

Original Research

Antibiotic prescribing and dispensing behavior among doctors and pharmacists working in UAE

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Abstract

Objectives: This study aims to determine the level of knowledge, attitude, and practice of doctors and pharmacists on antibiotic use in a group of Thumbay healthcare facilities in the UAE. **Methods:** This cross-sectional questionnaire-based survey included a convenience sample of doctors and pharmacists at Thumbay-related hospitals and clinics. The survey was sent online and it has a section on knowledge, attitude, and practice-related to antibiotics and barriers and facilitators of good antibiotic use. **Results:** This survey included 61 participants (doctors (n=27) and pharmacists (n=34)) with the age ranging between 26 to 60 years (mean age=37). More than half of the respondents were female (55.4%). Most of the participants (89%) agree that of antimicrobial resistance is a global problem. The majority of the participants agreed that antimicrobial stewardship programs can reduce antimicrobial resistance. Similarly, most of the participants feel confident about their knowledge and practice in the area of antimicrobial prescribing (81%), and they always or often (86.8%) use guidelines in their daily practice when prescribing or dispensing antibiotics. Similarly, 82% claimed that a policy that limits the prescribing of selected antibiotics to certain clinical indications via an approval process is introduced in their setting 82%. The top five cited barriers that hinder appropriate prescribing and dispensing of antibiotics include limited knowledge or confidence to discuss rational antibiotics use (72.1%), lack of incentives for appropriate prescribing or dispensing (68.9%), lack of interest by patients to receive counseling (68.9%), time limitations (62.3%) and presence of diagnostic uncertainties (62.3%). **Conclusion:** The participants have good level of knowledge regarding appropriate antibiotic prescribing and dispensing. However, there is a need for training opportunities to improve antimicrobial stewardship strategies and identified barriers needs to be addressed to improve optimal use of antibiotics.

Keywords: antimicrobial resistance; doctors; pharmacists; antibiotic prescribing; dispensing

INTRODUCTION

Antibiotics are an extremely important weapon in the fight against infections. Antibiotics have made a routine medical practice, surgery, chemotherapy, and other procedures such as organ transplant safer. The discovery of antibiotics has also improved the survival of preterm infants and improved the life expectancy of the global population. Despite their great benefits, antibiotics are losing their power to treat infections due to antimicrobial resistance. The world health organization (WHO) defines antimicrobial resistance as the resistance of a microorganism to an antimicrobial drug that was initially effective for the treatment of infections caused by the microbe.¹

Antimicrobial resistance is a major public health problem. In addition to the widespread use of antibiotics in the agriculture and food industry, the use of antibiotics for minor infections,

over-the-counter availability of antibiotics, or the lack of access to the right antibiotic when needed have increased the risk of resistance to antibiotics. Infections, which were once treated easily, are becoming incurable due to multiple drug-resistant bacteria. The decline in the development of new antibiotics makes it even more difficult to cure infections associated with resistant bacteria. Antibiotic resistance is costly and deadly, and it is spreading quickly due to population mobility. By 2050, ten million people are expected to die because of incurable infections associated with resistant bacteria.² World Health Organization considers combating antibiotic resistance a global priority. One way to combat antibiotic resistance is to reduce the overuse or misuse of antibiotics.^{3,4}

Providers, patients, health care organizations, and the community as a whole can play a role to reduce unnecessary use of antibiotics. Providers can reduce unnecessary use of antibiotics by avoiding prescription of antibiotics for minor illnesses and by educating patients not to share or save their antibiotics for later use and by educating patients to take a full course of antibiotics.⁵

Worldwide, inappropriate prescription has been associated with increased rates of antibiotic resistance⁶ Various patient-related factors, disease-related factors, physician-related factors, and healthcare system-related factors can influence the prescription of antibiotics by physicians. The decision and the selection of an appropriate antibiotic to prescribe are important in the treatment of infectious diseases. As with any human decision, it can be influenced by individual attitudes and

