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Back-up antibiotic prescriptions could reduce unnecessary antibiotic use in rhinosinusitis

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Abstract

Objectives: To examine the attitudes of patients with rhinosinusitis toward the availability of "back-up" antibiotics, and potential implications for antibiotic use rates.

Study Design and Setting: A survey that assessed actual and hypothetical antibiotic prescription patterns was administered to a convenience sample of patients treated for rhinosinusitis in one acute care facility between September 1 and December 1, 2001.

Results: Of 386 eligible patients, 114 completed the survey. Seventy-six percent of patients expected antibiotic treatment; satisfaction rates were significantly associated with receiving an antibiotic prescription ($P < .05$). Over two-thirds of patients (69.7%) reported preference for back-up antibiotic prescriptions in the future, with 91.1% stating they would wait at least 1 day, and 52.7% at least 7 days, to fill a backup prescription. In sensitivity analysis, back-up prescriptions significantly reduced antibiotic use over a wide range of assumptions.

Conclusions: The majority of patients with rhinosinusitis in this study expected antibiotic prescriptions, and were more satisfied if they were received. Back-up antibiotics have the potential to reduce unnecessary antibiotic use, mitigate risk of nontreatment, and preserve high levels of patient satisfaction.

Keywords: Back-up prescriptions; Antibiotics; Prescriptions; Patient satisfaction; Acute sinusitis; Survey

1. Introduction

Acute rhinosinusitis is diagnosed in more than 30 million Americans every year [1]. Reliably distinguishing a viral from bacterial etiology for the condition based on symptomatology, physical exam, or radiologic tests is very challenging [2–9]. As a result, prescription of antibiotics is frequent [10,11].

Acute rhinosinusitis of fewer than 7–10 days' duration is usually viral [12,13]. Only 0.5–2.0% of viral rhinosinusitis is complicated by bacterial infection [14]. The American Academy of Head and Neck Surgery has recently recommended that the etiologic diagnosis for acute rhinosinusitis be considered viral unless the symptoms have not improved over 10–14 days or are worse after 5–7 days. If symptoms have persisted or worsened, a diagnosis of acute bacterial rhinosinusitis can then be entertained [2]; viral rhinosinusitis generally lasts up to 9 days [15].

Use of antibiotics for rhinosinusitis is likely due to multiple influences [16,17]. Patient pressure and patient satisfaction are the most commonly cited explanations from physicians [18–21]. In multiple studies, patient expectation of antibiotic treatment has been shown to range from 50 to 76% [18,22–24]. Many physicians also hypothesize that their patients may go to another practitioner for care if they do not receive an antibiotic [25,26]. Although there is no definitive evidence to substantiate the claim that antibiotic prescriptions are associated with satisfaction, the conviction is widespread [16,18,27–30]. Physicians generally perceive a patient expectation for antibiotics correctly only 41–50% of the time, however [18,23,31–33]. Few patients preferring not to take antibiotics express these feelings to their physician [16,17]. Because of these factors, more than 20% of patients not expecting antibiotics leave their visit with a prescription for them [23,32].

Several methods for decreasing the prescription of unnecessary antibiotics have been attempted including computer algorithms, desk reminders, academic detailing, and public education, all with varying success [34]. The strategy of back-up prescriptions, defined as the provision of a prescription to be filled and used only when circumstances or the disease course meet certain conditions, has been used successfully in other medical arenas, primarily for emergency

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contraception and malaria treatment [35,36]. Studies of back-up prescriptions have shown rates of satisfaction varying from a slight decrease when compared to immediate antibiotic prescription in British studies to a satisfaction rate of over 96% in an American study [22,37,38].

Back-up prescriptions have also been shown to have a significantly lower fill rate, ranging from 24–45% in patients who had to return to the office to pick up their prescription, to 50.2% in studies where prescriptions were taken with the patient at the time of diagnosis [24,37–40]. In a study of delayed prescriptions for otitis media, the median number of prescriptions per month in one practice fell by approximately 20% [38–41].

To date, little is known regarding the utility of back-up antibiotic prescriptions for rhinosinusitis. We therefore conducted a survey study among patients recently seen and treated for rhinosinusitis to explore preference, satisfaction, and likely antibiotic use rate associated with actual treatment and the back-up prescription approach.

