



## General Public Knowledge, Source of Knowledge and Practice towards Antibiotics in the State of Penang, Malaysia

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### Abstract

**Objectives:** This study aims to investigate the general public knowledge, source of knowledge, and practice towards antibiotics in the state of Penang Malaysia.

**Methods:** A cross sectional study design using convenience sampling technique was adopted in this study from May 2010 until August 2010. A pre-validated questionnaire was developed and distributed to 700 participants in the state of Penang, Malaysia. All data was analysed using SPSS version 16. A p-value of less than 0.05 was considered significant.

**Results:** 85.6% of our respondents could correctly identify that antibiotics are used for bacterial infections whereas almost 58% believed that antibiotics are used for viral infections. Physicians and pharmacists were the main sources of knowledge about antibiotics. While around 30% of our respondents rely on the internet, family members and friends as their sources of information about antibiotics. Malpractice regarding antibiotics use was found in a high proportion of our respondents where many use antibiotics without prescription, prescribe the leftover antibiotics to their friends and family members while others modify the antibiotics dose without referring to healthcare professional and others stop the antibiotics course once they feel that their symptoms improve.

**Conclusion:** Malpractice regarding antibiotics was found in a great proportion of our respondents which might be due to the irrational prescription of antibiotics by healthcare professionals as well as due to the misleading sources of knowledge about antibiotics. There is a need for a national awareness program to the public and healthcare professionals about antibiotics and about the approaches to improve the current practice.

### Key words

*Antibiotics, use, knowledge, source of knowledge, Malaysia*

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### Introduction

*Antibiotics* are among the most purchased and prescribed drugs worldwide [1, 2]. Thus, antibiotics resistance has become a major worldwide threaten which increase the infectious disease morbidity and mortality [3]. Many research publications have demonstrated the irrational prescribing patterns of antibiotics by healthcare professionals [4, 5]. In many cases, due to the uncertainty of the infection, whether bacterial or viral, physicians face a tradeoff whether to prescribe or delay antibiotics prescription [6]. Another tradeoff faced by physicians is whether to prescribe a broad spectrum or narrow spectrum antibiotics. Therefore, many physicians prescribe a broad spectrum antibiotics to ensure a better outcomes [6]. In addition, physicians were found to overprescribe antibiotics as a response to their patients' expectations [7]. Causes of the escalating level of antibiotics resistance are not only due to the irrational antibiotics prescribing by physicians [8], but also due to patients' overuse and non-adherence to the treatment [3, 9-11]. Patients play a major role in the success of the treatment process and in the reduction of the development of antibiotics resistance. In addition, it has been found that many patients self-medicate themselves with antibiotics without referring to healthcare professionals [12, 13]. Others were found to stop the treatment course once they feel better, while others modify the dose once they feel that their health condition is not improving [8, 9]. A good proportion of patients were found to keep the leftover antibiotics and do prescribe them to their relatives and friends without referring to healthcare providers [14, 15]. Many patients were found to know about antibiotics from their relatives, friends, [12] internet, magazines, or television which are in most of the cases misleading resources. Therefore, patients' poor knowledge about antibiotics, over prescription of antibiotics by healthcare professionals, availability of antibiotics without prescription, and patients' non-adherence to the treatment, played a major role in the development of antibiotics resistance and the increase of infectious diseases morbidity and mortality. A recent study by Oh A. et al. was published in Malaysia regarding patients knowledge and attitudes towards antibiotics [16]. The published article was based on patients from government hospital and focused on patients' knowledge

and attitudes only. In their study, it was found that almost half of the respondents have moderate knowledge regarding antibiotics while many of them thought that antibiotics can be used to treat common colds and viral infections. Thus, source of knowledge and common practices are worth to be studied. Therefore, this study aims to examine the general public knowledge, source of knowledge, and practice towards antibiotics use in the state of Penang, Malaysia.

## Method

A cross sectional study design was adopted using non probability convenient sampling technique. A total of 700 respondents were approached in the public areas in the state of Penang through face to face interviews from May 2010 until August 2010. Only respondents with the age of 15 years and above were included in the study since management of health related problems for those aged below 15 years is mostly done by their parents or caregivers. Respondents were met in the public areas like shopping malls, restaurants, bus stations and universities. Then, they were informed about the aims of the study and were assured that their information will be kept confidential. After obtaining the verbal informed consent from the respondents, it took them about 10 minutes to complete the questionnaire.

