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Knowledge of antibiotic prescription guidelines among doctors in Ramadi PHC centers, Iraq

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Abstract

Background: The inappropriate use of antibiotics remains a critical driver of antimicrobial resistance (AMR), posing a significant threat to global public health. Poor adherence to antibiotic prescribing guidelines among healthcare providers contributes to the development and spread of resistant bacterial strains. In Iraq, the extent of this problem, particularly in primary healthcare settings, remains underexplored. This study aimed to assess the knowledge, attitudes, and practices of physicians regarding antibiotic prescription guidelines in primary healthcare centers (PHCs) in Ramadi, Iraq.

Methods: A cross-sectional study was conducted between January and March 2024 among 92 doctors working in PHCs in Ramadi. Data were collected through a structured questionnaire assessing sociodemographic characteristics, knowledge, and attitudes toward antibiotic use. Descriptive and inferential statistical analyses were performed using SPSS version 26.

Results: Among 92 respondents, 52.2% were female, and the majority had less than two years of experience. Although 77.2% reported that their facility provided antibiotic guidelines, only 46.7% had received regular training. Notably, 98.9% acknowledged that misuse of antibiotics contributes to resistance. However, 28.3% still believed antibiotics were effective against viral infections. Attitudes showed that 65.2% consult infectious disease experts before prescribing broad-spectrum antibiotics.

Conclusion: The study highlights moderate awareness but variable adherence to antibiotic prescription guidelines among doctors in Ramadi PHCs. Interventions focusing on continuous training, access to updated guidelines, and multidisciplinary support are essential to enhance rational antibiotic use.

Keywords: Antibiotic Resistance, Prescription Guidelines, Primary Healthcare, Antimicrobial Stewardship, Physician Knowledge, Antibiotic Misuse, Iraq

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Background

Antibiotics are among the most commonly used therapeutic agents worldwide, essential in treating and preventing bacterial infections. However, their overuse and misuse have significantly contributed to the emergence of antimicrobial resistance (AMR), now recognized as one of the most pressing global health threats [1]. AMR occurs when bacteria evolve mechanisms to resist the effects of antibiotics, resulting in prolonged illness, increased mortality, and higher healthcare costs [2]. The World Health Organization (WHO) has repeatedly emphasized the importance of rational antibiotic use, particularly in primary healthcare settings, where most antibiotics are prescribed [3]. A major contributor to inappropriate use is inadequate knowledge of antibiotic prescription guidelines among healthcare providers. For instance, a study in China reported that only 8.7% of 57,009 antibiotic prescriptions were appropriate, highlighting systemic gaps in prescriber education and decision-making [4]. Globally, AMR accounts for an estimated 700,000 deaths annually, a number projected to reach 10 million by 2050 if no significant action is taken [5]. In 2019, 4.95 million deaths were associated with AMR, of which 1.27 million were directly attributed to drug-resistant bacterial infections [6]. Furthermore, antibiotic consumption increased by 46% between 2000 and 2018, rising from 9.8 to 14.3 defined daily doses (DDD) per 1,000 people per day [7]. These statistics underscore the critical need for effective antibiotic stewardship and guideline adherence. In Iraq, the misuse of antibiotics remains a substantial challenge. A study in Karbala found high rates of inappropriate antibiotic use, largely

due to the availability of over-the-counter antibiotics and insufficient regulation [8]. Yet, little is known about prescribing practices and guideline awareness among primary healthcare physicians in Ramadi, Al Anbar province. This study was therefore conducted to assess physicians' knowledge, attitudes, and practices regarding antibiotic prescription guidelines in Ramadi PHC centers. The findings aim to inform targeted interventions and policy actions to improve antibiotic stewardship and mitigate AMR in the region.

Methods

Study design and sampling strategies

This was a descriptive cross-sectional study conducted to assess physicians' knowledge, attitudes, and practices regarding antibiotic prescription guidelines. The study was designed to capture data at a single point in time through self-administered questionnaires.

Study Setting and Duration

The study was conducted in primary healthcare centers (PHCs) located in Ramadi, the capital of Al Anbar Governorate in western Iraq. Data collection occurred between January and March 2024.

Sampling Technique

Convenience sampling was used to select physicians working at PHCs during the study period. Only those available and willing to participate at the time of data collection were enrolled in the study.