2. Methods

A retrospective survey study was conducted at a community hospital (Griffin Hospital) based walk-in clinic in Derby, CT, to assess the influence of hypothetic back-up prescriptions on patient satisfaction and antibiotic use. This setting provides ambulatory care to patients of all ages. Providers are physicians and physician associates. The survey included questions to determine: (1) patient satisfaction with treatment; (2) patients' perceived need for an antibiotic; (3) patient receipt of an antibiotic prescription; (4) patient receipt of a back-up prescription; (5) whether the patients filled their prescription; (6) whether the patients sought care from another physician due to dissatisfaction with treatment; (7) how satisfied patients would be with back-up prescription treatment in the future; and (8) how likely patients would be to fill a back-up prescription. "Back-up" prescriptions were defined to subjects as prescriptions provided now for potential use later should the condition progress in specified ways (e.g., development/increase of fever; symptom progression beyond 7 days; symptom persistence beyond 14 days, etc.). The Griffin Hospital Institutional Review Board approved the study protocol.

2.1. Subjects

All patients who were diagnosed with acute rhinosinusitis between September 1 and December 1, 2001, were included in the study provided they could read and write English. Patients were enrolled in the study if they had the following ICD-9 codes: acute sinusitis, 461.0, 461.1, 461.2, 461.3, 461.8, 461.9, upper respiratory infection, 465.9, or nasal congestion, 478.1. Children were eligible; parents completed surveys for assenting minors.

2.2. Protocol

The survey developed for the study was limited to simple and direct questions related to recent care. The survey was subject to face and construct validation, but did not undergo test–retest reliability testing, or evaluation for criterion validity. The survey and cover letter along with a self-addressed stamped envelope were mailed to all subjects. The survey was encoded for confidentiality. Subjects were asked to complete the survey and return it within 2 weeks. Three weeks after the surveys were mailed; subjects who had not returned the survey were contacted once to encourage completion of the survey via telephone. Unless advised by a family member to follow-up at a specified time, unavailable subjects did not receive further contact. The final deadline for completed surveys was 6 weeks from the initial mailing.

2.3. Data analysis

The returned coded surveys were entered and stored using Microsoft Excel 97®. Data were manually checked for entry errors. Satisfaction ratings were entered as numerals on a one to five scale with one corresponding to "poor" and five corresponding to "excellent." The analyses were performed using Microsoft Excel 97® and SAS 8.2 [42]. Frequency counts were completed for all questions on the survey. The chi-square test was used to assess for possible relationships between preferred treatment and factors including gender and age. Assessments using the chi-square test were also completed for possible associations between receipt of an antibiotic and factors including consulting another physician due to dissatisfaction with care. To assess differences in central tendencies for ordinal data, a nonparametric (Wilcoxon rank-sum test) approach was employed. The paired *t*-test was performed to assess the relationship between actual treatment satisfaction and satisfaction with the future use of back-up prescriptions in individuals.

A sensitivity analysis was performed to assess the potential effect back-up prescriptions would have on antibiotic fill rate. In this analysis, omitted sources of uncertainty were added as free parameters. The conventional analysis was then conducted with these parameters set at fixed values, as if known. The resulting array of effect estimates was examined for patterns of dependency on the varied parameters. Associations measured were predetermined. A two-tailed *P*-value of $<.05$ was required for statistical significance.

3. Results

A total of 114 subjects completed the survey out of 386 eligible (29.5%). Participants ranged in age from 5 months to 86 years of age, with a mean age of 30.2 years. Age, sex, insurance status, diagnosis, and treatment did not differ between participants and nonparticipants; the age and sex of participants compared to all eligibles are shown in Table 1.

Table 1
Demographics of study participants ($n = 114$) vs. nonparticipant population ($n = 272$)

	Male *N* (%)	Female *N* (%)	*P*-value	Mean age	*P*-value
Study participants	35 (30.7%)	79 (69.3%)	.4311	30.2	.0625
Non participant population	132 (34.2%)	254 (65.8%)		26.2	

Prior to their visit with a physician, 76% of patients held the belief that their infection would require an antibiotic. Overall, 63% of patients received an antibiotic prescription (Table 2). One hundred percent of patients who received a prescription for antibiotics filled the prescription; however, only 96% took the antibiotic. Eighty percent of patients rated their satisfaction with treatment as good or excellent.

Patients were queried about what type of treatment they would prefer for similar symptoms in the future. Seventy percent of patients preferred future treatment for acute rhinosinusitis with a back-up antibiotic prescription. If given a back-up antibiotic prescription, 91% of patients stated they would wait at least 1, and 53% at least 7 days, to fill their prescription (see Table 2).

Approximately 13% of patients consulted another physician due to dissatisfaction with their care. The likelihood of consulting another physician due to dissatisfaction was strongly associated with not receiving an antibiotic prescription ($P < .02$). Forty-six percent (46.2%) of patients who did not expect an antibiotic received a prescription for one. Mean satisfaction rates were significantly associated with receiving an antibiotic prescription among those patients who expected one ($P = .02$) (Table 3).

