



## Research Article

## Exploring Physicians' Perspectives on Antibiotic Stewardship Implementation: A Qualitative Investigation in Al-Nasiriyah Hospitals

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## Abstract

**Background:** The overuse and inappropriate use of antibiotics cause antimicrobial resistance (AMR). The antibiotic stewardship program (ASP) plays a crucial role in improving prescribing antibiotics. Although the Iraqi Ministry of Health has issued ASP legislation, its full implementation in clinical practice remains incomplete. **Objectives:** To explore physicians' perspectives regarding the current and potential implementation of ASP in Al-Nasiriya hospitals. **Methods:** A qualitative study was conducted in Al-Nasiriya public hospitals from December 17, 2023, to January 21, 2024, using face-to-face interviews. Physicians who prescribe antibiotics, work in Al-Nasiriya public hospitals, and consent to participate in the study were recruited using purposive and snowball sampling, and the size of the sample was specified by saturation. The interviews' audio was transcribed verbatim and analyzed thematically. **Results:** Nine public hospitals in Al-Nasiriya were included in the study. One hospital was excluded because the ASP was activated after data collection began. Sixteen physicians in different specialties were recruited, 15 males and one female. Thematic analysis revealed two major themes: challenges in antibiotic prescribing practices (3 subthemes: antibiotic selection, review, and practice, antibiotic mismanagement, and antibiotic resistance) and antibiotic stewardship implementation (4 subthemes: ASP knowledge and components, perceived benefits and importance, implementation challenges and barriers, and ASP enablers). **Conclusions:** There were many challenges in antibiotic prescribing practice, including antibiotic mismanagement and AMR. The participants acknowledged the importance of the ASP, but they mentioned many barriers to its application.

**Keywords:** Antibiotic stewardship, Antibiotic resistance, Physicians' perspectives.

استكشاف وجهات نظر الأطباء حول تنفيذ الإشراف على استخدام المضادات الحيوية: دراسة نوعية في مستشفيات الناصرية

الخلاصة

**الخلفية:** يؤدي الاستخدام المفرط وغير المناسب للمضادات الحيوية إلى ظهور مقاومة ضدها. يلعب برنامج إدارة المضادات الحيوية دورًا حاسمًا في تحسين وصف المضادات الحيوية. أصدرت وزارة الصحة العراقية تشريعات برنامج إدارة المضادات الحيوية؛ ومع ذلك، لم يتم تنفيذه بالكامل في الممارسة السريرية. **الأهداف:** استكشاف وجهات نظر الأطباء فيما يتعلق بالتنفيذ الحالي والمحتمل لبرنامج إدارة المضادات الحيوية في مستشفيات الناصرية. **الطرق:** أجريت دراسة نوعية في مستشفيات الناصرية العامة من 2023/12/17 لغاية 2024/1/21 باستخدام المقابلات وجهًا لوجه. تشمل معايير الإدراج الأطباء الذين يمكنهم وصف المضادات الحيوية والعمل في مستشفيات الناصرية العامة والموافقة على المشاركة في الدراسة. تمت تعبئة المشاركين باستخدام أخذ العينات العمدية والكرة الثلجية، وتم تحديد حجم العينة حسب التشبع. تم تسجيل المقابلات صوتيًا ونسخها حرفيًا وتحليلها موضوعيًا. **النتائج:** شملت الدراسة تسعة مستشفيات عامة في الناصرية. تم استبعاد مستشفى واحد من الدراسة لأن لجنة إدارة المضادات الحيوية تم تنشيطها بعد بدء جمع البيانات. تمت مشاركة ستة عشر طبيبًا في تخصصات مختلفة، 15 ذكرًا وأنثى واحدة. كشف التحليل الموضوعي عن موضوعين رئيسيين: التحديات في ممارسات وصف المضادات الحيوية (تضمنت 3 مواضيع فرعية؛ اختيار المضادات الحيوية ومراجعتها وممارستها، وسوء إدارتها، والمقاومة ضدها) وتنفيذ إدارة المضادات الحيوية (تضمنت 4 مواضيع فرعية؛ معرفة ومكونات برنامج إدارة المضادات الحيوية، والفوائد والأهمية المتصورة، تحديات التنفيذ والحوافز، وممكنات برنامج إدارتها). **الاستنتاج:** هناك العديد من التحديات في ممارسة وصف المضادات الحيوية، بما في ذلك سوء إدارتها والمقاومة ضدها. أقر المشاركون بأهمية برنامج الإشراف على المضادات الحيوية، لكنهم ذكروا العديد من العوائق التي تحول دون تطبيقه. إذا تم تنفيذ ممكنات البرنامج بشكل صحيح، يمكن تطبيقه بنجاح.

