

Public Knowledge, Attitudes and Behavior on Antibiotic Use: A Telephone Survey in Hong Kong

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Abstract

Background: This study aimed to examine public knowledge, attitudes and behaviors regarding antibiotic use in the community of Hong Kong.

Methods: A cross-sectional phone survey was conducted in 2006 on people aged 18 or older who were uninstitutionalized Hong Kong residents regarding antibiotic use for upper respiratory tract infections (URTIs).

Results: A total of 1,002 respondents participated in the survey and 77%, 72% and 85% of the respondents had adequate knowledge, appropriate attitude/belief and behavior on antibiotic use, respectively. Some respondents (26%) believed that antibiotic was needed for symptoms of URTIs if they felt sick enough to seek medical care and 8% would share antibiotic with family members. Eighty-nine (9%) respondents had acquired antibiotic without a prescription. During the most recent episode of URTI, 78% had completed the antibiotic treatment course. Stepwise multiple logistic showed that higher education level and family income were associated with adequate patient knowledge. Male gender was a predictor of poor behavior on antibiotic use. Appropriate belief was associated with tertiary level of education or above.

Conclusions: Over 70% of the present cohort showed adequate knowledge, appropriate attitudes/beliefs and behavior on antibiotic use. Despite a small percent (8%–9%) of respondents reportedly shared and/or self-prescribed antibiotics, this would translate into the practice of half a million people in Hong Kong. Public education programmes should therefore be developed, targeting specific areas of misconceptions, misuse of antibiotic and vulnerable groups at risk of improper use of antibiotics.

Infection 2008; 36: 153–157
DOI 10.1007/s15010-007-7214-5

Background

Antibiotic resistance is an institutional as well as community problem. Recently, antibiotic resistance of bacteria isolated in throat swabs, urine and sputa obtained by

general practitioners in the Hong Kong community were reported [1]. The proportion of *pneumococci* with intermediate resistance to penicillin was alarmingly high (81%).

Antibiotic resistance is strongly associated with improper usage of antibiotics. Prudent antibiotics use is essential for preserving their clinical effectiveness, while the reduction of unnecessary use will decrease antibiotic resistance. Beside the prescribers, the end users of antibiotics are also essential to the control of antibiotic use and resistance [2]. Patients' behavior, associated to their knowledge, attitudes and beliefs, may influence antibiotic prescribing [2, 3]. Most of the strategies for controlling antibiotic resistance, such as guidelines, policies and educational programmes, have been focusing on both prescribers and public to promote prudent antibiotic use [4–8].

The perceptions of general public on conditions requiring antibiotic therapy, channels of obtaining antibiotics, their compliance to the treatment as prescribed are fundamental to any efforts to control antibiotic use and resistance, yet they have not been well described in Hong Kong. In this study, we therefore proposed to examine public knowledge, attitudes and behavior regarding antibiotic use in the community of Hong Kong.

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Received: May 11, 2007 · Revision accepted: September 12, 2007

Published online: January 29, 2008

Methods

Study Design and Setting

This was a cross-sectional phone survey on a random sample of 1,000 non-institutionalized Hong Kong residents. The study protocol was approved by the Survey and Behavioral Research Ethics Committee of The Chinese University of Hong Kong (CUHK). The phone survey was conducted by skilled interviewers from the Centre for Epidemiology and Biostatistics at CUHK during the period of 9–22 February 2006. Residents of households aged ≥ 18 years were identified by random digit dialling, where numbers that conformed to the local telephone number structure were generated by computer in a random fashion. One individual in a household at each contact number was selected for interview. The interview was conducted in Cantonese or Mandarin for about 5 min–10 min. Respondents who were in the city for vacation, residents of nursing homes, old age homes, rehabilitation hospitals or mid-way houses, and those incapable of responding to survey questions because of psychiatric or neurological disorders, or incapable of speaking Cantonese or Mandarin were excluded. The interview was pre-tested with 20 subjects.

