

Knowledge that upper respiratory tract infection resolves on its own is associated with more appropriate health-seeking behaviour and antibiotic cognition

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ABSTRACT

Introduction: This study aims to study whether knowledge that upper respiratory tract infection (URTI) resolves on its own is associated with more appropriate antibiotic cognition and treatment-seeking behaviour in adult patients seeking consultation for upper respiratory tract symptoms in all nine polyclinics of the National Healthcare Group in Singapore.

Methods: A prospective study of 595 adult patients who attended for URTI symptoms of less than seven days duration was performed. We collected data using an interviewer-administered structured questionnaire eliciting the participant's personal and demographical data, his knowledge about URTI, past experience with URTI and treatment-seeking behaviour for this current episode of URTI. These variables were then regressed against the variable "URTI resolves on its own", adjusting for "antibiotics relieve URTI faster", "antibiotic used unnecessarily for URTI", "recovery faster with antibiotics" for antibiotic cognition; and "number of days with URTI", "first line of action: self-medicate", "reason for attendance: felt unwell", "reason for attendance: get well faster" and "used prescribed medication before current visit" for health-seeking behaviour.

Results: More than one-third of patients believed that URTI resolved on its own. Subjects who believed that URTI resolved on its own were not significantly different in terms of gender, ethnic group, educational status, age, knowledge of germs as causal, and number of days sick before attendance. However, such patients were 1.68 times (confidence interval [CI] 1.17, 2.41) more likely to agree that, nowadays, antibiotics are used unnecessarily for

"flu", and 2.07 times (CI 1.32, 3.24) more likely to self-medicate. They were 0.51 (CI 0.35, 0.76) times more likely to be dependant on prescribed medication.

Conclusion: Knowledge that URTI resolves on its own is associated with more appropriate antibiotic cognition and health-seeking behaviour.

Keywords: antibiotics, health-seeking behaviour, respiratory tract infection, upper respiratory tract infection

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INTRODUCTION

Acute upper respiratory tract infection (URTI) is the most common reason for consultation in the general practice and in Singapore. It constitutes 30% of all attendances⁽¹⁾. It is also a common condition for which antibiotics are prescribed. This is despite large amounts of evidence on the self-limiting nature of acute URTI⁽²⁻⁶⁾. Reasons for inappropriate antibiotic use range from a patient's perception that antibiotics are beneficial in URTI, to the doctor's attempt to secure the patient's satisfaction with the consult by meeting such expectations⁽⁷⁻¹²⁾.

Scott et al⁽¹³⁾ observed that patients strongly influenced the antibiotic prescribing of physicians through a number of different behaviours, for example, direct request, portraying severity of illness, suggesting diagnosis or implied diagnosis, or volunteering previous positive experience with use of antibiotics.

Lee et al⁽¹⁴⁾ observed that although 93% of parents understood that viruses cause colds, 66% also thought that bacteria were causative as well; and 53% reported that antibiotics were necessary to treat colds. They concluded that misconceptions about antibiotic use were an independent predictor of utilisation of emergency and ambulatory care.

Patient education is an important part of treatment for URTI⁽¹⁵⁾. However, current patient

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education literature on URTI and antibiotic use tend to emphasise the viral aetiology of the condition. Interventions using such patient education material have made little impact on the overall antibiotic use in some studies⁽¹⁶⁻¹⁷⁾. Similarly, as observed by Lee et al, the knowledge of viral causality in URTI has not translated to more appropriate antibiotic health-seeking behaviour in the group of parents studied⁽¹⁴⁾. Hence, it would suggest that for patient education to be successful, it must influence both the patient's antibiotic cognition as well as his utilisation of ambulatory care.

We aimed to study the knowledge factors influencing both treatment-seeking behaviour and antibiotic cognition in adult patients seeking consultation for upper respiratory tract symptoms in all nine polyclinics in the National Healthcare Group, Singapore. This may help point to more useful education strategies for URTI.

METHODS

This was a prospective study involving all nine clinics belonging to the National Healthcare Group Polyclinics (NHGP) in the Republic of Singapore. These clinics are one-stop primary care health centres, which provide subsidised services ranging from preventive healthcare to acute and chronic medical care. The proportion of patients recruited from each clinic was based on the proportion of patients seen for URTI during the same period in the past year. The sample size was based on the microbiological arm of the study. This was calculated based on the minimum number of subjects which was needed to provide at least 10% of bacterial infection in URTI. This 10% figure was based on literature review of similar studies that have been done previously.

