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Misuse of Antibiotics in the Community and Its Implications for the Healthcare Sector – A Narrative Review

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ABSTRACT

Antibiotic misuse is a problematic health concern in primary care. Antibiotic consumption has significantly increased globally during the last two decades. Today, almost two-thirds of antibiotic use in primary care settings is unnecessary or inappropriate not only in developing countries but also in developed countries. This inappropriate use has significantly contributed to increased resistance, which poses a serious threat to human health. Increasing antibiotic resistance is the leading cause of illnesses provoking death incidences among people worldwide. Antibiotic treatments for various acute and chronic infectious diseases are becoming less effective, and these diseases can become fatal in the future. The misuse is more common in low- and middle-income countries, and various influencing factors, such as inadequate knowledge of patients, physicians, pharmacists, and policymakers, ease of access to community pharmacies and over-the-counter sales, inadequate consultation by physicians, misconceptions of the general public about antibiotics, and weak regulatory enforcements, are exacerbating the misuse of antibiotics in the community.

Keywords: Antibiotics misuse, Antibiotics consumption, Antibiotics irrational use, Primary care, Antibiotics in primary care

Introduction

Antibiotic use (ABU) is expanding globally, especially in the past two decades, and the consumption of antibiotics has increased in low- and middle-income countries (LMIC).¹ Excessive and inappropriate ABU is a life-threatening medical concern in the current period. The Centers for Disease Control and Prevention (CDC) has proclaimed the utilisation of two-thirds of antibiotics as improper or unnecessary.² Antibiotics, which rose as a sacred sign for relieving and treating bacterial illnesses, are currently the primary cause of illnesses provoking death incidences among people worldwide.

Growing pathogen resistance, primarily caused by the misuse of anti-infective agents, poses a potential risk to people. Antibiotic resistance (ABR) occurs naturally, yet augmented use and abuse of antibiotics in people are accelerating the process.³ The ABR is perhaps the greatest danger to global well-being that can influence anybody of all ages in any country. ABR influences our capacity to treat a variety of infections. Medicines for a growing range of infections that were treatable for decades, including urinary infections, tuberculosis, pneumonia, sepsis, and foodborne diseases, are losing their effectiveness in numerous areas of the world due to an increase in resistance; and these diseases can become lethal soon.^{4,5} The increase in resistance obstructs our capacity to cure infections, has more extensive cultural and economic impacts, and

imperils the accomplishment of the sustainable development goals.^{6,7}

The World Health Organization (WHO) has well-defined rational usage as “the cost-effective use of antibiotics which maximises clinical therapeutic effect and minimises drug-related toxicity and the development of ABR.” Regrettably, the inappropriate use of antibiotics has an extensive prevalence. Due to concerns about the health effects of antibiotic abuse, the WHO has proclaimed “the beginning of a post-antibiotic era,” with an increase in deaths because of infections instigated by superbugs.⁸ To compensate for this risk, the WHO has provided a few guidelines to quantify the use at various levels.⁹ The WHO also initiated a Global Action Plan on antimicrobial resistance to enhance awareness, improve ABU, conduct proper surveillance of infection, and control its spread.¹⁰

The effect of ABR, for the most part, falls on LMICs, which frequently come up short in terms of infrastructure, financial, and human resources to satisfactorily counter ABR spreads.¹¹ Antibiotics are the most frequently sold medications in developing nations. Even without a prescription, these drugs are accessible to a great extent. Regardless of lawful restrictions in numerous countries, selling antibiotics without a prescription at drug stores and patients’ attitudes have likewise contributed to increased ABU.¹²

Methods

A narrative review was conducted to highlight issues and challenges in antibiotic misuse at the community level. The articles were searched through PubMed and Google Scholar using keywords such as “antibiotic use,” “antibiotic misuse,” and “antibiotic utilisation in primary care.” The review focused on identifying key healthcare-associated issues related to ABU and misuse. It included research articles specifically addressing antibiotic prescription, dispense, and use.

