GSC Biological and Pharmaceutical Sciences
eISSN: 2581-3250 CODEN (USA): GBPSC2
Cross Ref DOI: 10.30574/gscbps
Journal homepage: https://gscbps.gsconlinepress.com/

(RESEARCH ARTICLE)

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A PROSPECTIVE OBSERVATIONAL STUDY ON PRESCRIBING PATTERNS OF ANTIBIOTICS IN HOSPITAL AND COMMUNITY PHARMACY

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GSC Biological and Pharmaceutical Sciences, 2026, 37(01), 201–208

Publication history: Received on 07 September 2026; revised on 17 October 2026; accepted on 19 October 2026

Article DOI: https://doi.org/10.30574/gscbps.2026.37.1.0367

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ABSTRACT

Antibiotics are widely used for the prevention and treatment of bacterial infections. However, inappropriate prescribing, irrational dispensing, and excessive antibiotic use contribute to antimicrobial resistance, which has become a major public health concern. This prospective observational study aims to evaluate and compare antibiotic prescribing patterns in hospital and community pharmacy settings. The study focuses on identifying commonly prescribed antibiotics, assessing generic and branded prescribing practices, evaluating dosage regimens and treatment duration, and documenting reported adverse drug reactions. Data will be collected through prescription review and relevant patient records, where applicable, without interfering with routine treatment. The findings will help identify differences in antibiotic utilization between hospital and community settings and highlight potential areas of inappropriate antibiotic use. The study may also emphasize the role of pharmacists in promoting rational antibiotic use, improving patient counseling, and supporting antimicrobial stewardship. The results may contribute to safer prescribing practices and efforts to minimize antimicrobial resistance.

Keywords: Antibiotics; Prescribing Patterns; Antimicrobial Resistance; Community Pharmacy; Hospital Pharmacy.

1 INTRODUCTION

Antibiotics are essential therapeutic agents used for the prevention and treatment of bacterial infections. Their appropriate use has significantly improved clinical outcomes, reduced infection-related complications, and decreased mortality. However, inappropriate prescribing, unnecessary antibiotic use, incorrect dosage, inadequate treatment duration, and excessive use of broad-spectrum antibiotics have contributed to the emergence of antimicrobial resistance (AMR). Antimicrobial resistance is a major public health concern because it can reduce treatment effectiveness, prolong illness, increase healthcare expenditure, and lead to treatment failure **[1, 6].**

Antibiotic prescribing patterns differ between hospital and community pharmacy settings due to variations in patient characteristics, infection severity, diagnostic facilities, and prescribing practices **[4, 5]**. In hospitals, antibiotics are frequently prescribed for severe infections, hospitalized patients, and individuals with multiple comorbidities. Their selection may depend on clinical assessment, laboratory investigations, culture and sensitivity reports, local resistance patterns, and institutional antibiotic policies **[4]**. In contrast, community pharmacy settings commonly involve antibiotics prescribed for outpatient infections, including respiratory tract, urinary tract, and skin infections. The availability of antibiotics, patient expectations, self-medication, and non-prescription access may also influence antibiotic utilization in the community **[5, 8]**.

Rational antibiotic prescribing involves selecting the appropriate antibiotic according to the suspected or confirmed infection, choosing the correct dose and route of administration, determining an appropriate treatment duration, and monitoring therapeutic outcomes and adverse drug reactions **[2, 6]**. Antibiotic stewardship programmes promote these principles by encouraging evidence-based prescribing, reviewing microbiological results, and reducing unnecessary antibiotic exposure **[3, 4]**. Pharmacists play an important role in promoting rational antibiotic use through prescription review, patient counselling, identification of drug interactions, and education regarding adherence to the prescribed treatment **[5, 7].**

A prospective observational study can help identify commonly prescribed antibiotics, their indications, dosage regimens, duration of therapy, and patterns of antibiotic utilization in different healthcare settings. Comparing hospital and community pharmacy prescribing practices may reveal differences in antibiotic selection and potential opportunities to improve prescribing quality. Therefore, the present study aims to evaluate and compare antibiotic prescribing patterns in hospital and community pharmacy settings, identify areas of potentially inappropriate use, and provide information that may support rational antibiotic utilization and antimicrobial resistance prevention.

