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Hospital pharmacists' satisfaction with antimicrobial resistance management in Thailand

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ABSTRACT

Since 2017, antimicrobial resistance (AMR) management has been one of the key performance indicators (KPIs) of tertiary hospitals in Thailand. Pharmacists are an integral part of a multidisciplinary team combating AMR in hospitals. There has been no previous research on Thai pharmacists' satisfaction with AMR management. This study aimed to investigate hospital pharmacists' opinions, attitudes, and job satisfaction regarding AMR management as well as the relationships between variables. A cross-sectional survey was conducted. Self-administered questionnaires were posted to both public and private hospitals (n=1,298) across Thailand. Between April and July of 2021, data was collected. Descriptive statistics, Mann Whitney U test, and Kruskal Wallis test were used for analysis. A total of 249 pharmacists who were actively involved in AMR management in their hospitals completed questionnaires. The response rate was 19.2%. The respondents' average age was 37.20±8.2 years. Most of the pharmacists (77.5%) were female. The average number of years spent as a hospital pharmacist was 12.3±8.2. Approximately 63% believed it was worthwhile to work in AMR management and they liked their current job. Secondary hospital pharmacists had more favorable attitudes than tertiary hospital pharmacists. In terms of job satisfaction, pharmacists in secondary hospitals reported higher level of satisfaction with their salary than pharmacists in the tertiary hospitals (p=0.000). Regarding gender, work competency and career path were found to be statistically significant ($p < .05$). Males expressed greater satisfaction with work competency than females, whereas females expressed greater satisfaction with their career path. Pharmacists' opinions, attitudes, and job satisfaction with AMR management were significantly positively associated. It can be stated that the hospital pharmacists were optimistic about AMR management. While the majority of them expressed satisfaction with their jobs, improving some factors such as job-related skills and career path is necessary to retain health care professionals in hospitals.

INTRODUCTION

Antimicrobial resistance (AMR) is a global issue. It has been estimated that globally there will be around 700,000 deaths per year caused by AMR bacterial infections. In 2050, the number of deaths around the world and in Asia are expected to be 10 and 4.7 million cases, respectively (O'Neill, 2014). In Thailand, there were 87,751 AMR cases and 38,481 deaths in 2010. The day of hospitalization increased by at least 3.24 million days (Phumart et al., 2012).

Furthermore, it was estimated that there were 19,122 of 45,209 (43%) deaths in patients with hospital-acquired infection due to multidrug-resistant (MDR) bacteria (Lim et al, 2016). A study in 2012 reported the average expected treatment costs per patient increased by 42% due to AMR. The annual treatment cost from hospital perspective was 2.3 billion USD. Moreover, antibiotic costs for treating MDR bacterial infections alone were 262 million USD (Phodha et al., 2018).

The World Health Assembly (WHA) declared a global action plan on AMR in 2015. (World Health Organization, 2015). Then, Thailand's National Strategic Plan on AMR 2017-2021 had been launched by the Ministry of Agriculture and Cooperatives (MOAC) and the Ministry of Public Health (MOPH) in order to reduce morbidity, mortality, and economic burden due to AMR (Ministry of Agriculture and Cooperatives & Ministry of Public Health, 2016). This plan consists of six strategies. The third strategy is infection prevention and control and antimicrobial stewardship in humans and one of the strategic actions is to strengthen competency of infection control personnel. Since 2017, AMR management has been one of the key performance indicators (KPIs) of tertiary public hospitals in Thailand (Ministry of Public Health, 2016b). Pharmacists are an integral part of a multidisciplinary team combating AMR in hospitals, especially in Antimicrobial stewardship programs (ASP) (World Health Organization, 2019; Center for Disease Control and Prevention, 2019). The Society of Pharmacists in Infectious Disease Medicines and Therapeutic of Thailand (SOPITT) suggested that roles of pharmacists for ASP are antimicrobials procurement, appropriate use of antimicrobial agent promotion, drug monitoring, dose adjustment, medication reconciliation, and antimicrobials consumption analysis (Ministry of Public Health, 2016a).