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## INTRODUCTION

One major factor contributing to AMR is the overuse and misuse of antibiotics, especially in low- and middle-income countries, as the medications are readily available

and relatively inexpensive [1]. A survey of five teaching hospitals in Baghdad documented the misuse of antimicrobials. It recommended that the Iraqi health authority should develop an action plan for active ASP

and that medical laboratories should perform culture and sensitivity (C/S) tests [2]. The Ministry of Health's annual report for the AMR Surveillance System in Iraq in 2022 revealed that certain infections have high AMR levels, underscoring the necessity for effective therapies [3]. Iraq has developed a "One-Health" strategy to combat AMR by coordinating all industries using antibiotics, including food, agriculture, animal health, and human health. The action plan focuses on addressing AMR through raising awareness, ASP, infection prevention, and control activities [4]. The ASP, a comprehensive healthcare strategy, aims to promote the judicious use of antimicrobials through the execution of evidence-based interventions [5,6]. The fundamental components of hospital ASP involve leadership commitment, accountability, pharmacy expertise, interventions, surveillance, reporting, and training for improved outcomes [6,7]. Despite the implementation of similar ASP strategies, facilities may differ in the outcomes for appropriate antibiotic prescribing. It is crucial to investigate the factors contributing to these variations [8]. The lack of AMR surveillance systems, financial constraints, ASP knowledge, and training among healthcare professionals are significant obstacles to ASP deployment in the Middle East area [9]. The current study aimed to investigate physicians' views on ASP in Al Nasiriya hospitals, identify barriers and facilitators of the program, understand their perspectives, and identify areas requiring further training and improvement.

## METHODS

### *Study design*

A qualitative study was conducted in Al Nasiriyah public hospitals from December 17, 2023, to January 21, 2024.

### *Inclusion Criteria*

Physicians who prescribe antibiotics work in Al-Nasiriya public hospitals and consent to participate are qualified for enrollment in the study.

### *Exclusion Criteria*

We excluded physicians working in Al Nasiriya primary healthcare institutions and private sectors, trainee physicians with limited experience, physicians in public hospitals who did not consent to participate in the study, and physicians who, after the initial discussion, indicated limited awareness or knowledge of ASP.

### *Sampling methods*

Purposive convenience and snowball sampling were adopted. The data saturation point determined the sample size. In other words, the data collection was terminated when it reached a saturation point, meaning new participants gave the same responses and gathering additional data will not yield insightful discoveries.

### *Study procedure*

Physicians' perspectives were obtained through face-to-face, semi-structured interviews with potential study participants. The interview questions were based on an interview guide derived from previous literature, with further probing queries constructed based on participant responses [10-13]. Each interview lasted between 15 and 30 minutes and was conducted in a private setting within the hospital, such as a physician's or pharmacist's room, the administration office, or the continuous education hall. If the participants gave consent, the interviews were audio recorded. If they did not provide consent, as in Iraq, some participants rejected audio recordings due to cultural concerns about privacy and confidentiality [14]. In this case, notes were recorded. All interviews were transcribed verbatim into English.

### *Thematic analysis*

The qualitative information gleaned from the interviews was analyzed using thematic analysis. Braun and Clarke's six-step thematic analysis process was adopted. It includes familiarizing oneself with data, creating preliminary codes, looking for themes, evaluating themes, defining and labeling themes, and preparing a report [15].

### *Ethical considerations*

The study protocol was approved by the Scientific and Ethics Committee at the University of Baghdad/College of Pharmacy and the Iraqi Ministry of Health. All data about participants and patients' confidentiality and privacy were ensured.