To assess the effect of back-up prescriptions on antibiotic fill rate, a sensitivity analysis was conducted. Table 4 and Fig. 1 illustrate the range of fill rates for which the use of back-up prescriptions would result in a significant reduction in antibiotic use. Reported satisfaction with proposed use of back-up prescription did not differ from satisfaction with actual treatment.

Table 2
Patient beliefs, antibiotic use, and prescribing patterns of physicians ($n = 114$)

	N	%
Patient assumed they needed an antibiotic[a]		
Yes	86	76.11%
No	27	23.89%
Patient received an antibiotic prescription[a]		
Yes	71	62.83%
No	42	31.17%
Satisfaction with treatment		
Excellent	43	37.72%
Good	48	42.11%
Average	10	8.77%
Fair	7	6.14%
Poor	6	5.26%
Consulted another physician due to dissatisfaction		
Yes	15	13.16%
No	99	86.84%
Patient preferences in treatment for similar symptoms in the future[a]		
Immediate antibiotic prescription	20	17.86%
No antibiotic prescription	14	12.50%
Back-up antibiotic prescription	78	69.64%
Satisfaction with back-up prescription for future treatment[a]		
Excellent	45	40.18%
Good	47	41.96%
Average	9	8.04%
Fair	5	4.46%
Poor	6	5.36%
How long patients would wait to fill back-up prescriptions[a]		
Less than 1 day	10	8.93%
One–seven days	43	38.39%
Greater than 7 days	56	50%
Would not fill	3	2.68%

[a] Not all surveys received were fully completed, therefore, the sample size does not equal the total number of patients in all analyses.

4. Discussion

This preliminary study, based on hypothetic rather than actual use of back-up antibiotic prescriptions for symptoms consistent with rhinosinusitis, suggests that this simple practice has the potential to maintain high levels of patient satisfaction with care, while significantly reducing prescription fill rates and antibiotic use.

In the study sample, 76% of patients expected to be treated with an antibiotic for their illness, and 63% received an antibiotic prescription. Multiple studies have shown that the great majority of these infections do not require antibiotic treatment [12,13], and that only 0.5–2% of acute rhinosinusitis will be complicated by bacterial infection [14]. In real numbers, this suggests that only one to three patients in the

Table 3
An examination of association

Received antibiotic	*N*	%	[a]Mean satisfaction rank score	*P*-value
Association of satisfaction with assumption of need for antibiotics and receipt of an antibiotic				
Yes	59	52.68%	47.381	.0224
No	27	24.11%	35.019	
Association of satisfaction with assumption of no need for antibiotics and receipt of an antibiotic				
Yes	12	10.71%	13.125	.8269
No	14	12.50%	13.821	
Association between receiving an antibiotic prescription and satisfaction				
Yes	71	62.83%	60.620	.1027
No	42	37.17%	50.881	

[a] Values are obtained using the Wilcoxon rank-sum test, and represent the mean of rank scores.

Table 4
Sensitivity analysis of antibiotic fill rates

Assumed fill rate for patients waiting 1–7 days to fill prescription	Highest corresponding fill rate (upper 95% CI) among those waiting >7 days to fill prescription that still significantly reduces antibiotic use
10%	<82%
20%	<74%
30%	<66%
40%	<59%
50%	<51%

The antibiotic fill rate for the individual waiting 1–7 days is assumed to vary between 10–50%. The highest corresponding fill rate for those waiting greater than 7 days that results in a combined fill rate significantly lower than the current rate of antibiotic use is shown.

current study could actually have benefited from antibiotic use; 68 to 70 patients were exposed to antibiotics unnecessarily. Of the patients who were not expecting an antibiotic from their physician, 46% received a prescription for one.

Most study participants were satisfied with their treatment. However, although 80% rated their satisfaction with conventional treatment as good or excellent, 13% of patients consulted another physician due to dissatisfaction with care. Although antibiotic prescriptions have not been consistently associated with satisfaction [16,18,27–30], this association was demonstrated in the current study. Average satisfaction with treatment was significantly associated with receiving an antibiotic prescription, and the likelihood of consulting another physician for treatment was significantly associated with being denied an antibiotic prescription. This validates an hypothesis long held by physicians that if a prescription for an antibiotic is not given, patients may consult another physician. In analysis of subgroups, receipt of an antibiotic was significantly associated with satisfaction in only those patients who expected to receive an antibiotic prescription. This suggests that if physicians determine which patients expect to receive an antibiotic they could not only decrease the number of unnecessary antibiotic prescriptions, but also increase patient satisfaction with the use of back-up antibiotic prescriptions. This study inquired about patients' views and preferences pertaining to treatment of future episodes of acute rhinosinusitis with back-up prescriptions. When posed the question, "Sometimes doctors cannot immediately tell if your infection will improve with antibiotics. If this were the case, what type of treatment would you prefer?," 70% of patients preferred treatment with a back-up antibiotic prescription. These results suggest that patients are very amenable to the practice.