One survey study in Europe reported that 93% of pharmacists agreed that their dispensing of antibiotics related to the emergence and spread of antibiotic resistance, and 68.7% of hospital pharmacists agreed that they had a key role in controlling this problem (European Centre for Disease Prevention and Control, 2019). A study conducted in Thailand found that clinicians (nurses, doctors, and pharmacists) believed that AMR was a significant problem, therefore the improved use of antibiotics was important (Sutthiruk et al., 2018). Thai pharmacists' satisfaction with AMR management has never been studied in Thailand. The objectives of this study were to investigate hospital pharmacists' opinions, attitudes, and job satisfaction regarding AMR management as well as the relationships between the variables.

METHODOLOGY

This was a nationwide cross-sectional survey. Self-administered questionnaires were distributed to both public and private hospitals (n=1,298) through the head of infectious, prevention, and control committee across Thailand. In this study, AMR management covered infection prevention and control (IPC), surveillance, and antimicrobial stewardship programs (ASPs) (Ministry of Public Health, 2019). Data were collected between April and July of 2021. Three experts validated the questionnaire. It consisted of three parts. The first and second part asked about characteristics of hospital and demographic information of pharmacist (e.g. gender, age, education level, years of work experience in hospital and AMR management). The third part included opinions, job satisfaction, and attitudes on AMR management. Questions that asked opinions were "It is worth working in AMR management.", "I like my current job.", and "This job is suitable for me." Questions on these items were rated on a 5-point Likert scale (1=strongly disagree to 5=strongly agree). Questions that determined job satisfaction included salary and compensation, health, welfare and benefits, workload, work competency, relationship with colleagues at hospital, relationship with multidisciplinary AMR team, and career path. Questions on these items were rated on a 5-point Likert scale (1=least satisfied to 5=most satisfied). Five items on pharmacists' attitude were wasting time, risk, burden, being proud to work, and meaningful work, and these items were scored on a 7-point Osgood scale (1 = strongly agree with negative attitude to 7 = strongly agree with positive attitude).

Statistical analysis

Descriptive statistics (frequency, mean, standard deviation (SD), median, and percentage) were used for the characteristics of respondents. For associations between groups, Mann Whitney U test and Kruskal Wallis test were used for analysis due to non-normal distribution. A p-value of <0.05 was considered statistically significant. Additionally, spearman correlation rank was used. A p-value of <0.01 was considered statistically significant.

RESULTS
Demographic characteristics of respondents

A total of 249 pharmacists who actively involved in AMR management in their hospitals completed the questionnaires. The response rate was 19.2%. The majority of those who responded (n=208, 83.5%) were from public hospitals. Three-fourths worked in secondary hospitals. Most of them (n=193, 77.5%) were female. The average age was 37.20 ± 8.15 years old. For the education level of the respondents, most (n=190, 76.3%) had earned bachelor's degree. The average years of work experience as a hospital pharmacist was 12.29 ± 8.19 years and the average years of work experience in AMR management was 4.02 ± 3.65 years. Most of them (n=170,

69.7%) were members of the Infection, prevention, and control committee (IPC) in their hospitals. These results are shown in Table 1.

Table 1: Demographic characteristics of respondents

Characteristics	Frequency n (%)
Gender (n=249)	
Female	193 (77.5)
Male	56 (22.5)
Age (n=248)	
Mean ± SD	37.20 ± 8.15
≤ 30	70 (28.2)
31-40	88 (35.5)
41-50	75 (30.2)
>50	15 (6.1)
Education (n=249)	
Bachelor	190 (76.3)
Master and PhD	59 (23.7)
Years of work experience in hospital (n=248)	
Mean ± SD	12.29 ± 8.19
≤5	72 (29.0)
6-10	56 (22.6)
>10	120 (48.4)
Years of work experience in AMR (n=233)	
Mean ± SD	4.02 ± 3.65
<1	34 (14.6)
1-5	153 (65.7)
6-10	35 (15.0)
>10	11 (4.7)
Role in IPC committee (n=244)	
Chairman/Secretary	27 (11.0)
Member	170 (69.7)
No	47 (19.3)
Level of hospital (n=249)	
Secondary care	188 (75.5)
Tertiary care	61 (24.5)
Type of hospital (n=249)	
Public	208 (83.5)
Private	40 (16.1)
Teaching (Medical school)	1 (0.4)