### *Statistical analysis*

Descriptive statistics, such as frequencies and percentages for the demographic data of the study were analyzed using the statistical software SPSS.

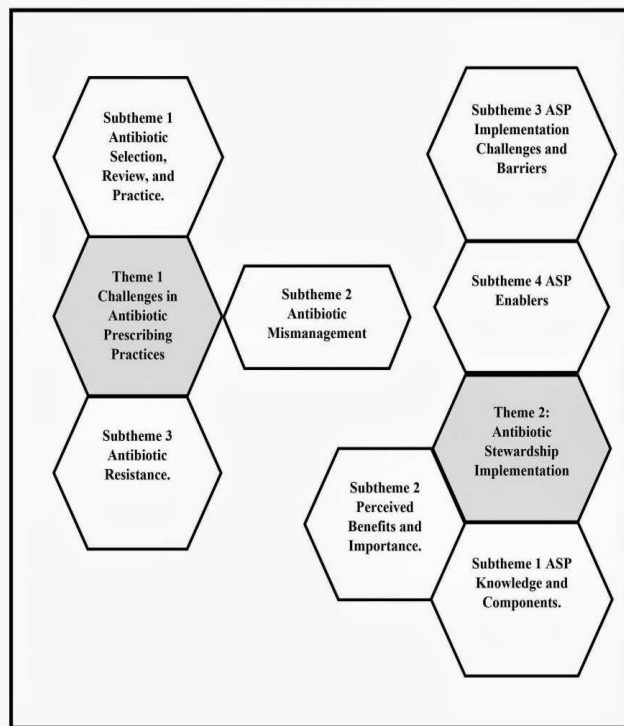
## RESULTS

The study included nine public hospitals in Al Nasiriyah. One hospital was excluded because the Antibiotic Stewardship Committee was established when data collection started, and no prior data was available. Eighty physicians were excluded since they did not have sufficient information about the program (Table 1). All physicians in the gynecology and obstetrics departments were excluded from the study since they had no information about ASP. Sixteen physicians were interviewed until data saturation was obtained, 15 males and one female in different specialties. The mean age of participants was  $43.37 \pm 12.39$  years. The mean duration of employment at the institution was  $19.93 \pm 12.4$  years. The median experience of the participants in a particular specialty was 11.5 years. All participants agreed to audio recording except one physician, where the researcher took notes.

**Table 1:** Demographic characteristics of the participants

Participants	Age	Gender	Duration of employment	Title/Department	Experience (year)
Physician 1	52	Male	28	Professor Doctor, Consultant Physician/Pediatric	21
Physician 2	57	Male	35	Senior Specialist Chief Physician/Internal Medicine	24
Physician 3	63	Male	39	Senior Specialist Chief Physician/Internal Medicine	21
Physician 4	54	Male	30	Professor Assistant Doctor, Consultant Physician/Internal Medicine	22
Physician 5	52	Male	27	Professor Doctor, Consultant Physician/Internal Medicine	20
Physician 6	29	Male	6	Senior Resident Physician/ Internal Medicine	3
Physician 7	30	Male	7	Senior Resident Physician/ Rheumatology Medicine	3
Physician 8	28	Female	4	Senior Resident Physician/ Internal Medicine	1.5
Physician 9	28	Male	4	Senior resident physician/ Nephrology	3
Physician 10	45	Male	21	Professor Assistant Doctor, Consultant Physician/ Internal Medicine	10
Physician 11	32	Male	8	Senior Resident Physician/ Internal Medicine	4
Physician 12	47	Male	23	Consultant Physician/ Internal Medicine	13
Physician 13	32	Male	13	Specialist Physician/ Internal Medicine	2
Physician 14	60	Male	39	Consultant Physician/ Cardiothoracic and Vascular Surgery	19
Physician 15	48	Male	23	Professor Doctor, Consultant Physician/ Internal Medicine	16
Physician 16	37	Male	12	Specialist Physician/ Internal Medicine	3

Thematic analysis revealed two major themes. The first theme was challenges in antibiotic prescribing practices, which included three subthemes: antibiotic selection, review, and practice, antibiotic mismanagement, and antibiotic resistance. The second theme was antibiotic stewardship implementation, which included four subthemes: ASP knowledge and components, perceived benefits and importance, implementation challenges and barriers, and ASP enablers (Figure 1).



