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ORIGINAL ARTICLE

Antibiotic Prescription In Upper Respiratory Tract Infections

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Abstract

Aims. To document the antibiotic prescribing rate for upper respiratory tract infections (URTI) in general practice and its associated factors.

Methods. Data extracted from a morbidity survey of 150 general practice clinics in three urban areas in Malaysia. Participating general practitioners recorded demographic, morbidity and process of care data for 30 consecutive adult patients using a structured form.

Results. URTI contributed 940 (27.0%) of the total of 3481 encounters recorded. Antibiotic was prescribed in 68.4% of encounters with URTI; a significant proportion of

the antibiotic choice was inappropriate. Half the antibiotics prescribed in this study were due to URTI.
Conclusions. General practitioners need to re-examine their own prescribing for URTI and decide whether it is consistent with current guidelines. Rational prescribing is not just part of the professional role of doctors, but will go a long way to impede the emergence of antibiotic resistance.

Keywords: Respiratory tract infections, antibiotics, physician practice patterns, family practice

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Introduction

Upper respiratory tract infection is a common problem seen in primary care. Although it is generally believed that there is over-prescription of antibiotic for URTI in general practice, there are few reports of this in the indexed literature from the Asia-Pacific region.(1) Chang et al.(1) in a one-week prescription study in Taiwan, reported that antibiotic was prescribed in 31.3% of patients with common cold. Aljunid (2) reported a marked difference in the antibiotic prescription rates for URTI in private and government clinics in one district (75.9% and 45.5% respectively).

While antibiotic is credited with the dramatic reduction in the morbidity and mortality associated with many bacterial infections, its abuse has resulted in the rapid emergence of resistant strains that reduce the effectiveness of many antibiotics.(3) It has been recognized that the problem of antibiotic abuse is a result of a complex interplay of various socio-cultural, economic and cognitive factors at the level of the patients, the prescribers and the drug industry.(4)

In this study, we report the factors associated with the prescribing of antibiotic for URTI in Malaysian general practice. The data were extracted from the study "Cost and Quality of Care in Three Urban Areas in Malaysia". (5,6)

Materials and Methods

Sampling and setting

A list of private general practice clinics (n=639) was created by perusal of the list of registered medical practitioners from Malaysian Medical Council (1995). Proportionate random samples of 150 clinics were selected (Kuala Lumpur 101, Penang 25 and Ipoh 24). These clinics were approached by mail and later visited personally by research assistants. The study was conducted over six months in the year 1999.

Questionnaire and definitions

In the morbidity component of this study, participating general practitioners were requested to complete Data Encounter Form for each of the 30 consecutive adult patients seen (age ³18 years). The Data Encounter Form was a 2-page questionnaire that asked for the following information from the clinical encounter: demographic data, reasons for encounter (RFEs, up to 5), physical findings, diagnoses (up to 2), investigation ordered,

outpatient procedures performed, medical certificate given, medication prescribed (up to 8, but only a maximum of 5 items were analysed), and referral made.

The sources of payment were originally coded as cash (out-of-pocket payment by patients), panel (patients or clinics claiming the consultation fee from the employers) and managed care (payment is paid via a managed care organisation, primarily by capitation). Panel system and managed care were recoded as "non-cash" as subsequent analyses showed that they are similar for patient's demographic characteristics, morbidity and process of care.

Data analysis

We used SPSS version 10 for data entry and analysis. The morbidity data was coded using ICPC-2, (7) this was facilitated by using ICPC-2 plus Demonstrator (courtesy of Family Medicine Research Unit, Dept of General Practice, University of Sydney).

Categorical and continuous variables were compared using c2-test and t-test respectively. Statistical significance is set at $p<0.05$. Multinomial logistic regression was used to look for independent association between age, Chinese ethnicity, fever and sore throat and antibiotic prescription.

Results

One hundred and twenty five clinics returned 3481 complete Data Encounter Forms. Encounters with ICPC Diagnosis codes R74, R75 and R76 were classified as URTI (Table 1). We have classified as URTI in 11 encounters where diagnoses were recorded as symptoms only (R21 and R25) after verifying the chief complaints recorded were consistent with URTI. Thus the number (%) of encounter was 940 (27.0%).

Table 1: ICPC diagnosis codes of URTI encounters

ICPC code	Symptoms/diagnoses	Number (%)
R21	Throat symptoms	10 (1.1)
R25	Sputum/phlegm abnormal	1 (0.1)
R74	Acute upper respiratory infection	874 (93.0)
R75	Acute sinusitis	1 (0.1)
R76	Acute tonsillitis	54 (5.7)

Demographic characteristics

As shown in Table 2, consultations for upper respiratory tract infections were more common in males, those in the non-cash payment system and those who were employed. URTI was less commonly seen in the 'Other' ethnic group who were mostly immigrant workers.

Table 2: Demographic characteristics of patients with and without upper respiratory tract infections

Characteristics	URTI	Not URTI	Statistical test
Gender Male Female	490 (29.1) 450 (25.0)	1192 (70.9) 1349 (75.0)	c^2=7.48, p=0.006
Ethnic group Malay Chinese Indian Others	507 (27.2) 253 (28.7) 147 (26.5) 33 (18.1)	1355 (72.8) 630 (71.3) 407 (73.5) 149 (81.9)	c^2=8.60, p=0.035
Payment system Cash Non-cash	358 (24.0) 582 (29.3)	1135 (76.0) 1406 (70.7)	c^2=12.14, p<0.001
Employment Yes No	767 (28.8) 141 (22.0)	1896 (71.2) 500 (78.0)	c^2=12.01, p=0.001

Factors influencing antibiotic prescribing

Antibiotic was prescribed for 33.4% of all encounters and for 68.4% (95%CI 65.4%, 71.4%) diagnosed to be URTI. Antibiotic was prescribed in 67.2% of encounters coded as R74 (acute upper respiratory infection) and 90.7% of encounters coded as R76 (acute tonsillitis). Antibiotic was prescribed more commonly in patients with URTI than those without URTI (68.4% versus 20.5%, c2=707.36, p<0.001). URTI contributed 55.2% of all antibiotics prescribed in his study.

