

Primary care management of group A streptococcal pharyngitis in Northland

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ABSTRACT

INTRODUCTION: Reducing the rate of acute rheumatic fever nationally by two-thirds by 2017 is a New Zealand Ministry of Health priority. Northland District Health Board (DHB) has high rates of rheumatic fever, disproportionately impacting on Māori children and young people. School-based programmes and general practice both contribute to rheumatic fever prevention in detecting and appropriately treating group A streptococcal (GAS) pharyngitis.

AIM: The aim of this study was to assess adherence by general practitioners and school-based sore throat programmes to national guidelines for the management of GAS pharyngitis in Northland.

METHODS: Laboratory and pharmaceutical data were obtained for children and young people aged 3–20 years who had GAS positive throat swabs in Northland laboratory services between 1 April and 31 July 2012. Data were analysed separately for general practice and the school programmes for rheumatic fever prevention.

RESULTS: One in five of those children presenting to general practice with a positive throat swab and complete prescription data did not receive treatment according to national guidelines, while appropriate treatment was offered to more than 98% of children accessing school-based programmes. A significant proportion of those seen in general practice received antibiotics not recommended by guidelines, an inadequate length of treatment or no prescription. There were no significant differences in the management of Māori and non-Māori children.

DISCUSSION: There is room for improvement in general practice management of GAS pharyngitis in Northland. School-based management of sore throat provides high-quality management for children at high risk of rheumatic fever.

KEYWORDS: Pharyngitis; prevention and control; primary health care; rheumatic fever; school health services; Streptococcus pyogenes

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Introduction

Reducing the rate of acute rheumatic fever (ARF) nationally by two-thirds by 2017 is a stated New Zealand Ministry of Health priority, and district health boards (DHBs) have been set local targets.¹ Northland has some of the highest rates of ARF in the country, with a highly inequitable distribution of cases. A total of 40 250 children and young people aged between 3 and 20 years, nearly 50% Māori, live in the Northland DHB area.² A recent audit of ARF surveillance in

Northland for the period 2002–2011 showed that 95% of cases were Māori, with a mean age of 11.4 years. The highest rates were in Māori in the age group 5 to 15 years (78/100 000 per year), compared to 4.6/100 000 per year in non-Māori.³

By mid-2012, four school-based rheumatic fever prevention programmes had been implemented in Northland, in recognition of historically inequitable primary care access for those most at risk. The earliest of these programmes began in 2002 in Whangaroa. These programmes offer children

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with sore throats swabbing and treatment for those testing positive for group A streptococcus (GAS). Treatment is usually given three times a week in the school setting, at no cost. Swabbing is based on children's symptoms alone; no clinical criteria are applied. The programmes are implemented primarily by kaimahi (community health workers), with antibiotic management overseen by nurses, supplying antibiotics under standing orders or via prescription from a local general practitioner (GP).

General practice has an important role to play in treating sore throats, as the first point of health care access for many children, and offers more comprehensive care than school programmes, including after-hours access. The 2008 New Zealand National Heart Foundation Guidelines⁴ and the 2012 New Zealand Primary Care Handbook national guidelines for rheumatic fever prevention⁵ recommend that children with positive GAS results should receive appropriate antibiotics within nine days of swab collection, for a 10-day course. To support compliance, once-daily amoxicillin for 10 days is recommended as first-line therapy.⁶

Audits carried out by general practice registrars in three general practices in Northland in early 2012 indicated that 37% of 98 patients (95% confidence interval [CI] 0.27–0.47) presenting with sore throat did not receive a prescription for appropriate antibiotics that adhered to the national guidelines. There was no statistical difference reported between ethnic groups (Māori, Pacific and non-Māori, non-Pacific).⁷ These results motivated the initiation of the larger study described in this paper.

The aim of this study was to assess adherence by primary care providers (GPs and school providers) in Northland to national guidelines for GAS pharyngitis management. The primary objective was to quantify the proportion of Māori and non-Māori children and youth aged 3 to 20 years in Northland who currently receive appropriate management according to the national guidelines for a laboratory-proven GAS pharyngitis in general practice. A further objective was to compare those findings to outcomes from the four school-based throat

swab programmes operating in Northland in the same period.

