Knowledge, attitude and practice of antibiotics prescribing among medical officers of public health care facilities in the state of Kedah, Malaysia

Tan Wei Leong, MD*, Siti Rahmah@Noor Syahireen Mohammed, Bachelor of Pharmacy (Hons.)*, Shahfini Ishak, Bachelor in Pharmacy (Hons.), Zuraidah Ali, Bachelor of Pharmacy (Hons.)*****

*Clinical Research Centre Kedah, Alor Setar, Kedah, Malaysia, **Kubang Pasu District Health Office, Jitra, Kedah, Malaysia, ***Kuala Muda District Health Office, Sungai Petani, Kedah, Malaysia

ABSTRACT

Background: Antibiotic resistance is a rising problem in Malaysia. For instance, high antibiotic prescribing rate for upper respiratory tract infection and inappropriate choice of antibiotic is a significant healthcare concern in Malaysia. Our main objective was to study knowledge, attitude and practice of antibiotic prescribing among medical officers in Kedah, Malaysia.

Methods: A cross sectional study was conducted in outpatient departments of health clinics and hospitals in Kedah from June 2013 until December 2013. Sample size was 118 and systematic sampling was conducted. Research tool used was a validated questionnaire from studies conducted in Congo and Peru.

Results: Response rate was 84.8%. Majority of our respondents were female doctors (71.0%), local graduates (63.0%), and practiced for 4 years or less (61.0%). 52.0% of the respondents prescribed antibiotics more than once daily. Mean knowledge score on antibiotics was 5.31 ±1.19 (95% CI: 5.06; 5.54). More than half (62.0%) of our respondents were confident in antibiotic prescribing and there were merely 18.0% of them consulted any colleagues prior to prescription. There was a significant difference in frequency of antibiotic prescribing between junior doctors and senior doctors (P-value: 0.036). In addition, there was also a significant association between frequency of antibiotic prescribing and awareness of antibiotic resistance in their daily practice. (P-value: 0.002).

Conclusion: Knowledge on antibiotic was moderate among our medical officers and antibiotic prescribing was frequent. Training and courses on appropriate antibiotic prescribing should be emphasized to ensure the best practice in antibiotic prescription.

KEY WORDS:
Antibiotic prescribing, antibiotic prescription, knowledge, attitudes, practice

INTRODUCTION

Antibiotics have given the modern medicine powerful ammunition against infection-related illness and deaths. The emergence of antibiotic resistance, however, threatens to undo decades of advancements in modern medicine. Although multiple factors can be accounted for antibiotic resistance, the prudent use of the once "miracle drug" is a definite catalyst to the rising spread of antibiotic resistances high antibiotic consuming area showed higher resistance rate.[1,2]

The World Health Organization (WHO) reported high resistance rate in bacteria associated with common illness in both hospital-acquired and community-acquired in all WHO regions.[1] Each year in the United States (US), an estimated 2 million reported cases of antibiotic-resistant infections resulted in 23,000 deaths.[3] Dismally, according to the US Centers for Disease Control and Prevention, about a third of 150 million yearly outpatient prescriptions for antibiotics in the United States are actually causeless.[3] In the Asian region, the reported resistant rate of *S. pneumonia* towards beta-lactam and macrolide are among the highest in the world.[4,5]

Malaysia is not an exception in facing this epidemic, as there has been a steady increase in antibiotic resistance rate of common organisms such as *Staph. aureus*, *Acinetobacter* and *H. influenza*.[6] A local study verified high antibiotic prescribing rate for upper respiratory tract infection and inappropriate choice of antibiotics in Malaysia that is consistent with the fact that antibiotics ranked among top 10 of most utilised drugs according to Malaysian National Use Survey (NMUS) in 2008.[7,8]

It is hoped that abatement in the use of antibiotics could be the cornerstone in the containment of antibiotic resistance escalating rate and this can be addressed through changes in prescribing behaviour. As such, this knowledge, attitude and practice surveys could provide a window for concise comprehension behind antibiotic prescribing. This study was conducted with the main aim to study knowledge, attitude and practice of antibiotic prescribing among medical officers.

