

Perceptions and practices of community pharmacists towards antimicrobial stewardship program in Erbil City, Iraq: A cross-sectional study

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Abstract

Background and objective: Antimicrobial resistance is a crucial health concern around the world, giving rise to millions of deaths each year. Despite the existence of recommendations for antimicrobial stewardship programs (ASP), the problem persists, particularly in conflict-affected areas such as the Middle East. The aim of this study is to investigate pharmacists' attitude and practices towards ASP in Erbil, Iraq.

Methods: A cross-sectional observational study was conducted among community pharmacies in Erbil City, Iraq, from March 2023 to May 2023. 170 Pharmacists completed an electronic questionnaire consisting of three sections: sociodemographic information, perception of ASP, and practices related to ASP. Statistical analysis was performed by using statistical package SPSS version 22 for the social science data.

Results: The questionnaire was completed by 170 participants in total, 85 of whom were female and 85 of whom were male. The majority of participants 65.9% were between the ages of 20 and 30, and 71.2% had bachelor's degrees in pharmacy. The survey indicated 28.2% strongly agreed that "AMS programs improve patient care." Furthermore, 33.5% strongly agreed that "AMS programs help reduce antimicrobial resistance," and 31.2% said they frequently administer antibiotics based on complete clinical information. While 24.7% occasionally administered antibiotics in accordance with local guidelines, 33.5% occasionally dispensed antibiotics without a prescription. Notably, 47.6% of those surveyed claimed they would never dispense antibiotics for periods longer than prescribed, even upon patient request.

Conclusion: The study shows that community pharmacists in Erbil have favorable views and are responding appropriately to promote antimicrobial stewardship. However, there is room for improvement, especially when it comes to promoting inter-professional collaboration, incorporating AMS programs into community pharmacies, and addressing the issue of providing antibiotics without a valid prescription. These results highlight the necessity of continued measures for patient awareness, education, and training in order to improve the prudent use of antibiotics and guarantee patient safety.

Keywords: Antibiotics; Antimicrobial resistance; Antimicrobial Stewardship Program; Cross-sectional Study.

Introduction

The accidental discovery of antibiotics revolutionized medicine and provided a powerful weapon against bacterial infections. However, over the years, irrational use of antibiotics has contributed to the rise of antimicrobial resistance

(AMR). Globally, AMR is a developing issue that poses a substantial threat to the public's health, as its prevalence continues to rise as the pipeline for the development of new antibiotics decreases. As per the World Health Organization (WHO) antibiotic resistance ranks among the top

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10 threats to public health. AMR is thought to have contributed to 1.27 million deaths in recent years, and up to 10 million deaths per year are predicted to occur by the year 2050.⁽¹⁾

In collaboration with other professional organizations, the WHO has advocated for and led the development of antimicrobial stewardship program (ASPs) frameworks.⁽²⁾ Antimicrobial stewardship (AMS) is an important approach that combines interventions meant to ensure the right use of antimicrobials in order to limit the spread of resistance and maintain the efficacy of existing antimicrobials.⁽³⁾

Implementing ASPs in hospitals, community pharmacies, and other healthcare settings offers various benefits, including enhanced clinical outcomes. ASPs focus on identifying the best antimicrobial medication for each patient, taking into account criteria such as infection type, susceptibility patterns, and specific patient characteristics. These programs help enhance clinical outcomes by guiding healthcare practitioners in administering the appropriate antimicrobial medicines at the appropriate dosage and duration.⁽⁴⁾

In the absence of Antimicrobial Stewardship Programs (ASPs), there is an elevated risk of irrational antimicrobial drug usage, thereby fostering the development and spread of antimicrobial resistance. As a result, therapy options may be limited, the likelihood of treatment failure increases, and public health is jeopardized. Furthermore, the lack of ASPs may result in extended hospital stays, unnecessary healthcare costs, increased adverse events, and decreased patient safety. It is critical to install ASPs to reduce these risks.

There are various national and international guidelines of ASP available for hospitals, health care facilities, and general practitioners. However, AMR is still a specific problem, especially in parts of the Middle East where conflict has had a significant negative influence on health

care.⁽⁵⁾ The aim of this cross-sectional study is to investigate pharmacists' perception and practices towards Antimicrobial Stewardship Programs (ASPs) in Erbil city, Iraq and to assess their level of awareness, understanding, and implementation of this program. This study seeks to provide valuable insights about the current state of ASP in Erbil, and identify areas for development, ultimately enhancing ASP efforts in the region.