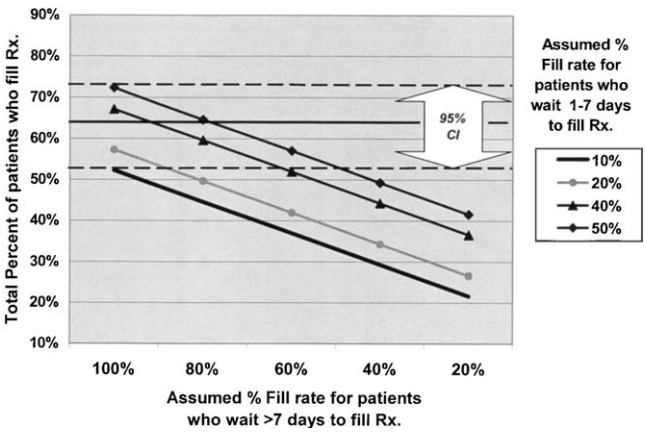

Fig. 1. Sensitivity analysis of back-up prescription fill rate. The antibiotic fill rate for the individual waiting 1–7 days is assumed to vary between 10–50%. The corresponding fill rate for those waiting greater than 7 days resulting in a combined fill rate significantly less than the current rate of antibiotic use is then calculated. The solid line indicates the current antibiotic prescription rate, the dashed lines indicate the 95% CI; points outside the confidence interval differ significantly from current practice.

This survey did not detect a real difference in back-up satisfaction vs. actual satisfaction. Although the current British literature suggests that satisfaction with back-up antibiotic prescriptions is slightly decreased compared to conventional treatment, their methods differed from the accepted use of back-up prescriptions in the United States and from a recent randomized control trial of back-up antibiotic prescriptions for the common cold in New Zealand [37,38,40]. The only other American study of back-up prescriptions for treatment of respiratory symptoms showed satisfaction with back-up antibiotic treatment to be 96% [24]. In the current study, most participants who received antibiotics were satisfied with their care, yet 70% indicated a preference for back-up antibiotic prescriptions in the future. These results suggest that satisfaction may actually be increased with back-up prescriptions, although further study will be required to establish this conclusively.

Although critics of back-up prescriptions hypothesize the practice could actually increase antibiotic usage, the evidence suggests the opposite. A recent trial by Arroll et al. in New Zealand showed a 41% decrease in antibiotic fill rate; however, their study did not incorporate querying patients if they expected an antibiotic prescription for their illness [40]. The appropriate use of back-up prescriptions includes asking patients if they expect an antibiotic.

In sensitivity analysis of the current findings, a statistically significant reduction in antibiotic use is demonstrated over a wide range of assumptions. As shown in Table 4, the likelihood that back-up prescriptions would increase antibiotic use is trivial. If antibiotics had been offered to only those participants in the current study who expected them; if 20% of those willing to wait 7 days filled their prescription; and if 60% of those waiting 1–7 days filled their prescription; there would be a 25% antibiotic fill rate for the group overall, and a 60% reduction in antibiotic use.

There are clear limitations to this study. First, the study was a retrospective survey. This type of study lends itself to recall bias, as the patients were asked to recall facts and feelings about a visit for acute rhinosinusitis that could have been as long as four months prior to survey completion. The survey, while simple and subject to face and construct

validation, was not subjected to criterion validity testing, or to measures of test–retest reliability. The sample size was relatively small, and only 30% of eligible patients responded to the survey. This study was conducted at only one location, in one type of clinical facility. Thus, patient attitudes and physician treatment strategies may not be generalizable to the population at large. The antibiotic prescription and satisfaction rates were based on patient self-reported data. There was no confirmation made of antibiotic prescription rates via pharmacy contacts or chart review. Although the study was voluntary and anonymous, it was conducted through the patients' usual site of medical care. This may have persuaded patients to give socially desirable responses and to be reluctant to report any poor experiences due to a possible negative influence on future care. Results pertaining to back-up prescriptions are based on patient projections regarding a hypothetical practice.

Despite these limitations, this study provides preliminary, but valuable evidence in support of the potential benefit of back-up antibiotic prescriptions as a routine approach to the management of acute rhinosinusitis. Findings suggest that this simple practice can maintain or enhance patient satisfaction; avoid the risk of withholding antibiotics from those in need of them; and significantly reduce unnecessary antibiotic use [43,44]. Further study of this practice is clearly warranted to verify these benefits.

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