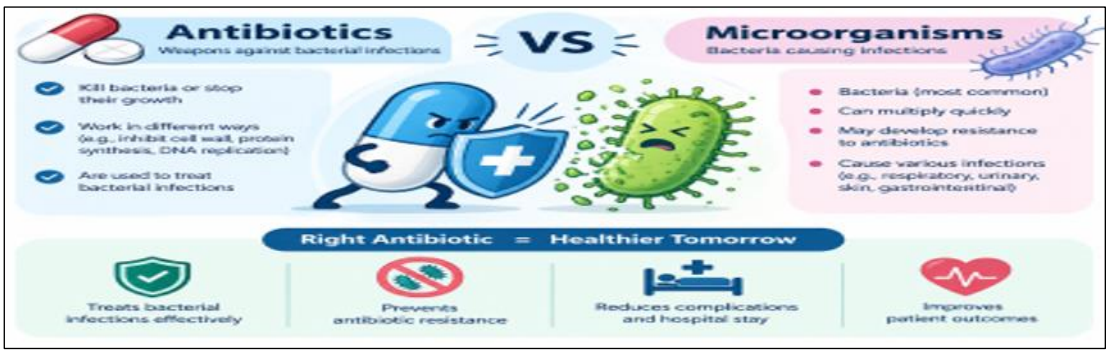


Figure 1: Antibiotics vs Microorganisms: Mechanisms of Action and Antimicrobial Resistance

1.1 Antibiotic Use in Community Pharmacies

Community pharmacies serve as the first point of contact for many patients seeking healthcare services. In several developing countries, community pharmacies provide easy access to medications, including antibiotics. Patients often approach pharmacists directly for treatment of minor illnesses such as cough, cold, fever, sore throat, and gastrointestinal disturbances. In some cases, antibiotics are dispensed without a valid prescription, leading to irrational drug use.

The misuse of antibiotics in community pharmacies can occur due to several reasons including lack of awareness among patients, self-medication practices, incomplete treatment courses, and pressure on pharmacists to provide immediate relief. These practices may contribute to the development of antibiotic resistance and can lead to treatment failures. Therefore, monitoring antibiotic dispensing patterns in community pharmacies is essential to promote rational drug use and ensure patient safety.

Pharmacists play a crucial role in educating patients about the appropriate use of antibiotics. They can counsel patients about the importance of completing the full course of therapy, avoiding self-medication, and following proper dosage instructions. Effective pharmacist-patient communication can significantly reduce antibiotic misuse in the community.

1.2 Antibiotic Use in Hospital Pharmacies

Hospital pharmacies function within a structured healthcare system where antibiotics are prescribed by qualified physicians based on clinical diagnosis, laboratory investigations, and microbiological culture results. Hospitals manage a wide range of infections including severe and complicated infections that require specialized antibiotic therapy. In

hospital settings, antibiotics are often used in departments such as internal medicine, surgery, pediatrics, and intensive care units.

Empirical antibiotic therapy is commonly initiated in hospital settings when the causative organism is not immediately identified. This approach involves prescribing broad-spectrum antibiotics based on clinical judgment and local resistance patterns. Once microbiological culture and sensitivity reports become available, antibiotic therapy is usually modified accordingly to ensure effective treatment.

Hospital pharmacists play an important role in monitoring antibiotic usage, ensuring adherence to physicians and other healthcare professionals to promote rational antibiotic prescribing and to reduce the risk of antimicrobial resistance.