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perceptions. Therefore, there is a need to evaluate the factors that influence healthcare providers' decision-making process to prescribe or provide antibiotics. It is crucial to identify factors that facilitate the proper use of antibiotics as well as the barriers to proper prescription or provision of antibiotics by providers.⁷⁻⁹

To our knowledge, no published study has assessed the knowledge, attitude, and practice of healthcare providers on antibiotic use in Thumbay healthcare facilities. Therefore, in this study, we will explore the factors influencing antibiotic dispensing and prescribing by pharmacists and physicians working in Thumbay hospitals, clinics and pharmacies in the UAE. The findings of this study can give insight into the level of pharmacists' and physicians' awareness regarding proper antibiotic use. Based on the findings, authorities can design interventions such as educational programs to better equip our healthcare providers in confronting antimicrobial resistance.^{3,5,10}

METHODOLOGY

Study design

This study is a cross-sectional questionnaire-based survey, which was undertaken in Thumbay hospitals, clinics and pharmacies. The study participants were doctors and the pharmacists. Doctors and pharmacists who did not give informed consent to participate in the study were excluded.

Data collection

A structured questionnaire-based survey is sent to convince sample of all doctors and pharmacists working at Thumbay hospital, clinics and pharmacies.

The link containing the consent form and a survey questionnaire designed using Google forms was sent to doctors and pharmacists working at Thumbay hospital, clinics and pharmacies using their organizational email addresses. Data collection was started after ethical approval is obtained for this study on May 15, 2021 and was concluded on June 15, 2021.

The questionnaire in the study is designed based on validated questionnaires used in similar published studies.⁵ Additional questions reflecting local context are generated by consulting with experts working in these centers. The main outcome of the study is the knowledge, attitude, and practice of doctors and pharmacists on antibiotic dispensing and prescribing.

Data will be collected using a structured questionnaire survey, comprising 7 sections designed to gather relevant information.

Section 1: Socio-demographic data of healthcare providers, including age, gender, years of practice.

Section 2: Frequency of antibiotic use and antibiotic resistance

Section 3: Knowledge regarding the rational antibiotic provision and antibiotic resistance.

Section 4: Attitudes towards antibiotic dispensing and prescribing

Section 5: Practice of antibiotic dispensing or prescribing

Section 6: Perceived facilitators of appropriate antibiotic prescribing in Thumbay hospitals and clinics.

Section 7: Perceived barriers of appropriate antibiotic prescribing in Thumbay hospital, clinics and pharmacies

Responses to the questions was scored using a five-point Likert-scale ("Strongly disagree" to "Strongly agree") or dichotomous answers (yes/no).

Statistical methods

Summary of categorical data (sociodemographic characteristics and provider-related factors) was presented using percentages and frequency. Descriptive statistics such as mean, and standard deviation was used as appropriate to assess the knowledge, attitude, and practice scores of the healthcare providers. The correlation between numerical and ordinal characteristics (e.g. age, years of practice) and knowledge score was examined using the spearman correlation test. The difference in mean knowledge score between any two categories of provider-related characteristics was tested using the Mann-Whitney test (e.g. male versus female, pharmacist versus doctors). By using the chi-square test, the association between categorical providers-related factors and providers' perception was examined. All data analysis was conducted using SPSS Statistics version 26. A P-value of < 0.05 was considered statistically significant for all tests.

RESULTS

Demographic characteristics: Survey included 61 participants, which included 26 doctors (43%), and 32 pharmacists (52%). The age of the respondents ranged between 26 and 60 years (mean age=37 years). There were comparable number of male (44.6%) and 33 female (54%) participants. The average year of working experience is 11.7 years.

More than half of the participants (65.5%) have completed a postgraduate education. The participants reported that they engage in an average of 34 hours of continuous medical education per year. The demographic characteristics of the study participants are provided in table 1.