Inclusion and Exclusion Criteria

Inclusion criteria included medical doctors currently working in PHCs in Ramadi who consented to participate in the study. Exclusion criteria were non-physician healthcare workers, physicians on leave, and those who refused consent.

Sample size determination

The sample size was calculated based on the Cochran formula:
$n = Z^2 \times p(1-p) / d^2$,
where $Z = 1.96$ for a 95% confidence level, $p = 0.5$ (assumed proportion of knowledge), and $d = 0.1$ (margin of error). This yielded a minimum sample of 96. However, due to time constraints, 92 complete responses were collected and analyzed.

Study Tool

Data were collected using a structured questionnaire consisting of three sections: sociodemographic characteristics, knowledge of antibiotic use and guidelines, attitudes and practice toward antibiotic prescribing. The tool was adapted from validated instruments used in similar studies and modified to fit the local context. Content validity was reviewed by two academic experts.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 26. Descriptive statistics (frequencies, percentages) were used to summarize the data. Associations between variables were tested using Chi-square tests, with a p-value of less than 0.05 considered statistically significant.

Results

Description of the Sample

A total of 92 physicians participated in the study. Of these, 52.2% were female and 47.8% were male. Most respondents were medical doctors (38.0%), followed by pharmacists (32.6%), nurses (16.3%), physician assistants (6.5%), and community health officers (6.5%). Regarding length of service, 58.7% had less than 2 years of experience, while 20.7% had 2–4 years, 10.9% had 5–10 years, and 9.8% had more than 10 years. Most participants (69.6%) had been working in their current facility for less than 2 years. Regarding the type of facility, 63% were based in hospitals, 28.3% in health centers, and 8.7% in clinics.

Table 1: Sociodemographic Characteristics of Participants (n = 92)

Variable	Category	N	%
Sex	Male	44	47.8
	Female	48	52.2
Profession	Doctor	35	38.0
	Pharmacist	30	32.6
	Nurse	15	16.3
	Physician Assistant	6	6.5
	Community Health Officer	6	6.5
Length of Service	< 2 years	54	58.7
	2–4 years	17	20.7
	5–10 years	10	10.9
	> 10 years	9	9.8
Years at Facility	< 2 years	64	69.6
	2–4 years	13	14.1
	5–10 years	8	8.7
	> 10 years	7	7.6
Facility Type	Hospital	58	63.0
	Health Centre	26	28.3
	Clinic	8	8.7

Knowledge Regarding Antibiotic Use

Respondents demonstrated good awareness of key aspects of antibiotic misuse and resistance. A majority (77.2%) reported that their facility provides antibiotic use guidelines, yet only 46.7% received regular training.

Almost all respondents (98.9%) agreed that misuse of antibiotics contributes to resistance. However, misconceptions persist: 28.3% believed antibiotics are effective against viral infections, and 26.1% thought antibiotics help treat the common cold.

Table 2: Knowledge of Antibiotic Use (n = 92)

Question	Response	Frequency	Percentage
Does your health facility provide guidelines for diagnosis and management of patient with infective problem?	Yes	71	77.2
	No	21	22.8
Have you received regular training and education in antibiotic prescribing in your work place?	Yes	43	46.7
	No	49	53.3%
Do you think that the wrong use of antibiotics creates resistance to microbes and reduces the effectiveness of antibiotics?	Yes	91	98.9
	No	1	1.1
Does inappropriate antibiotic prescribing put patients at risk?	Yes	84	91.3
	No	8	8.7
Is it always better to overprescribe antibiotics than to under prescribe?	Yes	11	12.0
	No	81	88.0
Should everyone be able to buy antibiotics without a prescription?	Yes	10	10.9
	No	82	89.1
Antibiotic resistance is a problem in your facility	Yes	79	85.9
	No	13	14.1
Are you consult with infectious diseases experts to prescribe of broad-spectrum antibiotics?	Yes	60	65.2
	No	32	34.8
Are you in contact with your local microbiology laboratory to determine and select the appropriate antibiotic panel?	Yes	24	26.0
	No	68	73.0

Attitudes Toward Antibiotic Prescribing

Attitude-related responses indicated room for improvement in clinical decision-making. While 91.3% recognized the risk of inappropriate antibiotic use, 12% believed overprescribing is better than underprescribing. Notably, 65.2% consult infectious disease specialists before prescribing broad-spectrum antibiotics. Also, 85.9% acknowledged antibiotic resistance as a problem in their facility.

