

Reported management of patients with sore throat in Australian general practice

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SUMMARY

Background. Sore throat is one of the commonest presenting symptoms in general practice in Australia, and results in the prescription of an antibiotic in 50–90% of cases, despite the finding of bacterial throat infection in around 30% of cases or fewer.

Aim. This study set out to examine whether inaccurate knowledge about the pathophysiological features and management of sore throat helps to explain the high level of inappropriate antibiotic prescribing for sore throat by general practitioners.

Method. A questionnaire with four case vignettes of sore throat presentations was sent to 400 randomly selected general practitioners, practising in Victoria, Australia. Of 367 eligible respondents, 284 responded (77%).

Results. Of the respondents 97% reported that they would prescribe an antibiotic for the case of tonsillitis, 70% for the case of possible glandular fever, 29% for the child with probable viral sore throat and 9% for the adult with probable viral infection. There were no differences in prescribing rates between general practitioners of different sex, practice location, practice type or qualification. Overall, 25% of the antibiotics which formed the respondents' first choice were inappropriate broad-spectrum antibiotics.

Conclusion. General practitioners are generally accurate in their assessment of the features of sore throats, but less accurate in their knowledge of appropriate antibiotics.

Keywords: pharyngitis; diagnosis; management of disease; clinical knowledge; inappropriate prescribing; clinical judgement.

Introduction

SORE throat is one of the commonest presenting symptoms in general practice in Australia,¹ and results in the prescription of an antibiotic in between 50% and 90% of cases.² This contrasts with the finding of bacterial throat infection in around 30% of cases or fewer.³ Thus, a large number of patients may be being unnecessarily exposed to the risks of antibiotic treatment, with a concomitant drain on the health budget. Furthermore it is common for broad-spectrum antibiotics, particularly amoxycillin, to be chosen,⁴ despite consistent advice that penicillin or erythromycin are still the most appropriate antibiotics for sore throats.⁵ The problem of excessive and inappropriate prescribing for sore throat is not unique to Australia, and has been documented elsewhere, for example in Denmark⁶ and the United Kingdom.⁷

The few studies that have looked at the reasons for general practitioners' prescribing preferences in sore throat have tended to focus on the external pressures on general practitioners, such as patient expectations⁸ and patients' psychosocial circumstances.⁹ However, it is possible that general practitioners have inadequate or inaccurate information about which features of sore throat imply a need for an antibiotic, and which antibiotics are appropriate. The aim of this study was to explore how the pathophysiological features of patients who present with sore throats affect general practitioners' decisions about investigation and antibiotic prescribing.

Method

Four case vignettes containing brief clinical descriptions of sore throat presentations, with no psychosocial information, followed by questions relating to choice of investigation and treatment were designed and piloted. The cases were designed to represent common and uncomplicated examples of sore throat presentations.

Child with tonsillitis. An eight-year-old girl with a 24 hour history of sore throat and fever. On examination she has a fever of 38.5 °C, pus on both tonsils and tender cervical lymph nodes.

Adult with probable viral upper respiratory tract infection. A 28-year-old man with a two day history of sore throat and non-productive cough. On examination he is afebrile, fauces red, chest clear.

Adult with either tonsillitis or glandular fever. A 22-year-old woman with a two day history of sore throat and malaise. On examination she has a fever of 37.5 °C, pus on both tonsils with palatal petechiae and tender cervical lymph nodes.

Child with probable viral upper respiratory tract infection. A seven-year-old child with a two day history of fever and sore throat. On examination the child has a fever of 37.5 °C, large pink tonsils with no exudate, otherwise no abnormality detected.

Respondents were also asked to grade various clinical features associated with sore throat according to how each feature might affect their likelihood of prescribing an antibiotic using a five point Likert scale from one (much less likely to prescribe) through three (no influence) to five (much more likely to prescribe).

The questionnaire, which also asked for demographic details, was sent to a random sample of 400 of the 3350 general practitioners practising in Victoria, Australia with one written reminder to non-respondents after two weeks. General practitioners' names were obtained from the Medical Board of Victoria. The study was carried out in November 1991.

All tests of statistical significance were calculated using two-tailed probability with Fisher's exact test.

Results

Demographic data

Thirty three respondents indicated that they were not working in general practice (working in a different field or had retired). Of

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the 367 eligible respondents, 284 replies (77.4%) were received. Basic data, such as age and sex, were available for only 11 non-respondents, making useful comparison with the respondents impossible.