Respondents characteristics	Frequency and percentages
Sex	Male = 44% (n=27) Female = 54%(n=34)
Profession	Doctors 27 pharmacists 34
Post graduate education\ specialization	Yes= (n=40) no = (n=21)
(CME) points per year	10 to 120 hrs. Average=33 hrs.
Previous experience in hospitals	Yes= (n=49) no = (n=12)
Recent training on rational antibiotic use in the past 6 months	Yes= (n=31) no = (n= 30)



In the general opinion of the survey respondents, 20 respondents claim that 25% of their patient's require at least one antibiotic prescription weekly, of the same number of respondents claim that about 26%-50% of their patients require 1 antibiotic per week. Half of the participants claim that they sometimes encounter an antibiotic resistant infection. (Table 2)

Awareness regarding rational use of antibiotic and antibiotic resistance: Most participants (90%) agree or strongly agree that of antimicrobial resistance is a global problem and that prescribing broad-spectrum antibiotics when there are equally effective narrower-spectrum antibiotics increases antibiotic resistance. Approximately 39% of the respondents either agreed or strongly agreed that antibiotic-related practice affects incidence of drug resistant organism. Similar number of respondents were neutral to this statement, on the other hand majority strongly disagreed 79% (n=48) that antibiotics can treat viral infections. Majority of the participants agreed or strongly agreed that antimicrobial stewardship programs can reduce antimicrobial resistance their response were 49% (n=30) strongly agreed.

About 66% of the participants strongly disagreed or disagreed that antibiotics can be stopped before the full course of antimicrobial is completed if symptoms improve. More than two thirds (74%) either disagreed or were neutral regarding antibiotics reducing the symptoms of pain and inflammation. (Table 3)

Most participants claim to be concerned about antibiotic resistance when they prescribe or dispense antibiotics. Most of the participants (81%) strongly agreed or agree that they feel confident about their knowledge and practice in the area of antimicrobial prescribing was.

More than three fourth of the participants agree that they are willing to participate in any activities to improve the quality of antimicrobial use in their healthcare center. Most of the participants also agreed that educating patients on the use of antimicrobials and resistance-related issues is important and that antibiotics access should be restricted to those with a prescription only. (Table 4)

Table 2. Perceived utilization of antibiotic and prevalence of antibiotic resistance

Item	25%	26-50%	51-75%	76-100%
1. What proportion of patients require at least 1 antibiotic prescription in your setting weekly?	21 (34%)	20 (33%)	12 (20%)	8 (13%)
	Always	Often	Sometimes	Rarely
2- How often do you encounter patients with an antibiotic resistant infection?	4 (7%)	12 (20%)	31 (51%)	12 (20%)
				2 (3%)

Table 3. Awareness regarding rational use of antibiotic and antibiotic resistance

Item	Strongly disagree	disagree	Neutral	Agree	Strongly agree
Antimicrobial resistance is a global problem	1 (2%)	1 (2%)	5 (8%)	12 (20%)	42 (69%)
Antimicrobial resistance affects my daily work	1 (2%)	12 (20%)	23 (28%)	20 (33%)	5 (8%)
My antibiotic-related practice affects incidence of drug resistant organism	4 (7%)	8 (13%)	25 (41%)	10 (16%)	14 (23%)
Prescribing broad-spectrum antibiotics when there are equally effective narrower-spectrum antibiotics increases antibiotic resistance	0 (0%)	3 (5%)	3 (5%)	22 (36%)	33 (54%)
Antibiotics can treat viral infections	48 (79%)	5 (8%)	4 (7%)	3 (5%)	1 (2%)
Antimicrobial stewardship programs can reduce antimicrobial resistance	0 (0%)	3 (5%)	9 (15%)	19 (31%)	30 (49%)
If symptoms improve before the full course of antimicrobial is completed, your patient can stop taking it	34 (56%)	6 (10%)	6 (10%)	10 (16%)	5 (8%)
Antibiotics reduce the symptoms of pain and inflammation	15 (25%)	13 (21%)	17 (28%)	11 (18%)	5 (8%)

