

Antibiotics and Respiratory Infections: Are Patients More Satisfied When Expectations Are Met?

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Background. Antibiotics are frequently prescribed for respiratory infections, even though most of these infections are viral. To understand why physicians do so, we studied patients' and physicians' expectations for antibiotics and the effects of the patient-physician interaction on patient satisfaction.

Methods. Patients with a respiratory infection were asked to complete a questionnaire before and after visiting with physicians at three family medicine centers. Physicians completed a questionnaire following the visit.

Results. Sixty-five percent of the 113 patients with respiratory infection expected antibiotics. Physicians had some ability to perceive this expectation and frequently prescribed antibiotics for patients who expected them. Antibiotics were prescribed to over 75% of patients with

sinusitis or bronchitis and to 18% of those diagnosed with only viral infections. No association was found between a prescription for antibiotics and patient satisfaction; however, patient satisfaction did correlate with the patients' report that they understood the illness and that the physician spent enough time with them.

Conclusions. Physicians frequently prescribe antibiotics for upper respiratory infections when they believe patients expect it, but receiving a prescription for antibiotics is not in and of itself associated with increased patient satisfaction.

Key words. Patient satisfaction; upper respiratory infection; antibiotics; physician-patient relations.
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A common decision that must be made by primary care physicians is whether to prescribe antibiotics to a patient presenting with the signs and symptoms of a respiratory infection.¹⁻³ Physicians are aware that in most cases, rhinitis, pharyngitis, and bronchitis have a viral rather than a bacterial origin, and therefore would not be responsive to antibiotics.^{4,5} Since there are few reliable signs or symptoms to differentiate patients with a viral infection from those with a bacterial infection, physicians are frequently uncertain about whether antibiotics are indicated.

The physician may feel a duty to treat the patient presenting with a mild but uncomfortable illness with antibiotics, even if the likelihood of improving the outcome is small.⁵ Although antibiotics may offer little

direct benefit, the physician may perceive the costs to the patient to be even smaller. While, in general, the safety record of antibiotics is excellent,⁶ the association between overuse of antibiotics and the development of resistant organisms as well as the expense of antibiotics are compelling reasons for not prescribing them except when necessary. It is difficult, however, for individual physicians to appreciate the significant association between antibiotic use and bacterial resistance.⁷⁻¹⁰ Further, physicians also may not factor cost into the decision to prescribe antibiotics, particularly if they believe it will be covered by insurance, if they are providing pharmaceutical samples to the patient, or if they are unaware of how much the drug costs.

Patients with a respiratory infection seek medical care with expectations that frequently include obtaining a prescription for antibiotics. If these expectations are not met, the patient may be dissatisfied, which may lead to a less favorable outcome.¹¹ Dissatisfied patients are less likely to comply with physicians' treatment recommendations.¹²

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Further, the dissatisfied patient may either continue to call or visit the physician until the expectations are met or choose another provider.¹³ To avoid these negative consequences, it is possible that physicians overprescribe antibiotics in response to patients' expectations.^{14,15} An association between patient satisfaction and antibiotic prescribing has not, however, been clearly established. Brody and Miller¹⁶ have questioned whether antibiotic prescribing improves satisfaction, as compared with other treatments such as patient education, stress counseling, or negotiation. Cowan¹⁷ failed to demonstrate a relation between antibiotic prescriptions and satisfaction.

The role of the physician can be summarized by the following three models: (1) *dominant doctor* model, ie, the physician controls the encounter, (2) the *consumerist patient* model, ie, the consumer-patient leads and the physician aims to please and retain this customer, or (3) the *cooperation* model, ie, the physician and patient cooperate to define the patient's problem and decide how to solve it.

We designed a study of patients with upper respiratory infections (URIs) to address these issues. We measured patient expectations for antibiotics before they saw the physician and their satisfaction with the physician immediately after the encounter. We also measured the physician's perception of the patient's expectations. Results are interpreted with respect to the three physician-patient relationship models.

