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LETTER TO THE EDITOR

Acute respiratory tract infections management in private primary healthcare in Singapore

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Dear Editor,

Antibiotic use is medically unnecessary for most acute respiratory infections (ARIs), which are mostly viral aetiology and self-limiting in nature. Despite this, high rates of antibiotic use in the treatment of ARI persist, particularly in primary care where most ARI cases are managed.[1] In Singapore, antimicrobial resistance (AMR) and its control is a national priority.[2] While we have a good conceptual understanding of knowledge and attitudes to antibiotic prescribing in Singapore, in both patients and doctors,[3,4] and of actual antibiotic use in public primary care clinics through retrospective surveys,[5] data are lacking on antibiotic use and its correlates in the private sector where 80% of primary care physicians practice.[6] To address this gap, we performed a multicentre, physician-led, prospective observational study based on the HAPPY AUDIT protocol.[7] Studies of prescribing practices using this audit methodology have been an integral part of antibiotic stewardship in other countries.[8]

Our study recruited 50 general practitioners (GPs) practising in private clinics, through the Primary Care Research Network (now renamed SPARK).[9] These GPs prospectively recorded ARI consultation details on standardised case report forms (without patient identifying data) that included the following fields: age, sex, ethnicity, duration of illness, point-of-care tests performed, suspected aetiology, working diagnosis and oral antibiotics prescribed. Under signs and symptoms, GPs were also asked to record the presence of any of the following: rhinorrhoea, cough, odynophagia, increased sputum production, purulent sputum, fever, purulent ear discharge, tender cervical lymph nodes or tonsillar exudate. Consultations with adult patients (aged ≥21 years) presenting with symptoms and diagnosis of ARI (maximum duration of 21 days) between March and September 2021 were included, to a maximum of 50 patients per GP.

A total of 2176 unique ARI consultations were recorded, with a median age of 36 years (range 21–94), and 54.4% female. The median number of symptoms was 2 (range 0–7), and the median duration of symptoms at time of consultation was 2 days (range 1–21).

Antibiotic use was recorded in 355 (16.3%) patient consults. Association of antibiotic use with patient characteristics is shown in Table 1. There was no significant association of antibiotic prescription with sex or patient ethnicity. However, antibiotic use did rise with age, number of symptoms and symptom duration.

We noted a similar rate of antibiotic use across age groups below the age of 60 years, and a doubling in the rate of antibiotic use above this age. Similarly, while patients presenting with fewer than 4 symptoms were treated with antibiotics at a rate comparable to the overall average rate (16.3%), those presenting with more than 4 symptoms were predominantly prescribed antibiotics. Similarly, antibiotic use increased above the study average in patients with more than 3 days duration of symptoms, reaching 60% in patients with symptoms for longer than 7 days. Multivariate analysis of the above failed to identify any additional correlation with antibiotic prescription.

Of the antibiotic classes prescribed, the most frequent (65.0%) were penicillin (51.6% amoxicillin with clavulanic acid, 13.3% amoxicillin alone), followed by macrolides (24.7%). Macrolides and penicillin together constituted 89.7% of all antibiotics prescribed. Cephalosporins (5.6%), quinolones (2.5%), tetracyclines (0.6%) and trimethoprim/sulfamethoxazole (0.3%) were rarely used.

Three doctors (6.0%) did not prescribe antibiotics to any of their patients. The remaining 47 GPs (94.0%) varied considerably in their pattern of antibiotics prescription. While 13 GPs (26.0%) prescribed a single class of antibiotic exclusively

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Table 1. Patient characteristics and antibiotic use.