Table 4. Attitude towards antibiotic prescribing and dispensing

Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I'm concerned about antibiotic resistance in my setting when I prescribe or dispense antibiotics.	5 (8%)	1 (2%)	9 (15%)	24 (39%)	22 (36%)
I feel confident about my knowledge and practice in the area of antimicrobial prescribing.	2 (3%)	2 (3%)	8 (13%)	29 (48%)	20 (33%)
I would be willing to participate in any activities to improve the quality of antimicrobial use in my healthcare center.	0 (0%)	3 (5%)	6 (10%)	16 (26%)	36 (59%)
I would be willing to participate in any activities to improve the quality of antimicrobial use in my healthcare center.	1 (1%)	3 (5%)	11 (18%)	21 (34%)	25 (40%)
I take part in antimicrobial-awareness campaigns to promote the optimal use of antimicrobials.	0 (0%)	3 (5%)	5 (8%)	20 (33%)	28 (46%)
I educate patients on the use of antimicrobials and resistance-related issues.	1 (1%)	1 (1%)	3 (5%)	11 (18%)	45 (74%)



Pharmacists or doctors’ practice regarding use of appropriate antibiotics:

The healthcare providers were asked if they are using guidelines in their daily routine when prescribing or dispensing antibiotics. Majority of the participants claimed to always (56%) or often (31%) use guidelines. Lesser proportion of patients always or often depend on information provided by drug companies or drug sellers when choosing neutral about providing antibiotics.

About 49% of the respondents claim to always or often use the strategy of delayed antibiotic prescription or dispensing. On the other hand, 62% of the participants often request culture and sensitivity test before initiating empiric antibiotic therapy while lesser number of providers (43%) claimed to request culture and sensitivity test only in the event of patient non-response to empiric antibiotic therapy.

Majority of the respondents always or often 54% discuss about antibiotic-resistance with patients who are prescribed with antibiotics while less than half of the respondents (33%) claim to discuss about antibiotic-resistance with patients who do not need antibiotics.

More than 65% of the respondents never or rarely provide antibiotic therapy due to pressure from patients to get antibiotics, to avoid confrontations with the patient when they are overloaded with work or due to the influence of colleagues. In the respondents also claimed that they rarely provide branded antibiotics due to pressure from patients.

More than three quarters of the respondents claimed that they rarely provide antibiotics to patient suffering cold and flu. On the contrary same proportion of the respondents claim to sometimes or more frequently provide antibiotic to eliminate an underlying infection in cases of unclear diagnosis. (Table 5)

Facilitators of rational antibiotic use: Majority of the respondents agree that improving an antimicrobial prescribing

is their organizations priority 90.2% (n=55). Similarly, 82% claimed that policy that limits the prescribing of selected antibiotic to certain clinical indications via an approval process is introduced in their setting 82% (n=50). More than three fourth (85%) of the respondents reported that there is a national or locally developed guidelines for antibiotic use which is implemented in their setting (n=52).

The respondents claimed there is a team of healthcare providers that provide antimicrobial prescribing and dispensing advice and that provide feedback (n= 45) and there is opportunity for continuous training to those who are involved in antibiotic use process in their setting (n=40). About 62.3% (n=38) of the respondents reported the absence of computer application that aids in selection and duration of antimicrobial therapy for specific clinical conditions in their setting.

Barriers for appropriate prescribing and dispensing of antibiotics:

The participants highlighted many barriers that hinder appropriate prescribing and dispensing of antibiotics. The top five barriers include limited knowledge or confidence to discuss rational antibiotic use 72.1% (n=44), lack of incentives for appropriate prescribing or dispensing 68.9% (n=42), lack of interest by patients to receive counselling (68.9%), time limitations (62.3%), presence of diagnostic uncertainties (62.3%). The other reported barriers are the concern not to upset patients by not providing antibiotic 59% (n=36), limited opportunities for training on antibiotic use (57.4%) and finally lack of clear internal policy or guidelines or other specialized antibiotic information resources 52.5% (n= 32).

As shown in table 6 none of the demographic characteristics are associated with Knowledge score.

As depicted in table 7, Higher knowledge score is correlated with positive attitude regarding antimicrobial use.