Only cross-sectional, longitudinal studies and research reports were considered for inclusion in the review. Narrative review articles, editorials, perspectives, and articles without research findings were excluded from the analysis. The articles were initially screened for relevancy to the topic, and irrelevant and duplicate articles were excluded (Figure 1). Considering the significant importance of having well-defined regulations for the prescription, dispensing, and utilization of antibiotics in humans, the primary objective of the review was to pinpoint the individuals, whether directly or indirectly, responsible for the misuse of antibiotics. Additionally, the review aimed to provide a comprehensive overview of the primary factors influencing ABU. To ensure the quality of the included research

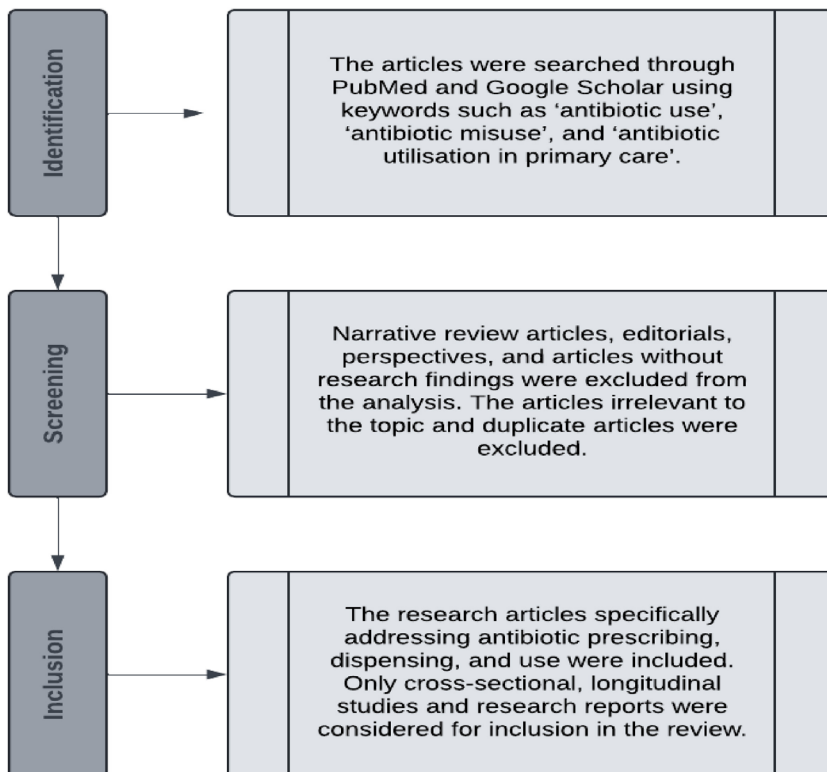


Fig 1 | Flowchart for inclusion of studies in narrative synthesis

articles, particular attention was given to including articles that directly addressed the core focus of the review.

Persons Influencing ABU

The ABU is a tri-faceted issue mainly involving physicians, pharmacists, and patients along with policymakers.¹³ All these 4Ps are directly or indirectly connected to antibiotic misuse in the community, and their misuse practices need thorough investigation and research (Figure 2).

Prescribers

The irresponsible prescribing of antibiotics is a top-priority public health concern,¹⁴ and is a critical problem in the paediatric populace.¹⁵ Inappropriate prescribing practices are prevalent throughout the world, and sooner or later, they lead to undesirable effects on patients.¹⁶ Irrational prescribing not only increases the expenditure on healthcare¹⁷ but is also primarily responsible for the increased emergence of ABR, unsuccessful treatments, and adverse effects.¹⁸ Several factors affect irrational prescribing practices, which include healthcare professionals (HCPs), patients, the workplace environment, the drug distribution system, legal guidelines, incorrect information about medicines, and profiting and monetary benefits.^{19,20} The physicians' craving for improved results and their wrong perception of high antibiotic demands by patients, diagnostic vagueness, and fright of bacterial super-infection are the driving factors liable for prescribing.