SUBJECTS AND METHODS

A cross-sectional study was conducted in Kedah, a state in Northern Peninsula Malaysia involving all medical officers practising in outpatient department of public health clinics and hospitals from January 2013 until June 2014. Sample

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Corresponding Author: Tan Wei Leong, Clinical Research Centre Kedah, Km 6, Jalan Langgar, Alor Setar, Kedah 05460, Malaysia
Email: Alextanwl@Yahoo.Com / Alextanwl@Gmail.Com

size was calculated using Sample Size Calculator for Estimation[9] with mean knowledge score 5.273 ± 1.009, level of confidence 95% and precision 0.2 from a pilot study conducted in Kubang Pasu district. Sample size required was 118 respondents after 20% allowance for non-respondents. Inclusion criteria were medical officers practising in outpatient departments either in public health clinic or hospital. Systematic sampling was done from a complete list of medical officers in public healthcare facilities in Kedah.

Questionnaire used in the study was adopted from two studies conducted in Peru and Congo.[10,11] The English version questionnaire was validated in aforementioned study. On top of that, the questionnaire was reviewed by public health physicians to ensure its relevance in our local setting before data collection. The questionnaire was also used in a pilot study in Kubang Pasu district. Feedback from every respondent in the pilot study was obtained and no amendment was done in view of positive feedback. During data collection, the questionnaires were distributed and answered by email. Statistical Package for Social Sciences (SPSS) version 2011 was utilised to analyse the data. Statistical tests utilised for inferential analysis included independent *t-test* and *Chi-square test*. This study was approved by Malaysian Medical Research Ethics Committee and registered under Malaysian National Medical Research Registry (NMRR-13-765-16460).

RESULTS

A hundred doctors participated in the study with a response rate of 84.8%. Among the respondents, majority of were female (71.0%), graduated locally (63.0%) and practiced for 4 years or less (61.0%). On top of that, more than half of respondents were from public health clinic (66.0%) and practiced at outpatient setting (70.0%).

Knowledge on antibiotic prescribing

The highest score by our respondents was 7 over 8 (19.0%) and the lowest score was 3 over 8 (7.0%). Mean knowledge score for the respondents in the study is 5.31 ±1.19 (95% CI 5.06; 5.54). One third of our respondents scored 5 over 8 (29.0%) followed by 6 over 8 (26.0%).

In the current study, independent t-test revealed no significant difference in mean knowledge score between junior and senior doctors (p-value: 0.720). On top of that, there was also no significant difference in mean knowledge score between confident doctors and unconfident doctors (p-value: 0.469).

Attitude on antibiotic prescribing

Confidence and input seeking

More than half of respondents n=62, 62.0% were confident of their knowledge on antibiotics and approximately three-quarter of respondents did not think they have any problem choosing the right antibiotics n=79, 79.0%. Merely, 18.0% of the respondents consulted any colleagues before prescribing antibiotics while the remaining 82.0% rarely seek any opinion from fellow colleagues.

There was no significant difference in confidence of antibiotic prescribing between junior and senior medical doctors (p-value: 0.729). In addition, we also found no significant association between frequency of consulting colleagues and confidence level (p-value: 0.247).

Acceptability of potential intervention

Majority of our respondents (97.0%) agreed that implementation of training programme about antibiotic would improve antibiotic prescription. On top of that, two-third of them agreed that local antibiotic guidelines would be more helpful as compared to the international guidelines. In addition, most of them (84.0%) did not agree that antibiotic guideline and committee was obstacle to correct practise. Otherwise, there were only 11.0% of them perceived unnecessary antibiotic prescription as harmless practise.

Awareness of antibiotic resistance

In this study, 56.0% and 27.0% of the respondents strongly agreed that antibiotic resistance is a worldwide and national problem. Respectively, merely 9.0% of our respondents strongly agreed that antibiotic resistance is a problem in their daily practice. Majority of our respondents (98.0%) perceived that non-adherence to antibiotic contributes to antibiotic resistance, followed by self-medication (92.0%).

Practice of antibiotic prescribing

Frequency of antibiotic prescription

Regardless of duration of practise, 52.0% of the respondents prescribed antibiotics more than once daily followed by 1-2 times per week (25.0%) and lastly 3-5 times per week (23.0%).