Table 5. Pharmacists or doctors’ practices regarding use of appropriate antibiotics

Item	Never	Rarely	Sometimes	Often	Always
1-i use guidelines in my daily routine when prescribing or dispensing antibiotics.	1 (2%)	0 (0%)	7 (12%)	19 (31%)	34 (56%)
2-i provide antibiotics based on information provided by drug companies or drug sellers.	10 (16%)	10 (16%)	19 (31%)	14 (23%)	8 (13%)
3-i use the strategy of delayed antibiotic prescription or dispensing.	8 (13%)	6 (10%)	17 (27.8%)	19 (31%)	11 (18%)
4-i request culture and sensitivity test before initiating empiric antibiotic therapy.	4 (7%)	5 (8%)	14 (23%)	28 (46%)	10 (16%)
5-I request culture and sensitivity test only in the event the patient did not respond to empiric antibiotic therapy.	8 (13%)	9 (15%)	18 (30%)	20 (33%)	6 (10%)
6- I discuss antibiotic-resistant with only with patients who are prescribed antibiotics.	6 (10%)	8 (13%)	14 (23%)	24 (39%)	9 (15%)
7-I discuss antibiotic-resistance with patients who do not need antibiotics.	7 (11%)	17 (28%)	17 (28%)	14 (23%)	6 (10%)
8-I provide antibiotic due to pressure from patients to get antibiotics.	30 (49%)	10 (16%)	12 (20%)	7 (11%)	2 (3%)
9-I provide antibiotic to avoid confrontations with the patient when I am overloaded with work.	29 (48%)	12 (20%)	7 (12%)	10 (16%)	3 (5%)
10-I am influenced by colleague’s suggestion to provide antibiotic to patients.	29 (48%)	11 (18%)	9 (15%)	10 (16%)	2 (3%)
11-I provide branded antibiotics due to pressure from patients.	27 (44%)	14 (23%)	7 (12%)	12 (20%)	1 (2%)
12-I provide antibiotics to eliminate an underlying infection in cases of unclear diagnosis.	16 (26%)	12 (20%)	17 (28%)	13 (21%)	3 (5%)
13-I provide antibiotic to the patient suffering from cold and flu.	40 (66%)	8 (13%)	8 (13%)	4 (7%)	1 (2%)



N=61	Demographic Parameters	n, (%)	Mean Rank of knowledge	Test p-value
Gender	Male	27 (44%)	12.59 [1.82]	Mann-Whitney Test 0.324
	Female	34 (56%)	12.05 [2.36]	
Age (years)		Average [SD] age in years 38 [7.69]	-	Spearman Correlation P=0.393 R=0.61
Post graduate education	Yes	40 (66%)	12.42 [1.99]	Mann Whitney test P=0.327
	No	21 (34%)	12.22 [2.46]	
Profession	Doctor	27 (44%)	11.70 [2.58]	Mann Whitney P=0.069
	Pharmacists	34 (56%)	12.76 [1.61]	
Years of experience and total knowledge score	N=61 participants	-	-	Spearman R=0.634 P=0.062

N=61 participants	Correlation coefficient	Test P value
Association of Knowledge score and attitude	R=0.561	Spearman Correlation P = 0.001*

DISCUSSION

Utilization of antibiotics is high in middle-income countries such as the United Arab Emirates (UAE). In this research the knowledge, attitude and practice of prescribers regarding antimicrobials is high among doctors and pharmacists working at a renowned private health care provider in the UAE.

This survey consisted of 61 doctors and pharmacists working at Thumbay hospitals, clinics and pharmacies. More than half of respondents (54%) in this study were female reflecting the higher number of female medical practitioners in the country. However, this is in contrast to studies done in Saudi Arabia and a study in Pakistan where higher number of the respondents were male.¹¹

There was comparable number of pharmacists (n=34) and doctors (n=27) in this study. The total knowledge scores for physicians and pharmacists did not differ significantly. None of the demographic factors were shown to be correlated with total knowledge score of the participants including the years of experience. A similar finding was also reported in a study that showed years of experience does not affect physician knowledge and attitude on prescribing antibiotic.¹²