General physicians (GPs) play a crucial role in directing patients toward the quest for relief with antibiotics. Countless prescribers themselves have mistaken beliefs about ABU, trusting that the use is usually justified for acute infections like upper respiratory tract infections (URTI).²¹ GPs may also recommend an antibiotic if the patient demands such a medicine, so as to maintain a decent association with the patient.²² Frequently, primary care physicians say that they encounter a situation in which patient pressure compels them to prescribe antibiotics.²³ Patient preferences for anti-infective agents are the leading factors that can impact and modify AB prescribing practices. However, data indicates an overestimation of patients' wishes for antibiotics by many doctors, who prescribe inappropriate medications.²¹ Research by Altiner et al.²⁴ showed that the abuse of antibiotics by and large will not be attributable to a limited physician's knowledge but due to a dearth of patient-centeredness. The authors proposed that a considerable extent of antibiotic prescriptions could be avoided if GPs try to recognise the genuine prospects and concerns of their patients.²⁴ Another factor contributing to antibiotic prescriptions is diagnostic uncertainty. It is particularly difficult to differentiate between bacterial and viral URIs based on clinical symptoms; thus, prescribers may commit errors and prescribe an antibiotic.²² The major hurdles in wise prescribing can be eliminated via the upgradation of skills in GPs to manage patient expectations effectively and by initiating campaigns in patients and physicians to reduce ABU and to promote the physician's role as a wise advisor to patients.²⁵

Prescribing practices of ABs vary among countries. Based on previous research, around 34%–60% of patients with URTI receive antibiotics, subject to the country's situation. Yet, most of these patients do not need antibiotics because the majority of URIs have a viral origin and are self-limiting with rare complications. Different non-antibiotic treatments are also available to offer symptomatic relief, but still antibiotics are prescribed.²⁶ Normally, primary care patients who are prescribed antibiotics for acute infections are at high risk of bacterial resistance to antibiotics.²⁷ The evidence also indicates that inappropriate empiric use increases hospital stay and in-hospital mortality in these patients.²⁸ The problem of antibiotic over-prescription seems to be more prevalent in lower-income countries than in higher-income settings.^{29,30} So, physicians should be aware of these problems and should develop their clinical skills to avoid over-prescribing antibiotics.

Pharmacists

Community pharmacies are an integral part of the primary healthcare system and are the primary source of medicines. For many patients, drug stores are the first point for seeking health advice in primary care for a common health condition. Approximately 80% of antibiotics are purchased in community outlets, either prescribed by a physician or directly from pharmacies without a valid prescription. In numerous country

jurisdictions, the supply and sale of antibiotics without a prescription is unlawful. Yet, over 50% of antibiotics are universally purchased without any legal prescription from community pharmacies.³¹ This illegal practice is predominantly common in developing countries where there is either an absence of regulations regarding the sale of medicines or, in case the regulations exist, their implementation is weak or not up to the required standards of control.³² Non-prescription ABU is reported in many developing countries, including Asia, South America, Africa, Europe, and Middle Eastern countries. Pitiably national regulations, inadequate staffing of qualified pharmacists at pharmacies, profit-making stress on pharmacy staff, customer demand, irrational dispensing practices, and a dearth of awareness about ABR are the contributing factors to non-prescription antibiotic supply in these countries.³³

Various studies conducted at drugstores have proposed taking practical steps to improve compliance with laws and regulations regarding the dispensing of antibiotics. Measures can be taken to put into practice the existing regulations and improve awareness of misuse and ABR through targeted campaigns targeting the public or health professionals. Novel methods and means must be exploited to improve the professional practice of pharmacists.³⁴ A study conducted to evaluate pharmacy staff behaviour found that pharmacy staff behaviour significantly impacts self-medication with antibiotics and can put patients at risk. Due to weak implementation of legislation and poor accomplishment of professional standards, community pharmacies have failed to enhance the rational use of antibiotics.³⁵ Another study discovered an astonishing