**Figure 1:** The two major themes. Theme 1: Antibiotic Prescribing Challenges; Theme 2: Antibiotic Stewardship Program Implementation.

All participants agreed that there is a lack of antibiotic guidelines in Iraq. Almost all of them (15 physicians) demonstrated that they relied on international guidelines

or textbooks in prescribing antibiotics. The 14 physicians mentioned that their lack of communication with the official authority responsible for these guidelines prevented them from being aware of the Iraqi guidelines. Some participants (3 physicians) distrusted the national guidelines' reliability, whereas others (3 physicians) acknowledged the need for such guidelines. "We rely on international guidelines. We do not have a local guideline in Iraq to choose antibiotics..." (Physician 4). All participants mentioned adherence to the guidelines in different contexts. Most (14 physicians) claimed a lack of adherence among other physicians. However, 5 physicians expressed concerns about compliance and accountability due to medicolegal responsibility, leading them to follow the guidelines strictly. Many participants (9 physicians) perceived that adherence to guidelines was greater among Board students and professors at the University of Thi-Qar/College of Medicine than among Thi-Qar Health Directorate physicians. "We adopt the textbook because we have a medico-legal responsibility," said Physician 2. The participants mentioned many barriers to adherence to guidelines, whether international or national. Many participants (9 physicians) attributed that to a lack of experience and awareness. Some participants (5 physicians) mentioned that certain physicians use broad-spectrum antibiotics to quickly improve their patients' condition. Some of them (4 physicians) also attributed the issue to resistance to change without enforcement, and others (4 physicians) pointed to a lack of accountability and surveillance by the official authorities. However, three physicians attributed the issue to the challenge of altering treatment plans initiated outside the hospital. A small number of participants, consisting of two physicians, stated that the issue stemmed from a lack of consensus on a specific guideline or a lack of collaboration and teamwork within the hospital. "However, if the law's force fails to enforce the guidelines and there's no accountability or punishment for those who violate them, then it remains unimplemented," said Physician 1. Several participants

(10 physicians) expressed that the hospital prioritized the availability of antibiotics over adherence to the guidelines, which were not available within the hospital. Some (4 physicians) said they had to use the same antibiotics for all patients and that antibiotic diversity is important. Others (8 physicians) were concerned about patient-influenced treatment decisions since patients' affordability of treatment outside the hospital was an issue. Moreover, the official authority instructs physicians to adhere to an essential medicine list and prohibits the practice of sending patients to purchase medications outside the hospital. Also, some participants (3 physicians) mentioned societal pressures as a crucial factor impacting guideline adherence. *"The hospital prioritizes the availability of medicines over guidelines, sending patients to buy them from private pharmacies when they are unavailable, a move that the Ministry finds objectionable."* (Physician 3). Concerning antibiotic practices, the participants demonstrated that antibiotic selection decision-making was based on experience and hierarchy. Most participants (12 physicians) mentioned that the specialist physicians' experience was a crucial factor in prescribing antibiotics. However, many participants (9 physicians) ensured that the senior resident physician had a decision-making role, too. *"In most cases, the senior resident physician begins treating the case; therefore, the senior resident physician makes more decisions..."* (Physician 6). The participants also discussed the criteria for antibiotic selection. All participants agreed with the empirical use of antibiotics. Many participants (11 physicians) mentioned that the selection was based on the site and type of infection. Some participants (5 physicians) mentioned the patient's condition, such as chronic diseases and renal function, as a determinant for selection. Some participants (5 physicians) revealed that they gave prophylactic antibiotics as a preventive measure for secondary infections. Some participants (6 physicians) mentioned the availability of resistance information, such as C/S testing, as a crucial factor for antibiotic selection. Although all participants revealed the prevalence of empirical antibiotic use, many participants (10 physicians) demonstrated the importance of sending blood samples for C/S testing before antibiotic administration for targeted treatment. Also, some participants (4 physicians) mentioned the use of a combination of antibiotics as an option for treating certain conditions: *"The choice of antibiotic is based on the site of infection, whether it is respiratory, GIT, urinary, or cellulitis."* (Physician 12). Regarding antibiotic review and monitoring, the participants discussed reviewing the antibiotics used and monitoring treatment responses. Some participants (4 physicians) suggested that if a patient is well, they should continue the same antibiotic, as this indicates that they are progressing in the right direction. Other participants (6 physicians) mentioned the option of stopping the antibiotic in cases of resistance, sending samples for C/S testing, and then prescribing antibiotics accordingly.