In this survey, we found the majority have good level of awareness about the antibiotic resistance, most of the respondents agree that antimicrobial resistance is a global problem. Practice of pharmacists and doctors have direct impact on the overuse and misuse of antimicrobials by patients. Both physicians and pharmacist can play a role in curbing antimicrobial resistance by counselling patients and through appropriate practice of prescribing and dispensing of antimicrobials.¹³

Majority of the respondents were unsure if antimicrobial resistance affects their daily work. In addition, few of them feel that their antibiotic-related practice affects incidence of drug resistant organism. Improper use of antibiotic has negative impact on quality of life of patients and healthcare cost.

Majority of the doctors and pharmacist are aware that prescribing broad-spectrum antibiotics when there are equally effective narrower-spectrum antibiotics increases antibiotic resistance. Narrow-spectrum antibiotics are more specific and only active against certain groups or strains of bacteria on other hand broad-spectrum antibiotics instead inhibit a wider range of bacteria. It is important to limit the use of broad-spectrum antibiotics to reduce antibiotic-resistant bacteria.¹⁴ De-escalation of antibiotic whenever the pathogens are identified is an important step in antimicrobial stewardship programs. The unnecessary use of broad and strong antibiotics still exist in some settings and this practice needs to discouraged to improve the appropriate use of antibiotics.¹⁵

Most of the participants (78.7%) in this survey are aware that antibiotics should not be used to treat viral infections. Previous studies conducted in Greece and Thailand, indicate that more than 70% purchase antibiotics for viral infections.¹⁶ The wide spread use of antibiotic for viral infections may be associated with the lack of awareness of the patients. This can be overcome by educating both providers and patients that antibiotic has no role in treating viral infections.

Nearly half of the doctors and pharmacists surveyed recognize that stopping to take antibiotics before the full course is completed will increase the antibiotic resistance. In a similar study, physicians reported their encounter with patients who use antibiotic therapy without consulting them and stop taking antibiotic therapy when their symptoms improve or keep remaining antibiotics to treat anticipated future infections.¹⁵

In addition, 45.9% of the doctors and pharmacists in this study are aware that antibiotics has no direct role on reducing the symptoms of pain and inflammation. Physicians may need to



prescribe antibiotic with pain reliever if a patient reports pain along with bacterial infections. The practice of using antibiotics to relieve symptoms of common cold such as headache has been reported in a recent study.¹⁵

Only half of the respondents agree that antimicrobial stewardship programs can reduce antimicrobial resistance. Lack of antimicrobial stewardship programs and the proof of impact of these programs on antibiotic resistance in the respondents setting may have contributed to lesser agreement with this statement. Therefore, there is a need to develop impactful antimicrobial stewardship programs.

Most of the respondents have positive attitude regarding appropriate antibiotic use. Our findings indicate that higher level of knowledge is significantly associated with positive attitude. Most of the respondents claim that they are concerned regarding antibiotic resistance in their setting when they prescribe or dispense antibiotics. Most of them feel confident about their knowledge and practice in the area of antimicrobial prescribing, and that they would be willing to participate in any activities to improve the quality of antimicrobial use in their healthcare center. This is unlike study that reported pharmacy workers were hesitant to take part in antimicrobial stewardship programs due to lack of antibiotic-related knowledge.¹⁶

Similarly, most of the participants are willing to take part in antimicrobial-awareness campaigns to promote the optimal use of antimicrobials, and to educate patients on the use of antimicrobials and resistance-related issues. Most of them also agree that access to antibiotics should be restricted to those with a prescription only similar to participants in other studies.¹⁴ Similar to UAE, in Qatar currently antibiotics can be prescribed both in the government and private sectors with prescription. However, there is no restrictions on when to prescribe antibiotics. Primary healthcare, organizations are encouraging individuals to seek antibiotic with any viral symptoms.¹⁵ This practice needs to be discouraged.