Table 3: Attitudes Toward Antibiotic Use (n = 92)

Question	Response	Frequency	Percentage
Antibiotics are effective in managing common cold?	Agree	43	46.7
	Disagree	26	28.3
	Don't Know	23	25.0
Antibiotics are effective in viral infection management?	Agree	26	28.3
	Disagree	63	68.5
	Don't Know	3	3.2
Antibiotics use might lead to dangerous allergies, which could cause death?	Agree	82	89.0
	Disagree	5	5.5
	Don't Know	5	5.5
Antibiotics will always be effective in the treatment of same infections in the future?	Agree	13	14.1
	Disagree	72	78.3
	Don't Know	7	7.6
Antibiotics should be prescribed before lab tests are done?	Agree	10	10.9
	Disagree	68	73.9
	Don't Know	14	15.2

Practice toward antibiotic prescription

Physicians'' practice toward antibiotic prescribing was measured using five questions which have been illustrated in five figures. Figure 1 reported responses to question about "how you choosing type of antibiotic?". This figure illustrates how physicians select antibiotics. The most common basis is culture and sensitivity results (37%), followed by site of infection (29.3%), bacterial type (12.0%), experience (7.6%), and guidelines (5.4%). A minority (8.7%) do not rely on any specific criteria. Figure 2 reported responses to question about "how you can differentiate between viral and bacterial infection clinically??". This figure shows how respondents clinically distinguish viral from bacterial infections. The top method is assessing toxicity level (34.8%), followed by type of discharge (33.7%), grade of fever (20.7%), and no method (10.9%). Figure 3 reported responses to question about "what is the most reliable factor in prescribing antibiotics?". Respondents reported that both symptoms/signs and lab investigations (48.9%) are the most reliable for prescribing antibiotics, followed by lab investigations alone (34.8%), symptoms and signs (8.7%), and culture results (7.6%). Figure 4 reported responses to question about "what is your role as a medical staff in convincing patients to reduce antibiotic use to treat the common cold?". A majority (82.6%) of physicians report they educate patients about the dangers of misuse, while 11.2% use other methods, and 1.1% comply with the patient's opinion. Figure 5 reported responses to question about "which one of the following antibiotics has the best activity against anaerobes?". Most respondents (57.6%) correctly identified Metronidazole as the most effective antibiotic for anaerobic bacteria, while others selected Ciprofloxacin (13%), Cotrimoxazole (6.5%), or responded "Don't know" (21.7%).