In the current study, we found a significant difference of frequency in antibiotic prescribing between junior and senior medical doctors (p-value: 0.036). In addition, there was a significant association between frequency of antibiotic prescribing and awareness of antibiotic resistance in their daily practice (p-value: 0.002).

Source of information on antibiotics

Overall, the most frequent sought after source of information was internet n=89 (89.0%) followed by antibiotic guidelines n=66 (66.0%), pharmaceutical companies n=58 (58.0%) and the least source of information consulted was through courses n=38, 38.0%. Half of the respondents n=51, (51.0%) believed that there should be more source of information than there is now.

Factors influencing antibiotic prescription

Most of our respondents (83.0%) perceived patients' demands for antibiotics contribute to antibiotic overuse in community and hospital. In addition, 86.0% of them thought that it was important to know the resistance rate in local setting before prescribing. Otherwise, 52.0% agreed that choice of antibiotic was not affected by its availability in their setting.

DISCUSSION

Knowledge on antibiotic prescribing

Overall, the mean knowledge score in this study was 5.31 ± 1.19. This value was higher than the study in DR Congo 4.9 ± 0.09 but lower than the study in Peru 6.0 ± 1.3.[10, 11] The higher score in Malaysian study was mainly attributed by the better score on three questions that were said to be 'worst-replied in DR Congo' namely the questions on antibiotic use

in upper respiratory tract infection, antibiotic susceptibility to MRSA and dosage adjustment in renal impairment.[10]

The respondents in this study scored higher on question regarding the rationale of starting antibiotics in viral diarrhoea and upper respiratory tract infection as compared to DR Congo. However, this finding did not concur with a different local study by Teng *et al.* that verified high antibiotic prescribing rate in upper respiratory tract infection cases.[7] In their study, they included private and public health clinics throughout Malaysia whereby they also concluded that antibiotic prescribing was higher among private clinics, particularly upper respiratory tract infection. On the other hand, the medical officers participated in our study were mainly from public health clinics. The different background of medical practitioners from both studies could have attributed to disagreement between level of knowledge and practise. This trend was also exhibited in Peru study in which the survey on theoretical knowledge did not coincide with practice evidence.[11] As for the question on susceptibility of antibiotic towards MRSA, Malaysian medical officers responded well as compared to DR Congo. This was attributed to the fact that local microbiological facilities are well equipped in contrast with the Congo study that certified the absence of such facility in the republic.10 In West Indies of the United States, Tennant *et al.* found that knowledge of resistance-prone antibiotic and specific organisms at University Hospital of West Indies was poor, except for methicillin-resistant *Staphylococcus aureus*.[12]

As analysed in the present study, there was no statistical significant difference in years of service with regards to knowledge score. Similarly, the study in Congo also found out that there was no significant difference in the mean score according to years of experience.[10] A study in France and Scotland by Pulcini C *et al.* revealed that knowledge of prevalence rate on antibiotic resistance was also not influenced by past training experience.[13] In John Hopkins Hospital, Srinivasan *et al.* found that there was no significant difference in knowledge score for various years of training.[14] This significant finding implies that longer duration of practice does not ensure good knowledge on antibiotic prescribing. Thus, appropriate training and update are required for all medical practitioners irrespective of their seniority in the institution.

Attitude towards antibiotic prescribing

In regards of confidence level, the results in this study showed that only 4.0% of the respondents were very confident in choosing the right antibiotics. This number is comparatively low as compared to DR Congo with 11.4% and Peru with residents and attending physicians were very confident 47.0% and 82.0% with themselves in picking the appropriate antibiotics.[10,11] On the contrary, junior doctors in Nice and Dundee felt confident when prescribing an antibiotic.[13] In West Indies, 29.0% of their physicians considered their knowledge on antibiotic resistance were good while 48.0% thought average.[12]

Statistically in this study, there was no significant association between years of service and confidence level (P-value: 0.729). The insignificant association between years of service and confidence level was also evident in DR Congo (P-value: 0.053).[10] The study in Peru however showed significant statistical difference between the confidence level of residents and specialists 47.0% vs 82.0%, (P-value<0.001).[11]

On a different note, more than three quarter of respondents in Malaysia (77.0%) and DR Congo (79.4%) answered "sometimes" to the question on the frequency of seeking peer opinion on antibiotic prescribing.[10] The percentage was less for study in Peru with only 57.0% sought opinion from peers.[11] The local result did concur with the fact that this survey involved medical officers in whom the respondents would have verified their decision with specialists. Respondents from all three studies were in agreement that they did not have any problems selecting antibiotics in their practice.[10,11]