Most respondents reported they use of guidelines in their daily routine of prescribing or dispensing antibiotics. In the UAE, WHO guidelines and national guidelines related to ministry of health (MOH), Dubai health authority (DHA), and department of health - Abu Dhabi (HAAD) are commonly utilized. In contrast to the findings of our study, physicians in a similar study reported that they did not use guidelines despite being aware of the guidelines.¹² Practices which are not in line with guideline recommendations have been reported in other studies. For example, some pharmacists reported that the implementation of delayed antibiotic prescription were not clear to them and they claimed that some physicians create their own regimens, which were not related to any guideline's recommendations.¹⁵

Some participants in our study reported that they make use of information provided by drug companies or drug sellers. Most of the respondents agree that the strategy of delaying antibiotic prescription or dispensing should be encouraged. The process of delayed antibiotic prescription is a well-known

tactic utilized globally to reduce antibiotic misuse, to the extent that Sargent et al. (2017) reports antibiotic use reduces by up to 60%.^{13,15} Majority of the respondent are providing antibiotics to eliminate an underlying infection in cases of unclear diagnosis.

Half of the participant request culture and sensitivity test before initiating empiric antibiotic therapy and the other half are requesting culture and sensitivity test only in the event of patient non-response to empiric antibiotic therapy. Diagnostic test is essential to make evidence-based decision-making in the management of infections. Hence, the practice of requesting for diagnostic test should be encouraged.

Most of the participants claimed to discuss about antibiotic-resistant with only patients who are prescribed with antibiotics. On contrary, most of the participant are not discussing about antibiotic-resistance with patients who do not need antibiotics. This may be related to high workload. However, all patients should be educated on antibiotic use since antibiotic resistance is a public health issue affecting everyone.

It is encouraging to find out that, the majority of respondents in this study neither provide antibiotic nor provide branded antibiotics due to pressure from patients.

In addition, most of them have their own decision and are not to be influenced by colleague's suggestion to provide antibiotic to patients. The respondents also do not provide antibiotic to patient suffering cold and flu. Unlike a study from Pakistan that revealed that antibiotics were provided for patients with cold, cough, flu, fever, and sore throat.¹¹ More than three quarters of the participants, (90.2%) agree that improving antimicrobial prescribing is their organizations priority. Nowadays hospitals and health care centers in the United Arab Emirates actively engage in antimicrobial stewardship program to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use.

Majority (82%) of the doctors and pharmacists claim that a policy that limits the prescribing of selected antibiotic to certain clinical indications via an approval process is introduced their setting. This finding is in line with reports of similar practice of limiting prescribing of antimicrobials in other setting.¹⁷

Less than quarter of our participant are not aware of the presence of a national or locally developed guidelines for antibiotic use which is implemented in their setting. These respondents may not be well informed regarding national and local guidelines, which are often discussed in continuous medical education programs.

It is encouraging to know that almost three-quarters of the participants are aware about the team of healthcare providers that provide antimicrobial prescribing and dispensing advice or feedback in their work place. As pharmacists and physicians are frontlines who deal with antimicrobial prescribing or dispensing, this result is pre-anticipated.

More than a quarter of the participants claimed that they



did not receive a continuous training regarding antibiotic use process in their setting. This could be the result of limited face-to-face direct training opportunities post the emergence covid-19 pandemic. The participants may have also been less aware of virtual trainings on antimicrobial stewardship programs in the UAE. A previous study has reported that the lack of training of pharmacy workers has been linked to inappropriate dispensing of antibiotics.¹⁶

In this study, barriers for appropriate prescribing and dispensing of antibiotics were assessed. Our results show that the major reported barrier is time limitation. Most of the doctors and pharmacists have limited time with their patients when prescribing or dispensing the antimicrobials. Time limitation is further exacerbated by the covid-19 pandemic. Furthermore, the need for social distancing to curb the spread of this infection, has adversely affected effective communication between healthcare providers and patients. In addition, limited working hours in the government hospitals has also been reported as a barrier in a similar study.¹¹ Previously high workload has been cited as a factor that prevents physicians to provide the needed education for patients in regard to antimicrobial use.¹⁵