Many participants (9 physicians) suggested changing the antibiotic if there was no response and adjusting the prescription based on the results of C/S testing. Some participants (2 physicians) revealed that they add antibiotics for certain cases. Others (3 physicians) demonstrated that treatment duration is a determinant of antibiotic discontinuation. Some participants (7 physicians) revealed that selective C/S sampling was done in critical cases. In comparison, others (2 physicians) mentioned that resistance cases triggered the antibiotic review. Many participants (11 physicians) mentioned that they monitored the clinical response of the patient to prescribed antibiotics, and some of them (6 physicians) mentioned that they trusted the patient's clinical features more than the C/S testing results. Additionally, a significant number of participants (9 physicians) indicated that they not only monitored the clinical response to antibiotics, but also monitored the inflammatory markers. *"I give the treatment empirically and follow the response clinically; we rely on signs and symptoms. If the patient responds, continue."* (Physician 1). Regarding the subtheme of antibiotic mismanagement, all participants expressed concerns about misuse, overuse, and misconception of antibiotics in Al-Nasiriya hospitals. They also mentioned the limited C/S testing for targeted antibiotic selection. Some participants (5 physicians) mentioned the improper use of antibiotics for viral infections. Some participants (4 physicians) mentioned medication errors, including wrong duration, wrong dose, prescribing error, omission error, and timing error. Others (3 physicians) questioned the necessity of using a combination of antibiotics, which could potentially reach triple or quadruple doses in situations where a single or double antibiotic might suffice. A few participants (2 physicians) mentioned the lack of utilization of minimum inhibitory concentration (MIC) data due to either unavailability of MIC reports or unfamiliarity with their application in clinical practice. Although only two physicians reported prescribing ceftriaxone and meropenem as the most common antibiotics, participants mentioned them seven and twelve times, respectively, during the interviews. *"Why are you giving meropenem, vancomycin, and Flagyl to a patient who only has urosepsis?"* (Physician 15). Regarding antibiotic resistance, all participants perceived the susceptibility to and severity of AMR. Although many of them (10 physicians) recognized AMR as a global trend that threatened the extinction of humanity, a few (2 physicians) complained of some other physicians' lack of awareness. For various reasons, all participants demonstrated a lack of implementation and utilization of antibiograms. Many participants (9 physicians) revealed that there were information gaps due to a lack of communication among healthcare workers. However, a few others (2 physicians) expressed their distrust or lack of confidence in the results or utility of antibiograms. *"The majority of antibiotics are resistant, and the patient either recovers on his own or dies."* (Physician 7). In theme 2 that concerns ASP Implementation (ASP