Of the respondents 79.3% were men (214/270), most (72.8%, 198/272) classified themselves as working in urban as opposed to rural practices, and 65.3% worked in group practices (177/271), 30.3% in single-handed practices (82/271) and 4.4% in community health centres (12/271); 21.3% (57/267) had FRACGP or equivalent postgraduate qualification.

Of the 271 respondents who gave their year of graduation, 82 (30.3%) had been in practice for more than 25 years. These older general practitioners were significantly more likely to work in single-handed practice (36/80, 45.0%) than their younger colleagues (44/188, 23.4%) ($P < 0.001$), and were slightly more likely to be men (72/81, 88.9% versus 142/189, 75.1%). There was no significant difference between older and younger general practitioners in practice area (urban versus rural) or qualification (FRACGP or equivalent).

Antibiotic use

Nearly all respondents chose to prescribe an antibiotic for the case of a child with tonsillitis (266/274, 97.1%) and a majority for the case of an adult with possible glandular fever (191/274, 69.7%). Interestingly, more chose to prescribe an antibiotic for the child with probable viral upper respiratory tract infection (79/275, 28.7%) than the adult (26/274, 9.5%).

There were no significant differences in overall prescribing rates between practitioners of different sex, practice location, practice type or qualification. Older general practitioners were significantly more likely to prescribe for the child with viral upper respiratory tract infection than their younger colleagues (32/74, 43.2% versus 47/189, 24.9%; $P < 0.01$).

The overall frequencies of the various antibiotics chosen are shown in Table 1. Broad-spectrum antibiotics were the preferred first choice in a quarter of cases for general practitioners who chose to prescribe, amoxycillin being the most popular at 20.8%

Table 1. General practitioners' choice of antibiotic (all cases combined).

Drug	% of cases	
	GPs' first choice (n = 558) ^a	GPs' second choice (n = 544) ^b
Penicillin	71.0	0.6
Erythromycin	3.8	82.9
Amoxycillin	20.8	1.1
Other broad-spectrum antibiotic	4.5	15.4

n = total number of cases where antibiotic would be prescribed. ^aFour responses illegible. ^bIn 14 cases a second choice of antibiotic was not specified.

Table 2. General practitioners' choice of antibiotic, by case (first choice only).

Drug	% of GPs who would prescribe drug			
	Child with tonsillitis (n = 266)	Adult with viral URTI (n = 26)	Adult with possible glandular fever (n = 188)	Child with viral URTI (n = 78)
Penicillin	77.8	23.1	71.8	61.5
Erythromycin	1.1	11.5	5.9	5.1
Amoxycillin	18.8	46.2	16.5	29.5
Other broad-spectrum antibiotic	2.3	19.2	5.9	3.8

n = total number of GPs who would prescribe an antibiotic. URTI = upper respiratory tract infection.

of all first choice prescriptions. Broad-spectrum antibiotics also formed a high proportion of the antibiotics which were the general practitioners' second choice (16.5%).

Table 2 shows the distribution of antibiotic preference among each of the four case vignettes. Amoxycillin was popular for all four cases, particularly for the two 'viral' cases. Older general practitioners were significantly more likely than younger doctors to choose amoxycillin for the case of a child with tonsillitis (23/71, 32.4% versus 26/189, 13.8%; $P < 0.01$), but there was no significant difference by qualification (41/202, 20.3% for those without the FRACGP, versus eight/57, 14.0%, for those with the FRACGP). Older general practitioners were also significantly more likely than younger doctors to choose amoxycillin for the case of possible glandular fever (19/53, 35.8% versus 12/133, 9.0%; $P < 0.001$), but there was again no difference by qualification (26/146, 17.8% for those without the FRACGP versus five/38, 13.2% for those with the FRACGP).

A preferred length of antibiotic course was specified in 351 of the 558 first choice prescriptions. The preferred length of antibiotic course varied between five and 10 days, with general practitioners choosing less than a week's course in 40.2% of the 351 cases and a full 10 days in 35.6% of cases. Ten day courses were significantly more common in the two cases where bacterial infection was a stronger possibility — 117/292 (40.1%) versus eight/59 (13.6%) for the two 'viral' cases ($P < 0.001$).

