Patients' responses to delayed antibiotic prescription for acute upper respiratory tract infections

Martin Edwards, Julie Dennison and Philip Sedgwick

SUMMARY

Background: *Upper respiratory tract infections (URTIs) account for approximately 50% of antibiotic prescriptions in the United Kingdom. General practitioners (GPs) frequently issue such prescriptions simply because they believe that the patient expects it. Deferred prescribing (issuing a prescription, but with instructions to wait for no spontaneous improvement before deciding whether to use it) might address patients' expectations, while minimising actual antibiotic consumption. Although the technique is quite widely practised, patients' attitudes and responses to it are unclear.*

Aims: *To establish the proportion of recipients who claim to consume their delayed antibiotic prescriptions. To elicit factors associated with patients' decisions to consume their antibiotics, and patients' confidence in taking this decision.*

Design of study: *Postal questionnaire survey.*

Setting: *Patients from 13 group practices in the south of England.*

Methods: *Patients who had received a delayed antibiotic prescription for URTI from their GP were posted a questionnaire 2 days after their consultation.*

Results: *Three hundred and seventy-four subjects were recruited, of whom 256 (68.4%) returned their questionnaires. Just over half (53.1%) of the responders claimed to have consumed their antibiotics. The majority of patients (87.1%) were confident about taking the decision as to whether to use their antibiotics, and 92.5% would choose to receive a delayed prescription again. Subjects were more likely to take their antibiotics if their presenting symptoms included a fever or sinus pain.*

Conclusion: *Most patients are confident in making the decision about whether or not to take their antibiotics when receiving a delayed prescription for URTIs. Antibiotic consumption is associated with presenting symptoms, and this has implications for future practice.*

Keywords: *infections, respiratory tract; upper respiratory infections; prescriptions; antibiotics.*

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Introduction

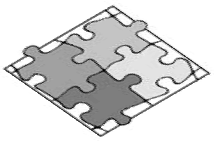
THE British government's Standing Medical Advisory Committee Sub-Group on Antimicrobial Resistance comments that half of the antibiotics prescribed in the United Kingdom (UK) are for the treatment of acute upper respiratory tract infections (URTIs).[1] This figure is derived from the analysis of computerised general practitioner (GP) prescribing data. Antibiotic prescriptions for URTIs are rarely appropriate on clinical grounds,[1,2] carry the risk of unwanted or dangerous sideeffects, have cost implications for the National Health Service (NHS), and may lead patients to inappropriately expect such treatment in the future.[3]

Physicians prescribing antibiotics for URTIs are generally aware that the prescription is clinically unnecessary,[4] but are often influenced in their decision by the perception that patients expect a prescription for antibiotics and will be dissatisfied without one.[5,6] This conflict may also lead the practitioner to feel uncomfortable with the decision whether to prescribe.[6,7] Other factors influencing doctors' decisions to prescribe antibiotics include anxiety or uncertainty about leaving a condition untreated, or simply the force of a long-established habit.[1]

Delayed prescribing could potentially address both the patient's expectation of an antibiotic prescription and the practitioner's clinical uncertainty, while minimising actual antibiotic consumption.[8] Essentially, the doctor offers a prescription for antibiotics, but instructs the patient to wait for no spontaneous symptomatic improvement before deciding whether to consume it.

Little is known about the patient's response to delayed prescribing, or the decision-making processes that they employ in choosing whether to consume their medication. Reports of the proportion of delayed prescriptions that are consumed vary between 24% and 55%.[9,10] This figure probably depends, in part, on the manner in which the delayed prescription is made available. In a study of childhood otitis media, Little *et al* asked patients to re-attend the surgery to collect a prescription if required after 72 hours, and found that only 24% of patients did so.[9] A similar requirement for patients aged 4 years and over with sore throats resulted in 31% collecting their prescription.[11] Dowell *et al* asked patients with uncomplicated cough to collect an antibiotic prescription if required after a week, and 45% did so.[13] However, providing the patient with a prescription during the initial consultation, but with instructions simply to defer its consumption might increase the proportion consumed. Jelley *et al* found that 55% of antibiotic prescriptions issued on this basis were used, although their study included other conditions besides URTI. [10]

HOW THIS FITS IN



What do we know?

