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Antibiotic use for upper respiratory tract infections before and after a education campaign as reported by general practitioners in New Zealand

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Abstract

Aim To assess change in general practitioner (GP) management of upper respiratory tract infections (URTIs) during a nationwide project to reduce antibiotic consumption in a half-decade (1998 to 2002–3).

Method Telephone survey of 100 randomly selected Auckland GPs in 1998 and 2002–3. Sixty-five GPs were in both samples.

Results A 69% response rate was recorded for an additional 35 GPs recruited in 2002–3. Of the 65 GPs interviewed at both periods, the number agreeing that *most patients who consult for URTIs expect antibiotics* decreased from 82% to 57%. Seventy-seven percent of GPs reported they were less likely to prescribe antibiotics, with over a quarter believing this change resulted from both GP and patient education. Common situations where GPs increased their antibiotic prescribing were patient request/expectation; smokers; older; or having sinusitis, purulent sputum, purulent nasal discharge, or imminent overseas travel. Thirty-nine percent of GPs reported an increasing use of delayed prescriptions over the half-decade. Reported use of amoxicillin clavulanate reduced from 21% to 4% ($p<0.001$).

Conclusion The GPs' response that they are less likely to prescribe antibiotics is consistent with the reduction in national antibiotic use. This may be related to the national campaign. The reduction may be a combination of combined GP and patient change.

Many patients presenting to their general practitioners (GPs) still receive antibiotics regardless of efficacy.[1,2] Indeed, antibiotics are considered to be over-prescribed.[3] A USA study found that the antibiotic prescribing rates for upper respiratory tract infections (URTIs) may be as high as 63% when all drug information is analysed. Another study has shown that prescribing rates for URTIs of presumed viral aetiology ranged from 17 to 60% in the UK and US, respectively.[4]

There is also a general trend toward increased use of broad-spectrum agents. In the USA, for example, there has been an increasing trend toward the use of broad-spectrum antimicrobials and decreasing rates of narrower-spectrum antimicrobials from 1980–1992.[5] In one study, the rate of broad-spectrum used increased from 24% to 48% of antibiotic prescriptions in adults ($p<0.001$), and from 23% to 40% in children ($p<0.001$).[6]

By 1998–1999, 22% of adult and 14% of paediatric prescriptions for broad-spectrum antibiotics were for viral URTIs. Indeed, physicians are increasingly turning to

expensive, broad-spectrum agents, even when there is little clinical rationale for their use.[7]

In 1999, PHARMAC (New Zealand's Pharmaceutical Management Agency which is responsible for nationwide funding of pharmaceuticals) launched the *Wise Use of Antibiotics* campaign aimed at reducing antibiotic use by educating the public that antibiotics are ineffective against viruses. The campaign involved posters in family practice waiting-rooms and pharmacies, leaflets given to patients in pharmacies and primary health care surgeries, plus small group training for GPs.[8] The campaign was endorsed by the Royal New Zealand College of General Practitioners.

As a result, PHARMAC reported a decrease in the national antibiotic drug bill from $NZ36 million in 1996 to 14.5 million in 2003. This reduction is a combination of decreased volume (one-third) and price (two-thirds) of antibiotics prescribed. Additionally, from 1995 to 2002, there was also a national reduction from 7% to 3.5% ($p<0.05$) in penicillin resistance among pneumococci.[9]

The aim of our study was to determine any change in reported antibiotic use for URTIs by GPs in the Auckland region between 1998 and 2002, before and after the educational campaign.

Methods

One hundred GPs were randomly selected from a list of Auckland-based practitioners supplied by the local diagnostic laboratory in 1998. In 2002–3, 65 of the initial group were available to participate in a subsequent interview. A further 35 were randomly selected to make the sample to 100. GPs were contacted by telephone or fax and asked to participate in research into primary care prescription of antibiotics for URTIs.

The total populations of GPs in the Auckland region is approximately 1000, hence 100 represents 10% of the population. From previous surveys, the authors have found statistically significant differences with such a sample size, and 100 practitioners were within the resources of the study.

Questions asked included the conditions under which they would prescribe antibiotics; their use of "as-needed" or delayed prescriptions, and the specific antibiotics they would prescribe. Data from the questionnaires was entered into a Microsoft Excel spreadsheet and analysed using Stat-Sak and SPSS version 11 statistical packages with Chi-squared statistical analysis.

Results

From the initial randomised list of 179 GPs in the Auckland region chosen in 1998, 16 were unable to be contacted at the number given. Fifty-two GPs declined to participate, and a further 11 failed to call back within the response period. Interviews were discontinued after 100 had been conducted. This gave a response rate of 61%. Of 51 additional GPs approached in 2002–2003, 35 (69%) agreed to be interviewed.