Lack of interest by patients to receive counseling regarding antimicrobials and the practice of providing antibiotic to avoid upsetting patients are cited as barriers for appropriate utilization of antibiotic. Some patients request to receive antibiotic and perceive that the physicians have obligation to provide them the antibiotic. In a similar study conducted in Qatar, physicians' claim that some patients with common cold symptoms, cough, and sore throat insisted to receive antibiotic to alleviate their symptoms. Physicians reported that they face a challenge to convince some patients that antibiotic prescribing is not needed for viral infections, which are often self-limited. The physicians claim that some patients would complain to the administration in the center and make an appointment with another physician who might prescribe antibiotic for them. The pharmacists in this study, also reported that patient's pressure can be considered one of the barriers of appropriate antibiotic prescription. They explained that if the physician did not prescribe the antibiotic, patients might come to them to get it from them. In addition, patients would also argue regarding the type of antibiotic they receive.¹⁵ In order to reduce the pressure from patients to prescribe or dispense antibiotic, patients' awareness and understanding of antibiotic prescription, needs to increase. A recent study reported that if patients are educated on proper use of antibiotic, they will be less likely to pressurize their physicians and would be able correctly take their antibiotics.

Diagnostic uncertainties have also been cited as a barrier for proper antibiotic prescribing and dispensing. Lack of rapid diagnostic test would hinder appropriate antibiotic use. Physicians claim that they are pressured to diagnose and treat within a short time frame. The long time taken to receive results of culture and sensitivity test does not allow identification of patients with resistant pathogens in the timely manner. There is a need to have rapid diagnostic tests and a need to train other healthcare providers such as nurses to request relevant

diagnostic tests early in the primary care setting.¹⁵

Limited opportunities for training on proper antibiotic dispensing and prescribing has been cited as a limiting factor in this survey. Introducing education programs for providers as well as patients, will help to address the gap in knowledge. Education on antibiotic prescribing is a core element of the CDC framework and it can be provided on electronic learning platforms to help increase uptake.¹⁵

This study has the following limitations. Firstly, the study included limited number of doctors and pharmacist working at Thumbay-hospitals, pharmacies and clinics. Hence, the results may not be generalizable to all facilities in Ajman or the UAE. Secondly, focus group discussion to understand in-depth knowledge and actual practice of participants was not conducted. Thirdly, all different stakeholders that are involved in antibiotic use process were not included in this survey. We acknowledge that perspective of other stakeholders such as nurses, microbiologists, administrators, patients are equally important. Despite these limitations, our study has given insight regarding doctors and pharmacists knowledge, attitude and practice on antibiotic use.

CONCLUSION

In conclusion, the doctors and the pharmacists included in this study have acceptable level of awareness regarding appropriate prescribing and dispensing antibiotics. There is a significant correlation between knowledge and attitude. However, there is still a gap between best practice and reported practice of antibiotic prescribing or dispensing. There is a need to discourage the use of antibiotic to treat viral infections, symptoms of pain or inflammation and provision of antibiotic due to the pressure from patients. All identified barriers such as time limitations, lack of confidence and diagnostic uncertainties need to be addressed. The results of this study can be used as a preliminary result to guide future studies. Future studies can be conducted to study the impact of antimicrobial stewardship programs on optimal use of antibiotics.

RECOMMENDATION

Provide continuous medical education and training opportunities improve awareness of doctors and pharmacist on appropriate prescribing and dispensing of antibiotics.

Train doctors and pharmacists on antimicrobial stewardship strategies to reduce the development and spread of antibiotic resistance.

Increase staffing in hospitals, clinics and pharmacies to avoid time limitations to give appropriate patient counselling when prescribing and dispensing the antibiotic.

Provide the access to antibiotic-related guidelines and up-to-date resources for healthcare providers.

Provide incentives for appropriate prescribing and dispensing of antibiotics.

Educate the patients about the proper antibiotic use and the impact of antibiotic misuse on increasing resistance rates



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CONFLICTS OF INTEREST

There are no conflicts of interest

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