Delayed antibiotic prescribing has been shown to reduce antibiotic consumption in some forms of upper respiratory tract infections (URTIs), but with reduced patient satisfaction. The proportion of delayed antibiotics that are consumed is uncertain, and little is known about patients' attitudes to the technique, or the decision-making processes that they employ.

What does this paper add?

In this study, half of the patients who received a delayed prescription for URTI claimed not to have taken their antibiotics. Delayed prescribing was acceptable, with 92% of patients choosing to receive a delayed prescription again. Patients with a fever or sinus pain were more likely than others to have claimed to have taken their antibiotics.

Patients' attitudes to delayed prescriptions are also unclear. Although it is a potentially empowering technique, it might also induce uncertainty or anxiety regarding the decision whether or not to consume the antibiotics. Little *et al*[9,11] and Dowell *et al*[13] found significantly less satisfaction among patients who were made to wait for their prescription compared to those given a prescription immediately, although satisfaction remained high overall. Nevertheless, the technique does appear to be effective in reducing antibiotic consumption in the treatment of sore throat,[11] childhood otitis media,[9,12] and cough.[13]

In this questionnaire study we aimed to examine the response to receiving a delayed prescription of patients presenting with an URTI, and also patients' confidence regarding the decision-making process that is imposed on them, and the factors associated with the decision to take their antibiotics.

Method

Subjects and setting

Patients were recruited from 13 general practices in south-east England that were members of the STaRNet or Lewisham Primary Care Research Consortium research networks. Six of these practices cover a predominantly mixed inner city/suburban population, and seven are predominantly suburban. All of the participating practitioners were familiar with the delayed prescribing technique as described above, and routinely employed it in their practice. Eligible subjects were those of any age presenting with an URTI (coryza, sore throat, acute sinusitis, acute otitis media, or cough without chest signs) for whom the doctor would under normal circumstances offer a delayed antibiotic prescription. For each patient, only one delayed prescription was included in the study. Recruitment took place during February through to October 2000.

The recruiting doctor issued an antibiotic prescription during the consultation, but advised the patient to use it after a couple of days and only in the absence of spontaneous improvement. In order to provide a degree of standardisation, the patient received a leaflet (see Supplementary appendix 1) briefly detailing the rationale of the technique and relevant instructions.

Ethical approval was granted by the South Thames Multi-centre Research Ethics Committee and by local ethics committees. The participating practices were encouraged to maintain recruitment through regular (at least weekly) telephone calls or by visits in person by one of the authors.

Questionnaire

The practice sent a questionnaire to each patient (see Supplementary appendix 2) by second class post. Questionnaires were posted in weekly batches at least 2 days after the patient's consultation. A pen, bearing the study logo, plus a Freepost response envelope were included to encourage completion of the questionnaire. Patients who did not respond within 2 weeks received another copy of the questionnaire. Patients were known by name only to their recruiting practice. All data received and analysed by the authors were anonymised.

Sample size and statistical analysis

The primary outcome of the study was the proportion of patients who consumed their antibiotics. From a pilot study we estimated that 50% of patients would consume their antibiotics. To estimate this proportion using a confidence interval (CI) with a width of 12% percentage points; i.e, to calculate the proportion to within 6 percentage points, was thought to be acceptable accuracy. A total of 250 questionnaires would be needed to do so. We further estimated that the questionnaire mailing would achieve a response rate of 70%. Therefore, a total of 357 questionnaires would be required.

The χ^2 test was used to compare those patients who reported consuming their antibiotics and those who did not with regard to their demographic characteristics, presenting symptoms, expectations, confidence in deciding whether to use the prescription, and knowledge of the difference between bacteria and viruses. When the χ^2 test was not valid, the Fisher's exact test (FI) was employed. All analyses were performed using SPSS 10.0 for Windows.