Methods

Study Design

Participants were surveyed using an electronic questionnaire designed in English language that consisted of three sections; sociodemographic information including gender, age, educational level, and years of experience in pharmacy; second section included eight questions concerning the participants' perspectives and views towards AMS; and the last section included eleven questions related to practices of participants towards AMS. The second section responses were on a five-point Likert scale – (1) Strongly Disagree; (2) Disagree; (3) Neutral; (4) Agree; (5) Strongly Agree. While the third section responses were on a five-point Likert frequency scale – (1) Never, (2) Rarely, (3) Occasionally, (4) Often, (5) Always. This strategy allowed the researchers to obtain an understanding of the current state of AMS within the target populations, the influence of sociodemographic factors, identification of challenges, and obtain insights that can inform educational initiatives aimed at the rational use of antibiotics.

Setting of this study

This cross-sectional observational study was carried out among community pharmacies in Erbil City, Iraq. Data was collected between March 2023 and May 2023.

Study Population

For this study, the researchers utilized a convenience sampling method to determine the study population.

Convenience sampling is a non-probability technique often employed when participants are selected based on their easy accessibility or availability. After agreeing to participate, the individuals were approached for interviews, and an electronic questionnaire was subsequently emailed to them. A total of 170 participants willingly agreed to take part in the study and were included in the analysis. To ensure clarity and understanding, participants were provided with guidance for each question in the electronic questionnaire. In an effort to maintain consistency and minimize potential biases that might arise from multiple sessions or interruptions, participants completed the questionnaire in a single session.

Inclusion and Exclusion Criteria

People employed in pharmacies who possessed qualifications such as a bachelor's degree in pharmacy, master's degree, or PhD were eligible to participate. The criteria ensured that participants had the necessary educational background and pharmacy practice experience to provide valuable information into the study. Individuals with degrees other than those listed above were excluded from the

selection process. These criteria aimed to maintain a homogeneous study population of people who were directly involved in pharmacy-related activities and had a thorough understanding of the issue at hand.

Statistical analysis

The SPSS version 27 software program was used in this study's statistical analysis of social science data. The data were summarized using descriptive statistics, and the relationships between variables were looked at using Mann-Whitney test and Kruskal-Wallis for correlation analysis.

Results

Sociodemographic characteristics

A total of 170 individuals participated and completed the questionnaire, with an equal distribution of respondents, comprising of 85 females (50%) and 85 males (50%). The majority of the participants (65.9%) fell within the 20-30 age group and had bachelor's degree in pharmacy (71.2%) as their highest qualification. 60 participants (35.3%) had one year of experience in community pharmacy as the largest duration category. (Table 1) summarizes the characteristics of the participants.

Table 1 Sociodemographic characteristics of the participants.

Variables		No.	%
Gender	Female	85	50.0
	Male	85	50.0
Age Groups	20-30	112	65.9
	31-40	34	20.0
	41-50	16	9.4
	51-60	5	2.9
	Above 60	3	1.8
Highest Educational level	Bachelor's degree in pharmacy	121	71.2
	Doctorate Degree in Pharmacy	20	11.8
	Master's degree in pharmacy	29	17.1
Practicing as a Community Pharmacist	6 Months	26	15.3
	1 Year	60	35.3
	2 Years	47	27.6
	4 Years	11	6.5
	5 Years	26	15.3
	Total	170	100

Perception towards antimicrobial resistance

According to the study findings from (Table 2), AMS programs are essential in improving patient care. 48 responders strongly agree with this notion, accounting for 28.2% of the total participants. The inclusion of AMS at the community pharmacy level is widely supported by responders. 29.4% of the total, strongly agree with this statement. 33.5% of the total, strongly agree with the belief that "AMS programs help to reduce the problem of antimicrobial resistance". 40.6% of those polled, strongly agree that community pharmacists should be properly trained in this area. This emphasizes the necessity of educating pharmacists with the information and skills needed to guarantee appropriate antimicrobial use and patient safety.