### The Questionnaire

The questionnaire was developed after extensive literature review on current issue. Face and content validation was done by a group of experts at the Discipline of Social and Administrative Pharmacy at Universiti Sains Malaysia. The questionnaire was pre-tested by 30 participants to address any ambiguity in the questions and make sure that the final questionnaire provides respondents with reliable information. The questionnaire was divided into 4 sections. The first section was about demographic data which included gender, age, ethnicity, marital status, occupation, educational level and the residential area. The second section assessed general public knowledge about antibiotics use. The third section assessed respondents' source of knowledge regarding antibiotics. Lastly, the fourth section assessed respondents' practice pertaining antibiotic use including how they take antibiotics, their actions when a dose was missed or when adverse effects were experienced. In addition, this section covered the sources of antibiotics, whether respondents use antibiotics without prescription and whether they use the leftover antibiotics for other cases.

### Statistical Analysis

Data obtained from this survey were coded, entered and then analyzed using the Statistical Package for Social Sciences (SPSS) Version 16. Descriptive results were presented as frequencies and percentages. Chi-square and Fisher Exact tests were used to determine the association between the general public demographic profiles and their knowledge, source of knowledge and practices towards antibiotics. P-value of less than 0.05 was considered significant.

## Results

A total of 627 respondents successfully responded to the survey. Majority of respondents were females (60%) and in the

middle age group between 21-30 years (55.5%). More than three quarters were Malay (76%) with average monthly income less than RM1000 (1 USD= RM3.2). Table 1 shows the full details of the respondents' demographic characteristics.

### Assessing Knowledge about Antibiotics Use

Majority of respondents (85.8%) answered that antibiotics are used for the treatment of bacterial infections followed by 58.1% who mentioned that antibiotics are used for the treatment of viral infections. A significant higher proportion of respondents at the age between 21-30 years old said that antibiotics are used for bacterial infections whereas a significant higher proportion of those aged between 41-50 years old said that antibiotics can't be used for worm infections. In addition, a significant greater proportion of those who have health related occupation mentioned that antibiotics are used for bacterial infections whereas a significant higher proportion of those who have health related occupations mentioned that antibiotics are not used for viral infections. Table 2 details all responses.

### Sources of Knowledge

It was found that respondents rely on medical doctors as the main source of knowledge regarding antibiotics (72.2%). This is followed by pharmacists (60.1%, nurses (35.1%), and family members (29.8%). When results were compared with respondents' demographics, few significant results were found. A higher proportion of males, those aged between 51-60 years old, have health related occupation, have secondary education level, have income of RM1000-3000 were found to rely more on medical doctors than others. In addition, high proportion of respondents with health related occupation, don't rely on nurses, friends or family members regarding antibiotics information. Furthermore, area of residence found to play a significant impact on respondents' answers. It was found that higher proportion of urban residents don't rely on television, newspapers, nurses, friends or relatives Table 3.

### Respondents Practice towards Antibiotics

Hospitals and pharmacies were found to be the main sources of antibiotics (94.7% and 54.1%, respectively). Almost two-thirds of the respondents continue taking antibiotics as usual if they miss any dose whereas only 20% take the next dose as soon as they remember it. More than 20% of the respondents use antibiotics without prescription and almost similar percentage of the respondents increase antibiotics dose if their condition is not improving. A common miss use of antibiotics was found in almost 50% of the respondents where they used to stop taking antibiotics once their medical conditions improve. In addition, more than one-third of the respondents keep the leftover antibiotics for future use and at the same time they give it to family members if they suffer from similar symptoms. A significant higher proportion of respondents with income between RM1000-3000 and respondents living in rural areas mentioned that they don't use antibiotics without doctor's prescription. In addition, a significant higher proportion

of respondents with age between 41-50 years old, have health related occupation, with monthly household income of more than RM6000 and living in rural areas mentioned that they don't use the leftover antibiotics for future use. Furthermore, a significant higher percentage of respondents who have health related occupation, with income more than RM6000, living in rural areas and married mentioned that they are not going to ignore any side effects from antibiotics use. Also, a significant greater percentage of respondents with the age of 41-50 years old, with health related occupation, with secondary education level, married and with income of more than RM9000 mentioned that they would not give the used antibiotics to their family members if they have similar symptoms. Details are found in Table 4.

