



## EVALUATION OF ANTIMICROBIAL RESISTANCE PATTERNS IN COMMUNITY PHARMACIES: IMPLICATIONS FOR ANTIBIOTIC STEWARDSHIP

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### Abstract:

The discussion highlights the pivotal role of community pharmacists in addressing antimicrobial resistance (AMR) through responsible antibiotic dispensing practices and patient education. Despite challenges such as improper antibiotic use and patient demand for antibiotics without prescriptions, recent pharmacist-led interventions have shown promise in improving antibiotic prescribing practices. Collaboration among healthcare professionals, policymakers, and the public is crucial in addressing the multifaceted factors contributing to AMR. Public awareness campaigns and efforts to improve access to healthcare services are essential in fostering a culture of responsible antibiotic use. Community pharmacists, equipped with their expertise, are well-positioned to play a central role in combating AMR. Through ongoing education and training, pharmacists can enhance their knowledge and skills in antimicrobial stewardship, ultimately contributing to the mitigation of AMR and safeguarding public health.

### Introduction:

The misuse of antibiotics has been found to be a major contributing factor in the development of antibiotic resistance, which is a serious threat to public health worldwide [1,2]. Antimicrobial stewardship initiatives, in which all healthcare professionals must participate, are crucial to addressing this problem [3]. Antimicrobial stewardship initiatives must be implemented in outpatient settings due to the high prevalence of prescriptions for unneeded antibiotics [4]. Preauthorization of medicines, stewardship teams, post-prescription audits and reviews, and the creation of local treatment standards are just a few of the tactics that make up antimicrobial stewardship [5, 6]. As gatekeepers to the use of antibiotics, community pharmacists are essential to antimicrobial stewardship [7, 8]. Antimicrobial dispensing laws, however, differ from nation to nation; some permit over-the-counter sales of antimicrobials even though they are considered prescription-only medications [9,10,11,12]. Research has demonstrated that the administration of antibiotics without a legal prescription is a common problem in various socioeconomic contexts [12]. Healthcare workers and other stakeholders



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must be made aware of their responsibilities with antimicrobial stewardship [3]. Publications describing community pharmacists' initiatives to lower antibiotic use and their involvement in antimicrobial stewardship initiatives are included in this study.

### **Barriers to Antimicrobial Stewardship:**

Although they emphasize the need for further training and sufficient compensation for their efforts, pharmacists support the incorporation of antimicrobial stewardship programs into community pharmacies [13-14]. More than 70% of pharmacists acknowledge the critical role they play in regulating the use of antibiotics, and they see educational programs as an essential tool in the fight against antimicrobial resistance [15-16]. Community pharmacists actively discourage needless medical visits, offer advice on self-care, and support initiatives aimed at preventing infections [17]. Nonetheless, a number of pharmacists acknowledge giving out antibiotics without a legitimate prescription, have false beliefs regarding antibiotic resistance, and are ignorant of antimicrobial stewardship initiatives [18]. Research on antimicrobial stewardship practices in neighborhood pharmacies emphasize the value of allergy testing and patient education, but due to inadequate distribution, the use of existing tools and guidelines is still not at its best [19]. Antimicrobial stewardship initiatives in pharmacies are hampered by a number of factors, such as a lack of funding, restricted access to medical information, a lack of prescribing choices, and trouble getting in touch with patients' general practitioners [20]. Despite these obstacles, pharmacists show proficiency in managing medications; many of them participate in the creation of guidelines and the review of prescriptions, highlighting their ability to play a significant role in the advancement of antimicrobial stewardship initiatives [21]. To optimize their effectiveness in battling antibiotic resistance, further training and assistance may be necessary, as shown by their underutilization.

### **Primary Care Indications:**

Since most antibiotics are used in primary care settings, community pharmacists play a critical role in the fight against antimicrobial resistance. Reminding pharmacists to dispense over-the-counter antimicrobials sensibly and diligently is vital, considering how easily accessible they are. Antimicrobial stewardship requires patient education and counseling regarding prudent self-medication, particularly when antibiotics are not needed [22]. It's also crucial to inform patients about the significance of adhering to antimicrobial therapy and appropriately discarding any unwanted medications. Raised concerns center on how treatment guidelines and registered drug-pack quantities don't match, highlighting the significance of patient adherence to treatment and how to properly dispose of leftover antibiotics [23]. Furthermore, community pharmacists are essential in resolving patient concerns regarding negative drug responses, improving patient outcomes, and, when required, directing patients to general practitioners [24]. They can also work with prescribers to optimize treatment, give physicians feedback, and instruct other members of the healthcare team [24]. Pharmacists may provide immunization services, fast

infectious disease testing, and, when allowed the prescription of antibiotics for common, mild diseases if they have further training or work with doctors in this regard.