Methods

Data on throat swabs were accessed from Northland DHB hospital laboratories (DHBL) and Northland Pathology Laboratory (NPL) for all GAS positive results for the period 1 April to 31 July 2012. Pharmaceutical data were accessed from the New Zealand Health Information Service (NZHIS) Pharmaceutical Claims Data Mart (PHARMS) for the same period, plus an additional nine days, to allow for any delay in the prescription for treatment being filled. This PHARMS data collection holds prescribing claims and payment data from pharmacists of subsidised dispensing processed by the Ministry of Health's Sector Services. Patient identifier (national health index number [NHI]), dispensing date, therapeutic class and name of medicine, daily dose and days supplied are included in this data.⁸ All throat swabs testing positive for GAS for children and youth aged 3 to 20 years inclusive for the period were matched against the pharmaceutical data for the period using Microsoft Excel spreadsheets to cross-match individual NHIs for throat swabs and pharmaceutical data.

School-based programmes' throat swab data were analysed separately from that collected in general practice. Throat swabs analysed at two DHBLs were excluded from the analysis, as the majority of these swabs were not collected in general practice but from hospital inpatients. For the purposes of this study, 'appropriate antibiotics' were defined as per the national guidelines (either amoxicillin, penicillin V, benzathine penicillin G, or erythromycin ethyl succinate).^{4,5} An assumption was made that all antibiotics were prescribed at an appropriate dose for the child's weight. Chi-square tests were performed on results. Statistical analysis was completed using Stata version 11 (StataCorp, College Station, Texas, USA).

The study, as a health sector quality improvement initiative, did not require formal ethics approval. However, the study proposal was reviewed and approved by the Northland DHB locality assess-

ment and the Northland Primary Health Organisation (PHO) clinical governance groups.

Results

School programmes

Four school-based programmes collected a total of 3046 swabs in the period of interest (Table 1); 243 (8%) were positive for GAS. These schools have rolls that are predominantly Māori (overall 79% Māori and 21% non-Māori). All of the swabs taken were in the highest-risk age group (5 years to under 15 years) for rheumatic fever.

Prescription data were complete (i.e. medicine prescribed, date of collection and length of course) for 179/243 (73.7%) children (Table 2). Of those with complete data, 177/179 (98.9%) were

WHAT GAP THIS FILLS

What we already know: The effectiveness of treating group A streptococcal (GAS) pharyngitis with 10 days of penicillin antibiotics to prevent rheumatic fever was established over 50 years ago. Recent New Zealand Guidelines have reiterated this, providing algorithms for use adapted to New Zealand populations, and advising use of 10 days of once-daily amoxicillin to enhance adherence. Previous studies in New Zealand have shown variable adherence to primary care guidelines.

What this study adds: Reducing rheumatic fever rates in our community will require excellent primary care management of GAS pharyngitis, in addition to broader interventions to improve health literacy and to address socioeconomic factors, such as household crowding and child poverty. The under-treatment of proven GAS pharyngitis revealed in this study suggests that further efforts are urgently required to improve the quality of general practice management of this common condition in Northland.

Table 1. Throat swab results in Northland collected from Māori and non-Māori patients aged 3–20 years (April–July 2012)

Swab result	School programme n (%)			General practice n (%)			Grand total
	Māori	Non-Māori	Total	Māori	Non-Māori	Total	
Group A streptococci	178 (7.9%)	65 (8.3%)	243 (8.0%)	208 (18.7%)*	234 (18.6%)*	442 (18.7%)*	685 (12.7%)
Group C streptococci	63 (2.8%)	13 (1.7%)	76 (2.5%)	37 (3.3%)	29 (2.3%)	66 (2.8%)	142 (2.6%)
Group G streptococci	70 (3.0%)	19 (2.4%)	89 (2.9%)	26 (2.3%)	25 (2.0%)	51 (2.2%)	140 (2.6%)
Negative swab	1951 (86.3%)	687 (87.6%)	2638 (86.6%)	839 (75.6%)*	967 (77.1%)*	1806 (76.4%)*	4444 (82.1%)
Total swabs	2262 (100%)	784 (100%)	3046 (100%)	1110 (100%)	1255 (100%)	2365 (100%)	5411 (100%)

* $p < 0.001$ compared to school programme

Table 2. Availability of prescription data for group A streptococcal positive results collected from Māori and non-Māori patients aged 3–20 years (April–July 2012)

Data available	School programme n (%)			General practice n (%)			Grand total
	Māori	Non-Māori	Total	Māori	Non-Māori	Total	
Complete prescription data available	129 (72.5%)	50 (77.0%)	179 (73.7%)	119 (57.2%)*	125 (53.4%)*	244 (55.2%)†	423 (61.8)
No prescription data	12 (6.7%)	5 (7.7%)	17 (7.0%)	21 (10.1%)‡	9 (3.9%)	30 (6.8%)	47 (6.9%)
Guideline recommended drug, length of course recorded as zero	37 (20.8%)	10 (15.3%)	47 (19.3%)	68 (32.7%)*	100 (42.7%)†	168 (38.0%)†	215 (31.4%)
Total	178 (100%)	65 (100%)	243 (100%)	208 (100%)	234 (100%)	442 (100%)	685 (100%)