The study population included 595 consecutive patients who presented with complaints of respiratory tract symptoms from February to April 2002. The sampling was done as follows: The number of subjects in each polyclinic was determined by the same proportion it had of URTI patients the previous year. The polyclinics were sampled one at a time, the order of which was randomly selected. At each polyclinic, consecutive number of subjects were selected until the quota for that particular clinic was met before moving on to the next clinic.

Inclusion criteria were: all patients, who were Singaporean residents, aged 21 years and above, who complained of any one of the following symptoms, namely cough, nasal (sneezing, runny nose, blocked nose) or throat (sore throat, throat clearing, phlegm in throat), symptoms of less than seven days' duration. Patients were excluded if they had a history of

chronic respiratory problems, such as allergic rhinitis, chronic sinusitis, asthma or chronic obstructive pulmonary disease, were currently on treatment for tuberculosis, or were immunocompromised in any way. The subjects were recruited into the study based on the inclusion and exclusion criteria. They were then seen by the doctors before being subject to a ten-minute interview conducted by our trained research nurses. The training involved calibration of the way the questions were to be presented to the subjects, the degree of prompting, the use of translations to mandarin, hokkien and malay. "Flu" was used in the questionnaire to mean URTI since for the layperson, "flu", "common cold" and less commonly, "upper respiratory tract infection" are used interchangeably. For this study, "flu" was meant to mean any URTI symptom (nasal or throat symptoms or cough) of less than seven days' duration.

Out of a total of 821 eligible patients, 595 gave signed informed consent to participate in the study. This gives a response rate of 72.4%. There were more male respondents (80.9%) compared with female respondents (69.4%). However, there were no differences between respondents and non-respondents with respect to age or ethnic distribution.

We collected data using an interviewer-administered structured questionnaire. The questionnaire elicited the participant's personal and demographical data, his knowledge about URTI, past experiences with URTI, treatment-seeking behaviour for a current episode of URTI, including reasons for his attendance. All data were checked for accuracy of entry before being scanned and converted into Microsoft Excel files. These were then imported into the Statistical Package for Social Sciences (SPSS) version 11.0 (Chicago, IL, USA), on which statistical analysis was performed. Frequency tabulations were done for descriptive data. Two tests were used for comparison of differences in proportions. Odds-ratios and 95% confidence intervals were calculated for bivariate analysis. Significant univariate variables were regressed with "URT resolves on its own" as the dependant variable, adjusting for factors associated with antibiotic cognition: "antibiotics relieve URTI faster", "antibiotic used unnecessarily for URTI", "recover faster with antibiotics" for antibiotic cognition; and factors associated with health-seeking behaviour: "number of days with URTI", "first line of action: self-medicate", "reason for attendance: felt unwell", "reason for attendance: get well faster" and "used prescribed medication before current visit". As variables "flu last longer if did not see doctor", "flu better after medication prescribed by

the doctor” were found to be co-linear with “taking prescribed medication before current visit”, they were left out of the regression model.

RESULTS

There were 319 males (53.6%) and 276 females (46.5%). The median age was 45.0 years (range 21 - 88 years). Ethnic distribution was: Chinese 69.1%, Malay 17.5%, Indian 11.1% and Others 2.2%. About half the patients (49.6%) had six years of education or less, and 71.9% had earned income. 47.4% of patients paid for their own medical treatment. For all URTI episodes in the past, 72.0% reported that symptoms tended to last longer if not seen by a doctor, 87.1% recovered faster with rest, and 57.8% said that their URTI improved at a faster rate when antibiotics were used.

As for lay theories on the cause of URTI (Table I), only 11.1% (66) thought that it was caused by germs. 21% (125) attributed it to weather and 19.8% (118) to the environment. 11.8% (70) of patients thought that URTI was caused by “heatiness”, a popular Asian concept, where there is a disharmony of the yin and yang balance. Usually when a person is described as “heaty”, it implies either excessive “yang” or insufficient “yin”. Of those who thought that germs caused URTI, about three-quarters of the group quoted viruses as the germ involved. Although 60% of patients thought that getting wet or chilled, and getting tired or a lack of sleep predisposed a person to URTI, only 34% thought too much stress predisposed a person to URTI. 36.3% (213) of patients believed that URTI resolved on its own. 31% (180) of patients used prescribed medication just prior to the current visit for URTI. Of this, 23.8% (43) used left-over cough mixtures and 21.5% (39) used left-over antibiotics.