Knowledge and Components), a few participants (2 physicians) mentioned that the ASP was a recent program, and some (7 physicians) mentioned that they learned about this topic during antibiotic week workshops and lectures. However, many participants (9 physicians) demonstrated that personal efforts were a vital factor in knowledge acquisition through self-reading, international conferences, and communication. Others (8 physicians) highlighted the significance of official authority instructions in this program. The participants discussed many categories of ASP components, or core elements. Most participants (13 physicians) spoke about the committee and the role of teamwork and collaboration. Many participants (12 physicians) emphasized the importance of leadership commitment and the role of the hospital director. Although all participants mentioned the physician's role in this program, many of them (11 physicians) agreed with the pharmacist's role. Half of them mentioned the role of nurse, others (7 physicians) mentioned the role of laboratory representative, and a few (2 physicians) mentioned the role of infection prevention and control representative in the program. Many participants (11 physicians) demonstrated the importance of monitoring, feedback, and reporting mechanisms. Some participants (4 physicians) mentioned the action implementation intervention as a crucial component, and others (6 physicians) revealed the importance of institutional guidelines and policies. Additionally, four physicians highlighted the significance of collaborating with official authorities during program activities. *"During Antibiotics Week, we began by introducing the program to implement it in cooperation with pharmacists."* (Physician 5). Regarding the issue of perceived benefits and importance of ASP, all participants agreed with the ASP's role in optimizing antibiotic usage. Most of them (13 physicians) mentioned that it aided in addressing misuse and overuse. Some of them (3 physicians) mentioned its role in managing the duration of antibiotics, some others (6 physicians) revealed its advantages in antibiotic selection criteria, and others (6 physicians) demonstrated the benefits of supporting clinical decision-making. *"The antibiotic stewardship program represents the proper selection of antibiotics, with the presence of a guideline..."* (Physician 3). Additionally, the participants mentioned the program's public benefit. They all mentioned its role in addressing AMR and its future implications. Most participants (14 physicians) mentioned the program's benefits and importance in infection prevention measures. Many (9 physicians) demonstrated its broad societal and public health impact. Additionally, a group of five physicians highlighted the program's economic implications and cost-effectiveness. *"A global program whose goal is to reduce resistance and, in general, the use of antibiotics."* (Physician 9). Moreover, the participants discussed the benefits of the program for patients. Some participants (7 physicians) mentioned the program's impact on the mortality rate. Many participants (10 physicians)

mentioned that the program enhanced patient outcomes. Some of them (5 physicians) revealed the program's role in improving treatment efficacy and speed. Additionally, four other physicians demonstrated the program's role in minimizing the adverse effects of antibiotics. *"In the end, we will reduce morbidity and mortality."* (Physician 8). Regarding the implementation challenges and barriers of ASP in Al-Nasiriya, the participants stated that there were numerous challenges and barriers, with the first being the lack of training and education. All participants mentioned the presence of knowledge and education gaps, and some (4 physicians) complained of the lack of practice and studies regarding the program. *"We need more training at various levels and individually. We need to train nurses on infectious diseases, laboratory workers on the laboratory culture unit, specialist physicians, and rotating resident physicians,"* stated Physician 2. Some participants (5 physicians) identified the second barrier as a lack of leadership commitment. Others (8 physicians) revealed a lack of resources and institutional support. Half of the participants mentioned the unavailability of antibiotics, which are essential for targeted treatment based on the results of C/S testing. Most participants (15 physicians) discussed the inadequate laboratory facilities in Al Nasiriya hospitals. Some of them (3 physicians) mentioned the lack of C/S in some hospitals; others (5 physicians) mentioned the lack of C/S on the night shift; and some others (4 physicians) always mentioned the lack of C/S in the emergency department and outpatients. Many participants (10 physicians) confirmed the delay of C/S results, whereas others (10 physicians) distrusted them due to contamination or unexpected results from limited laboratory personnel experience. Lastly, seven physicians pointed out that public hospitals lack laboratory tests such as procalcitonin, despite their availability in the private sector. A few (2 physicians) discussed routine or bureaucratic procedures as barriers. *"The hospital director must take his role, follow up, and instruct the hospital,"* said Physician 7. Additionally, *the ineffectiveness and inactivity of the committees were perceived by all participants.* Most participants (14 physicians) had these negative perceptions due to the lack of communication and teamwork among healthcare workers. Some participants (5 physicians) perceived inactive stewardship committee personnel or members, while the remaining 11 physicians attributed this to a lack of practical application of the program. Most participants (15 physicians) perceived a lack of involvement in the program. *"The hospital lacks antibiotic stewardship, with no council, management, or guidelines for antibiotic administration"* (Physician 1). The participants also identified surveillance and monitoring barriers as significant obstacles. Ten of the participants mentioned the monitoring challenges and physicians' resistance to change, whereas some of them (3 physicians) demonstrated the presence of hierarchical discrepancies in oversight. Additionally, all participants discussed the barriers associated with ASP guidelines,