Methods

Patients presenting with a respiratory infection at two community practices and one academic family practice clinic (representing 13 physicians) were asked by the clinic staff to participate in the study. Parents filled out questionnaires on behalf of children.

Two patient questionnaires and one physician questionnaire were used. The instruments were developed following a pilot study and reviewed by the institutional review boards from the health science center. Patients completed the first questionnaire immediately before seeing a physician, and the second questionnaire after seeing the physician and before leaving the clinic. The previsit instrument elicited patients' expectations about the best treatment for the illness and asked whether they believed antibiotics kill viruses. The postvisit instrument asked patients again whether they believed antibiotics would kill viruses, and whether they believed antibiotics would shorten the course of their disease; it also asked about their perception of their interaction with the physician, and whether they were satisfied with the visit. The treating physician completed a questionnaire following the

patient's visit, answering questions about the patient's expectations for antibiotics, the patient's diagnosis, whether any antibiotic was prescribed, and the reason for it. Results of a telephone interview 7 to 10 days later are reported elsewhere.¹⁸

Data analysis was conducted using the SAS statistical package. Multiple regression, multiple logistic regression, and ANOVA were used.

Results

One hundred forty-two patients were initially enrolled. Although the instructions specified that every qualifying patient be given an opportunity to participate, patient selection was at the discretion of the staff at the participating clinics. One hundred thirteen patients (80%) and their physicians completed all aspects of the study. Questions were answered by either the patient (n=100) or the person responsible for the patient's care (n=12 for children and n=1 for an elderly man). Dropouts were primarily the result of our inability to reach the respondent for a follow-up phone interview. Patient age ranged from 1 to 85 years, with a mean of 36. Seventy-six percent of the participants were female, and 22% of the participants had previously seen the physician for the same illness.

In the previsit interview, the majority (65%) of patients indicated an expectation for antibiotics, but there was no clear consensus about whether they thought that antibiotics would kill viruses. In the postvisit patient interview, nearly all (97%) the patients either agreed or strongly agreed that they were satisfied with the visit, 97% indicated that they would return to the same physician for a similar illness, 99% said they understood the physician's choice of treatment, 93% thought the physician spent enough time with them, and 59% believed that antibiotics would shorten the illness. Again, patients were evenly split in their opinion about whether antibiotics kill viruses; however, fewer patients were "unsure." After seeing their physician, two thirds of the 27 patients who were unsure at the previsit interview had formed an opinion: 12 patients now agreed with the inaccurate statement and 6 patients disagreed with it.

Sixty-three percent of patients received antibiotics. Interviewed after the visit, one half of physicians expressed the belief that their patient expected an antibiotic, but only 8% of the physicians who prescribed an antibiotic indicated doing so because of the patient's expectation. Others indicated doing so because they diagnosed bacterial infection, believed the patient would benefit from an antibiotic, or considered the risk of bacterial infection sufficient to warrant an antibiotic.

Slightly more than one half of the infections docu-

Table 1. Number of Patients with Each Diagnosis Who Received Prescription for Antibiotics

Type of Respiratory Infection	No. (%) of Patients with Respiratory Infection	No. (%) of Patients Given Prescription
Sinusitis	39 (34.5)	35 (89.7)
Viral infection, URI, rhinitis	27 (23.9)	5 (18.5)
Bronchitis	24 (21.2)	19 (79.2)
Other (pharyngitis, asthma, HRAD, otitis)	23 (20.4)	12 (52.2)
Overall	113 (100)	71 (62.8)

URI denotes upper respiratory infection; HRAD, hyperreactive airway disease.

mented were sinusitis or bronchitis (Table 1). About 80% of patients with these infections were prescribed antibiotics. One fourth of the infections were documented as URI, viral infection, or rhinitis. Although there is no empirical evidence of antibiotics' efficacy against these infections, one fifth were treated with antibiotics.