Abbreviation: IPC = Infection, prevention, and control

Table 2: Pharmacists' opinions on AMR management

	Level of opinions*, n (%)					Mean ± SD
	Strongly agree	Agree	Neither	Disagree	Strongly disagree	
It is worth working in AMR management.	59 (24.4)	153 (63.2)	25 (10.3)	5 (2.1)	0 (0.0)	4.10 ± 0.65
I like my current job.	23 (9.5)	154 (63.6)	57 (23.6)	8 (3.3)	0 (0.0)	3.79 ± 0.65
This job is suitable for me.	18 (7.4)	143 (59.1)	71 (29.3)	9 (3.7)	1 (0.4)	3.69 ± 0.68
Total						**3.87 ± 0.55**

*Rate on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree), n=242

Opinions on AMR management

The mean and SD of the overall score in pharmacists' opinions dimension on AMR management were 3.87 ± 0.55 (possible score 1-5). Most of the respondents felt that it was worth working in AMR management and they liked their current job. Furthermore, almost 60% (n=143) agreed that the AMR job was suitable for them (3.69 ± 0.68). Hospital pharmacists with postgraduate degrees expressed greater scores for their current jobs than those with bachelor's degrees (p=0.019). Table 2 shows the scores of pharmacists' opinions on AMR management and Table 5 shows the significant association between levels of education.

Job satisfaction with AMR management

The mean and SD of overall score for job satisfaction were 3.47 ± 0.46 (possible score 1-5). The highest satisfaction score was in relationships with colleagues, followed by relationships with multidisciplinary AMR team (3.77 ± 0.65 and 3.68 ± 0.70, respectively). On the contrary, the lowest score was in welfare and benefits (3.34 ± 0.68) as shown in Table 3.

Pharmacists with less than 10 years of hospital experience were more satisfied with their relationships with colleagues, and relationships with the multidisciplinary team than pharmacists with more than 10 years of hospital experience (p=0.000 and 0.026, respectively). Pharmacists in secondary hospitals were more satisfied with salary and compensation than those in tertiary hospitals (p=0.000). In terms of years spent in AMR management, respondents who worked for more than five years were more satisfied with their pay and compensation than those who worked for less than five years (p=0.030). Regarding gender, work competency and career path were found to be statistically significant (p=0.034 and 0.027, respectively). Males expressed greater satisfaction with work competency than females, whereas females expressed greater satisfaction with their career path.

Table 3: Pharmacists' job satisfaction with AMR management

	Level of satisfaction* n (%)					
	Most satisfied	Very satisfied	Moderately satisfied	Slightly satisfied	Least satisfied	Mean ± SD
Salary and compensation	6 (2.5)	92 (37.9)	133 (54.7)	10 (4.1)	2 (0.8)	3.37 ± 0.65
Health	6 (2.5)	100 (41.2)	117 (48.1)	20 (8.2)	0 (0.0)	3.38 ± 0.67
Welfare and benefits	7 (2.9)	90 (37.0)	125 (51.4)	21 (8.6)	0 (0.0)	3.34 ± 0.68
Workload	5 (2.1)	100 (41.2)	127 (52.3)	11 (4.5)	0 (0.0)	3.41 ± 0.61
Work competency	5 (2.1)	109 (44.9)	112 (46.1)	15 (6.2)	2 (0.8)	3.41 ± 0.68
Relationship with colleagues at hospital	23 (9.5)	147 (60.5)	69 (28.4)	3 (1.2)	1 (0.4)	3.77 ± 0.65
Relationship with team	20 (8.3)	135 (55.8)	77 (31.8)	9 (3.7)	1 (0.4)	3.68 ± 0.70
Career path	4 (1.6)	99 (40.7)	120 (49.4)	17 (7.0)	3 (1.2)	3.35 ± 0.69
Total						**3.47 ± 0.46**

Rate on a 5-point Likert scale from 1 (least satisfied) to 5 (most satisfied), n=242

Attitudes on AMR management

The hospital pharmacists had positive attitudes on AMR management as showed in Table 4. Pharmacists' attitudes were significantly different between pharmacists in secondary care and tertiary care. Regarding wasting time and risk of working in AMR management, pharmacists in secondary care hospitals has higher score when compared with those in the tertiary care hospitals. (p=0.002 and 0.013, respectively). In contrast, those who worked in tertiary care hospitals were prouder of their jobs (p=0.009). In addition, the pharmacists in charge of the chairman or secretary of IPC expressed gratitude for the opportunity to work on this job. In terms of overall pharmacists' attitude, secondary care hospitals had higher scores than tertiary care hospitals (p=0.042).