In the comparison of patients who believed URTI resolved on its own and those who did not (Table II), there was no significant difference in terms of gender, ethnic group, educational status, age and knowledge of germs as causal. Number of days sick before consultation and reasons for attendance, such as needing medication, needing sick leave or the fact that the URTI was lasting longer, were also not statistically different between the two groups (Table III). There was also no significant difference between the two groups in terms of belief that antibiotics relieve URTI faster and their previous persuasion of doctors for antibiotics (Table II).

As variables “flu last longer if did not see doctor”, “flu better after medication prescribed by the doctor” were found to be co-linear with “taking prescribed

Table I. Lay theories about URTI in 595 adult patients with acute respiratory symptoms.

	Number	(%)
Cause of URTI		
Germs	66	(11.1)
Environment	118	(19.8)
Weather	125	(21)
Heatiness	70	(11.8)
Don't know	119	(20.0)
Knowledge of URTI		
Yes to “Resolves on its own”	213	(36.3)
Yes to “Antibiotics relieve URTI faster”	362	(61.7)
Yes to “Antibiotics used unnecessary for URTI”	191	(32.3)

medication before current visit”, they were left out of the multivariate analysis.

After adjusting for possible confounders in the multivariate analysis, it was found that patients who believed that “URTIs resolve on their own” were 1.68 times (CI 1.17, 2.41) more likely to agree that nowadays antibiotics are used unnecessarily for the “flu”, and 2.07 times (CI 1.32, 3.24) more likely to self-medicate, but 0.51 (CI 0.34, 0.76) times more likely to use prescribed medication. The reason for attendance also differed, with them attending 1.75 times (CI 1.02, 3.00) more because they wanted to get well faster. They were also 1.78 times (CI 1.22, 2.60) more likely to think that URTI lasts not more than three days (Tables IV and V).

DISCUSSION

Although 51.3% of the patients had completed more than six formal years of education, only 7.9% of them knew that URTI was caused by viruses and 11.2% knew it was caused by some kind of germ. This contrasts with a similar study by Braun et al^(8,9), who reported that the patients associated URTI with either virus alone or a combination of both virus and bacteria in more than 80% of the 500 patients studied. Similarly, only 36.3% of the patients in our study believed that URTI resolved on its own compared to 85% in the study by Braun et al. The most obvious difference in the groups studied was the educational status, with more than 70% of the patients in the Braun et al study having more than ten years of education. However, racial and cultural differences may also have an impact on their perception of other non-germ factors as causal of URTI, such as heatiness and the weather⁽¹⁸⁻¹⁹⁾. It is also observed in this study that the knowledge of URTI being caused by virus

Table II. Patient characteristics (demographics, URTI knowledge and past experiences) by their belief that URTI resolves on its own.

	Variable	Resolves on its own Number (%)	Unadjusted odds-ratio	95% CI
Demographics				
Gender	Male	109 (34%)	0.84	0.60, 1.17
	Female	104 (39%)		
Age group	≤50 years	146 (38%)	1.25	0.87, 1.80
	>50 years	63 (33%)		
Education	≤6 years	102 (35%)	0.90	0.64, 1.26
	>6 years	109 (37%)		
Ethnic group	Chinese	145 (36%)	0.94	0.66, 1.35
	Non-Chinese	68 (37%)		
Knowledge				
Cause	Germ	22 (34%)	0.86	0.50, 1.48
	Non-germ	191 (37%)		
Duration of URTI	0 - 3 days	156 (37%)	1.06	0.73, 1.55
	≥4 days	57 (35%)		
Antibiotics relieve URTI faster	Yes	122 (34%)	0.77	0.55, 1.09
	No	90 (40%)		
Antibiotics are used unnecessarily for URTI	Yes	83 (44%)	1.60*	1.12, 2.29
	No	130 (33%)		
Past experiences				
Previous complication of URTI	Yes	28 (39%)	1.17	0.70, 1.94
	No	181 (36%)		
URTIs tend to last longer if not seen by doctor	Yes	134 (32%)	0.51*	0.35, 0.73
	No	78 (48%)		
First thing normally done for URTI: self-medicate	Yes	174 (39%)	1.80*	1.18, 2.74
	No	37 (26%)		
Better after doctor's prescribed medication	Yes	155 (32%)	0.36*	0.23, 0.56
	No	56 (57%)		
Ever persuaded doctor for antibiotics	Yes	17 (29%)	0.70	0.39, 1.26
	No	192 (37%)		
Recovered faster with: enough rest	Yes	21 (28%)	0.62	0.37, 1.06
	No	192 (38%)		
Recovered faster with: antibiotics	Yes	113 (34%)	0.73	0.52, 1.03
	No	100 (41%)		