Logistic multivariate regression analysis was performed with the binary dependent variable being whether the patient claimed to have consumed their antibiotics (yes versus no). To decide which of the variables listed above should be entered into the logistic regression analysis as prognostic factors for the consumption of antibiotics, the approach described by Hosmer and Lemeshow was employed.[14] Variables were included if a *P*-value less than 0.25 resulted from comparison of the patients who reported consuming their antibiotics to those who did not. The adjusted odds ratio, associated *P*-value, and 95% confidence interval for the consumption of antibiotics versus non-consumption are presented for each prognostic variable.

A large number of significance tests were conducted overall. Because of multiple testing, the more stringent 1% critical significance level for statistical testing was applied.

Results

Comparison of responders and non-responders

A total of 374 subjects were recruited, of whom 256 (68.4%) returned their questionnaires. There were no statistically significant differences between responders and non-responders in their age (mean age of responders = 29.9 years [standard deviation {SD} = 22.93 years] versus a mean age of non-responders = 23.8 years [SD = 20.45 years]; *t*-test = 2.85, df = 360, $P = 0.18$), or in the proportion that were male ($n = 105$ [41.0%] responders versus $n = 39$ (36.8%) non-responders; $\chi^2 = 0.59$, $P = 0.481$).

Furthermore, there were no statistically significant differences between the practices in the proportion of patients that returned the questionnaire (FI = 22.23, df = 13, $P = 0.052$). The antibiotic-taking behaviour of most non-responders is not known (see *The fate of delayed prescriptions* below.)

There was no statistically significant difference between the practices in the age (FI = 28.55, df = 26, $P = 0.332$), sex (FI = 9.36, df = 13, $P = 0.745$), and antibiotic-taking behaviour (FI = 15.09, df = 13, $P = 0.302$) of the responders. This data has not been presented but is available upon request from the authors.

Factors associated with the decision to consume antibiotics

There were no statistically significant differences between those who claimed to have consumed their antibiotics and those who did not in respect of their age, sex, or exemption from the standard prescription charge (Table 1).

Subjects were significantly more likely to take their antibiotics if their symptoms included a fever ($P = 0.004$) or sinus pain ($P = 0.006$) (Table 1). No other presenting symptoms differed between those who claimed to have consumed their antibiotics and those who did not. Furthermore, there were no differences between the two groups of patients with regard to their expectation of the consultation or knowledge of the differences between viruses and bacteria.

The 136 patients who did take their antibiotics most commonly reported that they did so because their symptoms were getting worse ($n = 79$ [58.1%]) or had been going on too long ($n = 54$ [39.7%]). The 120 patients who did not take their antibiotics generally based their decision on the fact that their symptoms had improved ($n = 101$ [84.2%]).

Patients' expectations of the consultation

Approximately two-thirds ($n = 167$ [65.2%]) of responders had expected to receive a prescription for antibiotics, 37% ($n = 96$) had expected advice alone, 2.0% ($n = 5$) expected tests or a hospital referral, and 4.7% ($n = 12$) anticipated a sickness certificate.

The fate of delayed prescriptions

Just over half ($n = 136$ [53.1%]; 95% CI = 47.0 to 59.2) of the responders chose to consume their antibiotics. Of these, 82.4% ($n = 112$) claimed to have taken all the antibiotics they were prescribed, while the remaining responders claimed that they only took some of them. Although subjects were asked to return their prescription if they chose not to use it, less than 10 did so.

Of the patients who claimed that they took their antibiotics, nearly one-quarter ($n = 32$ [23.7%]) did so on the same day that they received their prescription, despite the doctor's advice to delay. This early consumption behaviour was not associated with grouped age or sex (see Table 2). Early consumption behaviour was also not associated with any of the presenting symptoms (Table 2).

Of the patients who claimed that they did not take their antibiotics, 20% ($n = 24$) still collected their antibiotic drugs from the pharmacy.