Antibiotic prescribing did not differ by gender (males 70.4%, females 66.2%, c2=1.902, p=0.168), payment system (cash 70.1%, non-cash 67.4%, c2=0.78, p=0.377) and employment status (employed 67.9%, unemployed 71.6%, c2=0.757, p=0.384).

Antibiotic prescribing differed significantly by ethnic groups (Malays 61.5%, Chinese 77.1%, Indians 76.9%, Others 69.7%; c2=24.76, p<0.001). Patients prescribed antibiotic were slightly older than those not given antibiotic (mean ages 34.2 versus 32.2 years, t=2.65, p=0.008).

Antibiotic prescribing for various URT symptoms were as follow: fever 72.7%, cough 68.9%, sore throat 78.8%, runny nose 65.5%, phlegm 66.7% and hoarseness 66.7%. Fever (c2=6.596, p=0.01) and sore throat (c2=27.467, p<0.001) were significantly associated with antibiotic prescribing.

Four factors that were initially associated with antibiotic prescribing (age, Chinese ethnicity, fever, sore throat) were tested with multinomial logistic regression; the last three factors remained independently associated with antibiotic prescribing (Table 3).

Table 3: Unadjusted and adjusted odds ratios of factors associated with antibiotic prescribing

Characteristics	Antibiotic prescription rate	Unadjusted odds ratio (95%CI)	Adjusted odds ratio (95%CI)
Chinese	77.1%	1.79 (1.29, 2.50)	1.67 (1.19, 2.36)
Fever	72.7%	1.44 (1.09, 1.91)	1.64 (1.23, 2.19)
Sore throat	78.8%	2.25 (1.66, 3.01)	2.22 (1.62, 3.04)

Antibiotic choice

Table 4 showed the antibiotic group and six most common antibiotics prescribed in the patients with URTI.

Table 4: Antibiotic choice in URTI

Antibiotic group	Number (%)**	Antibiotic name	Number (%)
Penicillins	389 (59.4)	Amoxycillin Ampicillin	279 (42.6) 68 (10.4)
Sulphonamides	68 (10.4)	Co-trimoxazole	58 (8.8)
Cephalosporins	60 (9.2)	Cephalexin	40 (6.1)
Tetracyclines	59 (9.0)	Doxycycline	45 (6.9)
Macrolides	58 (8.9)	Erythromycin	49 (7.5)
Others*	21 (3.2)		
Total	655 (100)		539 (82.3)

* aminoglycosides, quinolones, metronidazole, lincomycin
**in 13 encounters two antibiotics were prescribed.

Discussion

The research methodology in this study relies on the conscientious recording by the participating general practitioners, for which we were unable to verify by direct examination of the actual clinical records. Nonetheless, we feel that the data collected broadly apply to the adult attendees in the urban Malaysian general practice for the following reasons: (a) high response rate (83.3% of clinics approached returned the encounter forms), (b) the profile of the general practitioners in this study was similar to those in the West Malaysia,(6,8) (c) missing data for medication in URTI encounters was only 1.7% (data not shown), and (d) similarly high antibiotic prescribing rate for URTI had been reported in a smaller Malaysian general practice survey.(2)

URTI contributed at least one-quarter of all encounters sampled from the general practice clinics. The differences in the consultation rates for URTI for various demographic subgroups suggest the complex interplay of many factors that lead to a consultation for URTI in general practice.

Antibiotic was prescribed for 68.4% of the encounters diagnosed to have URTI. The prescribing rate was high irrespectively of the demographic characteristics and clinical features, although we found that Chinese ethnicity, the history of fever and sore throat were significantly associated with antibiotic prescription. The poor recording of physical findings in this morbidity survey did not allow a more detailed analysis of the clinical decision-making of the general practitioners. However, the prescribing of antibiotic is somewhat indiscriminate and appears to be inconsistent with the guidelines.(9,10)

The choice of antibiotics was by and large appropriate with respect to their ability to eradicate the group A b-haemolytic streptococcus, the most important bacterial pathogen in URTI. However, some choices were clearly inappropriate on account of the sensitivity towards group A b-haemolytic streptococcus (e.g. sulphonamides, tetracyclines, metronidazole).(9,10) The prescribing of newer antibiotics (e.g. azithromycin and quinolones) was relatively uncommon.

This study illustrates that antibiotic prescribing for URTI in Malaysian general practice is a suitable target of intervention since it contributed at least half of all antibiotics prescribed in general practice. Snow et al, (9) in keeping with systematic review(11) of the predictive features of streptococcal pharyngitis, recommended starting empirical antibiotics (either penicillin V, amoxycillin or erythromycin) for adults with at least three of four clinical criteria (history of fever, tonsillar exudate, tender anterior cervical lymphadenopathy, and absence of cough). However, the problem of patient expectation, either implied or expressed, for antibiotic in general practice is keenly felt by general practitioners and possibly influence their prescribing behaviour.(12) Thus clinical trials aimed at increasing adherence to evidence-based guidelines in URTI have had mixed success so far. (13-15)

Summery of Implications for GPs

The high antibiotic prescribing in URTI is likely to encourage the emergence of antibiotic resistance. Reducing antibiotic use may require a major change in the mindset for both general practitioners and the patients. Rational prescribing in URTI is consistent with the doctors' professional role and may not lead to a disruption of doctor-patient relationship.

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