### **Respiratory Tract Infections:**

Only 52% of antibiotics recommended for common diseases such as sinusitis, pharyngitis, and otitis media were first-line drugs, according to research by Hersh et al. [25]. This underscores the need for outpatient antimicrobial stewardship. Community pharmacists are acknowledged as important antimicrobial stewards for upper respiratory tract infections. They have the knowledge and skills to interact with patients and prescribers in an efficient manner, providing a vital chance to prevent the overuse of antibiotics [25]. Prescribers are frequently influenced by diagnostic uncertainty, which makes the Centor score and other similar measures crucial for determining the probability of streptococcal pharyngitis [26]. Research conducted in Thailand by Saengcharoen et al. revealed a correlation between pharmacists' knowledge of diagnostic criteria such as the Centor score and a decrease in the amount of antibiotics prescribed. This highlights the significance of pharmacist education and following evidence-based guidelines [26]. At a number of contexts, the use of point-of-care testing for infectious illnesses at community pharmacists has produced encouraging results. Rapid antigen testing for streptococcal pharyngitis has been shown to result in excellent patient satisfaction in studies conducted in Wales and France [27]. These findings suggest that incorporating such services into community pharmacy practice is feasible. These programs not only offer prompt diagnosis and treatment but also help lower the number of needless GP visits and the total use of antibiotics [28]. Moreover, antimicrobial stewardship training for pharmacists has been linked to a drop in respiratory infection referrals to general practitioners and an increase in the provision of self-care guidance, when combined with patient education programs like the TARGET TYI-RTI leaflet. Encouraging communication tactics, such as giving patients textual information, are essential for enabling them to make knowledgeable decisions regarding their health and available treatments [29]. Pharmacists can also encourage delayed antibiotic prescribing strategies by declining to dispense antibiotics right away and by giving patients who need immediate care additional guidance. To sum up, community pharmacists are essential to antimicrobial stewardship, especially when it comes to managing upper respiratory tract infections as effectively as possible. Pharmacists may make a substantial contribution to lowering the inappropriate use of antibiotics and enhancing patient outcomes by utilizing their experience, putting point-of-care testing into practice, and encouraging patient education.

### **Urinary Tract Infections:**

Studies show that a considerable fraction of patients—roughly 25–30%—go to community pharmacies for help with urinary tract infection (UTI) symptoms prior to seeing a medical practitioner. The TARGET UTI booklets are being distributed in England with the intention of improving consumer confidence in self-care and facilitating efficient communication between patients and healthcare providers. Recognizing their role as the first line of care for UTIs,

pharmacists emphasize the benefits of presenting assistance in a community pharmacy setting, including easy access, extended hours, and the pharmacists' expertise in providing guidance. They emphasize the significance of patient compliance in their practice, and their motivation comes from a dedication to patient well-being rather than financial incentives [29]. Family medicine clinics with pharmacist-led stewardship programs have shown to provide substantial contributions to good prescribing practices for mild UTIs, guaranteeing the best possible antibiotic choice, dosage, and course of treatment [30]. Trimethoprim was reclassified in New Zealand to enable pharmacists to treat specific UTIs while adhering to required training and using screening tools to assure appropriate dispensing. This was accomplished without affecting physician prescribing practices or raising the general usage of antibiotics. Even while only a tiny percentage of patients qualified for trimethoprim prescriptions from pharmacists, these programs ease the burden on general practitioner offices and may lower the need for antibiotic prescriptions [31].

Research has indicated that interventions by pharmacists for urinary tract infections (UTIs)—such as evaluation, treatment modification or prescription, education, and referrals—lead to good patient adherence, first-time cure rates, and satisfaction with pharmacist accessibility. In addition, compared to physician care, pharmacist interventions resulted in shorter decision-to-care intervals and changes to a sizable percentage of physician-initiated prescriptions, improving patient convenience and lowering the need for general practitioner appointments [32]. Furthermore, studies have shown that pharmacist-managed UTI treatments are less expensive than those started by emergency room doctors or general practitioners. Additionally, because community pharmacies provide more accessibility to antibiotics, they may reduce the need for patient consultations with general practitioners [33].