percentage of antimicrobials dispensed with ease without prescription from almost all visited pharmacies.³⁶ A number of studies conducted in different countries have reported that antibiotic misuse is very common in acute respiratory tract infections,³⁷ acute diarrhea,³⁷ sore throat,³⁸ acute bronchitis,³⁸ and urinary tract infections.³⁸ The most commonly dispensed antibiotics for respiratory tract infections are amoxicillin alone or amoxicillin plus clavulanic acid,³⁹ whereas for urinary tract infections are norfloxacin, fosfomycin, and piperidic acid,³⁸ and for acute diarrhoea metronidazole.⁴⁰

Pharmacy staff play a central role as community educators in promoting appropriate and rational ABU. Pharmacy staff, including pharmacists, pharmacy technicians, and assistants, are perfectly positioned to assist patients in managing common and acute infections without using antibiotics by adopting symptomatic treatment alternatives. Advising patients about the use of antibiotics is crucial to reduce the severity of symptoms. However, any advice on medication use should be tailored to the specific symptoms and preferences of the individual patient. Through better knowledge, behaviour, and practices, the pharmacy staff can make a significant contribution toward antibiotic stewardship and managing acute and common self-limiting infections.⁴¹

A vast majority of studies conducted in LMIC have constantly highlighted deficiencies in the professional practices of the pharmacy staff at drugstores in terms of advice-giving about the proper use of medicines.⁴³ Community pharmacists' attitude and practice directly influence their willingness to dispense antibiotics; interventions focusing on improving such attitudes can be beneficial to improve pharmacist–patient communication and ABU.⁴³ Research indicates that educational materials, outreach visits, and feedback can improve pharmacists' counselling in community settings.⁴⁴ It is therefore important to conduct further research at community pharmacies to evaluate antibiotic dispensing practices and to determine the factors leading to the misuse of antibiotics at primary care centres in different countries.

Patients

It is believed by many patients that antibiotics reduce illness and result in rapid recovery from acute infections. Likewise, prescribing antibiotics may lead patients to inappropriately believe that their condition is serious. Most patients are not aware that most acute infections like acute URIs and diarrhoea are typically caused by viruses; therefore, antibiotics will be ineffective in treating the condition.⁴⁵ Most acute infections are self-limiting, but the self-limiting illness concept might be difficult to accept by the patients, particularly when they think of antibiotics as a suitable solution to getting rid of the illness. Additionally, a large percentage of the public is not aware that inappropriate ABU can increase resistance in individual patients and the community.²⁷ Previous exposures and experiences with antibiotic treatment for acute infections also