## Discussion

Respondents have shown different levels of knowledge regarding antibiotics use. Majority agreed that antibiotics are used to treat bacterial infections whereas a great proportion said that antibiotics are used to treat viral infections. Previous studies have shown similar findings [16]. A previous study in Malaysia found that 76.6% of respondents identified that antibiotics are used for bacterial infections whereas 67% believed that antibiotics can be used to treat viral infections [16]. Another study was conducted in Colorado showed that 70% of their respondents could identify that antibiotics are used for bacterial infections whereas 55% mentioned that antibiotics are used for viral infections [17]. It is important to enforce on the fact that over prescribing of antibiotics by medical doctors and pharmacists might play an important role in developing these miss conceptions about the use of antibiotics. Many physicians are aware about the usefulness of antibiotics in the treatment of common cold, but they feel that they are forced to do so to please their patients and meet their expectations [5]. The problem arises when physicians don't prescribe antibiotics for susceptible bacterial infections only, but mainly arise when physicians prescribe antibiotics for cases that they are aware and very sure that antibiotics are not the right choice to be prescribed. This may arise from the pressure faced from their patients to prescribe antibiotics, from the incentives offered to them by the industries, sales profits from a major part of hospital income and incentives from pharmaceutical suppliers [5]. In a study conducted in Jordan, 52% of respondents said that physicians prescribe antibiotics for common cold symptoms, 23% said that physicians prescribe antibiotics without examining patients, 33% mentioned that they have asked their physicians to prescribe them antibiotics and 29% said that they would change their physician if he/she disagreed to prescribe them antibiotics [8]. Since viral infections are self limiting, patients would believe that they got the right medications even though it is not the case. This malpractice resulted in building the believe by patients that antibiotics are safe and can be simply used in many cases [9]. In which many believe that antibiotics are effective, strong, life saver, and safe in the treatment of common cold and many other viral infections [8, 16, 18, 19]. Source of information about antibiotics is vital and worth to be discussed. Medical doctors and pharmacists were the main sources of knowledge regarding antibiotics (72% and 60%,

respectively). But internet, friends, and family members were the sources of knowledge for more than one-fourth of the respondents. This might contributed to the miss conception about antibiotics for a good proportion of our respondents. Where patients might serve the wrong websites on the internet and serve many social forums where inexperienced people might share their experiences towards antibiotics and provide patients with wrong information. Friends and family members as well, are not healthcare professionals and in many cases might provide their peers with wrong information about antibiotics.

It was found that respondents with health related occupation mostly rely on medical doctors and pharmacists as the main sources of knowledge about antibiotics. Respondents with health related occupation are in frequent contact with medical doctors and pharmacists, therefore they are aware about the use of antibiotics and the consequences of miss using them. In addition, elder patients (51-60 years old) might don't have the skills of using the new media, therefore they rely more on medical doctors as the main source of knowledge regarding antibiotics.

Hospitals/clinics and pharmacies were the main sources of antibiotics in our study. Since patients can get their medications free of charge from public hospitals, this might explain why almost 95% of respondents are getting their medications from hospitals and clinics. In addition, the current practice in Malaysia where there is no dispensing separation in which patients can get their prescriptions and medications from the same clinic would justify the high percentage of getting antibiotics from clinics [20]. 54% of our respondents get their antibiotics from pharmacies. This percentage is higher than Jordan (41%) [8], but less than what was found in Mongolia (86%) [19] and Abu Dhabi (68.4%) [2]. In our study, 25% of our respondents mentioned that they keep the leftover antibiotics for future use whereas 32% mentioned that they would give the leftover antibiotics to their family members if they experience similar symptoms. In a study conducted in Jordan, 53% of respondents mentioned that they used their siblings' antibiotics whereas 49% keep the leftover antibiotics for future use [8]. A global survey of outpatients who had taken self-administered antibiotics within the previous 12 months was conducted in 11 countries which include Brazil, China, Italy, Japan, Mexico, The Netherlands, The Philippines, Russia, South Africa, Turkey and the USA. In this study it was found that 77% of their respondents that have leftover antibiotics, they kept them for future use [14]. Another study was conducted among immigrants in New Zealand found that 21% of their respondents used antibiotics from friends, family members and friends [21].