specifically highlighting the absence of guidelines in Iraq. Many participants (10 physicians) expressed concerns about the challenges of implementing ASP guidelines in hospitals, even if they were sent by the official authority. Additionally, six physicians highlighted the perceived obstacles to effective infection prevention. These barriers included limitations within the health system and specific procedural issues. For example, physicians noted that improper practices, such as random camera use, improper catheter insertion, and inappropriate inhaler techniques, increased the risk of hospital-acquired infections. At the same time, others (4 physicians) mentioned limited access to comprehensive infectious disease management expertise. A few participants (2 physicians) demonstrated hospital instability, exacerbated by the COVID-19 pandemic. Also, many participants (11 physicians) mentioned the negative impact of the private sector on the public sector, and a few of them (2 physicians) warned of the impact of substandard antibiotics on treatment outcomes. *"Dispensing antibiotics by hand in private pharmacies is one of the causes of antibiotic resistance."* (Physician 4). In the ASP enablers section, the participants deliberated on program implementation enablers or facilitators, irrespective of their availability or feasibility; that is, they assumed that if a category existed, it would serve as a facilitator or enabler. The first enabler was self-efficacy, where many participants (10 physicians) had confidence in their contribution to the program. The second was human resources and expertise, as demonstrated by many participants (11 physicians). Some participants (7 physicians) considered pharmacist involvement in clinical decisions an enabler. Many participants (9 physicians) mentioned academic engagement as an enabler, specifically the teaching centers supervised by professors at the College of Medicine at the University of Thi-Qar. Some participants (7 physicians) demonstrated the importance of collaborative teamwork. *"The presence of the pharmacist with the physician during the morning tour is the most crucial facilitator,"* said Physician 2. The participants also expressed their awareness of the program's requirements. Some participants (3 physicians) mentioned the importance of leadership commitment; others (5 physicians) mentioned financial resources; others (5 physicians) mentioned the quality of the laboratory services; and some others (3 physicians) mentioned the availability of antibiotics. All participants agreed that organizational strategies for improvement are necessary. They advocated systematic improvement and official intervention. Some participants (4 physicians) mentioned the need to ensure collaborative efforts with official authorities. Some participants (7 physicians) revealed the need to establish institutional guidelines and policies. Many participants, specifically nine physicians, expressed their desire for the program requirements to be provided. All participants affirmed the necessity of implementing education and training, while some others (5 physicians) suggested raising public awareness. Half of the participants mentioned the importance of media

engagement, whereas a few participants (two physicians) requested integration into the school curriculum. Some participants (6 physicians) revealed the need to implement specialized personnel and comprehensive systems, whereas others (6 physicians) requested structural reforms. Many participants (11 physicians) confirmed the need to incorporate monitoring and feedback mechanisms. Also, half of the participants requested government oversight and enforcement of the private-sector antibiotic prescription policies, whereas some (3 physicians) requested the application of a reward and punishment system. *"The Ministry must adopt the issue in the public and private sectors, and the prescriptions must be inspected, and compliance with the instructions must be enforced."* (Physician 3).

## DISCUSSION

Physicians' perspectives in the current study revealed a high consumption of empirical broad-spectrum antibiotics with limited C/S testing. These findings are consistent with previous studies in Iraq, which showed similar findings [2,9,16–20]. All participants agreed with the lack of Iraqi guidelines, while many mentioned reliance on experience. Despite the publication of national guidelines by the Iraqi Ministry of Health, it is crucial for Iraqi physicians to either familiarize themselves with or become aware of these policies [21]. This was consistent with the study by Al-Jumaili *et al.*, which assessed the state of clinical antibiotic prescriptions and outlined the types of antibiotics utilized in Iraqi public hospitals. Al-Jumaili *et al.*'s study highlights a preference for prescribing antimicrobials based on clinical experience rather than evidence-based guidelines, which may cause AMR [17]. All participants noted the high prevalence of empirical treatment, the reliance on the site of infection for antibiotic selection, and the limited use of C/S testing, even in response monitoring. Some participants preferred the clinical response or inflammatory marker over C/S, which aligns with previous studies [2,9,18]. The physicians highlighted the absence of Iraqi antimicrobial prescribing guidelines, their reliance on international guidelines or textbooks, and the numerous obstacles to following these guidelines, with the most significant being the availability of antibiotics and patients' affordability when purchasing them from outside hospitals. The Bizri *et al.* study, which evaluated AMR in Egypt, Iraq, Jordan, and Lebanon and identified barriers to implementing antimicrobial stewardship initiatives, aligned this with current findings. The Bizri *et al.* study revealed a lack of infectious disease treatment protocols or guidelines, and the high price of modern antimicrobials plays a crucial role in determining the choice of empirical antibiotics and presents a significant obstacle to successfully managing multi-drug resistance (MDR) [9]. All physicians mentioned various antibiotic mismanagements, such as misuse, medication error, and unsuitable combinations. This result was consistent with