Furthermore, respondents emphasize the need of community pharmacists attending relevant conferences, workshops, and educational activities to improve their awareness of antimicrobial stewardship. This proposition is strongly supported by 35.3% of the total. 21.8% disagree that "individual efforts at AMS have minimal impact on resistance". Nonetheless, a disagreement was observed from 27.6% who firmly believe that the comprehension of Antimicrobial Stewardship (AMS) should be restricted solely to prescribing physicians. Conversely, the majority of 35.3% hold a strong belief that pharmacists bear a significant responsibility in playing a prominent role in antimicrobial stewardship and infection control programs within the healthcare system.

Practices towards antibiotic use and dispensing:

The data shown in (Table 3) highlights significant variations in the dispensing of antimicrobials among the respondents. Notably, a considerable proportion, 31.8%, claimed to always prescribe antimicrobials with full clinical information based on a valid prescription. Conversely, 33.5% admitted to occasionally dispensing antimicrobials without a prescription.

Additionally, 24.7% of the participants revealed that they occasionally prescribed antibiotics in line with local guidelines before dispensing.

Furthermore, 47.6% of respondents emphasized their commitment to never dispensing antimicrobials for durations exceeding those prescribed by the physician, even upon patient request. The study also discovered that 39 respondents 22.9% occasionally collaborated with other healthcare professionals. Meanwhile, 45 participants 26.5% reported often communicating with prescribers when unsure about the appropriateness of an antibiotic prescription.

Regarding patient education, 29.4% of responders expressed an often practice of inquiring about patients' knowledge of prescribed antimicrobials and their usage. Additionally, 28.8% often sought additional clinical information, such as drug interactions, adverse drug reactions, and allergies, before dispensing the prescribed antibiotic. Notably, 38.2% of respondents always educated patients on the proper use of antimicrobials and issues related to antimicrobial resistance.

The study revealed that 27.1% of participants occasionally took part in antimicrobial awareness campaigns to promote optimal antimicrobial use, while 35.3% always made efforts to prevent or reduce the transmission of infections.

Table 2 Perception towards antimicrobial resistance

	Variables	No.	%
AMS programs improve patient care	Strongly Disagree	6	3.5
	Disagree	8	4.7
	Neutral	40	23.5
	Agree	68	40.0
	Strongly agree	48	28.2
AMS should be incorporated at community pharmacy level	Strongly Disagree	5	2.9
	Disagree	9	5.3
	Neutral	33	19.4
	Agree	73	42.9
	Strongly Agree	50	29.4
AMS programs reduce problem of antimicrobial resistance	Strongly Disagree	7	4.1
	Disagree	10	5.9
	Neutral	29	17.1
	Agree	67	39.4
	Strongly Agree	57	33.5
Adequate training should be provided to community pharmacists on antimicrobial use	Strongly Disagree	6	3.5
	Disagree	6	3.5
	Neutral	24	14.1
	Agree	65	38.2
	Strongly Agree	69	40.6
Relevant conferences, workshops and other educational activity are required to be attended by community pharmacists to enhance understanding of antimicrobial stewardship	Strongly Disagree	5	2.9
	Disagree	13	7.6
	Neutral	29	17.1
	Agree	63	37.1
	Strongly Agree	60	35.3
Individual efforts at antimicrobial stewardship have minimal impact on antimicrobial resistance problem	Strongly Disagree	12	7.1
	Disagree	37	21.8
	Neutral	46	27.1
	Agree	61	35.9
	Strongly Agree	14	8.2
I think that the prescribing physicians are the only professionals who need to understand antimicrobial stewardship	Strongly Disagree	47	27.6
	Disagree	41	24.1
	Neutral	35	20.6
	Agree	33	19.4
	Strongly Agree	14	8.2
Pharmacists have a responsibility to take prominent role in antimicrobial stewardship and infection control programs in health	Strongly Disagree	7	4.1
	Disagree	14	8.2
	Neutral	25	14.7
	Agree	64	37.6
	Strongly Agree	60	35.3