Investigations

A minority of general practitioners reported that they would carry out throat swabs — 12.8% (35/274) for the child with tonsillitis, 1.1% (three/273) for the adult with viral upper respiratory tract infection, 22.9% (62/271) for the adult with possible glandular fever and 7.0% (19/272) for the child with viral upper respiratory tract infection — 10.9% (119/1090) overall. The percentage of doctors who would carry out throat swabs for the two 'viral' cases was significantly lower than for the other two cases ($P < 0.001$). For the case of suspected glandular fever, which had the highest level of reported throat swab use, older general practitioners were significantly more likely than younger doctors to report that they would do a throat swab (24/75, 32.0% versus 33/183, 18.0%; $P < 0.05$). For the case of a child with tonsillitis the difference was only statistically significant for qualification, with those without the FRACGP reporting use of throat swabs more than those with the qualification (30/207, 14.5% versus two/57, 3.5%; $P < 0.05$).

To explore the possibility that those who reported that they would prescribe amoxycillin for the case of possible glandular fever had not considered that this case could be glandular fever, their choice of investigation was examined. A Paul-Bunnell test (or equivalent) would have been requested by 32.8% (42/128) of those who would have prescribed penicillin for this case but by only 12.9% (four/31) of those who prescribed amoxycillin ($P < 0.05$). A test would have been requested by 76.2% (64/84) of

those who chose not to prescribe, significantly more than of those who prescribed amoxycillin ($P < 0.001$).

Pathophysiological features

Results for the seven Likert scales are given in Table 3. Responses indicating 'much more likely' and 'more likely' were pooled, as were responses indicating 'less likely' and 'much less likely'. Pus, fever and large lymph nodes were all seen as likely indicators of the need to prescribe, whereas cough and runny nose indicated a lower likelihood of prescribing. There were no significant differences in responses to any of the features, by doctors' age, qualification or type of practice.

The decision to prescribe for the two 'viral' cases might be based on a belief that the pathophysiological features of these cases warranted antibiotics. To examine this hypothesis, the decision by each of the general practitioners whether or not to prescribe for these two cases was correlated with their individual responses to the Likert scales. The appearance of the throat in the two viral cases was described as 'large pink tonsils' for the child and 'fauces red' for the adult. Of the 78 general practitioners who chose to prescribe for the child with viral infection, 51 (65.4%) would be more likely to prescribe for large pink tonsils on the Likert scales, compared with 28 of the 185 general practitioners (15.1%) who chose not to prescribe for this case ($P < 0.001$). Of the 26 general practitioners who chose to prescribe for the adult with viral infection, 19 (73.1%) would be more likely to prescribe for red fauces on the Likert scales, compared with 57 of the 237 general practitioners (24.1%) who chose not to prescribe for this case ($P < 0.001$).

Discussion

The demographic data for the respondents to this study are similar in terms of age, sex, qualifications and type of practice to the registration data of the 495 participants in a nationwide study of Australian general practitioners,¹⁰ which suggests that the sample is representative.

Many previous studies have examined general practitioners' decision making regarding sore throats using data from clinical practice.¹¹⁻¹³ This study was designed not to replicate realistic clinical situations but to examine general practitioners' responses to the purely pathophysiological features of sore throat, hence the choice of written vignettes. Vignettes have been used by others to research upper respiratory tract infection,^{9,14,15} and although more complex vignettes may be prone to problems with validity,^{16,17} the relatively simple cases in this study, not being intended to reflect the full information of real life presentations, would not be expected to cause much confusion.

The low prescribing rates for the two 'viral' cases and the near 100% rate for the case of tonsillitis suggests that most general practitioners have little difficulty in accurately assessing the likelihood of a bacterial aetiology on this basis. Many previous studies have shown that pharyngeal exudate, high fever and tender

cervical adenitis are associated with an increased chance of bacterial infection, while cough and rhinorrhoea are not.¹⁸⁻²⁰ The first four of these features were used in a study by Centor and colleagues in 1981 and have come to be known as the 'Centor criteria'.²¹ Responses to the seven items using the Likert scales confirm the impression from the case examples that most general practitioners are well aware of the importance of these features.

A Danish study found that older general practitioners were more likely than younger doctors to assume a bacterial aetiology for sore throat and therefore to prescribe antibiotics more frequently,⁶ but in this study this was only true for the case of a child with viral upper respiratory tract infection. Doctors who possess the FRACGP were not significantly different from those without the FRACGP in prescribing rates for each case.