Patients' Expectations for Antibiotics

Patients' beliefs about the best medicine for their problem had little relation to the physician's diagnosis (Table 2). Overall, 65% of the patients indicated that they expected an antibiotic. Of the patients judged by a physician to have a viral respiratory infection, 56% expected antibiotics. This percentage is not significantly lower than the proportion of patients with sinusitis or bronchitis who expected antibiotics. Only with respect to decongestants were patients' expectations for medication related to their diagnoses: fewer patients with bronchitis expected a decongestant ($\chi^2=9.98$, degrees of freedom [df]=3, $P=.02$).

Table 3. Accuracy of Physician's Perception of Patient's Expectation for Antibiotic Prescription

Patient's Belief About Appropriateness of Antibiotics for Problem	Physician's Belief About Patient Expectation for Antibiotic Prescription		
	Expected	Not Sure	Not Expected
Antibiotics appropriate	39	21	14
Antibiotics inappropriate	14	8	17

$\chi^2=7.82$, $df=2$, one-tailed $P=.01$.

Physician's Perception of Patient's Expectations for Antibiotics

The accuracy of the physician's perception of the patient's desire for antibiotics is shown in Table 3. There is a large degree of inaccuracy in the physicians' perceptions of the patients' desire for antibiotics. For 25% of the patients, the physician's perception was inaccurate, and for an additional 26%, the physician was unsure about whether they expected antibiotics.

Relation Between Patient Expectations and Antibiotic Prescribing by Physicians

Physicians' medication advice and prescriptions were related to what the physician thought the patient wanted. When the physicians believed that the patients wanted antibiotics (53 patients), they prescribed antibiotics for 41 (77%). When the physicians believed that the patients did not want antibiotics (31 patients), they prescribed antibiotics for only 9 (29%). Surprisingly, physicians who were unsure whether their patients wanted antibiotics (29 patients) prescribed them for 21 (72%); ie, these physicians were just as likely to prescribe antibiotics as were those who believed the patients expected them. Although in only 8% of the cases did physicians explicitly acknowledge writing antibiotic prescriptions to meet patient expectations, there was a highly significant association between the physicians' judgment regarding what patients expected from the encounter and the physicians' reports

Table 2. Percentage of Patients with Each Diagnosis Who Expected Each Type of Medication

Diagnosis Assigned by Physician	Medication Expected by Patient, %					
	Antibiotic	Decongestant	Cough Medicine	Pain Medicine	Other	None
Sinusitis	66.7	54.6	15.2	6.1	9.1	6.1
Viral infection	55.6	51.9	37.0	11.1	11.1	3.7
Bronchitis	70.8	19.2	26.9	7.7	7.7	3.9
Other	69.6	58.8	29.4	0	11.8	0

NOTE: Patients ($n=113$) could indicate they expected more than one medication.

of prescriptions written ($\chi^2=22.7$, $df=4$, $P<.001$). The correlation between patients' belief that antibiotics would shorten their illness and the likelihood they would receive an antibiotic ($r=.50$, $df=109$, $P<.001$) further supported the theory that patients would receive antibiotics when they expected to.

We have shown that three factors influence physicians to prescribe an antibiotic for an upper respiratory tract infection: the physician's diagnosis, the patient's belief that antibiotics are the best treatment, and the physician's belief that the patient expected antibiotics. It is important to know whether these factors influence physician behavior independently. For example, the patients may be accurate when they believe antibiotics could be effective against the disease. If so, there would be nothing surprising or disturbing about the physician prescribing antibiotics when the patient expects it. To test this explanation, a multivariate analysis was performed.

If each factor independently predicted the physician's prescribing of antibiotics, it would confirm the impression that physicians accede to patient wishes. If the patient's expectation and the physician's belief about the patient's expectation have no independent influence on the physician's decision to prescribe antibiotics (irrespective of diagnosis), it would support the theory that patients can recognize illnesses that will benefit from antibiotics.