Table 3 Practices towards antimicrobial resistance

	Variables	No.	%
I dispense antimicrobial on prescription with complete clinical information	Never	7	4.1
	Rarely	25	14.7
	Occasionally	31	18.2
	Often	53	31.2
	Always	54	31.8
I dispense antimicrobials without a prescription	Never	15	8.8
	Rarely	40	23.5
	Occasionally	57	33.5
	Often	43	25.3
	Always	15	8.8
I dispense antimicrobial for durations more than prescribed by the physician on patient's request	Never	81	47.6
	Rarely	38	22.4
	Occasionally	27	15.9
	Often	12	7.1
	Always	12	7.1
I screen the antimicrobial prescription in accordance with local guidelines before dispensing	Never	20	11.8
	Rarely	45	26.5
	Occasionally	42	24.7
	Often	39	22.9
	Always	24	14.1
I collaborate with other health professionals for infection control and antimicrobial stewardship	Never	22	12.9
	Rarely	45	26.5
	Occasionally	39	22.9
	Often	37	21.8
	Always	27	15.9
I communicate with prescribers if I am unsure about the appropriateness of an antibiotic prescription	Never	17	10.0
	Rarely	31	18.2
	Occasionally	38	22.4
	Often	45	26.5
	Always	39	22.9
I sought additional clinical information (E.g., drug interaction, ADRs, allergy, etc.) before deciding to dispense the antibiotic prescribed	Never	9	5.3
	Rarely	22	12.9
	Occasionally	42	24.7
	Often	49	28.8
	Always	48	28.2
I take part in antimicrobial awareness campaigns to promote the optimal use of antimicrobials	Never	17	10.0
	Rarely	31	18.2
	Occasionally	46	27.1
	Often	46	27.1
	Always	30	17.6
I educate patients on the use of antimicrobials, and resistance-related issues	Never	5	2.9
	Rarely	16	9.4
	Occasionally	31	18.2
	Often	53	31.2
	Always	65	38.2
I make efforts to prevent or reduce the transmission of infections	Never	7	4.1
	Rarely	12	7.1
	Occasionally	35	20.6
	Often	56	32.9
	Always	60	35.3
I ask the patients about their knowledge of prescribed antimicrobial and its usage	Never	12	7.1
	Rarely	29	17.1
	Occasionally	40	23.5
	Often	50	29.4
	Always	39	22.9
	Total	170	100

The independent samples Mann-Whitney U were conducted to compare the mean rank of perceptions towards antimicrobial resistance and practices towards antimicrobial resistance between female and male participants. Results revealed no statistically significant differences in perception between genders (M-WU (168) = 3096.5, $P > 0.05$), indicating similar levels of understanding across sexes. Similarly, no significant distinctions were found in

practices towards antimicrobial resistance between female and male participants (M-WU (168) = 3419.0, $P > 0.05$), suggesting comparable behavioral responses regardless of gender. These findings underscore the importance of addressing antimicrobial resistance through education and interventions that are inclusive of diverse demographic groups, aiming to promote awareness and appropriate practices uniformly. (Table 4&5)

Table 4 Perceptions towards antimicrobial resistance and practices towards antimicrobial resistance across gender

Gender		N	Mean Rank	Mann-Whitney U
Perception towards antimicrobial resistance	Female	85	91.57	3096.5 ($P = 0.106$)
	Male	85	79.43	
Practices towards antimicrobial resistance	Female	85	87.78	3419.0 ($P = 0.546$)
	Male	85	83.22	

Table 5 Perceptions towards antimicrobial resistance and practices towards antimicrobial resistance across different age group

	Age	N	Mean	Kruskal-Wallis test
Perception towards antimicrobial resistance	20-30	112	78.77	10.28 ($P = 0.036^*$)
	31-40	34	95.46	
	41-50	16	115.63	
	51-60	5	67.60	
	Above 60	3	93.00	
	Total	170		
Practices towards antimicrobial resistance	20-30	112	79.01	9.20 ($P = 0.056$)
	31-40	34	89.84	
	41-50	16	102.16	
	51-60	5	129.10	
	Above 60	3	117.00	
	Total	170		

*Significant at level ($P < 0.05$)

As shown in table 6 The correlation coefficient between perception towards antimicrobial resistance and practices towards antimicrobial resistance is significant at the 0.01 level (2-tailed), with a value of .433**. This indicates a moderately strong positive correlation between perception and practices towards antimicrobial resistance. In simpler terms, individuals who have a better understanding or perception of antimicrobial resistance tend to engage in better practices to combat it. Conversely, those with poorer perceptions are more likely to exhibit inadequate practices in managing antimicrobial resistance.