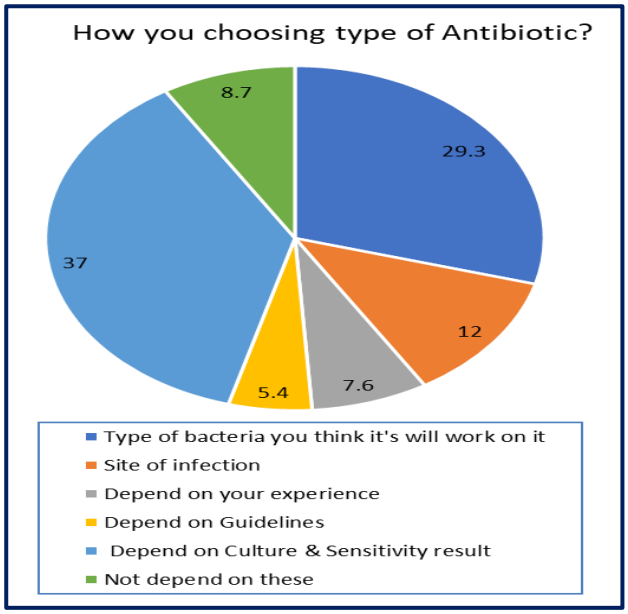

Figure 1: Basis for choosing antibiotic type

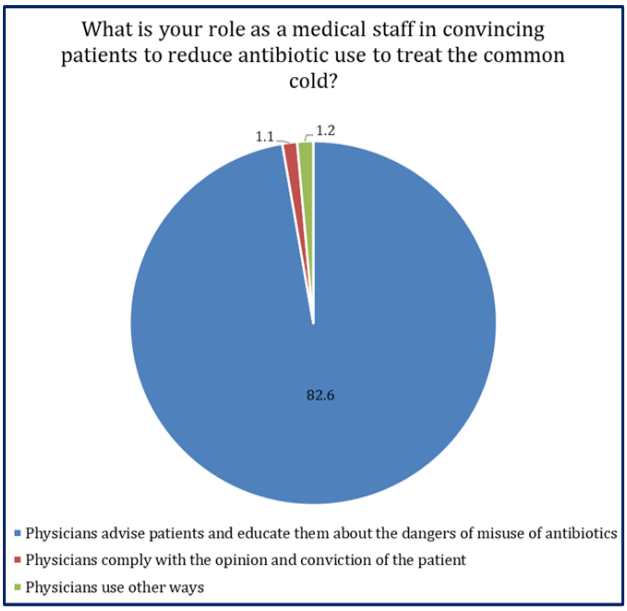

Figure 4: Role of medical staff in reducing antibiotic misuse

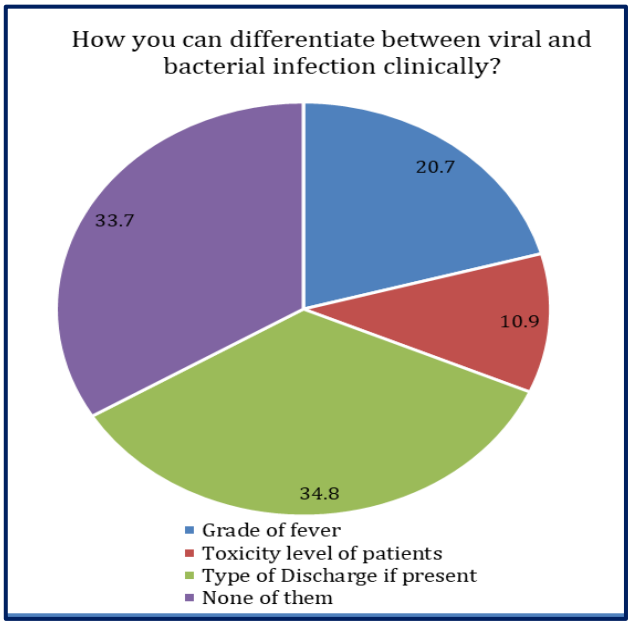

Figure 2: Clinical differentiation between viral and bacterial infections

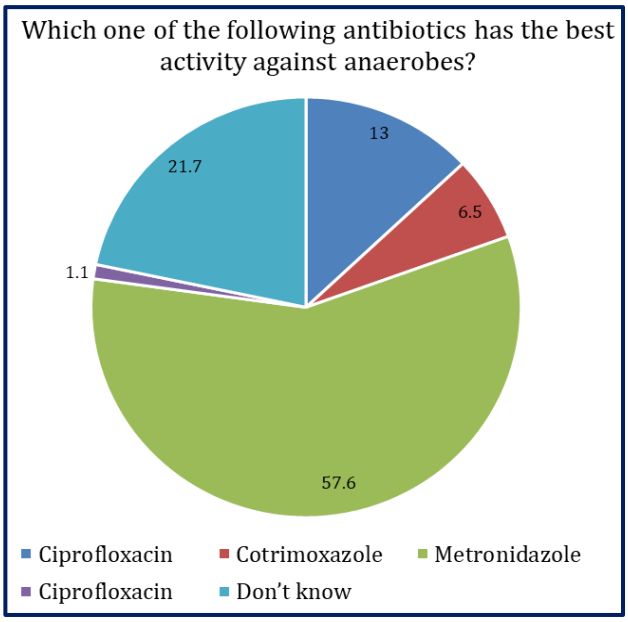

Figure 5: Best antibiotic for anaerobes

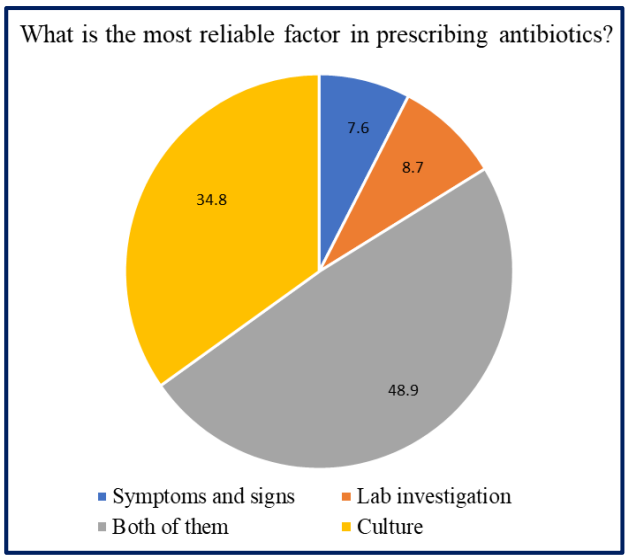

Figure 3: Most reliable factor in prescribing antibiotics

Discussion

This study explored the knowledge and attitudes regarding antibiotic prescription guidelines among physicians working in primary healthcare centers in Ramadi, Iraq. The findings revealed mixed levels of awareness and adherence to recommended practices, highlighting both progress and areas in need of improvement in local antibiotic stewardship. The study found that while 77.2% of physicians reported having access to antibiotic prescription guidelines, only 46.7% received regular training. This gap is concerning given that continued professional education is essential to maintaining up-to-date prescribing practices. Similar trends have been observed globally; a study in China reported that a majority of inappropriate antibiotic use stemmed from lack of guideline knowledge and poor adherence [4]. Most participants (98.9%) correctly identified that misuse of antibiotics contributes to antimicrobial resistance (AMR), aligning with WHO's findings that knowledge of AMR is generally high among healthcare workers but not always

reflected in prescribing behaviors [1]. Nonetheless, the presence of misconceptions—such as 28.3% of participants believing antibiotics can treat viral infections, and 26.1% believing they are effective against the common cold—points to persistent gaps in knowledge. This is consistent with findings from Peng et al. [5], who reported similar knowledge deficits even among educated populations. Encouragingly, 65.2% of respondents reported consulting infectious disease specialists before prescribing broad-spectrum antibiotics. However, the 12% who believe overprescribing is preferable to underprescribing indicates risk-averse behavior that may fuel resistance in the long term. The perception that antibiotic resistance is a problem within local facilities (85.9%) is noteworthy and suggests physicians are aware of the broader implications of their prescribing habits [9]. Yet, awareness alone is insufficient without institutional support, such as training programs, access to diagnostics, and strong prescribing policies [10]. This study has several limitations. The use of a convenience sampling method may limit the generalizability of findings to all PHC physicians in Iraq. In addition, the self-reported nature of responses introduces the potential for social desirability bias, where participants may overstate their adherence to recommended practices. Finally, the cross-sectional design does not allow for causal interpretations.