Of the 65 GPs who were interviewed at both periods (1998 and 2002–2003), there was a decrease (from 82% in 1998 to 57% in 2003) in the numbers of GPs agreeing that most patients who see a GP for an URTI expect to be given antibiotics. Of the total of 100 GPs, 77% said they were less likely to prescribe antibiotics for URTI; 2% more likely, and 21% felt unchanged.

Similar percentage occurred in terms of patients wanting antibiotics (71% less likely, 7% more likely, and 22% unchanged). Over a quarter of the GPs believed that the change was due to education of both the doctors and patients (12% doctor from education, 14% patient from education).

When asked what would encourage them to prescribe antibiotics, there were some interesting changes over the period of time. The direction of change was the same for both the original 65 GPs and the total of 100 GPs. We report the 65 GPs' results which give greater statistical power due to use of paired comparisons (McNemar's test)—see Table 1, and the 100 GPs' results—see Table 2.

Table 1. Comparison of reasons for GPs prescribing antibiotics in 1998 and 2002–3 (N=65)

Reason for prescribing antibiotics	1998	2002–3	p value
Planning overseas trips in near future	77%	82%	0.029
Productive cough all day	74%	78%	0.61
Patient young, had had recurrent otitis media	71%	58%	0.049
Symptoms of sinusitis	68%	98%	0.00001
Patient sick and febrile	68%	58%	0.52
Green-coloured sputum	63%	75%	0.86
Patient expected and asked for antibiotics	62%	63%	0.832
Purulent nasal discharge	52%	71%[22]	0.029
Productive cough in morning	45%	40%	0.86
Patient a smoker	38%	54%	0.0169
Patient requests antibiotics	38%	62%	0.0963
Patient older	37%	68%	0.0002
Patient will go to another doctor for antibiotics if not given	32%	31%	1.0
Patient tried over-the-counter medications (OTCs) first	30%	28%	0.92
Patient expects antibiotics	26%	57%	0.0001
Persisting dry cough	18%	14%	0.45
Patient was young	14%	11%	0.836
White productive sputum	9%	6%	0.73
Cough at night	8%	11%	0.726
Rhinitis clear	0%	0%	1.0

Furthermore, there was a significant increase in the giving of antibiotics to patients for the following reasons: smoker; symptoms of sinusitis; older patients; patients expecting antibiotics; patients planning imminent overseas trip; green-coloured sputum; and purulent nasal discharge. The only significant reason for decrease in prescribing antibiotics was for otitis media.

All others showed no significant change. However a third of the doctors still reported they would prescribe antibiotics for fear that patients would otherwise go to another GP, and two-thirds were willing to give antibiotics to patients who expected and asked for them.

100 GPs interviewed in 2002-3 reported giving "as needed" or "delayed" prescriptions as follows: always 50%, often 25%, sometimes 36%, rarely 16%, and never 5%. In 1998, the proportions were 0%, 13%, 52%, 30%, and 5% respectively. There was a statistically significant increase in the number of GPs reporting that they often prescribed "as needed' or "delayed" prescriptions" between the two studies (p=0.017). Thirty-nine percent of the GPs in 2002–3 said they had increased the number of delayed prescriptions while 12% had decreased them and 46% had made no change.

The most common first-line antibiotic used by the doctors was still amoxicillin (28% vs 78%) followed by amoxicillin clavulantate (21% vs 4%) and tetracyclines (14% vs 5%) for 1998 and 2002–3 respectively (all $p<0.05$). Only 12% vs 6% ($p>0.05$) used penicillin as first choice.

Table 2. Comparison of reasons for the 100 GPs prescribing antibiotics in the 1998 and 2002–3 studies (N=100)

Reason for prescribing	1998	2002–3	p value
Productive cough all day	78%	76%	0.93944
Planning overseas trips in near future	74%	78%	0.50087
Patient young, had had recurrent otitis media	68%	59%	0.186
Symptoms of sinusitis	65%	94%	0.000001
Green-coloured sputum	64%	81%	0.00710
Patient sick and febrile	64%	62%	0.699
Cough at night	6%	10%	0.31686
Patient expected and asked for antibiotics	55%	57%	0.83727
Productive cough in morning	49%	45%	0.48117
Purulent nasal discharge	47%	65%	0.01839
Patient tried over-the-counter medications (OTCs) first	47%	46%	0.88726
Patient older	42%	68%	0.00022
Patient requested it	37%	54%	0.018
Patient a smoker	30%	55%	0.00043
Patient will go to another doctor if antibiotics not given	27%	29%	0.82093
Patient expected	25%	51%	0.00023
Persisting dry cough	19%	18%	0.80146
Patient was young	14%	14%	0.97
White productive sputum	9%	6%	0.42060
Rhinitis clear	0%	1%	0.31610

Discussion

It is encouraging to find that 77% of the original 65 GPs were less likely to prescribe antibiotics after 5 years. A similar percentage felt there was a reduction in patients wanting antibiotics. This might indicate that patients and GPs were more correctly informed about the effectiveness of antibiotics.