An analysis of variance (ANOVA) was done using the decision to prescribe antibiotics as the dependent variable (coded as 1=yes, 0=no). ANOVA was used rather than multiple logistic regression because it provides for consideration of categorical predictor variables with three levels. Results with multiple logistic regression were similar. Predictors included the physician's diagnosis (viral; presumed bacterial, such as sinusitis or bronchitis; or other) (Table 1), whether the patient believed that antibiotics were the best treatment for the illness, and whether the physician believed that the patient expected antibiotics (yes, not sure, or no). These factors together accounted for 43.6% of the variance in the physicians' prescribing of antibiotics, and each of the predictors was statistically significant in the context of the others in the analysis: physician's diagnosis ($F[2,107]=20.6$, $P<.001$), patient's expectation ($F[1,107]=8.3$, $P=.005$), and physicians' belief about patient's expectation ($F[2,107]=5.9$, $P=.004$). That all three factors influenced the antibiotic prescription rate means that the relation between the patients' expectations for antibiotics and the physicians' prescribing of antibiotics cannot be entirely explained by the patients' accurately recognizing that they have bacterial respiratory infections.

Effects of Antibiotic Prescriptions on Patient Satisfaction

Patient satisfaction was measured with a questionnaire completed immediately after visiting the physician. Patients were asked whether they agreed or disagreed with two statements concerning their satisfaction with their treatment and whether they would return to the same physician for a similar illness. The answers to these questions were coded on a 1 to 5 scale (1=strongly agree, 2=agree, 3=do not agree or disagree, 4=disagree, 5=strongly disagree), and the average of the two questions was used as an overall measure of the patient's immediate satisfaction with the physician-patient encounter. Because over 95% of the respondents agreed or strongly agreed that they were satisfied, most variation in this measure was due to differences in the degree to which patients were satisfied, rather than to patients being dissatisfied.

A multiple regression analysis was done, predicting patients' immediate satisfaction as a function of answers on the patients' previsit questionnaire and patients' and physicians' postvisit questionnaires.* An additional measure was constructed reflecting the central issue of whether the patient received what he or she wanted. This measure was added because inspection of the data revealed that patients who believed antibiotics to be the best treatment for their problem were more satisfied when the doctor gave them antibiotics, while patients who did not believe antibiotics to be the best for them were more satisfied when the physician did not give them antibiotics. In the additional measure, a high score (reflecting "getting what one expected") is given both to patients who said they wanted antibiotics and received them, and to patients who said they did not want antibiotics and did not receive them. A low score indicates "not getting what one expected." Using this measure in the multiple regression analysis allowed the effect of meeting the patient's expectations for antibiotics to be compared with other factors that influence patient satisfaction.

The regression analysis explained 71% of the variance in patients' immediate satisfaction ($F=15.6$, $df=89$, $P<.001$). The measures that had the strongest positive association with satisfaction were whether the physician spent enough time explaining the illness ($F=26.7$, $P<.001$) and whether the patient understood the physician's choice of treatment ($F=10.2$, $P=.002$). Patients who believed that antibiotics kill viruses tended to be less

*Variables included: whether the patient had previously seen the physician for the present illness, how many days the patient had had the illness, belief that viruses last less than 5 days, belief that antibiotics kill viruses, belief that antibiotics would shorten the present illness, patient's judgment that the physician had spent enough time with the patient, patient assessment that he or she understood the physician's choice of therapy, patient report of being given antibiotics, and physician report of giving the patient antibiotics.

satisfied ($F=2.25$, $P=.054$). Factors that *did not* influence patient's satisfaction included whether the patient thought antibiotics were the most appropriate treatment for the illness ($F=0.04$, $P=.83$), whether the patient received antibiotics (by physician's report, $F=0.08$, $P>.05$; by patient's report, $F=0.12$, $P>.05$), and whether patients received what they expected with respect to antibiotics ($F=0.67$, $P>.05$).