Confidence with the decision-making process

There was no statistically significant difference in patients' confidence in deciding whether to use their prescription between those who claimed that they took their antibiotics and those who did not (Table 1). Overall, 87.1% ($n = 223$) of patients were either very or fairly confident about making this decision. Most patients (92.5% [$n = 237$]) would choose to receive a delayed prescription again in the future. As the vast majority of patients were very or fairly confident about their decision-making, this variable was grouped as either confident (very or fairly), neither/nor, or unconfident (very or fairly). Grouped self-rated confidence was not associated with either grouped age or sex (Table 3).

Logistic regression analysis

The prognostic variables in Table 1 that resulted in a *P*-value of less than 0.25 from the test comparing those patients who reported consuming their antibiotics and those who did not (Table 1) were included in a logistic multivariate regression analysis. These variables included age, sex, symptoms of cough, headache, fever and sinus pain, and the patient's expectation of advice. The outcome variable was whether the patient claimed to have consumed their antibiotics (yes versus no). The results of this analysis, including the adjusted odds ratios and 95% CI, are shown in Table 4. Having adjusted for the other variables in the analysis, both fever and sinus pain as presenting symptoms were found to remain as significant prognostic factors for the consumption of antibiotics. Patients who reported a fever were approximately three times as likely as those without fever to consume their antibiotics, and those with sinus pain were more than five times as likely to consume their antibiotics as those without sinus pain.

Discussion

Summary of findings

Nearly half of the patients who received a delayed antibiotic prescription for URTI claimed that they did not take their antibiotics. Patients with a fever or sinus pain were more likely to claim to have used their prescription than those without these symptoms. Subjects generally felt confident in making the decision whether or not to take their drugs, and 92.5% would choose to receive a delayed prescription again.

Study strengths and limitations

The response rate (68.4%) was reasonably high for a postal survey. The antibiotic-taking behaviour of non-responders is not known, and it is possible only to speculate; they might

Table 1. Subjects' characteristics, presenting symptoms, expectations, confidence in decision-making, plus knowledge of bacteria and viruses, by consumption of antibiotics.[a]

	Patients who took antibiotics (%)[b] (*n* = 136)	Patients who did not take antibiotics (%)[b] (*n* = 120)	*P*-value[c]
Grouped age (years)			
Less than 16	43 (31.6)	53 (44.2)	0.02
16–60	68 (50.0)	57 (47.5)	
60 and over	25 (18.4)	10 (8.3)	
Female sex[d]	86 (63.2)	65 (54.2)	0.09
Pays for prescription[d]	56 (41.5)	49 (41.2)	0.53
Presenting symptoms[d]			
Sore throat	57 (42.2)	58 (48.7)	0.31
Earache	36 (26.7)	39 (32.8)	0.34
Cough	62 (45.9)	37 (31.1)	0.02
Headache	29 (21.5)	16 (13.4)	0.10
Swollen glands	7 (5.2)	9 (7.6)	0.45
Fever	46 (34.1)	21 (17.6)	0.004
Sinus pain	18 (13.3)	4 (3.4)	0.006
Muscular aches	6 (4.4)	4 (3.4)	0.75
Sore eyes	3 (2.2)	2 (1.7)	1.00
Runny nose	17 (12.6)	10 (8.4)	0.28
Other symptoms	14 (10.4)	11 (9.2)	0.83
Patient expectations[d]			
Antibiotic prescription	89 (66.4)	78 (66.1)	1.00
Other prescription	13 (9.7)	11 (9.3)	1.00
Advice	43 (32.1)	53 (44.5)	0.05
Tests or referral	2 (1.5)	3 (2.5)	0.67
Sicknote	5 (3.7)	7 (5.9)	1.00
No expectations	25 (18.7)	19 (16.0)	0.57
Confidence in deciding whether to use prescription			
Very confident	79 (59.8)	73 (61.3)	0.78
Fairly confident	36 (27.3)	35 (29.4)	
Neither/nor	12 (9.1)	8 (6.7)	
Fairly unconfident	3 (2.3)	3 (2.5)	
Very unconfident	2 (1.5)	0	
Knowledge of difference between bacteria and viruses			
Little or none	18 (13.6)	11 (9.2)	0.74
Some	44 (33.3)	42 (35.3)	
Good	42 (31.8)	41 (34.5)	
Full	28 (21.2)	25 (21.0)	