the Abdulbary *et al.* study, which intended to discuss the most prevalent abuse of antibiotics and recommend that pharmacists guide antibiotic selection [22]. Participants also mentioned using antibiotics for viral infections as a problem, consistent with the Mustafa *et al.* study that sought to evaluate the state of the ASP and the prevalence and quality indicators of antimicrobial usage, especially after the COVID-19 pandemic. The Mustafa *et al.* study demonstrated the frequency of antibiotic use, especially carbapenem, contrary to guidelines for viral infections like COVID-19 [18]. In comparison, Mikhael's survey in Baghdad revealed that 20% of Iraqi community pharmacists solely dispense antibiotics for the treatment of the common cold, with amoxicillin being the predominant choice. This indicates inadequate clinical and communication competencies, resulting in illogical antibiotic distribution and suboptimal patient education [23]. All physicians revealed several barriers and challenges to ASP implementation. These included a lack of education and training, resource shortages, a lack of antibiogram implementation, and inadequate laboratory facilities. These results were identical or consistent with the study by Bizri *et al.*, who also highlighted similar barriers [9]. Many physicians mentioned uncontrolled antibiotic use in the private sector as a problem. This aligns with previous studies that documented the over-the-counter use of antibiotics without a prescription and the lack of knowledge about AMR and ASP, highlighting the need for education and awareness raising among pharmacists and the public [24–27]. The Yawuz *et al.* study emphasized the critical need to improve public awareness of the dangers of antibiotic abuse, increase pharmacy school curricula, and concentrate on improving dispensing techniques [27]. According to the Mohammed *et al.* study, most Iraqi community pharmacists had positive opinions about pharmacy education programs [28]. Moreover, the Yawuz *et al.* study provides more proof to policymakers about the significance of enacting national laws and regulations controlling the over-the-counter sale of antibiotics, as doing so will enhance antibiotic use and lower AMR [27]. The Iraqi strategic plan needs to incorporate the physicians' positive perception of the importance and benefits of ASP, along with the presence of ASP enablers such as human resources and expertise [4].

### Limitations of the study

The qualitative method of this study prevents generalizing its results. We only included one female participant, excluding all other females, especially those working in the gynecology department, as they required more information on ASP.

### Conclusion

There were many challenges in antibiotic prescribing practice, including the use of empirical treatment, lack of C/S testing, concerns about adherence to guidelines, antibiotic misuse, overuse, and resistance. The

participants acknowledged the importance of the ASP and perceived its benefits, but they mentioned many barriers to its application. If the program enablers were available and recruited properly, the program could be applied successfully.

### Recommendations for future work

Revising Iraqi antimicrobial recommendations, augmenting C/S testing, employing effective antibiograms, disseminating information and training, and refining monitoring and feedback mechanisms will enhance antibiotic prescribing practices. The perspectives of laboratory personnel and nurses regarding antibiotic utilization and Antimicrobial Stewardship Programs must be assessed. Moreover, enhancing health professionals' comprehension, institutional backing, supply necessities, fostering communication and collaboration, addressing private sector practices, refining laboratory services, and instituting formal oversight and accountability would all advance ASP.

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### Conflict of interests

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### Data sharing statement

Supplementary data can be shared with the corresponding author upon reasonable request.

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