	47	.20
Pain relievers	68	71	.16

*Scenario 1; † Scenario 2.

TABLE 3

Percentage of Patients Who Said That Normally Used Treatments Were Effective, by Symptom Complex

Treatment Regimen	5 Days,Cough, Sore Throat, Clear Nasal Discharge*	5 Days, Cough, Sore Throat, Discolored Nasal Discharge†	*P* Value
Antibiotics	46	69	.0001
Antihistamines	52	53	.78
Decongestants	55	56	.93
Chicken soup	33	31	.35
Breathing steam	24	27	.19
Vitamin C	42	43	.93
Pain relievers	76	77	.60

*Scenario 1; † Scenario 2.

DISCUSSION

The results indicate that patients do not have a good understanding of the normal course and presentation of an uncomplicated URI. This finding seems to account for the incongruence between patient reports of not seeking care for common colds and the high rate of health care utilization for uncomplicated URIs. Moreover, this lack of knowledge and expectation of the effectiveness of antibiotics in treating certain symptom complexes found in uncomplicated URIs (particularly purulent nasal discharge) may play a role in the widespread use of antibiotics for uncomplicated URIs.

The multiple regression analyses on likelihood of seeking care yielded results similar to those of the bivariate analyses. Statistically significant variables yielded in the regression analyses for likelihood of seeking care for scenario 1 were history of usual antibiotic use (β=–.42, *P*=.0001), being a Medicaid recipient (β=–.08, *P*=.01), being male (β=–.08, *P*=.02), and being at a lower economic level, ie, those with less income were more likely to seek care (β= .07, *P*=.04). For scenario 2, only three variables were significant predictors of the likelihood of seeking care: history of usual antibiotic use (β=–.43, *P*=.0001), being female (β=.13, P=.0001), and age (β=–.10, P=.001).

Table 6 shows the significant predictors of perceived effectiveness of antibiotics in the multiple regression analyses for each scenario. The strongest predictor of belief in the effectiveness of antibiotics for URI symptoms in both scenarios was usual antibiotic use for those symptoms.

TABLE 4

Relationship of Demographic Characteristics to Likelihood of Utilization of Care and Perceived Effectiveness of Antibiotic in Scenario 1

Characteristics	Likelihood of Seeking Care* Mean ± SD	(*P*)	Effectiveness of Antibiotics† Mean ± SD	(*P*)
Sex				
Male	3.07±1.48		2.25±1.29	
Female	3.25±1.47	(.09)	2.39±1.38	(.14)
Race				
White	3.26±1.45		2.54±1.39	
Black	2.90±1.50		1.93±1.15	
Other	2.94±1.60	(.002)	2.36±1.33	(.0001)
Age	*r*=–.09	(.008)	*r*=.05	(.16)
Education				
<High school	2.74±1.48		2.03±1.24	
HS graduate	3.06±1.43		2.16±1.19	
>HS	3.31±1.48	(.0001)	2.56±1.43	(.0001)
Total family income	*r*=.17	(.0001)	*r*=.20	(.0001)
Health insurance				
None/other	3.15±1.37		2.08±1.34	
Medicaid	2.56±1.51		2.50±1.41	
Indemnity	3.26±1.48		2.34±1.13	
Prepaid plan	3.33±1.45	(.0001)	2.32±1.39	(.02)
Smoker				
Yes	2.94±1.51		2.17±1.36	
No	3.21±1.45	(.01)	2.40±1.34	(.02)

*Rated on a scale of 1 to 5, where 1=very likely, 5=very unlikely.
†Rated on a scale of 1 to 5, where 1=very effective, 5=not effective at all.
NOTE: Scenario 1 symptoms: 5 days' cough, sore throat, clear nasal discharge.

TABLE 5

Relationship of Demographic Characteristics to Likelihood of Utilization of Care and Perceived Effectiveness of Antibiotic in Scenario 2