Discussion

The antibiotic prescribing pattern of the physicians in our study does not conform to scientifically based practice recommendations as given in a standard text.⁴ Even though there is little documentation that antibiotics would change the outcome in the majority of these patients, over 80% of patients with bronchitis were given a prescription for antibiotics.¹⁹ Further, antibiotics were prescribed for 18% of patients with diagnoses of URI or rhinitis, although these are quite likely of viral origin. These rates are similar to those reported in some earlier studies,^{20,21} although less than those reported in a recent US study.²²

To explain these results, we refer to three models of the physician's strategy in the physician-patient relationship. In the *dominant doctor* model, the physician defines and prescribes, and the patient listens and follows. Prescription of antibiotics beyond standard recommendations would be due to the physician's belief that antibiotics will effectively treat the patient's disease.

In the *consumerist patient* model, physicians seek to please patients to ensure their continued business. Patients have their own expectations about antibiotics. Excess prescribing of antibiotics would result from the physician's belief that patients want antibiotics and will be dissatisfied if they do not receive them.

In the *cooperation* model of the physician-patient relationship, each has power. The physician's power is based on specialized knowledge, the patient's on beliefs and values. The physician seeks to satisfy the patient with respect to his or her perception of medical needs, yet also educates the patient so that these desires are accurate, well founded, and unlikely to result in disappointment. In this model, overprescribing of antibiotics could be due to the beliefs of either party. In addition, overprescription is a reflection of failure on the part of the physician to educate patients.

These models are useful for explaining inappropriate prescribing of antibiotics, even though no one model describes all physicians. Individual strategies vary widely,²³ and a physician may practice according to any of the three models at any time.

Patients' Expectations

When they arrived at the physician's office, most patients with respiratory infection (65%) expected antibiotics. Their beliefs about the best medicine for their problem had little relation to the physician's diagnosis. More than one half (59%) of those who received a diagnosis of a viral infection expected to be treated with antibiotics, even though this would be inappropriate; only slightly higher percentages of patients with bronchitis (65%) and sinusitis (69%), which may be responsive to antibiotics, expected antibiotic treatment. That is, patients were almost as likely to expect antibiotics when inappropriate as when appropriate.

Physicians' Perceptions and Prescriptions

Physicians in this study inaccurately perceived their patients' expectations for antibiotics: they underestimated the proportion who expected antibiotics and were inaccurate in identifying which patients expected antibiotics. This is inconsistent with the consumerist or shared-power perspectives on the physician-patient relationship, which assume the physician is motivated to know what the patient wants.

The consumerist model is supported by physicians having been more likely to prescribe an antibiotic when they believed that the patient expected one. The physicians did not acknowledge this consumerist motivation: only 8% of physicians cited the patient's expectations for an antibiotic as the reason for prescribing an antibiotic.

Because there was some relation between what the patient wanted and what the physician perceived the patient wanted, the net effect is that patients who wanted antibiotics were more likely to get them. This is consistent with Vinson and Lutz's finding²⁴ that when children have a cough, physicians are more likely to diagnose "bronchitis" if parents expect antibiotics, because bronchitis can justifiably be treated with antibiotics. The method in that study did not eliminate the possibility that the association might exist only in the physician's mind, since it was the physician who reported the parent's expectation. In our study, however, patient expectation was elicited directly. Our replication strengthens the earlier finding and shows that it occurs not just with parents of sick children but with all patients who have URI.

The factors influencing whether patients were given antibiotics were the physician's diagnosis, the patient's expectation, and the physician's belief that the patient wanted antibiotics. It is important to note that each of these factors had a separate role in influencing the physician's decision; it is not just that the patient had expectations based on his or her ability to accurately self-diagnose. That the physician complied with the patient's

wishes for antibiotics, even when there is no good evidence antibiotics are effective, is support for the consumerist model.

Effects of the Physician's Behavior on Patient Satisfaction

The physicians' behavior usually satisfied the patients. Satisfaction immediately after the visit was highly related to patients' reports of whether the physician spent enough time explaining the illness and whether they understood the physician's choice of treatment. This association supports both the cooperative model and the consumerist model.