* $p < 0.01$ compared to school programme

† $p < 0.001$ compared to school programme

‡ $p < 0.01$ compared to non-Māori in general practice

given an appropriate antibiotic for 10 days, within nine days of the swab result (Table 3), meeting all criteria in the national guidelines.⁴ Of these children, 122/179 (68%) received once-daily amoxicillin. Only 1/179 (0.6%) received an appropriate antibiotic, but for less than 10 days' duration and 1/179 (0.6%) received a non-guideline prescription; this latter was a case of recurrent GAS. No prescription data were available for 17/243 (7.0%) children with GAS positive swab results; of these 12/17 (70.6%) were Māori. The length of antibiotic prescription was not possible to ascertain for the remainder of the prescription data; 47/243 (19.3%) had the correct antibiotic prescribed but 'zero' days recorded as the length of antibiotic course prescribed. The majority of these prescriptions were for oral suspensions.

General practice

In total, 2365 throat swabs (1801 from NPL and 564 from DHBL) were collected through general practices in Northland during the period 1 April to 31 July 2012 (Table 1). A total of 1513 (64.0%) of the swabs taken were in the highest-risk age group (5 years to under 15 years) for rheumatic fever. Of these, 742 (49.0%) were Māori, a slightly higher proportion than across the whole sample (where 46.9% were Māori). Males were under-represented (only 44.4% of all those who had swabs taken). The proportion of GAS positive swabs was similar for Māori and non-Māori (18.7% and 18.6%, respectively).

Prescription data were complete (i.e. medicine prescribed, date of collection and length of course) for only 244/442 (55.2%) of those with GAS positive swabs (Table 2).

Of those with complete data, 196/244 (80.3%) were given an appropriate antibiotic for 10 days, within nine days of the swab result, meeting all criteria in the national guidelines.⁴ There was an 18% difference in prescribing of an appropriate antibiotic, for 10 days and within nine days of swab results, between general practice and the school programme ($p<0.001$; Table 3).

In all, 31/244 (12.7%) received an appropriate antibiotic, but for less than 10 days' duration; 16/244 (6.6%) received a non-guideline prescription and one patient received the appropriate antibiotic but collected it more than nine days post throat swab.

No prescription data were available for 30/442 (6.8%) children with GAS positive swab results; of these 21/30 (70.0%) were Māori. The length of antibiotic prescription was not possible to ascertain for the remainder of the prescription data, the majority of which were oral suspensions; 168/442 (38.0%) had 'zero' days recorded as the length of antibiotic course prescribed.

Overall, 396/442 (89.6%) of the children with a GAS positive result seen in general practice—Māori 180/208 (86.5%); non-Māori 216/234 (92.3%)—met the first criteria in the national

Table 3. Management of group A streptococcal positive swabs where complete prescription data available collected from Māori and non-Māori patients aged 3–20 years (April–July 2012)

Antibiotic regimen	School programme n (%)			General practice n (%)			Grand total
	Māori	Non-Māori	Total	Māori	Non-Māori	Total	
Guideline recommended antibiotic, 10 days' course and within 9 days	127 (98.4%)	50 (100%)	177 (98.9%)	96 (80.7%)*	100† (80.0%)	196 (80.3%)*	373 (88.2%)
Guideline recommended antibiotic, <10 days' course	1 (0.8%)	0	1 (0.6%)	16 (13.4%)*	15 (12.0%)‡	31 (12.7%)*	32 (7.6%)
Guideline recommended antibiotic dispensed >9 days after diagnosis	0	0	0	0	1 (0.8%)	1 (0.4%)	1 (0.2%)
Not guideline-recommended antibiotic	1 (0.8%)	0	1 (0.6%)	7 (5.9%)‡	9 (7.2%)	16 (6.6%)‡	17 (4.0%)
Total	129 (100%)	50 (100%)	179 (100%)	119 (100%)	125 (100%)	244 (100%)	423 (100%)

* $p<0.001$ compared to school programme

† $p<0.01$ compared to school programme

‡ $p<0.05$ compared to school programme

guidelines, receiving one of the recommended antibiotics. In all, 269/442 (60.9%) (Māori 62.8%, non-Māori 72.2%) of these were prescribed amoxicillin, but only three (0.7%) children in general practice received this in a once-daily dosage.

If it is assumed that those children and young people prescribed 'zero' days of antibiotic treatment in general practice actually received 10 days of antibiotics, then the proportion who received the recommended antibiotic and length of course would be slightly higher (364/442; 82.4%) than that estimated from analysis of the 'complete data' subset.