Characteristics	Likelihood of Seeking Care* Mean ± SD	(P)	Effectiveness of Antibiotics† Mean ± SD	(P)
Sex				
Male	2.42±1.26		1.87±1.06	
Female	2.06±1.29	(.0001)	1.69±1.05	(.01)
Race				
White	2.21±1.26		1.76±1.06	
Black	2.11±1.30		1.72±1.04	
Other	2.30±1.42	(.45)	2.36±1.33	(.83)
Age	*r*=–.08	(.01)	*r*=.07	(.03)
Education				
<High school	2.11±1.26		1.91±1.24	
HS graduate	2.25±1.28		1.86±1.11	
>HS	2.16±1.27	(.49)	1.64±0.94	(.003)
Total family income	*r*=.01	(.67)	*r*=–.07	(.04)
Health insurance				
None/other	2.56±1.18		1.75±1.20	
Medicaid	1.92±1.27		1.62±0.97	
Indemnity	2.16±1.25		2.10±1.00	
Prepaid plan	2.14±1.31	(.001)	1.74±1.10	(.0001)
Smoker				
Yes	2.03±1.23		1.76±1.13	
No	2.25±1.29	(.02)	1.76±1.04	(.95)

*Rated on a scale of 1 to 5, where 1=very likely, 5=very unlikely.
†Rated on a scale of 1 to 5, where 1=very effective, 5=not effective at all.
NOTE: Scenario 2 symptoms: 5 days' cough, sore throat, discolored nasal discharge.

IMPLICATIONS OF PATIENT EDUCATION

Educating patients about the normal course and presentation of uncomplicated URIs, as well as appropriate treatments, has several meaningful implications. First, appropriate knowledge of what a URI is should decrease utilization of health care for URIs. Patients already report that they would not seek care for a "cold"; consequently, if they knew that their symptoms represented the normal presentation of a "cold," they should be less likely to seek care. Both scenarios in the survey represented uncomplicated URIs, yet both prompted indications of substantial utilization and the likelihood of future utilization of health care. Consumer education interventions have been shown to be effective in reducing the rate of visits for common colds with no increase in complications.[30]

Since uncompliicated URIs are one of the five most common diagnoses in ambulatory care,[1] a decrease in utilization for this condition would have an enormous impact on health care expenditures. Even though high-cost low-volume services tend to be the focus of managed care systems, capitated systems would experience substantial savings from decreased utilization for uncomplicated URIs. Moreover, as health care systems struggle with delivering care with finite resources, decreasing inappropriate utilization would alleviate some of the pressure in making decisions for rationing care for conditions with more significant health implications.

Second, the data indicate that, particularly in the scenario with discolored nasal discharge, the majority (69%) of respondents report usually using antibiotics as treatment for the symptom complex. The widespread use of antibiotics for uncomplicated URIs has implications for both the rapid rise of antibiotic resistant pathogens[16] and significant costs in treating URIs.[13] A recent study in a Medicaid population demonstrated that antibiotics for URIs accounted for 23% of the total cost of managing URIs.[13]

The Role of Expectations. It has been suggested that patient expectations play a role in the physician's decision to prescribe antibiotics for presumably viral respiratory tract infections.[23] Some recent data suggest, however, that the receipt of antibiotics for a respiratory infection is not in and of itself associated with increased patient satisfaction.[31] The present results would suggest that patients do have a belief in the effectiveness of antibiotics for certain symptom complexes characteristic of viral URIs and that they report usually receiving them for those symptoms. Although controlled trials have not yielded evidence of the effectiveness of antibiotics as treatment of URIs,[32-34] past receipt of antibiotics for a self-limited condition may act to create a sense of

TABLE 6

Multiple Regressions for Demographic Variables with Perceived Effectiveness of Antibiotics

Illness Scenario	b	Standard Error	β	*P*	Cumulative R^2
Scenario 1*					
Normally use antibiotics	−1.34	0.08	−0.50	.0001	.28
White race	−0.34	0.09	−0.12	.0001	.30
Income	0.07	0.02	−0.12	.0001	.31
Indemnity insurance	−0.30	0.09	−0.10	.0001	.32
					df=4, 834
Scenario 2†					
Normally use antibiotics	−1.08	0.07	−0.48	.0001	.24
Prepaid insurance	−0.42	0.08	−0.20	.0001	.26
Indemnity insurance	−0.37	0.09	−0.15	.0001	.26
Medicaid	−0.28	0.10	−0.10	.007	.27
Female	0.16	0.06	0.07	.01	.27
					df=5, 821

*Scenario 1 symptoms: 5 days' cough, sore throat, clear nasal discharge.
†Scenario 2 symptoms: 5 days' cough, sore throat, discolored nasal discharge.
NOTE: Effectiveness of antibiotics was reported on a scale of 1 to 5, where 1=very effective, 5=not effective at all.

effectiveness of antibiotics.[35] The patients pair the resolution of the self-limited illness in time with the receipt of the antibiotics and thus draw the conclusion that the antibiotics caused the resolution of the illness. Thus, intervening through patient education may be an effective way of decreasing the rate of antibiotic prescribing by decreasing expectations for antibiotics for certain symptom complexes.