It is difficult to ascertain how much the *Wise Use of Antibiotics* campaign contributed to this reduction. However the national figures suggest a one-third reduction in antibiotic prescribing during the course of the campaign. National figures show a reduction in amoxicillin clavulanate and an increase in amoxicillin use consistent with our data. The higher response to patient expectations may be a response to the "patient-centred medicine" approach which has received more attention in recent years.[10]

There is no new literature suggesting that coloured sputum may be responsive to antibiotic therapy although there is some for acute purulent rhinitis.[11] Ironically, for sinusitis, new guidelines suggest not treating mild cases, hence the increase in giving antibiotics to these patients is difficult to explain.[12] Two systematic reviews conclude that antibiotic use does not significantly affect the resolution of acute cough nor change the course of illness and any modest benefits may be outweighed by the side effects.[13,14]

Reduction in antibiotic use for acute otitis media is consistent with studies indicating that delayed prescribing is an effective means of reducing antibiotic use in children over the age of 6 months.[15] Apparent contradictions may result from GPs seeing patients with more severe symptoms (those with minor symptoms now being less likely to visit their doctor) and hence more likely to prescribe antibiotics.

International literature suggests other antibiotic campaigns have been effective in lowering the use of antibiotics for URTIs and subsequently leading to reduction in resistance to commonly used antibiotics. For instance, a nationwide Finnish programme involved recommendations in response to concern about increasing resistance to group A streptococci. In that programme, a relative risk reduction of 42% was found in daily doses of erythromycin which translated to a 7.9% reduction in the frequency of antibiotic resistance among group A streptococci.[16]

In response to penicillin-resistant pneumococci increasing from 2.3% in 1989 to 20% in 1993, an Iceland initiative used radio, television, and newspaper articles as well as targeting the medical community using infectious disease experts in a publicity campaign regarding antibiotic overuse.[17] Penicillin-resistant pneumococci subsequently dropped to 16.9%.

Morever, in 1994, a Swedish programme responded to concern over increasing antibiotic resistance by producing a guideline on how to deal with penicillin-non-susceptible pneumococci.[18] This led to a relative risk reduction of 39%. National programmes in USA, Canada, Belgium and Australia aimed at controlling antibiotic use and resistance have also reported success.[19] The Canadian programme increased use of “appropriate” first-line antibiotics for URTIs and the Belgium programme resulted in significant but transient reduction in retail antibiotics from 17% to 9%. This is a similar order of magnitude to that achieved in New Zealand.

A Dutch randomised trial of GP peer-group education with monitoring and feedback as well as pharmacist and patient education found that this multiple intervention reduced prescribing rates of antibiotics for URTIs without decreasing patient satisfaction.[20] A Spanish quasi-experimental intervention study of the effects of GP education and feedback had similar results.[21]

The strength of our study is that it reports on a random selection of the GPs comparing two time periods between which there was a campaign to reduce antibiotic use. Two-thirds of the participants were involved in both time periods, thus allowing paired statistical analysis. We are not aware of any other such study in the international literature. The response rate was 69% for the additional GPs, which is acceptable for this type of study.

A limitation of the study is that it relies on asking doctors what they do, rather than measuring what they do. However this study is a step towards explaining the changes in antibiotic use over the duration of the *Wise Use of Antibiotics* campaign. What the doctors report they do is consistent with actual national data. Given a 61% response rate from the GPs initially studied in 1998, a selection bias is possible. A causal relationship between decreased GP prescribing and the educational campaign cannot be proved.

In conclusion, the global response of GPs stating that they are less likely to prescribe antibiotics is consistent with the reduction in antibiotic use nationally. This may be

related to the national campaign. The reduction may be a combination of combined GP and patient change. There was a significant reduction in the use of amoxicillin clavulanate. The apparent increase in antibiotic use for specific conditions may relate to patients presenting with more serious conditions/symptoms.

There are no conflicts of interest in this study.

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