The correlations of pharmacists' opinions, attitudes, and job satisfaction

Job satisfaction had significant, moderate, and positive correlations with pharmacists' opinions and attitudes

on AMR management (r = 0.475 and 0.302, respectively). In addition, the opinions of pharmacists had a significant, moderate, and positive correlation with their attitude on AMR management (r = 0.324). These correlations are shown on Table 6.

Table 4: Pharmacists' attitudes on AMR management (n=238)

Items of attitude	Level of attitude*, n (%)							Mean ± SD
	1	2	3	4	5	6	7	
Wasting time	5 (2.1)	10 (4.2)	13 (5.5)	19 (8.0)	40 (16.8)	82 (34.5)	69 (29.0)	5.53 ± 1.50
Risk	16 (6.7)	9 (3.8)	21 (8.8)	53 (22.3)	46 (19.3)	56 (23.5)	37 (15.5)	4.76 ± 1.68
Burden	4 (1.7)	8 (3.4)	25 (10.5)	35 (14.7)	56 (23.5)	70 (29.4)	40 (16.8)	5.11 ± 1.45
Being proud to work	4 (1.7)	1 (0.4)	7 (2.9)	22 (9.2)	38 (16.0)	92 (38.7)	74 (31.1)	5.78 ± 1.25
Meaningful work	4 (1.7)	2 (0.8)	1 (0.4)	10 (4.2)	23 (9.7)	77 (32.4)	121 (50.8)	6.20 ± 1.15
Total								**5.47 ± 1.00**

*Rate on a 7-point Osgood scale from 1 (Strongly agree with negative attitude) to
7 (Strongly agree with positive attitude)

DISCUSSION

ASPs have been implemented in hospitals to promote appropriate antimicrobial use in several countries including Thailand. It is one of the components of AMR management that helps to lower the likelihood and danger of drug resistance (Ministry of Public Health, 2019**)**. Generally, pharmacists play roles in ensuring and monitoring the appropriate use of medicines. Thus, they would play important roles in managing antimicrobial drugs under the ASPs.

Nearly half of the respondents had worked as a hospital pharmacist for more than ten years. It was reasonable to suppose that they were delighted to provide health care to patients. Around 80% of them worked in an AMR or ASP team, therefore they were aware that AMR was a big global health concern. This may have caused the observation that the majority of them believed that working in AMR management was worthwhile. This is consistent with the findings of Sutthiruk et al. (2018), which showed that pharmacists' attitudes toward ASP scores were high. They also thought AMR was a serious issue and that appropriate use of antibiotics was critical. In Thailand, the adoption of ASP has expanded. This can be observed in a 2015 survey, which found that 46% of pharmacists had been involved and had experience with AMR and ASP (Sutthiruk et al., 2018)., while the present study found that 81 % of respondents were chairman/secretary/members of the IPC or AMR committee.

Regarding job satisfaction, the finding suggested that pharmacists were most satisfied with their relationships with colleagues and the AMR team. There is evidence that ASPs were influenced by structures or systems, such as a core team, financial support, and local guidelines (Kallen et al., 2018)**.** The multidisciplinary team responsible for ASPs was comprised mostly of Infectious Disease (ID) physicians, clinical pharmacists, Infections Control Nurses (ICNs), clinical microbiologists or technologists, and hospital epidemiologists. Additionally, information systems specialists and administrative support employees can successfully supplement the program (Charani & Holmes, 2013). Collaboration is critical for AMR management success. Surprisingly, respondents who worked for more than ten years reported lower relationship satisfaction scores than those who worked for less than ten years. One possible explanation is that younger pharmacists with greater satisfaction thought their profession as a challenge and were more active in collaborating with teams and colleagues. It is vital to reinforce certain factors, such as competency development and career advancement. The ASP activities, such as appropriate antimicrobial agent promotion, drug monitoring, dose adjustment, and antimicrobials consumption analysis, require competencies, which may necessitate additional short training courses for pharmacists. Previous research showed that the pharmacists expressed an interest in participating in ASP education sessions (Sutthiruk et al., 2018). Furthermore, the individual received no additional pay for AMR management. This may be one of the causes for lower satisfaction scores on both the salary/compensation and welfare/benefits items. Finding from this study showed that all variables including opinions, attitudes and job satisfaction were significantly positively associated. Thus, some factors, such as compensation, benefits, and career path, may influence their motivation to work on AMR management.