Adhering to the treatment is a key factor for the treatment success. When respondents were asked about their behavior once they miss a dose, 8.8% said that they would double the next dose, 70% would continue as usual and

leave the missed dose, and 21% would take the missed dose as soon as they remember it. In addition it was found that more than 20% of the respondents would increase their dose of antibiotics without referring to healthcare professionals if their symptoms persist. Furthermore, almost 50% of our respondents mentioned that they would stop taking antibiotics if their symptoms subside. In a survey conducted in Hong Kong found that almost 76% of their respondents completed their recent antibiotics course, 18% did not complete the antibiotics course and 66% of those who did not complete the course deemed that it is not necessary to complete the course. In addition, immigrants in New Zealand showed different responses in which 71% of Korean immigrants reported that they would stop taking antibiotics once their symptoms improve compared to Indians immigrants (41%) and Egyptians immigrants (21%) [21].

These findings stress on the need for a national awareness programs regarding antibiotics. Physicians should rationally prescribe antibiotics and try not to be affected by any pressure or incentive. Physicians and pharmacists should educate their patients about antibiotics and the danger from the development of antibiotics resistance. In addition, they have to collaborate in educating patients about the usefulness of antibiotics in viral infections and informing them that such infections are self limiting. This is not expected to change the current practice rapidly, but there should be a starting point and an initiative to improve the current practice. In addition, due to the absence of dispensing separation in Malaysia, and due to the fact that prescriptions are not dispensed by pharmacists in the clinics, decision makers in Malaysia have to make sure that those who dispense prescriptions in the clinics are qualified and have enough knowledge about medicines and are able to educate and counsel their patients.

### Study Limitations

This study was conducted using non-random convenient sampling technique of the general public in the state of Penang only, limiting the generalizability of the findings. Hence, the results may not accurately represent the whole population of general public.

### Conclusion

Respondents have shown a good level of knowledge regarding antibiotics use. But still many perceive antibiotics as the drug of choice for the treatment of many illnesses. Malpractice regarding antibiotics was found in a high proportion of our respondents which might be due to the irrational prescription of antibiotics by healthcare professionals as well as due to the misleading sources of knowledge about antibiotics in almost one quarter of our respondents. There is a need for a national awareness program to the public and healthcare professionals about antibiotics and about the approaches to improve the current practice.

### Conflict of Interest

Authors have disclosed no conflict of interest

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**Table 1: General characteristics of the respondents**

Demographic characteristics		Frequencies(n)	Percentages (%)
Gender	Male	245	39.1
	Female	382	60.9
Age	16-20	168	26.8
	21-30	348	55.5
	31-40	54	8.6
	41-50	37	5.9
	51-60	20	3.7
Ethnicity	Malaysian	620	3.2
	Non-Malaysian	7	98.9
Education Level	Informal education	2	0.3
	Primary School	4	0.6
	Secondary School	144	23.0
	Tertiary School	477	76.1
Marital Status	Single	476	75.9
	Married	144	23.0
	Widowed	7	1.1
Household monthly income	<RM1000*	257	42.3
	RM1000-RM2999	247	39.4
	RM3000-RM5999	85	13.6
	RM6000-RM9000	20	3.2
	≥RM9000	10	1.6
Residence of location	Rural	253	40.4
	Urban	374	59.6
Occupation	Health related	7	1.1
	Non-Health relates	175	27.9
	Student	405	64.9
	Retired	7	1.1
	Unemployed	31	4.9
Have a family member whose Occupation is health related	Yes	246	39.1
	No	381	60.8

\*1 USD = 3.2RM

Table 2: Antibiotic use

Section	Responses		Chi-square test exact <i>p</i> -values ( <i>p</i> <0.05)						
	Yes	No	Gender	Age	occup ation	Marit al status	Educat ion level	Month ly incom e	Reside nce locatio n
<b>An antibiotic is a medicine used for:</b>									
Bacterial infection	538 (85.8)	89 (14.2)	0.322	0.015 *	0.028 *	0.874 *	0.130*	0.023*	0.005
Viral infection	364 (58.1)	263 (41.9)	0.230	0.219	0.012 *	0.002 *	0.876*	0.286*	0.312
Fungal infection	210 (33.5)	417 (66.5)	0.482	0.692	0.210 *	0.738 *	0.765*	0.542*	0.519
Insect bites	124 (19.5)	503 (80.3)	0.466	0.168 *	0.318 *	0.279 *	0.684*	0.025*	0.688
Worm infection	97 (15.5)	530 (89.5)	0.838	0.054 *	0.125 *	0.211 *	0.278*	0.090*	0.520