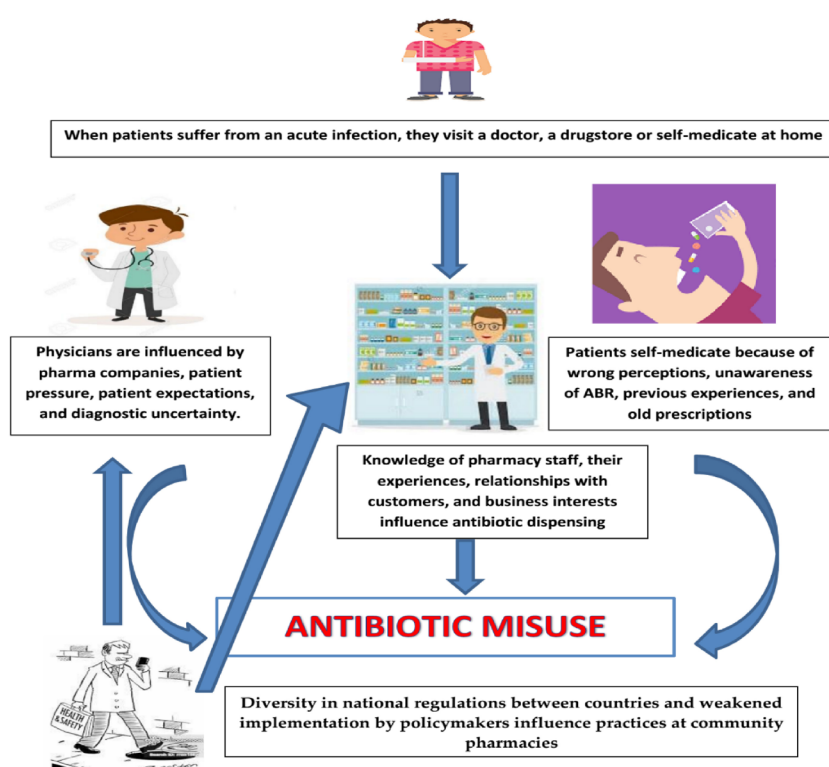


Fig 2 | Four Ps influencing antibiotic use and misuse

strengthen the misconceptions of patients about the use of antibiotics for common conditions.²¹ Such mistaken beliefs can lead physicians to prescribe antibiotics. The evidence indicates that doctors are 10 times more expected to prescribe an antibiotic if they are certain that the patient awaits such a prescription.²³ Therefore, mobilising the patients is important to endorse the non-antibiotic therapeutic management of self-limiting conditions.²³ Educating and counselling the public in schools and universities is a useful way to foster change and increase awareness regarding ABU.²² Sometimes, however, patients do not expect antibiotics to be prescribed as often as general practitioners perceive them to be. Having a clear understanding of when and why patients think that antibiotic therapy will help improve their symptoms is a crucial concern for physicians. Patients' concerns and expectations can be addressed by adopting a patient-centred approach during consultations with patients,²¹ which includes providing training and counselling on the correct use of antibiotics.

Polymakers

National legislation has a key role in assuring the correct use of antibiotics at primary health centres. Each country has unique laws and regulations. Currently, there is extensive variation between countries regarding the use of antibiotics in primary care. Some countries allow patients to self-treat or self-medicate with antibiotics by purchasing from pharmacies, whereas other countries have strict regulations, and antibiotics are only dispensed on prescription. Community pharmacists in a few countries are legally allowed to sell non-prescription antibiotics, while most countries prohibit these practices. Treatment guidelines for some infections also differ. For instance, ABU for acute pharyngitis is not recommended in many national regulations. In some countries, the guidelines recommend the use of antibiotics if a streptococcal infection is doubted.⁴⁶

Factors Leading to Antibiotics Misuse

Increased drug resistance may be due to multiple factors, including antibiotic overuse and abuse. The main factors identified for the overuse and misuse include (but are not limited to) the following.

Prescribing Behaviours of Clinicians and Physicians

The prescriber's behaviour also influences the customers' behaviour regarding the use of antibiotics. Often, physician visits are considered unnecessary by patients in whom they are familiar with the symptoms of infection and have a former experience of relief after using antibiotics. Patients are often seen complaining about their visits to clinics and almost always being prescribed the same prescription for common infections. As a result, most patients question the need for clinic visits and often end up buying the same antibiotic, based on their previous experience, from a nearby pharmacy or drugstore.⁴⁷⁻⁴⁹

Inadequate Consultation Time at the Clinic/Hospital
Time constraints have been seen as a limitation on the quality of doctor consultation due to the lack of time given to patients to discuss their concerns about the disease. Because of a busy schedule, the clinician's time is perceived as 'precious', leaving the patients unable to fully explain their health condition. In this situation, patients might experience a feeling that doctors are not taking their concerns seriously because they don't listen to or take note of their complaints. Community pharmacists, on the other hand, have the opportunity to spend quality time with patients, providing them with personalized counselling regarding their medications and addressing any concerns they may have.⁵⁰

Ease of Access to Pharmacies

The physician clinics are open for limited times, whereas the pharmacy is open round the clock. This makes it convenient for patients to visit the pharmacy at any time to discuss their issues. As a result, patients prefer to go to community pharmacies instead of hospitals/clinics to get antibiotics because of the easy access. Not only does it save patients' time by bypassing the queues for consultations, but it also saves money, especially in private hospitals where consultation costs can be high.⁵¹