Characteristics	No. of patients prescribed with antibiotics		No. of patients not given antibiotics		Total no. of patients	OR (95% CI)
Sex						
Male	187	15.8%	995	84.2%	1182	1 (0.8–1.2)
Female	167	16.9%	822	83.1%	989	1.1 (0.9–1.4)
Total	354		1817		2171	
Ethnicity						
Chinese	233	16.4%	1189	83.6%	1422	1.0 (0.8–1.2)
Indian	38	18.8%	164	81.2%	202	1.2 (0.8–1.7)
Malay	51	13.5%	327	86.5%	378	0.8 (0.6–1.1)
Others	33	19.8%	134	80.2%	167	1.2 (0.8–1.9)
Total	355		1814		2169	
Age						
21–30	85	13.5%	543	86.5%	628	1.0 (0.7–1.4)
31–40	113	15.9%	599	84.1%	712	1.2 (0.9–1.6)
41–50	58	14.6%	339	85.4%	397	1.1 (0.8–1.6)
51–60	34	17.6%	159	82.4%	193	1.3 (0.9–2.1)
61–70	38	29.5%	91	70.5%	129	2.6 (1.7–4.1)
Above 70	27	23.3%	89	76.7%	116	1.9 (1.1–3.0)
Total	355		1820		2175	
No. of symptoms at presentation						
0	3	16.7%	15	83.3%	18	1.0 (0.2–5.8)
1	94	13.0%	630	87.0%	724	0.7 (0.2–2.6)
2	118	13.7%	745	86.3%	863	0.8 (0.2–2.8)
3	72	16.3%	370	83.7%	442	1.0 (0.3–3.4)
4	49	48.0%	53	52.0%	102	4.5 (1.3–16.6)
5	15	65.2%	8	34.8%	23	9.4 (2.1–42.3)
6	7	100.0%	0	0.0%	7	NA
7	1	100.0%	0	0.0%	1	NA
Total	359		1821		2180	
Symptom duration (days)						
1	37	6.1%	571	93.9%	608	1.0 (0.6–1.6)
2	97	10.9%	791	89.1%	888	1.9 (1.3–2.8)
3	78	21.1%	291	78.9%	369	4.1 (2.7–6.3)

Table 1. Patient characteristics and antibiotic use. (Cont'd)

Characteristics	No. of patients prescribed with antibiotics		No. of patients not given antibiotics		Total no. of patients	OR (95% CI)
Symptom duration (days)						
4	41	40.6%	60	59.4%	101	10.5 (6.3–17.7)
5	32	49.2%	33	50.8%	65	15.0 (8.3–27.0)
6	4	28.6%	10	71.4%	14	6.2 (1.8–20.6)
7	33	47.8%	36	52.2%	69	14.1 (7.9–25.2)
More than 7	33	60.0%	22	40.0%	55	23.1 (12.2–43.6)
Total	355		1814		2169	

CI: confidence interval; NA: not applicable; OR: odds ratio
Note: Percentages refer to proportion of each category. Denominators may differ due to missing data in each category. ORs are calculated with reference to the first category in each table.

(22.0% only penicillin; 4.0% only macrolides), the majority (70%) of GPs prescribed a variety of antibiotic types. Of these GPs, 18 (36%) alternated between macrolides and penicillin, whereas 17 (34.0%) GPs also prescribed other antibiotic types. Dual antibiotic use in the same patient was only noted in 2 cases. An explicit request for antibiotics was documented in 26 consultations, of which antibiotics were given in all but 1 case. Penicillin allergy was documented in 36 (1.6%) patients.

To our knowledge, this is the first published study of antibiotic prescription in the private primary care environment in Singapore. Using prospective data collection enabled a rich and complete dataset, which would have been challenging retrospectively given the many different electronic health record systems used in private clinics and variations in clinical case notation.

The antibiotic prescription rate we recorded (16.5%) compares favourably with regional estimates of antibiotic use by GPs, estimated between 34% and 85% for a number of Asian countries and Australia,[10] but is 4-fold the 3.73% rate of antibiotic use for respiratory conditions noted at Singaporean public polyclinics during the same period.[5] However, any comparison with such diverse environments should be made with caution, even between public and private clinics, due to the often-considerable variations in patient/case characteristics.[6]

We based our study on an established audit protocol. Audit approaches in themselves constitute a form of antibiotic stewardship,[11] not least by allowing practitioners to consider their prescribing in relation to others. Similarly, the implementation of guidelines for antibiotic prescription has been shown to lower overall antibiotic use in primary care.[12] The lack of specific guidelines for antibiotic use in ARI in primary care likely contributed to the variation in antibiotic use reported by GPs in our study. Patterns of use of antibiotic classes are increasingly becoming a focus of antibiotic stewardship, as embodied by the World Health Organization's Access, Watch, Reserve classification.[13] We note a relatively high use of macrolides, which are classified as "watch" antibiotics, among our GPs (and comparatively at a higher rate than in the polyclinics where prescription of antibiotics are subject to institutional guidelines).[5] As noted above, these are distinct clinical environments, and further research is needed to understand what factors may underlie antibiotic prescription decisions in each setting to effectively promote evidenced-based antibiotic prescription. Well-defined guidelines codifying antibiotics use in primary care, formulated in consultation with private general practitioners, may address many of these issues. We hope that the results of our study will help to inform the development of guidelines for the treatment of ARI in primary care in Singapore and support both relevant patient and professional education on appropriate antibiotic use.

Ethics statement

The study was approved by the Nanyang Technological University Institutional Review Board (2019-10-039).

Declaration

The authors declare there are no affiliations with or involvement in any organisation or entity with any financial interest in the subject matter or materials discussed in this manuscript.

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