* Statistically significant

CI: confidence interval

was not associated with the expected knowledge that URTI is self-limiting.

Another difference between the study by Braun et al and ours is that in Singapore, most employees would be expected to produce a sick leave certificate if they fail to turn up for work during an illness; as compared with their Western counterparts who are able to call in sick.

More than one-fifth of the patients who used prescribed medication to self-medicate before the visit used left-over antibiotics. This observation supports the suspicion that antibiotics may not be used properly by patients even when prescribed.

However, among the patients who believed that URTI resolved on its own, they appeared to have the right cognition about antibiotic misuse. This was associated with a more appropriate health-seeking behaviour in the event of URTI. They were less dependent on prescribed medication and more likely to self-medicate. They were also less likely to consult just because they felt unwell. Having the right cognition towards antibiotics in URTI is important since the wrong cognition, as in the study by Scott et al⁽¹³⁾, resulted in increased pressure on the physicians to prescribe antibiotics both directly or indirectly. However, it was observed that they did attend more

Table III. Comparison of patients' URTI health-seeking behaviour by their belief that URTI resolves on its own.

	Variable	Resolves on its own Number (%)	Unadjusted odds-ratio	95% CI
Number of days sick before consultation	≤3 days	156 (37%)	1.06	0.73, 1.55
	>3 days	57 (35%)		
Reason for attendance				
Feel unwell	Yes	97 (32%)	0.68*	0.48, 0.95
	No	116 (41%)		
Need medication	Yes	53 (34%)	0.88	0.6, 1.30
	No	160 (37%)		
Need to get well faster	Yes	33 (49%)	1.83*	1.1, 3.05
	No	180 (35%)		
Need sick leave	Yes	21 (46%)	1.52	0.83, 2.79
	No	192 (36%)		
Last longer	Yes	21 (43%)	1.35	0.75, 2.44
	No	192 (36%)		
What was used prior to visit				
Traditional measures	Yes	152 (35%)	1.18	0.79, 1.79
	No	47 (39%)		
Traditional medicine	Yes	61 (32%)	1.27	0.88, 1.83
	No	151 (38%)		
OTC medication	Yes	109 (38%)	0.89	0.63, 1.25
	No	100 (35%)		
Prescribed medication	Yes	48 (27%)	0.52*	0.36, 0.77
	No	162 (41%)		
Not used anything	Yes	13 (48%)	1.74	0.80, 3.78
	No	179 (35%)		

* Statistically significant

CI: confidence interval

Table IV. Adjusted odds-ratio of patients' antibiotic cognition and past antibiotic experience by their belief in URTI resolving on its own.**

	Number	Variable	Adjusted p-value	Adjusted odds-ratio	95% CI
Antibiotics relieve URTI faster	357	Yes	0.342	0.82	0.54, 1.24
	224	No		1.00	
Antibiotic used unnecessarily for URTI	189	Yes	0.005	1.68*	1.17, 2.41
	396	No		1.00	
Recover faster with antibiotics	334	Yes	0.290	0.80	0.54, 1.21
	243	No		1.00	

* Statistically significant (p-value <0.05)

** Significant univariate variables (p<0.05) were regressed with "URTIs resolve on its own" as the dependant variable, using binary logistic regression model of the SPSS version 11.0, adjusting for factors associated with antibiotic cognition: "antibiotics relieve URTI faster", "antibiotic used unnecessarily for URTI", "recover faster with antibiotics" for antibiotic cognition; and factors associated with health seeking behaviour: "number of days with URTI", "first line of action: self-medicate", "reason for attendance: felt unwell", "reason for attendance: get well faster" and "used prescribed medication before current visit".