The interview included questions about knowledge and attitudes regarding appropriate antibiotic use for treatment of general symptoms (sore throat and runny nose) of upper respiratory tract infections (URTIs) and symptoms associated with more serious URTIs (sore throat, runny nose, cough and fever). The respondents were asked four questions about their attitudes and beliefs on the types of URTI symptoms requiring antibiotic therapy and sharing antibiotics with family members who presented with similar symptoms (Table 1). Each question could be responded with three choices: agree, disagree and do-not-know. Agreeing to take antibiotic for general symptoms of URTIs (sore throat and runny nose), expecting a prescription of antibiotic when visit a doctor for the same general symptoms and sharing antibiotics with others were considered as

mis-beliefs. Scores of 1, 2, 3 were assigned to the responses of mis-belief, do-not-know and appropriate belief, respectively. A total belief score was constructed arbitrarily with values between 4–8 being defined as mis-belief and 9–12 as appropriate belief.

Five questions were asked concerning one's knowledge on the indications for antibiotics, compliance to completing the prescribed course of antibiotic and risk factors related to bacterial resistance to antibiotic therapy. A knowledge score was determined by calculating the number of correct responses to these five questions. Poor and adequate knowledge were defined as total knowledge scores of 0–2 and 3–5, respectively.

Questions on the behavior towards antibiotic use for their most recent episode of URTI treated by antibiotics and the types of medical service received were included in the survey. Inappropriate behavior was defined as stopping the antibiotic therapy when the symptoms improved or acquiring antibiotic without a prescription. The respondents' demographic data was documented before the end of the phone interview.

Statistical Analysis

Descriptive statistics of patient demographics, findings of patient knowledge, attitudes/beliefs and behavior regarding antibiotic use and bacterial resistance were reported. Numerical data were expressed as mean \pm standard deviation or percentage, as appropriate. The Hong Kong population size was 6.8 million at year-end of 2005 [9]. A sample size of 1000 would give a confidence interval of 3% and confidence level of 95% in the determination of a prevalence in a population. Association of demographic variables with knowledge, attitudes/beliefs, and behavior on antibiotic use was first evaluated using univariate analysis by logistic regression. Factors with significant association in the univariate analysis were further analyzed by stepwise multiple logistic regression analysis. A *p*-value < 0.05 was considered as statistically significant.

Table 1
Questions on attitude/belief, knowledge and behavior of antibiotic use.

Attitude/belief:

Would you agree with/disagree with/do not know the following statement?

If I had sore throat and runny nose, I should take an antibiotic.

If I had sore throat, runny nose, cough and fever, I should take an antibiotic.

If I visit a doctor for sore throat and runny nose, I would expect a prescription of antibiotic.

If my family member is sick, I would give my antibiotic to him/her.

Knowledge:

What is an antibiotic?

A medicine for bacterial infections/a medicine for arthritis and inflammation/a medicine to stop fever/a pain killer/not sure or do not know

You can stop taking a full course of antibiotic if your symptoms are improving

Yes/no/not sure or do not know

Would you agree with/disagree with/do not know the following statements

The effectiveness of treatment is reduced if a full course of antibiotic is not finished

One may be infected with bacteria that are difficult to treat if this person is repeatedly treated with the same antibiotic and does not complete the treatment course.

An antibiotic will not be effective for treating infections if it is overused in a community.

Behavior:

Referring to the most recent episode of upper respiratory tract infection

Where did you seek medical care?

If you received antibiotic, did you complete the course of treatment?

Have you ever obtained antibiotic without a prescription? If yes, from where did you obtain the antibiotic?

Results

A total of 7,072 phone calls were made and 1,002 (14%) respondents met the selection criteria and were willing to participate in the survey. Demographic data of the 1,002 respondents are shown in table 2. There were 483 (48.2%) male respondents and 30 to < 50 years was the most

	Number (%)
Age (years) (N = 1,001) ^a	
< 30	194 (19.4%)
30 to < 50	442 (44.2%)
50 to < 65	210 (21.0%)
≥ 65	155 (15.5%)
Male	483 (48.2%)
Education (N = 999) ^a	
Primary or below	224 (22.4%)
Secondary	474 (47.4%)
Tertiary or above	301 (30.1%)
Occupation related to health care (N = 1,001) ^a	62 (6.2%)
Having family member's occupation related to health care (N = 1,001) ^a	112 (11.2%)
Family monthly income (HKD) ^b	
≤ 10,000	233 (23.3%)
10,001–20,000	273 (27.2%)
20,001–30,000	144 (14.4%)
≥ 30,000	211 (21.1%)
Unsure/refused to answer	141 (14.1%)
Number of visits to a clinic in the last 12 months	
None	240 (24.0%)
1–4 times	507 (50.6%)
5–10 times	161 (16.1%)
> 10 times	68 (6.8%)
Cannot remember	26 (2.6%)