The low prescribing rates for the 'viral' cases contrast with prescribing rates of from 40% to 51%²² reported for non-tonsillitis undifferentiated upper respiratory tract infection in actual practice. Although direct comparison of the data from this study with actual prescribing data is not possible, this study would seem to suggest that a lack of knowledge about pathophysiological features is not the major reason for excessive use of antibiotics in viral upper respiratory tract infections. Even so, 29% and 9% of respondents, respectively, chose to prescribe for the child and the adult with viral upper respiratory tract infection. The significant correlation between prescribing in these two cases and considering the features of 'large pink tonsils' and 'fauces red' as indicative of the need for antibiotics raises the possibility that a number of general practitioners prescribe antibiotics in response to these clinical features. As the evidence about these features is equivocal,²³⁻²⁵ this suggests that a small proportion of the antibiotic prescribing for viral upper respiratory tract infection may be due to overinterpretation of these pathophysiological features.

In each of the four cases presented at least 20% of prescriptions chosen were for broad-spectrum antibiotics, despite the only information provided in the vignettes being about pathophysiological data. This suggests that external pressures, such as psychosocial information and patient pressure, are not the only cause of inappropriate antibiotics being prescribed for sore throat. Younger general practitioners were significantly less likely to prescribe amoxycillin in the two cases of possible bacterial infection than older doctors, but higher training, as evidenced by possession of the FRACGP, did not affect prescribing rates in these two cases.

The high percentage of respondents choosing amoxycillin for the case of possible glandular fever is a cause for concern. However, since significantly more of those who would prescribe penicillin for this case would request a Paul-Bunnell test than of those who would prescribe amoxycillin (33% versus 13%) it seems possible that the majority who chose amoxycillin for this case may not have considered the possible diagnosis of glandular fever. This would seem to indicate a gap in knowledge about clinical factors rather than about prescribing.

Table 3. Effect of different pathophysiological features on likelihood of prescribing an antibiotic.

Likelihood of prescribing	% of respondents influenced by feature						
	Pus on tonsils (n = 267)	High fever (n = 264)	Large lymph nodes (n = 263)	Large pink tonsils (n = 261)	Red fauces (n = 264)	Dry cough (n = 273)	Runny nose (n = 273)
More likely ^a	98.5	77.3	71.1	30.7	29.9	6.2	0.7
Less likely ^b	0	6.1	6.5	42.1	31.4	62.6	85.7
No influence	1.5	16.7	22.4	27.2	38.6	31.1	13.6

n = total number of respondents for each feature. ^aMuch more likely or more likely. ^bMuch less likely or less likely.

The hypothesis that inaccurate information about the pathophysiological features of sore throat is a cause of inappropriate prescribing has been only partially substantiated. Most general practitioners displayed a good knowledge about the features of sore throat, accurately identifying when antibiotics were indicated. However, at least 20% of those who prescribed those inappropriate antibiotics, suggesting a problem with knowledge about what to prescribe. This study does not address what the reasons for this relatively high preference for inappropriate antibiotics might be. General practitioners have at times come under pressure by the pharmaceutical industry to consider bacterial causes other than streptococci, such as chlamydiae and mycoplasma species, and to consider the possibility of resistance to penicillin when treating sore throat. Despite the lack of convincing evidence to support these suggestions,²⁶ the pressure may have been sufficient to override doctors' previous knowledge about appropriate prescribing. Recent work in Melbourne by Landgren and colleagues has shown that interventional marketing campaigns, using similar techniques to those employed by the pharmaceutical industry, such as visits by educational representatives and written materials can change prescribing behaviour in hospitals²⁷ and a new study has shown that similar intervention can increase appropriate prescribing for tonsillitis.²⁸

The results of this study suggest that any further education attempts should encompass the signs of 'red fauces' and 'large tonsils', and of glandular fever, and include advice about which antibiotics are appropriate in the treatment of sore throat. With the goal of reducing inappropriate prescribing in mind, future research should be directed at a better understanding of the benefits that general practitioners expect from the use of antibiotics for patients with sore throats.