CI: confidence interval

because they wanted the doctor to give them something to help them get well faster. This appeared to be a contradiction; yet it might be an indication that these patients were aware of the availability of antiviral agents, which have been touted by pharmacological

companies to help with URTI recovery. Hence, despite their understanding of the self-limiting nature of URTI, influences such as social and economic commitments might pressurise them to seek help from a physician for a faster cure, than to allow the disease

Table V. Adjusted odds-ratio of patients' URTI health-seeking behaviour by their belief in URTI resolving on its own.**

	Number	Variable	Adjusted p-value	Adjusted odds-ratio	95% CI
Number of days with URTI	173	0-3	0.003	1.78*	1.22, 2.60
	391	>3			
First line of action: self-medicate	443	Yes	0.001	1.00	1.32, 3.24
	140	No	2.07*		
Reason for attendance: felt unwell	303	Yes	0.093	1.00	0.51, 1.05
	283	No	0.73		
Reason for attendance: get well faster	67	Yes	0.043	1.00	1.02, 3.00
	519	No	1.75*		
Used prescribed medication before visit	180	Yes	0.001	1.00	0.34, 0.76
	395	No	0.51*		

* Statistically significant ($p < 0.05$)

** Significant univariate variables ($p < 0.05$) were regressed with "URT resolves on its own" as the dependant variable, using binary logistic regression model of the SPSS version 11.0, adjusting for factors associated with antibiotic cognition: "antibiotics relieve URTI faster", "antibiotic used unnecessarily for URTI", "recover faster with antibiotics" for antibiotic cognition; and factors associated with health-seeking behaviour: "number of days with URTI", "first line of action: self-medicate", "reason for attendance: felt unwell", "reason for attendance: get well faster" and "used prescribed medication before current visit".

CI: confidence interval

to run its natural course. They also tended to believe in a shorter duration of URTI, which might explain why the number of days sick before consultation did not differ between the two groups.

A lot of health education literature on URTI has focused on emphasising viral causes. Similarly, many doctors attempt to convince patients of the viral causality of URTI in order to avoid unnecessary pressure to prescribe antibiotics. However, it has not been established that acquisition of such knowledge for the patient will translate to a more appropriate health-seeking behaviour for URTI. Contrary evidence was illustrated in the study by Lee et al⁽¹⁴⁾. In this study, knowing that URTI resolves on its own appears to be associated significantly with more appropriate health-seeking behaviour. Educating that "URT resolves on its own" is probably a less daunting task than "URT is caused by virus and therefore....". This is especially true in the context of our patients who seem to have some diverse views about URTI causality that seemed to be influenced by strong socio-cultural factors. Hence, any attempt to educate on the latter will inevitably lead to the need to tackle all the other believed causes of URTI. Nonetheless, the usefulness of such an education strategy will need to be further studied to measure its clinical effectiveness in actual practice.

Our study population was adult patients attending all nine polyclinics belonging to the NHGP. As these clinics represent about half the subsidised primary healthcare delivery in Singapore, it was not unexpected to find that the study population appeared skewed, with a median age of 45.5 years compared to that of the general population of 34 years (Population census 2000); and with 49.6% of the study population with less than six years of formal education compared to 32% in the general population (Population census 2000). Hence, it will be difficult to extrapolate the study findings to the rest of primary care in Singapore. It was also impossible to assume that the patients who sought treatment at private practices were similar to those who sought treatment at the polyclinics. Hence, the conclusions of the study and the possible application of these findings should be viewed within the context of the study population, with cautious extrapolation to the rest of primary care. While all attempts were made in the study to minimise missing values, it was impossible to totally get rid of them. In the analysis, as we could not assume that those who responded were the same as those who had not responded, the missing values were excluded from the denominator, hence the discrepancy in the denominator of the variables. As the number of missing values was small compared

to the sample size, the effect of this was thought to be negligible.

In conclusion, the patients' perception of the causality of URTI is diverse, with only 7.9% knowing that it is caused by virus. Knowledge that URTI resolves on its own is associated with more appropriate antibiotic cognition and health-seeking behaviour. The education that "flu resolves on its own" may be easier to do, and may translate to more desirable behaviour with regard to URTI.

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