[a]The response rate was not 100% for all questions, with, at most, six missing responses for the knowledge question about viruses and bacteria, including one patient who consumed their antibiotics and five who did not. [b]Percentages within the brackets are those within the patient group. [c]The *P*-values resulting from the tests comparing the two groups of patients are presented. [d]The variables 'sex', 'pays for prescription', 'presenting symptoms', plus 'patient expectations', are all dichotomised and only one category is presented.

conceivably be more likely to consume their antibiotics, but be reluctant to inform their doctor of this and so fail to complete their questionnaire. Patients' antibiotic consumption was entirely self-reported, with no independent assessment, and the self-reported and actual consumption rates could, conceivably, differ. There is no evidence to suggest selection bias on the part of participating GPs, as there was no difference between the practices in the age, sex and antibiotic-taking behaviour of their responders. Patients were only enrolled into the study once, that is to say those who had previously been recruited were excluded if they presented with a further URTI. It is possible that some patients had received a delayed prescription as part of their doctor's routine practice prior to the start of this study. The impact of this is likely to be small; it might conceivably have familiarised subjects with delayed prescribing and increased their confidence regarding the use of the technique.

The 374 patients who were recruited, represented approximately 10% of all patients presenting with URTI to participating clinicians during the study period. We have no figures for the total proportion of the remaining 90% of patients with URTI who received an antibiotic prescription. However, figures from one practice (Jenner) suggest that 18% of this group received antibiotics; the extent to which this figure is applicable to the other practices participating in this study is uncertain.

Existing literature and implications for future research

Previous studies have generally examined the role of delayed prescriptions in one manifestation of URTI, such as sore throat,[11] cough,[13] or otitis media.[9,12] However, data from these studies may not be directly comparable, given the suggestion from our study that patients' behaviour varies according to the nature of the presenting symptoms. In this study, patients with fever or sinus pain were most likely to claim to have consumed their antibiotics. The accounts of children's behaviour presumably reflect the decision-making and reporting processes of their parents or carers.

Table 2. Characteristics and presenting symptoms of patients who took antibiotics, reported on the day of taking, or later on.[a]

	Patients who took antibiotics		
	On the same day (%)[b] (*n* = 32)	Not on same day (%)[b] (*n* = 104)	*P*-value[c]
Grouped age (years)			
Less than 16	11 (34.3)	32 (30.8)	0.16
16–60	12 (37.5)	56 (53.8)	
60 and over	9 (28.1)	16 (15.4)	
Female sex[d]	18 (56.3)	68 (65.4)	0.40
Presenting symptoms[d]			
Sore throat	11 (34.4)	46 (44.7)	0.32
Earache	9 (28.1)	27 (26.2)	1.00
Cough	21 (65.6)	41 (39.8)	0.01
Headache	11 (34.4)	18 (17.5)	0.05
Swollen glands	3 (9.4)	4 (3.9)	0.36
Fever	13 (40.6)	33 (32.0)	0.40
Sinus pain	1 (3.1)	17 (16.5)	0.07
Muscular aches	3 (9.4)	3 (2.9)	0.15
Sore eyes	0	3 (2.9)	0.58
Runny nose	6 (18.8)	11 (10.7)	0.23
Other symptoms	3 (9.4)	11 (10.8)	1.00

[a]For the group that did not take their antibiotics on the same day as they received their prescription, the response rate was not 100% for all questions on presenting symptoms: there was one missing response for all questions except for 'other symptoms', where there were two. [b]Percentages within the brackets are those within the patient group. [c]The *P*-values resulting from the tests comparing the two groups of patients are presented. [d]The 'presenting symptoms' and 'sex' are all dichotomised and only one category is presented.