Discussion

The fact that antibiotics are the most commonly administered medications worldwide highlights the pressing need to address the problem of antibiotic resistance.⁽⁶⁾ Unbelievably, almost 80% of antibiotics are used in the community,⁽⁷⁾ where they are either given by medical experts or directly purchased by patients without a valid prescription from a variety of sources, including community pharmacies. The purpose of this study was to assess community pharmacists' knowledge, perception, and practices towards the AMS program in Erbil, Iraq.

The study included 85 males and 85 females; majority were young ages. The majority (85%) had less than five years of community pharmacy experience, possibly

due to an increase in the number of pharmacies opening in the city and a consequent need for pharmacists to fill these positions. People with little to no prior work experience were probably hired to fill these positions in order to meet the demand for employment.

The study's findings showed that a significant number of the participants were not only aware of AMS programs but also expressed agreement with their potential advantages. Participants acknowledged the value of AMS programs in reducing antimicrobial resistance, improving patient outcomes, and enhancing awareness on rational antibiotic use, these findings are consistent with similar studies conducted in Malaysia and Pakistan.⁽⁸⁻¹⁰⁾

Knowledge and awareness of pharmacists can be improved, and responsible antimicrobial use in community settings should be encouraged, with the help of targeted educational training. The majority of responders (40.6%) in this study believed that pharmacists should receive training. A study conducted in Egypt revealed that implementing an educational program on AMS significantly improved the practice of the participants.⁽¹¹⁾

Many participants in our survey believed that attending relevant conferences, workshops, and other educational events is crucial for community pharmacists to expand their knowledge of antimicrobial resistance (AMS). This notion is confirmed by a study conducted in Jordan, which determined

Table 6 Spearman's Rho between perception towards antimicrobial resistance and practices towards antimicrobial

		Perception towards antimicrobial resistance	Practices towards antimicrobial resistance
Perception towards antimicrobial resistance	Spearman's rho	1	0.287**
	Sig. (2-tailed)		< 0.001
Practices towards antimicrobial resistance	Spearman's rho	0.287**	1
	Sig. (2-tailed)	< 0.001	

** . Correlation is significant at the 0.01 level (2-tailed).

that participation in an educational workshop greatly enhanced pharmacists' knowledge and perceptions regarding AMS.⁽¹²⁾ Even though the participants in this study were aware of and acknowledged the advantages of AMS programs, a worrying gap was found between their beliefs and behaviors. Research shows that there is a significant gap between scientific evidence and clinical practice guidelines, and the actual implementation of these guidelines in clinical settings.⁽¹³⁾

According to the study's findings, most participants acknowledged dispensing antibiotics without a prescription. This finding highlights a significant problem with adherence to responsible antimicrobial use. Antibiotic dispensing without a prescription (DAWP) is an alarming practice that occurs all over the world; it has also been documented in Eritrea and Armenia.^(14,15)

This phenomenon involves community pharmacists or other healthcare practitioners giving patients antibiotics without a valid prescription from a qualified healthcare provider. The availability of antibiotics without proper medical supervision makes it easier for people to use them irrationally.

In 2020, the Iraqi National Antimicrobial Guideline (INAG) was developed with the main objective of promoting the rational use of antibiotics. The guideline stressed the importance of a clear diagnosis, which requires minimal appropriate investigations for diagnosis and prognosis, as well as the need to conduct follow-up microbiological samples before beginning antibiotic therapy, even in cases where empiric therapy is taken into account.⁽¹⁶⁾ The INAG discouraged the prescription of antibiotics for viral sore throats, simple coughs and colds, and acute self-limiting upper respiratory tract infections in order to ensure the rational use of antibiotics. Nevertheless, despite these guidelines, Iraq continues to be rife with the improper practice of giving antibiotics without a prescription. Another study conducted in

Iraq revealed that DAWP is a common practice in community pharmacies in Baghdad capital city.⁽¹⁷⁾ Similar to this, a Pakistani study revealed that many community pharmacists frequently prescribe antimicrobials without a prescription for a variety of common conditions, including skin infections, influenza, sore throats, diarrhea, ear infections, toothaches, pharyngitis, sinusitis, and colds.⁽¹⁸⁾