^aTotal number < 1,002 because of missing data; ^bHKD1 = USD0.128

	Number (%)
Attitudes/beliefs (total score: 4–12)	
Not adequate (scores 4–8)	
4–7	79 (7.9%)
8	204 (20.4%)
Adequate (scores 9–12)	
9	196 (19.6%)
10	355 (35.4%)
11–12	168 (16.8%)
Knowledge (total score: 0–5)	
Adequate knowledge (3–5)	768 (76.6%)
Poor knowledge (0–2)	234 (23.4%)
Behavior	
Good behavior	844 (84.6%)
Misbehavior	123 (12.3%)
Do not remember	31 (3.1%)

common age group (44.2%). Table 3 shows that 76.6%, 71.8% and 84.6% of the respondents had adequate knowledge, appropriate attitudes/beliefs and behavior on antibiotic use, respectively.

Over half of the respondents had correct knowledge of antibiotics for treatment of bacterial infections (65%) and continuation of antibiotic treatment when symptoms of infection improved (58%). A majority of the respondents also agreed that the effectiveness of treatment would be reduced if the full course of antibiotic treatment was not complete (65%), that repeated non-compliance to the treatment course of the same antibiotic would increase bacterial resistance (79%), and that antibiotics would not be effective for treating infections if they were overused in the community (77%).

Questions on attitudes/beliefs indicated that 17% of the respondents believed that antibiotic was needed when there were general symptoms of URTIs (sore throat and runny nose) without fever, while 31% believed in using antibiotics for URTIs symptoms with fever, and 26% would consider antibiotics necessary if they felt sick enough to seek medical care for URTIs symptoms. Only 8% of respondents would share antibiotics with family members.

Referring to the most recent episode of URTI, majority sought medical care at private clinics (75%), public outpatient clinics (16%), and accident and emergency departments of public hospitals (1.5%). Fifty percent of respondents reported that the most recent episode of URTI occurred in the past 12 months whereas the remaining cases occurred over 12 months ago. A total of 237 respondents received antibiotic treatment for the most recent episode of URTI and 186 (78%) had completed the treatment course. Eighty-nine (9%) of 1002 respondents had acquired antibiotic without a prescription mainly from a pharmacy (73/89) and from family members or friends (11/89).

Five variables (age, education, family income, gender and number of clinics in the past 12 months) showed significant association with respondents' knowledge, behavior and attitudes in the univariate analysis. Stepwise multiple logistic regression was further conducted on these five variables and only three variables were shown to be significant predictors (Table 4). Higher education level and family income were associated with adequate patient knowledge. Male gender was a predictor of poor behavior on antibiotic use. Appropriate belief was associated with tertiary level of education or above.

Discussion

It can be inferred from our study that a majority of people in the Hong Kong community had adequate knowledge, appropriate attitude/belief and behavior on antibiotic use. More respondents in our cohort had correct knowledge on the indication of antibiotics (65%) and compliance to completing an antibiotic treatment

	Dependent variabile		OR _A (95% CI) ^a	p
	Adequate knowledge	Poor knowledge		
Education				
Primary or below ^b	130 (58.0%)	94 (42.0%)	1	
Secondary	368 (77.6%)	106 (22.4%)	0.50 (0.35–0.71)	< 0.001
Tertiary or above	267 (88.7%)	34 (11.3%)	0.28 (0.17–0.46)	< 0.001
Family monthly income (HKD) ^c				
≤ 10,000 ^b	153 (65.7%)	80 (34.3%)	1	
10,001–20,000	212 (77.7%)	61 (22.3%)	0.69 (0.46–1.04)	0.077
20,001–30,000	124 (86.1%)	20 (13.9%)	0.48 (0.27–0.84)	0.011
≥ 30,000	191 (90.5%)	20 (9.5%)	0.348 (0.19–0.62)	< 0.001
Unsure/refused to answer	88 (62.4%)	53 (37.6%)	1.358 (0.87–2.13)	0.182
Gender				
Male ^b	391 (81.3%)	90 (18.7%)	1	
Female	453 (87.6%)	64 (12.4%)	0.61 (0.43–0.87)	0.006
Education				
Primary or below ^b	153 (68.3%)	71 (31.7%)	1	
Secondary	332 (70.0%)	142 (30.0%)	0.92 (0.65–1.30)	0.641
Tertiary or above	234 (77.7%)	67 (22.3%)	0.62 (0.42–0.91)	0.016