Notably, this study also had positively shown that our respondents were very receptive to intervention, which was in line with low number of respondents who answered very confident in their choice while prescribing antibiotics. Most of the respondents would preferably chose local antibiotic guidelines than international as they regarded local data would be more useful and tailored to their practice. In this context, local guidelines will definitely be more focused and discuss deeply on common infectious disease in the country. As such, the guidelines will definitely be helpful and useful to medical doctors who practice locally.

Awareness on antibiotic resistance

Pertaining to awareness level on antibiotic resistance, all three studies showed similar trends in which the issue of antibiotic resistance was more recognised globally and nationally as compared to their very own practice.[10,11] Statistical analysis in this study exhibited association between low awareness level of local antibiotic resistance with high frequency of antibiotic prescribing. This would be an interesting scope for possible future intervention. The low level of awareness on antibiotic resistance in own practice might be due to the fact that there was limited access to data on antibiotic resistance in their own local practice. Therefore, it is naturally befitting to encourage more data dissemination on local antibiotic resistance to prescribers as also highlighted by the Peru study.[11]

Practice in antibiotic prescribing

Overall, the frequency of antibiotic prescribing among all three countries; Malaysia, DR Congo, and Peru was more than once daily.[10,11] High antibiotic prescribing rate does not necessarily indicate irrational use as some antibiotic prescription was well justified. In Nice and Dundee, Pulcini et al. revealed that 23 out of 136 medical doctors prescribed more than five antibiotic per week while 66 prescribed two or less per week.[13] In this context, frequency of antibiotic prescribing varies at different setting and it could be affected by many factors such as place of practice, medical practitioners' knowledge and background and patients' factors. Unfortunately, we mainly probed into medical practitioners' knowledge and attitude in the current study, thus, future study may explore into other factors.

In this present study, respondents were asked on the factors that influence their antibiotic prescribing. As the result shown, respondents collectively agreed on the usefulness of

Table I: Demographic data of doctors participated in the study

Variable	Frequency, n (%)
1. Gender	
Male	29 (29.0)
Female	71 (71.0)
2. Graduation	
Local University	63 (63.0)
Foreign University	37 (37.0)
3. Duration of Practice	
≤ 4 years Junior	61 (61.0)
> 4 years Senior	39 (39.0)
4. Place of Practice	
Patient at outpatient department	70 (70.0)
Both patient at outpatient department and hospitalised patient	30 (30.0)
5. Institution	
State Hospital	11 (11.0)
District Hospital with Specialist	11 (11.0)
District Hospital without Specialist	12 (12.0)
Public Health Clinic	66 (66.0)

Table II: Comparison of mean knowledge score between different categories

Variable	Knowledge Score Mean ±SD	Mean difference [95% CI]	t statistic df[a]	P valuea
Junior doctors n=61	5.34 ±1.14	0.09	0.36 (98)	0.720
Senior doctors n=39	5.26 ±1.27	[-0.40,0.57]		
Confident doctors	5.24 ±1.22	-0.18	-0.731 (98)	0.468
Unconfident doctors	5.42 ±1.13	[-0.67,0.31]		

[a] Independent t-test

Table III: Comparison of confidence in antibiotic prescribing between junior and senior medical doctors

Variables	n	Confident n (%)	Unconfident n (%)	X^2statistica df	P valuea
Junior doctors	61	37 (60.6)	24 (39.4)	0.12 (1)	0.729
Senior doctor	39	25 (64.1)	14 (35.9)		
Frequent consulting with colleagues on choice of antibiotic	18	9 (50.0)	9 (50.0)	1.34 (1)	0.247
Infrequent consulting	82	53 (64.6)	29 (35.4)		

[a] Chi-square test for independence

Table IV: Awareness of Antibiotic Resistance

Antibiotic is a problem	Worldwide Frequency, n (%)	In Malaysia Frequency, n (%)	In my practice Frequency, n (%)
Strongly agree	56 (56.0)	27 (27.0)	9 (9.0)
Agree	41 (41.0)	64 (64.0)	44 (44.0)
Neutral	3 (3.0)	8 (8.0)	40 (40.0)
Disagree	0 (0)	1 (1.0)	6 (6.0)
Strongly disagree	0 (0)	0 (0)	1 (1.0)