References

- Bridges-Webb C. Acute pharyngitis, tonsillitis and tonsillectomy. *Aust Fam Physician* 1977; **6**: 498-509.
- Bridges-Webb C, Dunstone MW. Respiratory infections. *Med J Aust* 1976; **2** (suppl 1): 18-20.
- Lang S, Singh K. The sore throat — when to investigate and when to prescribe? *Drugs* 1990; **40**: 854-862.
- Birkett DJ, Mitchell AS, Godeck A, et al. Profiles of antibacterial drug use in Australia and trends from 1987 to 1989. *Med J Aust* 1991; **155**: 410-415.
- Antibiotic guidelines sub-committee of the Victorian Drug Usage Advisory Committee. *Antibiotic guidelines* (7th edition). Toorak, Australia: Victorian Medical Postgraduate Foundation, 1992.
- Hoffmann S. Incidence and management of sore throat in general practice. *Scand J Prim Health Care* 1986; **4**: 143-150.
- Burke P, Bain J, Lowes A, Athersuch R. Rational decisions in managing sore throat: evaluation of a rapid test. *BMJ* 1988; **296**: 1646-1649.
- Herz MJ. Antibiotics and the adult sore throat — an unnecessary ceremony. *Fam Pract* 1988; **5**: 196-199.
- Stephenson MJ, Henry N, Norman GR. Factors influencing antibiotic use in acute respiratory tract infections in family practice. *Can Fam Physician* 1988; **34**: 2149-2152.
- Bridges-Webb C, Britt H, Miles D, et al. Morbidity and treatment in general practice in Australia. *Med J Aust* 1992; **157** (suppl): 1-56.
- Everett MT. Antibiotics in the treatment of tonsillitis. *J R Coll Gen Pract* 1975; **25**: 317-325.
- Pitts J, Vincent SH. Diagnostic labels, treatment and outcome in acute sore throat. *Practitioner* 1988; **232**: 343-346.
- Touw-Otten FWMM, Johansen KS. Diagnosis, antibiotic treatment and outcome of acute tonsillitis: report of a WHO regional office for Europe study in 17 European countries. *Fam Pract* 1992; **9**: 255-262.
- Greenberg RA, Wagner EH, Wolf SH, et al. Physicians' opinions on the use of antibiotics in respiratory infections. *JAMA* 1978; **240**: 650-653.
- De Melker RA, Kuyvenhoven MM. Management of upper respiratory infection in Dutch general practice. *Br J Gen Pract* 1991; **41**: 504-507.
- Friedman M, Prywes M, Benbassat J. Variability in doctors' problem-solving as measured by open-ended written patient simulations. *Med Educ* 1989; **23**: 270-275.
- Morrell DC, Roland MO. Analysis of referral behaviour: responses to simulated case histories may not reflect real clinical behaviour. *Br J Gen Pract* 1990; **40**: 182-185.
- Breese BB, Disney FA. The accuracy of diagnosis of beta streptococcal infections on clinical grounds. *J Pediatr* 1954; **44**: 670-673.
- Chancellor AHB. A survey of acute respiratory illness. *Ann Gen Pract* 1965; **10** part 2: 88-96.
- Breese BB. A simple scorecard for the tentative diagnosis of streptococcal pharyngitis. *Am J Dis Child* 1977; **131**: 514-517.
- Centor RM, Witherspoon JM, Dalton HP, et al. The diagnosis of strep throat in the emergency room. *Med Decis Making* 1981; **1**: 239-246.
- Whitfield M. Upper respiratory tract infections in general practice. *Aust Fam Physician* 1986; **15**: 1057-1061.
- Siegel AC, Johnson EE, Stollerman GH. Controlled studies of streptococcal pharyngitis in a pediatric population. *N Engl J Med* 1961; **265**: 559-556.
- Walsh BT, Bookheim WW, Johnson RC, Tompkins RK. Recognition of streptococcal pharyngitis in adults. *Arch Intern Med* 1975; **135**: 1493-1497.
- Feery BJ. Streptococcal sore throat in general practice — a controlled study. *Med J Aust* 1976; **1**: 989-991.
- Del Mar C. Managing sore throat: a literature review. 1. Making the diagnosis. *Med J Aust* 1992; **156**: 572-575.
- Landgren FT, Harvey KJ, Mashford ML, et al. Changing antibiotic prescribing by educational marketing. *Med J Aust* 1988; **149**: 595-599.
- De Santis G, Harvey K, Howard D, et al. Improving the quality of antibiotic prescription patterns in general practice. The role of educational intervention. *Med J Aust* 1994; **160**: 502-505.

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