Discussion

Successful reduction of ARF in New Zealand will likely require a multi-pronged approach, including improving health literacy and addressing socioeconomic determinants, such as household crowding, as well as ensuring GAS pharyngitis is effectively treated.⁹ General practice plays a role in this as 'sore throat' is a common presenting symptom in primary care, with New Zealand surveys suggesting rates of 2.8–10 per 100 presentations to general practice.¹⁰

Despite the markedly elevated risk of ARF in Māori and Pacific children aged 5–15 years, no significant differences in throat swabs taken or prescribing by age or ethnicity have been found in previous studies—in fact rather the opposite, with lower utilisation of general practice by this age group seen in some studies.¹⁰

We estimate from this study that one in five children and young people with a laboratory-proven GAS positive throat swab seen in general practice in Northland did not receive treatment according to the 2012 New Zealand primary care guidance,⁵ despite the high incidence of ARF in our community. This is significantly poorer quality management than that achieved in the Northland 'sore throat' school programmes, where greater than 98% received treatment according to guidelines. In addition, use of once-daily amoxicillin supports adherence, and although amoxicillin was frequently used in general practice, it was rarely prescribed in once-a-day dosage, in contrast to the school programmes.

It is important to note, however, that GPs are prescribing antibiotics for children and young people with a GAS positive swab. An earlier study of upper respiratory infection management in general practice, based on GP interviews, suggested that 98% of GPs would prescribe antibiotics for a positive GAS throat swab.¹¹ A similar result is also seen in this study with at least 93.2% of children with a positive GAS throat swab receiving an antibiotic from a GP.

In New Zealand, people with below average incomes are more likely not to fill prescriptions and to miss out on diagnostic tests or treatments, and Māori are over-represented in this category

A further important finding is that Māori children with a GAS positive result in general practice were disproportionately more likely than non-Māori to have no NZHIS prescription data recorded ($p < 0.01$). There are three possible reasons for this. The first is that GPs may be utilising Medical Practitioner Supply Order (MPSO) medications and dispensing antibiotics directly to Māori. Although this is a possibility, other research has shown that even when MPSO dispensing is taken into account, Māori have lower rates of being prescribed antibiotics.¹² The two other possibilities are that some Māori were given a prescription but did not collect it from a community pharmacy, or that some Māori did not receive a prescription. In New Zealand, people with below average incomes are more likely not to fill prescriptions and to miss out on diagnostic tests or treatments, and Māori are over-represented in this category.^{13,14} In addition, when socioeconomic factors are adjusted for, Māori are more likely to defer obtaining already subsidised medication because of costs associated with prescription charges compared to non-Māori.¹⁵ Given the limitations of the prescribing data in this study, it was not possible to ascertain with accuracy which is the true reason.

Our study has limitations: we were only able to analyse management of children given throat

swabs in general practice with proven GAS pharyngitis, rather than all those presenting with sore throat. Previous New Zealand studies have indicated that throat swabbing rates in general practice are low compared with antibiotic prescribing rates (with sore throat swabbing rates up to 10 times lower than prescribing rates).¹⁰ It may be that higher-risk children are being prescribed antibiotics appropriately without being given throat swabs. Certainly, the percentage of children with a positive throat swab is higher in general practice compared to school-based programmes, indicating either that children attending general practice are more likely to have GAS than those having a throat swab in schools, or that GPs are better able to predict a positive result.

Prescribing data was incomplete in nearly half of cases from general practice. However, even in the 'best case' scenario, that is, including all those who were prescribed the correct antibiotic but with no 'length of course' data, the estimate of 1:5 children receiving inadequate treatment is not significantly altered.

High rates of ARF inequitably impact on Māori children and young people in Northland. The school programmes provide easily accessible, quality treatment of sore throat, according to best practice national guidelines. GPs should likewise ensure that all children presenting with sore throat are managed according to the national guidelines. Empirical treatment of high-risk children with sore throat and with the presence of either a temperature $>38^{\circ}\text{C}$, absence of cough, anterior cervical lymphadenopathy or tonsillar swelling or exudate, should be encouraged, in addition to throat swabbing.^{4,16} Protocol-led management in general practice (i.e. systematic use of guidelines, and antibiotic administration under standing orders) could improve adherence to guidelines for high-risk children, and this strategy should be further utilised in Northland. Further GP education, peer discussions, audit and feedback, and implementation of electronic decision support tools, are likely to improve prescribing patterns.¹⁷ Low cost or free access for <18 -year-olds to general practice in Northland should also be considered, as well as waiving prescription charges, or greater use of MPSO medications.

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COMPETING INTERESTS

None declared.