OTC Availability of Antibiotics

In many developing countries, the OTC availability of antibiotics without prescription and at partial doses is a common practice, though not a legal one. The misuse of antibiotics is increasing due to the availability of antibiotics, OTC. Studies suggest that most pharmacy professionals working at retail stores do not adhere to the country's laws, professional codes of ethics, and good dispensing practices. This leads to the non-prescription use of antibiotics, which has been recognised as a growing public health concern. This trend is on the rise primarily due to an ever-increasing pressure on owners of pharmacies and drug stores, which trickles down their management to attract customers, gain profits, and compete with nearby retail pharmacies.^{47,50,52}

Table 1 | Summary of Factors That May Lead to Antibiotic Misuse

Sr No.	Summary of Factors That May Lead to Antibiotic Misuse
1	Prescribing behaviours of clinicians and physicians
2	Inadequate consultation time at the clinic/hospital
3	Ease of access to pharmacies
4	OTC availability of antibiotics
5	Experience and knowledge of pharmacy staff and patient trust
6	Misconceptions and lack of awareness by the public about antibiotic use
7	Previous positive treatment experiences
8	Business model of pharmacies and customer pressure
9	Weak regulatory enforcement mechanism

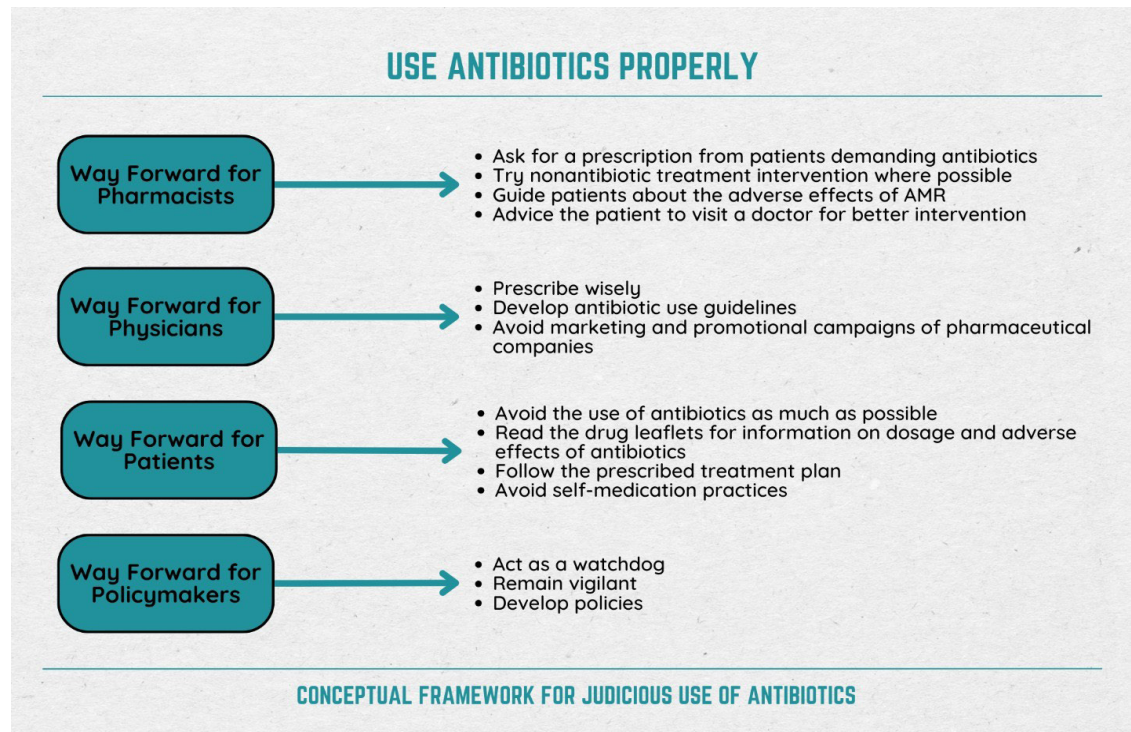


Fig 3 | Conceptual framework for judicious use of antibiotics

Experience and Knowledge of Pharmacy Staff and Patient Trust

Most drugstore staff feel that they have the required knowledge and experience and feel confident managing certain acute infections. In such situations, pharmacy staff may dispense any antibiotic to try to cure the infection. The staff at local pharmacies also believe that physicians are sometimes influenced to prescribe unnecessary medication or favour specific brands because of the perks they receive. This can result in a loss of patients' trust in physicians, and owing to this, patients often turn to community pharmacies/drug stores for the provision of care and medication.^{47,51}

Misconceptions and Lack of Awareness by the Public About ABU

Generally, the public has misconceptions about unethical practices regarding ABU such as a certain segment of the public believing that antibiotics can eradicate and treat any type of infection and may accelerate recovery. This has prompted certain segments of the public to use antibiotics when they are not necessary. Customers demand antibiotics without prescription owing to a lack of awareness regarding the risks associated with non-prescription use of antibiotics.⁵¹

Previous Positive Treatment Experiences

Patients who have previously encountered familiar symptoms often ask for the same treatment that was previously prescribed and effectively treated the symptoms by their healthcare provider during past episodes. Self-medication seems suitable to these patients, but it may have considerable public health implications.