Table V: Factors Contributing to Antibiotic Resistance

Factor	Yes, Frequency, n (%)	No Frequency, n (%)	Don't know Frequency, n (%)
Treatment not completed	98 (98.0)	1 (1.0)	1 (1.0)
Inaccurate choice of antibiotics	60 (60.0)	26 (26.0)	14 (14.0)
Inadequate dosage	79 (79.0)	18 (18.0)	3 (3.0)
Poor quality antibiotic	79 (79.0)	18 (18.0)	3 (3.0)
Over prescription and overconsumption	90 (90.0)	7 (7.0)	3 (3.0)
In-patient transmission	85 (85.0)	6 (6.0)	9 (9.0)
Self-medication	92 (92.0)	3 (3.0)	5 (5.0)

Table VI: Comparison of frequency in antibiotic prescribing

Variables	n	Frequency of antibiotic prescription			X^2statistica df	P valuea
		Once daily or more (%)	3 – 5 times per week (%)	1 – 2 times per week (%)		
Junior doctors	61	38 (62.2)	11(18.1)	12 (19.7)	6.64 (1)	0.036
Senior doctors	39	14 (35.9)	12 (30.8)	13 (33.3)		
Doctors who agreed on local antibiotic resistance	53	36 (67.9)	6 (11.3)	11(20.8)	13.00 (2)	0.002
Doctors who disagreed with local antibiotic resistance	47	16 (34.0)	17 (36.2)	14 (29.8)		

[a] Chi-square test for independence

knowing the local resistance rate prior to prescribing antibiotics (86.0%). In DR Congo, 89.7% of their respondents agreed that knowledge of local antibiotic resistance pattern was needed.[10] Patients' insistence for antibiotics was still extensively regarded as a factor in prescriber's decision in prescribing antibiotic (83.0%) in this study. Kamala et al. found that 61.9% and 34.3% of their respective respondents in community and hospital perceived that patient pressure contributed to overuse of antibiotic in DR Congo.[10] Factors influencing antibiotic prescribing in Nice and Dundee were previous experience 121/135, guideline 126/135 and infectious diseases advice 88/135.[13] In a nutshell, there could be different factors contributed to antibiotic overprescribing in different countries. However, we have to bear in mind that most of the studies mentioned were conducted from healthcare providers' point of view, thus, future studies may look into the possible factors from other perspectives.

When asked on sources of information pertaining to antibiotics, a vast majority of respondents use Internet followed by antibiotics guidelines. Courses and workshops on antibiotics were claimed as the least important point of reference. On the other hand, lectures was the most used training in Dundee and Nice.[13] Proactive action should be prompted to provide more courses and workshops to prescribers. It would be interesting with the idea of providing courses and workshops via the net as what have been done in developed countries.

This present study showed that there is a significant difference in frequency of antibiotic prescribing between junior and senior medical doctors. A study in Turkey also revealed a similar situation whereby appropriate antibiotic prescribing was higher among physician in the age group between 25- and 29-year-old as compared to older group of physician.[15]

This study has a few limitations. Firstly, there is possibility of bias in answering the question as the questionnaire was distributed via email to every respondent. Thus, the respondent might discuss with their colleagues while answering the questions or refer to book while answering the knowledge questions. Secondly, honesty in answering some of the questions might also cause bias in our results. Thirdly, we did not include specialists and house officers in this study where the two other main categories in medical services will not be represented in this study.

CONCLUSION

In a nutshell, knowledge score on antibiotic is moderate among our doctors while prescribing is frequent. Training and courses on antibiotic prescribing are needed to strengthen their knowledge on antibiotic in the future. On top of that, we strongly recommend that future study will include specialists and house officers in their study as knowledge level on antibiotic prescribing will be different in both categories. To reduce bias in answering questionnaire, questionnaire can be distributed in an enclosed environment such as in a meeting, a teaching session, or gathering whereby referring to book and discussing with others is prohibited.

CONFLICT OF INTEREST

There is no conflict of interest to declare for this study.

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