The present results indicate that there were some patient characteristics related to both likelihood of utilization for URIs and belief in effectiveness of antibiotics. Likelihood of utilization differed according to health insurance status across both of the scenarios, with Medicaid recipients being the most likely to utilize health care for URIs.

Formal education was related to the likelihood of utilization for the scenario that included the symptom of clear nasal discharge. There was no relationship between education and the scenario featuring purulent nasal discharge. Similarly, formal education was significantly related to belief in effectiveness of antibiotics across both scenarios. The higher the individual's education level, the less the belief in the effectiveness of antibiotics for the scenario with clear nasal discharge. In the scenario with purulent discharge, the higher the education, the greater the belief in the effectiveness of antibiotics for that problem. In the regression analyses, the variable with the strongest relationship to the belief in the effectiveness of antibiotics was reported utilization of antibiotics for the symptom complex. Most importantly, the report of usually using antibiotics for the URI symptom complex was a strong predictor of both utilization and a belief in the effectiveness of antibiotics for the presented symptom complexes.

The scenario that featured discolored nasal discharge seemed to be the presentation that patients were most confused about. In this scenario, 72% would seek care, whereas for the scenario involving 5 days of clear discharge, 42% would seek care. Moreover, although a high proportion of respondents (61%) felt that antibiotics would be effective in the scenario specifying clear discharge, 79% felt that antibiotics would be effective in the scenario specifying discolored discharge.

Patients may be confusing the symptom complex presented in scenario 2 with acute sinusitis, a condition that would suggest antibiotic treatment.[36] Although purulent nasal discharge is present in acute sinusitis, without other symptoms such as headache, fever, facial pain, maxillary toothache, and poor response to decongestants, the patient has a low probability of having sinusitis. Other authors focus on diagnosing sinusitis only after 7 days of purulent discharge.[37,38]

Evidence suggests that purulent discharge that is not symptomatic of acute sinusitis is not effectively treated by antibiotics. Antibiotic treatment of purulent discharge alone, with no foreign body or otitis media, compared with treatment with decongestant-antihistamines or placebo resulted in no difference in the rates of complications or times of recovery.[39]

Additionally, another study demonstrated no difference in duration of illness or complication rates among children with clear or purulent nasal discharge who were followed without any intervention until they were symptom free.[40]

Study Limitations

Several limitations to the study should be noted. First, there could have been an effect exerted by the sequence of two similar scenarios: since the second scenario was the one that included the discolored nasal discharge, the subjects might have been led to respond to it differently simply because it followed scenario 1. However, since the primary difference in the responses between the two scenarios concerned the use of antibiotics, it seems more likely that the differences noted between the scenarios were due to the type of nasal discharge and not the order of the scenarios.

Second, the subjects responded to only the presented symptoms. Although a common way of differentiating conditions that is employed by clinicians moving through differential diagnoses is to include in the patient information set signs or symptoms that the patient does not have (eg, absence of fever), we felt that patients, with their more limited knowledge base, could adequately respond to a set of symptoms the patient does have.

The sample included a substantial proportion of low income, minority, and uninsured subjects that might have been excluded from conventional random-digit-dialing telephone surveys. However, although data were collected at a variety of sites in two states, aspects of the design render it a nonprobability design. Because of limitations in the design, a degree of bias may be present in the findings.

An additional limitation to the generalizability of the results relates to the use of antibiotics as a standard treatment regimen for URIs, resulting in exacerbations of chronic obstructive pulmonary disease (COPD). We attempted to address this by examining differences in subjects with and without COPD. Our question asking whether the subject had ever received a physician's diagnosis of emphysema or chronic bronchitis was not answered by 22% of the sample. Consequently, we felt that analysis of an item with such substantial missing data would have questionable validity, and for this reason we did not address this issue in the analysis.

CONCLUSIONS

Patient knowledge of the normal presentation of URIs and appropriate treatments is inaccurate enough to suggest that substantial use of resources for inappropriate utilization and expectations for antibiotics are unfortunate results. The lack of knowledge of what is a cold seems to explain the incongruence between patient expectations for colds and utilization and expectations for antibiotics. As the prevalence of antibiotic-resistant bacteria increases and health care systems deal with finite resources, patient education on this problem becomes particularly important.

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