Mandatory training: Institutionalize regular and updated training programs on antimicrobial stewardship for all PHC physicians [11]. Guideline enforcement: Strengthen the implementation of national or WHO-based prescribing guidelines at the PHC level. Public education: Parallel community-focused awareness campaigns should be introduced to reduce patient-driven demand for antibiotics. Future studies should involve larger, more diverse samples and include clinical audits to compare knowledge with actual prescription patterns.

Conclusion

This study highlights the current status of physicians' knowledge and attitudes toward antibiotic prescription guidelines in primary healthcare centers in Ramadi, Iraq. While general awareness of the dangers of antibiotic misuse and antimicrobial resistance is high, there remain notable gaps in practical understanding, particularly regarding the use of antibiotics for viral infections and the importance of continuous training. The findings indicate that although most physicians recognize AMR as a serious issue and consult experts before prescribing broad-spectrum antibiotics, inconsistent training and limited guideline application persist. These challenges underscore the urgent need for targeted interventions to support rational prescribing behavior at the PHC level. Improving physician education, enforcing standardized guidelines, and strengthening institutional support systems are vital steps to enhance antimicrobial stewardship in Iraq. These efforts should be supported by wider public health initiatives aimed at reducing community-driven antibiotic misuse.

Abbreviation

AMR: Antimicrobial Resistance; PHCs: Primary Healthcare Centers; WHO: World Health Organization; DDD: Defined Daily Doses

Declaration

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Availability of data and materials

Data will be available by emailing ma_m776@yahoo.com

Authors' contributions

All authors had equally participated in the conception of study, data collection, analysis, interpretation, and drafting of the manuscript. All authors have read and approved the final version of the manuscript for publication.

Ethics approval and consent to participate

We conducted the research following the declaration of Helsinki. The study adhered to the necessary research clearance and ethical protocols to protect participant rights and ensure compliance with regulations. Research clearance was granted by Ethic Committee of College of Medicine, Anbar University, Anar, Iraq.

Consent for publication

Not applicable

Competing interest

The authors declare that they have no competing interests.

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