\* Fisher Exact test

Table 3: Respondents' source of knowledge regarding antibiotics

Section	Responses		Chi-square test exact <i>p</i> -values						
	n	(%)	Gender	Age	Occupatio n	Marital status	Educati on level	Monthl y income	Residen ce location
<b>From which sources do you know about antibiotics?</b>									
Internet	171 (30.2)	456 (72.2)	0.187	0.073	0.076*	0.283*	0.145*	0.426*	0.100
Radio	43 (6.9)	584 (93.1)	0.477	0.340*	0.212*	0.220*	0.526*	0.160*	0.069
Television	95 (15.2)	532 (84.8)	0.072	0.733*	0.581*	0.917*	0.392*	0.278*	0.004
Newspaper	122 (19.2)	505 (80.5)	0.191	0.823*	0.229*	0.674*	0.801*	0.052*	0.005
Magazines	114 (18.2)	513 (81.8)	0.923	0.648*	0.624*	0.341*	0.945*	<0.001*	<0.001
Medical doctors	453 (72.2)	174 (27.8)	0.854	0.013	<0.001*	<0.001*	<0.001*	<0.001*	0.094
Pharmacists	376 (60.1)	250 (39.9)	0.016	0.740	0.140*	0.642*	0.294*	0.854*	0.785
Nurses	220 (35.1)	407 (64.9)	0.489	0.913	0.210*	0.406*	0.046*	0.140*	<0.001
Friends	174 (27.8)	453 (72.2)	0.360	0.027	<0.001*	0.002*	0.006*	0.101*	0,001
Family members	187 (29.8)	440 (70.2)	0.072	0.060	0.028*	0.281*	0.102*	0.720*	0,010

\* Fisher Exact test



Table 4: Respondents practice

Section	Responses %		Fisher Exact test exact p-values (p<0.05)						
	Yes	No	Gender	Age	occupation	Marital status	Education level	Monthly income	Residence location
From where do you get your antibiotics?									
Hospital/clinic	94.7	5.3	0.685*	0.673	0.180	0.783	0.490	0.369	0.328*
Pharmacy	54.1	45.9	0.001*	0.245	0.065	0.229	0.245	0.440	0.492*
Family or friends	8.0	92.0	0.457*	0.424	0.022	0.120	0.570	0.002	0.340*
Leftover antibiotics	9.7	90.3	0.558*	0.002	0.001	0.052	0.098	<0.001	0.048*
If you missed taking a dose, what would you do?									
Double the next dose	8.8		0.235	0.540	0.313	0.617	0.112	0.018	0.062
Continue as usual	69.9								
Take the next dose as soon as I remember	21.1								
Do you use antibiotics without doctor's prescription?	14.0	89.0	0.983*	0.330	0.042	0.840	0.118	0.009	<0.001*
Would you use the same antibiotic for other infections without consulting your doctor?	22.1	77.9	0.019*	0.091	0.028	0.102	0.237	0.491	0.111*
Do you increase the dose or the number of times you take the antibiotic if your symptoms persist?	20.6	79.4	0.352*	0.664	0.737	0.814	0.315	0.006	0.539*
Do you stop taking antibiotics once your symptoms subside?	49.8	50.2	0.427	<0.001	0.308	0.049	0.148	0.026	0.691
If you experience adverse effects (e.g. rashes, swelling) from taking antibiotics, what would you do									
Stop taking the antibiotic	66.7		0.354*	0.022	0.183	0.206	0.076	0.220	0.420*
Consult a healthcare professional	68.4		0.728	0.034	0.668	0.020	0.486	0.641	0.046
Ignore the adverse effect	10.8		0.910*	0.053	0.037	0.014	0.299	0.001	<0.001*
Have you ever asked your doctor to prescribe you an antibiotic?	27.8	72.2	0.067*	0.744	0.277	0.312	0.792	0.304	0.344*
Do you keep the leftover antibiotics for future use?	24.7	75.3	0.934*	0.009	0.123	0.022	0.172	0.208	0.391*
If one of my family members experience a similar symptom, I will give him/her my antibiotics	32.2	67.8	0.717*	0.001	<0.001	<0.001	0.003	<0.001	0.138*

\*Chi-Square test

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