### **Antimicrobial Resistance in KSA:**

By battling harmful bacteria strains and stopping the spread of illnesses, antibiotics have been instrumental in saving countless lives. However, the major concern posed by the formation of antimicrobial resistance (AMR) is mainly due to the misuse and overuse of antibiotics, as well as other factors such as inadequate regulation of antibiotic usage in healthcare and agriculture and poor hygiene. Presently, more than 700,000 people die from AMR-related causes each year; estimates indicate that number might soar to 10 million by 2050, with an estimated \$100 trillion in economic costs if unchecked. As a result, the world community has stepped up efforts to address the AMR epidemic, and in 2015, the World Health Organization proposed a comprehensive global action plan [33].

Saudi Arabia has acted locally to reduce the overuse of antibiotics, which is a major cause of AMR. The Ministry of Health (MOH) unveiled an antimicrobial stewardship action plan in 2014, which was strengthened in May 2018 by strict laws that forbade the selling of antibiotics without a prescription [34]. Documented public reaction to these regulatory actions highlights the significance of promoting responsible antibiotic use and increasing knowledge of

AMR [35]. Public education is crucial in the fight against antimicrobial resistance (AMR), as evidenced by the plethora of research that have looked at antibiotic use patterns, misuse, and public knowledge of AMR across various groups and areas within Saudi Arabia [36-37]. Few research have examined the prescribing and dispensing of antibiotics in Saudi Arabian community pharmacies, despite the paucity of data on the subject. Some of these studies have concentrated on the effects of regulatory changes [38-39], and [40]. Nonetheless, there is still a lack of knowledge on community pharmacists' awareness of antibiotic resistance, especially when it comes to in-depth research or studies that span larger geographic areas of Saudi Arabia.

The most often mis prescribed antibiotics, according to the study, were azithromycin and amoxicillin (with or without clavulanic acid), which accounted for 11.1% and 48.2% of errors, respectively. Cefuroxime and ciprofloxacin were less commonly implicated, at 3.5% and 4.3%, respectively [41]. The majority of incorrect antibiotic prescriptions (65.4% of errors) were found to be written by general practitioners (GPs) and dentists, with GPs writing 28.7% of the errors and dentists writing 36.7%. This emphasizes how crucial it is to implement focused teaching initiatives in order to increase adherence to prescription recommendations and reduce errors [41]. Community pharmacies in Saudi Arabia mostly obtain their antibiotic prescriptions from primary care institutions, which include both private and public clinics. Approximately 80–90% of prescriptions for antibiotics are written by general practitioners (GPs), which is comparable to European practices. According to the study, gynecologists and pulmonologists had reduced prescribing error rates, whereas general practitioners and dentists were the most frequent sources [28]. These results highlight the need for improved instruction and training to support appropriate prescribing practices for antibiotics in all areas of medicine.

The mean score of inaccurate antibiotic prescriptions during a month was 3.32, showing a considerable occurrence of errors. The study also evaluated the frequency of prescription errors. These mistakes, which can include giving the wrong dosage, using the wrong frequency, or using the wrong duration, might have an impact on patient safety and increase the burden of antimicrobial resistance [28]. The study also made clear the need for innovative approaches to medication errors and improved healthcare systems in order to reduce the danger of antimicrobial resistance (AMR). Penicillin (amoxicillin with or without clavulanate), cephalosporin (3rd generation), macrolide, and fluoroquinolone are frequently prescribed antibiotics in outpatient clinics and emergency rooms in the Gulf Cooperation Council (GCC) countries, including Saudi Arabia [29]. These trends mirror those seen in other regions.

The research findings indicate that a noteworthy segment of community pharmacists in Saudi Arabia regularly prescribe antibiotics, underscoring their crucial function in the fight against antimicrobial resistance (AMR). But the poll also revealed differences in the ways that antibiotics are dispensed, especially when it comes to non-prescription administration. There was a noticeable distinction between the non-prescription dispensing of oral and topical antibiotics, even though the majority of pharmacists stated that they followed correct dispensing procedures. This variance could result from things like patient preferences or budgetary considerations.