Lack of severe law enforcement and efficient regulatory measures may be one of the factors contributing to the persistence of DAWP in Iraq and other regions. Iraq may have difficulties implementing and enforcing such strict restrictions. In Saudi Arabia, on the other hand, the introduction of DAWP laws in 2018 led to the imposition of significant fines, and the potential cancellation of licenses for non-compliance, which resulted in significant decrease of DAWP.⁽¹⁹⁾

Our results showed that the participants in our study never or rarely (47.6% and 22.4% respectively) dispense antibiotics for periods longer than prescribed even upon patient request. Another study conducted in Pakistan reported that 28% of pharmacists dispensed antibiotics for periods longer than prescribed.⁽⁹⁾

Collaboration between pharmacists and healthcare professionals has been found to improve patient care and outcomes. The majority of our survey participants showed a positive tendency toward collaborating with other medical experts to combat infection. This finding is in line with studies conducted in Ethiopia and Malaysia, which also reported similar results.^(8,20)

The results of this study demonstrate that the participants always, occasionally, and often (28.2%, 24.7%, and 28.8% respectively) seek additional clinical information (e.g., drug interactions, ADRs, allergies, etc.) before deciding to dispense the antibiotic prescribed, and majority of the participants educate patients on the use of antimicrobials and

resistance-related issues. It is critical to assess patients' awareness to ensure that they have the essential information to use antimicrobials effectively. One of the Core Elements of Outpatient Antibiotic Stewardship by Centers for Disease Control and Prevention (CDC) is "Provide educational resources to clinicians and patients on antibiotic prescribing and ensure access to needed expertise on optimizing antibiotic prescribing".⁽²¹⁾

The study findings reveal that gender does not affect perceptions or practices related to antimicrobial resistance, suggesting that both groups have similar degrees of understanding regarding antibiotic use and resistance, it has been shown that this variation is mostly affected by several factors, notably sociodemographic characteristics. However, research findings suggest that males exhibited a comparatively lower level of overall understanding and knowledge regarding antibiotic use and resistance when compared to females as it has been shown in many studies.⁽²²⁻²⁴⁾ Additionally, significant variations in perception scores were noted across different age groups, possibly pharmacists with a greater number of years of experience are less likely to dispense antibiotics without a prescription, in contrast to their less experienced peers, as same results discovered among other studies.⁽²⁴⁻²⁶⁾

The study found a significant positive correlation between individuals' perception and practices related to antimicrobial resistance. Those with a deeper understanding or perception of antimicrobial resistance are more likely to adopt effective actions to address it. There was a high rate of inappropriate antibiotic practices among community pharmacists in Libya, including dispensing antibiotics on patients' requests and providing shortened courses of antibiotics, despite the pharmacists' good perception of antimicrobial stewardship.⁽²⁵⁾

This underscores the significance of the antimicrobial stewardship programme

training course for community pharmacists. A study conducted by Haseeb and his colleagues in Saudi Arabia indicates that having a good understanding of antimicrobial agents is crucial for effectively managing antimicrobial therapy and treating illnesses caused by various microorganisms.⁽²⁷⁾ Research has shown a positive correlation between the knowledge of medical interns and their practices regarding antibiotic use.⁽²⁸⁾

Conclusion

Our study revealed positive perceptions and practices among community pharmacists regarding antimicrobial stewardship (AMS). A significant finding of the study is the strong belief among community pharmacists that AMS programs play a crucial role in improving patient care and reducing the emergence of antimicrobial resistance. The study also provided encouraging findings about ethical antibiotic dispensing procedures. Overall good perception about AMS related to good practice among community pharmacist and they consistently followed the recommended treatment durations and dispensing antibiotics for periods longer than prescribed. However, several aspects still need improvement, like how to deal with dispensing antibiotics without a valid prescription and incorporating AMS programs into community pharmacies. Improving community pharmacists' participation in AMS requires targeted initiatives aimed at overcoming these gaps. Larger studies involving more Iraqi community pharmacists are essential to validate and strengthen the findings presented in this study.

Competing interests

The authors declare that they have no competing interests.

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