^apOR_A: odds ratio adjusted for other significant factors; obtained by stepwise multiple logistic regression analysis; ^bReference group of the categorical variable that analyzed by creating dummy variables; ^cHKD1 = USD0.128

course (58%) when compared with reports of other similar surveys (45%–59% and 50%, respectively) [10, 11]. Our survey showed that 65%–79% of the respondents demonstrated knowledge on antibiotic resistance, similar to the findings (61%–91%) reported by *Rodis* et al. [12].

Our result of 26% compared well with other surveys reported in literature that 28%–48% would ask for antibiotics for treatment of URTIs [11, 13]. Fewer respondents (8%) in the present cohort would share antibiotic with family when compared to that of 13% in a similar survey on Chinese people in Taiwan [10]. Another study also showed a higher proportion (one in four) of subjects would save antibiotic for future use [14]. Nevertheless, our findings did demonstrate that a proportion of people treated with antibiotic would share the medicine with others, thus exposing the community to the problem of antibiotic misuse.

To determine the actual behaviors relating to antibiotic use, the most recent episode of URTI was assessed. Overall, our study confirmed that most (78%) people who received antibiotic had completed the treatment course. It was higher than the reported compliance rate (69%) in subjects from nine countries [14]. Obtaining antibiotics without a prescription was claimed by 9% of our respondents, similar to the findings of a report in which 9% acquired antibiotics using old prescriptions or someone else's [13]. Despite the small percentage reported to self-prescribe antibiotic, it might account for what has been happening in up to 0.6 million of the population in Hong Kong.

In the present study, higher education level was identified as a positive predictor for adequate patient knowledge and appropriate attitudes/beliefs. Similar observations were also reported that college graduate and female gender were associated with high antibiotic knowledge [11]. In the present study, female gender was also identified as a positive predictor of appropriate behavior. Our study showed that family income was a positive predictor of adequate knowledge. Family income was only documented in very few surveys on antibiotic use [13] and the association of family income and antibiotic use had not been reported previously. It was suggested that misconceptions regarding antibiotics use in low-income groups such as Medicaid-insured patients may contribute to inappropriate antibiotic prescribing [15]. The potential association of family income and education level might explain the positive association of family income with patient knowledge demonstrated in the present study. Future studies on interactions among the determinants are warranted.

The present study was limited by the relatively small number of questions in the questionnaire. The arbitrary attribution of a mid-point score between appropriate belief and mis-belief to “do-not-know” might limit our scoring system that a person who has no knowledge might have the appropriate attitude of seeking medical advice. Our description of a more serious URTI requiring antibiotic in the survey might be inadequate that infections such as acute rhinosinusitis are not included in the

description. Some of the questions might also lack independence that patients who agreed sore throat and runny nose need antibiotic treatment also tended to agree that sore throat, runny nose, cough and fever need antibiotic as well. The behavior scores might be influenced by recall bias as 50% of respondents had the most recent episode of URTI over 12 months ago.

In conclusion, over 70% of the present cohort showed adequate knowledge, appropriate attitudes/beliefs and behavior on antibiotic use. Despite a small percent (8%–9%) of respondents reportedly shared and/or self-prescribed antibiotics, this would translate into the practice of half a million people in Hong Kong. Lower education level/family income and the male gender were identified as predictors of poor knowledge and inappropriate behavior for antibiotic use, respectively. Programmes targeting at consumer and caretaker awareness, beliefs, attitudes and behavior were reported to achieve reduction in inappropriate use of antibiotics [16, 17]. Public education programmes should therefore be developed, targeting specific areas of misconceptions, misuse of antibiotic and vulnerable groups at risk of improper use of antibiotics as identified in the present study.

Acknowledgment

This study was supported by the Research Fund for the Control of Infectious Diseases (RFCID) from the Health, Welfare and Food Bureau of the Hong Kong Special Administrative Region Government. We thank Professor Joseph Lau and his team for supporting the telephone survey in Hong Kong.

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