In terms of gender, women were more satisfied with their career path than men while men were more satisfied with competency. This finding was in line with a study in 28 EU countries (Redmond & McGuinness, 2019). The

study found that women place more importance on qualification and skill match while men were more concerned about career progression. These factors should be considered by chairman of the IPC, hospital directors, and policymakers to ensure that they are effectively managed in order to retain hospital pharmacists.

Table 5: The significant associations between pharmacists' characteristics and their opinions, job satisfaction, and attitudes

Items	Characteristics			Mean Rank*	p-value**
Opinion					
I like my current job.	Education		Bachelor	116.51	0.019
			Higher	137.69	
This job is suitable for me.	Years in management	AMR	≤5	109.04	0.021
			>5	130.93	
Job satisfaction					
Salary/compensation	Years in management	AMR	≤5	109.77	0.030
			>5	130.65	
	Level of hospital		Tertiary	97.32	0.000
			Secondary	130.09	
Work competency	Gender		Male	138.09	0.034
			Female	117.40	
Relationship with colleagues at hospital	Years in hospital		≤10	135.78	0.000
			>10	106.25	
Relationship with AMR team	Years in hospital		≤10	129.56	0.026
			>10	111.77	
Career path	Gender		Male	105.15	0.027
			Female	126.81	
Attitude					
Wasting time	Years in hospital		≤10	127.93	0.032
			>10	109.53	
	Education		Bachelor	126.18	0.006
			Higher	98.77	
	Level of hospital		Tertiary	97.08	0.002
			Secondary	127.06	
Risk	Level of hospital		Tertiary	100.78	0.013
			Secondary	125.81	
Being proud to work	Role in IPC committee		Chairman/secretary	119.13	0.046
			Member	91.59	
	Level of hospital		Tertiary	138.52	0.009
			Secondary	113.09	
Attitude score	Level of hospital		Tertiary	103.93	0.042
			Secondary	124.75	

*Abbreviation: IPC = Infection, prevention, and control. *Mann-Whitney U test. **p-value < 0.05*

Table 6: The correlations between opinions, job satisfaction and attitudes

	Opinion	Job satisfaction	Attitude
Opinions	1.000	-	-
Job satisfaction	.475*	1.000	-
Attitudes	.324*	.302*	1.000

* p-value < 0.01

According to the Ministry of Public Health's health policy (Ministry of Agriculture and Cooperatives & Ministry of Public Health, 2016), integrated antimicrobial resistance management in hospitals has been designated as a key performance indicator (KPI) for tertiary hospitals (Ministry of Public Health, 2016b). Consequently, the pharmacist had to work extra hard to meet the KPIs. Additionally, AMR in tertiary hospitals may be more complicated than in secondary hospitals. As a result, pharmacists perceived themselves to be at risk of AMR and spent considerable time attempting to complete tasks. In this study, data were collected during the COVID-19 pandemic. This could explain why the attitude score toward the risk of working in AMR management was so low in comparison to the other attitude items.

A strength of this survey study was that it gathered data from across the country. However, there were some limitations. First, using a self-administered questionnaire may lead to social desirability bias as there was a tendency that the respondents answered questions in a positive way. Second, this study collected data during the COVID-19 pandemic. Thus, the response rate was low. This may introduce bias as non-responders may differ from responders in their views of AMR management. Further studies should seek to achieve higher response rates and obtain some comparison for responders and non-responders.

CONCLUSION

The hospital pharmacists were optimistic about AMR management. While the majority of them expressed satisfaction with their jobs, improving some factors such as ability, career path, and compensation is necessary to increase productivity and retain health care professionals in hospitals, especially in tertiary care settings.

AUTHOR CONTRIBUTIONS

Somying Pumtong suggested the conception of the work and led the project. Saranya Khunjan and Somying Pumtong performed the study, analyzed and interpreted the data, and drafted the work. All authors edited, revised, and finally approved the manuscript.

ETHICS APPROVAL

This study was approved by the Ethics Committee of Institution for the Development of Human Research Protections (IHRP), Thailand (Project No. 128-2563, Certificate of Approval (COA) No. IHRP2020142) , and the Institutional Review Board, Faculty of Dentistry and Faculty of Pharmacy (DTPY-IRB), Mahidol University, Thailand (Project No. 2021/PY073, COA No. 2021/056.2406).

CONFLICTS OF INTEREST

The authors declare no conflicts of interest in this work.

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