Studies have also highlighted that the public lacks awareness relating to an ever-increasing rate of ABR, allergies, and adverse effects related to antibiotics.⁵¹

Business Model of Pharmacies and Customer Pressure

A few studies have reported that community pharmacists retain links and relationships with patients, and often prescribe unnecessary antibiotics, which contributes to the misuse. Customers also frequently push the staff at pharmacies to dispense antibiotics on demand despite the absence of a medical indication. Certain pharmacists may not always fulfil the requests. Nonetheless, in some instances, antibiotics are dispensed due to concerns about losing business to another pharmacy.^{47,51}

Weak Regulatory Enforcement Mechanism

Previous research from many countries, including southern Europe, suggests that weak regulation of antibiotics is the most obvious reason for non-prescription sales of antibiotics. People tend to buy antibiotics directly from retail/community pharmacies without consulting a physician; one of the key reasons for this is the weak enforcement of regulations. This calls for strong regulatory enforcement of prescription-only sales of antibiotics to counter the dilemma of antibiotic misuse, especially in developing countries.^{47,50}

Recommendations for Future Practice and Policy

Pharmacists should adopt the practice of requesting prescriptions from patients while dispensing antibiotics. In case of viral and nonbacterial infections, they should always resort to nonantibiotic interventions

and should also educate the patients about the key challenges of antibacterial resistance. Policymakers also have a key role in restricting antibiotic misuse. They should act as a watchdog to pharmacies and clinics and develop policies for future ABU.

There is a need to develop evidence-based guidelines for ABU in hospitals and the community for both acute and chronic infections, especially in developing countries. Physicians should play their part in developing these guidelines and also follow them strictly. The judicious use of antibiotics should be promoted when clinically necessary, and the influence of marketing campaigns from pharmaceutical companies should be minimised. Training and awareness should also be provided to the patients, and they should be familiarized with the adverse effects of antibiotics (Figure 3).

Conclusion

Antibiotic misuse is a severe and problematic health concern in primary care, and it contributes to increasing antibiotic resistance in the community. It is triggered by irrational prescriptions by physicians, non-prescription dispensing by pharmacists at community pharmacies, self-medication by patients with acute infections, and imprecise legislation or lenient enforcement of antibiotic regulations by policymakers. Numerous factors influence the rational practices of physicians, pharmacies, and self-medication malpractice. Educational campaigns and training programmes along with interventional studies are needed to increase awareness among all healthcare professionals and the general public.

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