Comparing current research with earlier studies indicates that the Ministry of Health's (MOH) tougher rules have improved antibiotic dispensing procedures. It was discovered that a greater proportion of pharmacists were dispensing antibiotics without a prescription prior to the execution of these restrictions. The decrease in antibiotic abuse that has been seen highlights how successful regulatory actions are in encouraging appropriate antibiotic distribution procedures.

It's important to note that while the survey was mostly conducted among community pharmacies in urban settings, the results of the study may not accurately reflect antibiotic dispensing habits in rural areas. To provide a thorough grasp of the problem in various settings, future research might examine how antibiotics are dispensed in rural areas. Overall, the study emphasizes how crucial it is to keep an eye on and control antibiotic dispensing procedures in order to guarantee antibiotic usage responsibly and lessen the risk of antimicrobial resistance (AMR). Pharmacists and the general public can both benefit from ongoing education and awareness programs that further encourage responsible antibiotic use and advance the global battle against antimicrobial resistance (AMR).

The study sheds light on the difficulties community pharmacists encounter when assisting patients who want antibiotics without a prescription. Although the pharmacists have been quite good in addressing these kinds of situations, there are still a lot of people who ask for drugs that are not prescribed. This pattern is alarming, particularly in light of the possibility that inappropriate antibiotic usage contributes to the emergence of antimicrobial resistance (AMR), a serious hazard to public health. The results point to a gap in the public's and community pharmacists' knowledge of antimicrobial resistance (AMR). Even though the majority of pharmacists understand how critical it is to address antimicrobial resistance (AMR), a sizable portion feel that the Saudi public is not aware of this problem. This knowledge gap highlights the necessity of focused education and awareness initiatives to raise public awareness of AMR and the significance of using antibiotics responsibly. Patients' requests for medicines that are not prescribed have many different causes, from financial hardships to misconceptions about minor ailments. These results demonstrate the intricate socioeconomic variables affecting the community's practices related to antibiotic seeking. It will take a multifaceted strategy engaging the public, legislators, and healthcare experts to address these fundamental concerns.

The report also highlights the joint accountability of medical professionals—physicians and pharmacists included—in the fight against antimicrobial resistance. It emphasizes how crucial it is for pharmacists to have continual education and training so they can guarantee they have the know-how to support patients' concerns and encourage the responsible use of antibiotics. All things considered, the study emphasizes how critical it is to launch coordinated campaigns in Saudi Arabia to educate the public and medical professionals about antimicrobial resistance (AMR) and encourage appropriate antibiotic use. Together, stakeholders can address the underlying causes of improper antibiotic use, reducing the threat of antimicrobial resistance (AMR) and preserving public health.

## Conclusion:

In conclusion, the role of community pharmacists in addressing antimicrobial resistance (AMR) is paramount in the battle against this global health threat. Through their accessibility and frequent interactions with patients, pharmacists play a crucial role in promoting responsible antibiotic use and combating the spread of AMR. However, challenges such as improper antibiotic dispensing practices, patient demand for antibiotics without prescriptions, and limited public awareness of AMR persist within community pharmacy settings. Despite these challenges, recent initiatives, such as the implementation of laws restricting antibiotic sales without prescriptions, have shown promising results in improving antibiotic dispensing practices and reducing antibiotic misuse. Additionally, pharmacist-led interventions, including patient education, counseling on appropriate antibiotic use, and point-of-care testing for infectious diseases, have demonstrated positive outcomes in optimizing antibiotic prescribing and improving patient outcomes.

Furthermore, the study highlights the importance of ongoing education and training for pharmacists to enhance their knowledge and skills in antimicrobial stewardship. By equipping pharmacists with the necessary tools and resources, they can effectively engage with patients, address their concerns, and promote adherence to treatment guidelines. Collaboration among healthcare professionals, policymakers, and the public is essential to address the multifaceted factors contributing to AMR. Public awareness campaigns, coupled with efforts to improve access to healthcare services and address socio-economic barriers, are crucial steps in fostering a culture of responsible antibiotic use. In conclusion, while challenges remain, community pharmacists are well-positioned to play a central role in the fight against AMR. By leveraging their expertise and engaging with patients and stakeholders, pharmacists can contribute significantly to mitigating the spread of AMR and safeguarding public health for future generations.

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