Table 3. Distribution of grouped age and sex by grouped confidence in decision-making.[a]

	Confidence in decision-making			
	Confident (%)[b] (*n* = 223)	Neither/nor (%)[b] (*n* = 19)	Unconfident (%) (*n* = 9)	Test statistics[c] χ^2, df, *P-value*
Grouped age (years)				
Less than 16	86 (38.6)	6 (31.6)	4 (44.4)	1.49, 4, 0.84
16–60	110 (49.3)	9 (47.4)	4 (44.4)	
60 and over	27 (12.1)	4 (21.1)	1 (11.1)	
Female sex	137 (61.4)	7 (36.8)	5 (55.6)	4.45, 2, 0.10

[a]The response rate was not 100% with regard to the question on confidence, with five missing responses. [b]Percentages within the brackets are those within the patient group. [c]The test statistics for comparing the three groups of patients are presented. df = degrees of freedom.

Our study found that 53.1% of patients reported using their antibiotics. This is towards the high end of the range of 24–55% reported by previous studies.[9-12] Our delayed prescribing technique (issuing a prescription on the spot, but with instructions to delay) differs from that of Little[9,11] and Dowell,[13] who asked their patients to return to the surgery to collect a prescription if it was still required. The requirement of these two studies might well constitute a further disincentive to antibiotic use, and could largely account for the lower rates of antibiotic consumption among their subjects. Our technique is, however, probably closer to that employed on a routine basis by most GPs who use delayed prescribing.

One anxiety, expressed at the outset of the study by GPs critical of delayed prescribing, was that it could result in antibiotic prescriptions being cashed but not consumed. This could lead to significant quantities of antibiotics being stored in patients' homes, with possible inappropriate future use. This study appears, at least partially, to allay these anxieties, as only 24 (20%) patients who did not consume their antibiotics collected their drugs from the pharmacy. Nevertheless, this does still represent a potential reservoir of antibiotics held at home. Furthermore, the fate of the prescriptions that were not used remains uncertain. As these remain valid for 6 months it is conceivable that they could be cashed and inappropriately used in the future. The fate of unused drugs and prescriptions merits further study.

The government's Standing Medical Advisory Committee echoed the suggestion that educating patients as to the difference between viral and bacterial infections could reduce unnecessary antibiotic consumption.[1] However, this assumption has been challenged; Butler *et al* even found that such education merely appeared to confuse patients.[6] Our study demonstrated no association between patients' self-rated knowledge of the difference between viruses and bacteria, and antibiotic-taking behaviour.

This study provides support for delayed prescribing as a technique that patients would choose for themselves in future, and feel able to employ with confidence.

Table 4. Results of logistic multivariate regression analysis.

	Odds ratio (95% CI)[a]	*P*-value
Age (years)		
Less than 16	(1)[b]	
16–60	0.99 (0.54 to 1.85)	0.10
60 and over	1.96 (0.78 to 4.94)	0.16
Sex		
Male	(1)	
Female	1.69 (0.96 to 2.97)	0.07
Cough		
No	(1)	
Yes	1.70 (0.95 to 3.02)	0.07
Headache		
No	(1)	
Yes	1.19 (0.56–2.54)	0.65
Fever		
No	(1)	
Yes	2.91 (1.51–5.62)	0.001
Sinus pain		
No	(1)	
Yes	5.37 (1.62–17.81)	0.006
Advice		
No	(1)	
Yes	0.52 (0.29–0.92)	0.02

[a]The odds ratios are adjusted for other prognostic variables in the model and give the odds of patients claiming to have consumed their antibiotics versus those that did not. [b]For each prognostic factor, the category indicated by (1) is the baseline category against which the odds ratio is calculated for the other category or categories.

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Supplementary information

Additional information accompanies this paper at http://www.rcgp.org.uk/rcgp/journal/index.asp

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