Although 83% of the patients who expected antibiotics received them, we were unable to demonstrate that receiving a prescription for an antibiotic improved immediate patient satisfaction. Further, patient satisfaction was not influenced by whether the physician met the patient's initial expectation either for antibiotics or for something else. These results contradict the consumerist model's central assumption that prescribing antibiotics improves patient satisfaction.

This study substantiates the work of other researchers which shows that the quality of the patient interaction has a greater impact on patient satisfaction than the use of medical technology.^{11,16,17} Satisfaction was strongly correlated with the patient's believing the physician had spent enough time explaining the illness and with the patient's understanding the physician's choice of treatment, but was not related to the physician's prescribing antibiotics. This finding supports the assumptions of the cooperative model of the physician-patient relationship. How the physician knows at what point the patient understands the physician's explanation of and rationale for treatment or feels the physician has spent enough time may represent good "bedside manner." Therefore, achieving patient satisfaction may be best related to the interviewing skills of the physician. While most physicians have had extensive education about the use of antibiotics, interviewing skills receive much less emphasis during training. Although physicians are frequently visited by advocates for the use of antibiotics, they are seldom visited by advocates for improved communication with patients.

There is some support in this study for each of the three models of the physician-patient relationship. The doctor-dominant model is consistent with the finding that physicians do not know what their patients expect. The consumerist model is supported by strong evidence that physicians prescribe antibiotics for patients who expect them. Finally, the cooperative model is supported by strong evidence that patients are more satisfied when the

physician spends time talking with them and ensuring that they understand the basis for the selected treatment.

For the most part, physicians seem to be acting in accord with consumerist assumptions. Anticipating that patients will be dissatisfied if not given medicine, physicians give antibiotics even when they are unlikely to be effective. Our study, however, which found that patients are more satisfied with the medical encounter when the physician spends adequate time explaining things to them, supports assumptions underlying the cooperative model.

Limitations of the Study

Our study found little evidence to support the fear of physicians that failing to prescribe an antibiotic will result in patient dissatisfaction. Our measurement of the effects of prescribing antibiotics for respiratory infections on patient satisfaction is, however, weakened by a possible ceiling effect, ie, most patients were satisfied with their physician. Additionally, the study design was correlational rather than experimental. As we did not control whether patients received antibiotics, we cannot eliminate the possibility that physicians avoided dissatisfaction by selectively prescribing antibiotics for patients who otherwise probably would have complained. Because physicians knew they were being studied, they may have sought to make their diagnoses consistent with their treatments. This could explain why we observed physicians prescribing antibiotics for only 18% of patients with viral diagnoses, compared with 60% in a study using Medicaid claims.²² Further, we relied on patient report rather than direct measurement of several factors, such as the time the physician spent educating the patient. Therefore, there is the possibility of a "halo effect" in patient rating of doctor behavior: those who were satisfied reported that the physician did helpful things during the physician-patient encounter.

Our findings may not be generalizable to all diseases because the study focused on only one disease: respiratory infection. Physicians' strategies for respiratory infections take into account that while antibiotics prescribed for colds may have little effect, they have only a small possibility of harming the patient. Physicians, however, have different strategies for different diseases, and patients may think differently about their physician's behavior when it comes to more serious diseases.

Conclusions

In our study, patients presenting to a community or academic family physician's office with a respiratory infection are frequently given a prescription for antibiotics, a treat-

ment approach for which there is little support in the literature. Our survey documents that the patient's expectation for antibiotics is an important factor in this decision. Our study, however, does not suggest that prescribing antibiotics results in greater patient satisfaction.

In light of the increasing cost of medical care and the growing problem of antibiotic resistance, we recommend that physicians rely more on patient interaction skills and less on antibiotics to achieve patient satisfaction in the care of patients with respiratory infection.

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