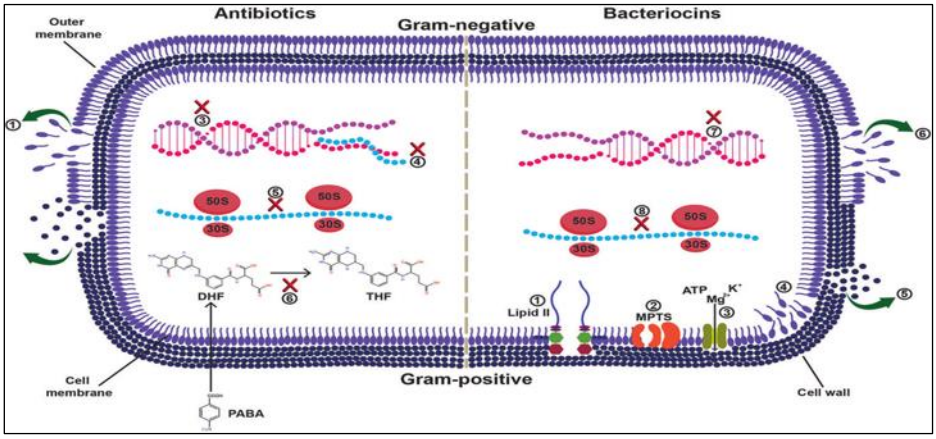


Figure 2: Mechanisms of Action of Antibiotics and Bacteriocins Against Gram-Positive and Gram-Negative Bacteria

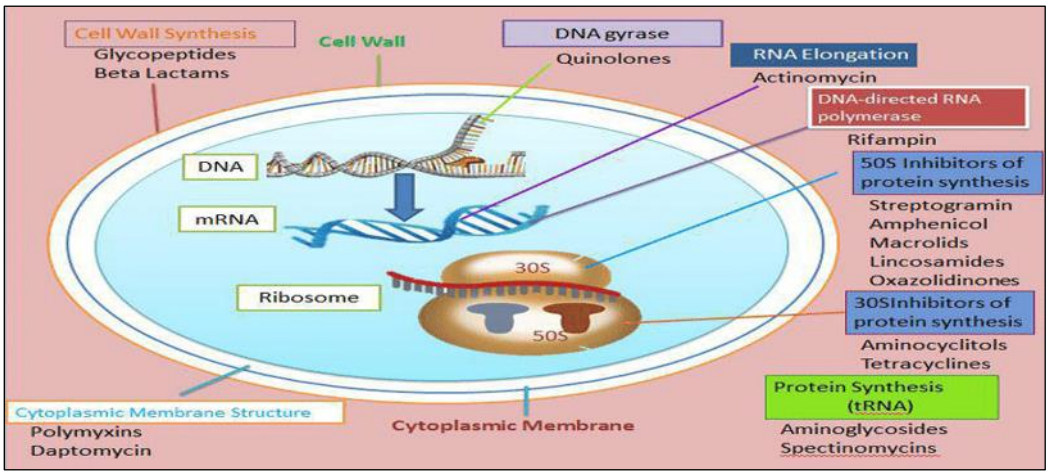


Figure 3: Mechanisms of Action of Antibiotics: Inhibition of Cell Wall Synthesis, Cell Membrane Function, DNA Replication, RNA Transcription, and Protein Synthesis

2 RESULTS AND DISCUSSION

This Study presents a descriptive interpretation of the antibiotic-utilization data collected from 150 patient prescriptions. The results are organized by category of use, gender, geriatric representation, and the antimicrobial agents recorded in the source document. The discussion explains the possible clinical significance of the observed patterns while distinguishing descriptive findings from conclusions that would require additional patient-level or microbiological evidence.

2.1 Overview of Antibiotic-Use Statistics

A total of 150 patient records containing prescription details were examined for the study. The source document classified the reported use into three groups: antibiotics used in surgical management, over-the-counter (OTC) use, and use under physician prescription only. Surgical management accounted for 60 records (40.0%), OTC use accounted for

40 records (26.7%), and physician-prescribed use accounted for 50 records (33.3%). Surgical use was therefore the largest category in this dataset, followed by physician-prescribed use and OTC use.

Table 1: Number of records in each antibiotic-use category

Use category	Reported count	Percentage of total (n=150)
Surgical management	60	40.0%
OTC use	40	26.7%
Physician prescription only	50	33.3%
Total	150	100.0%

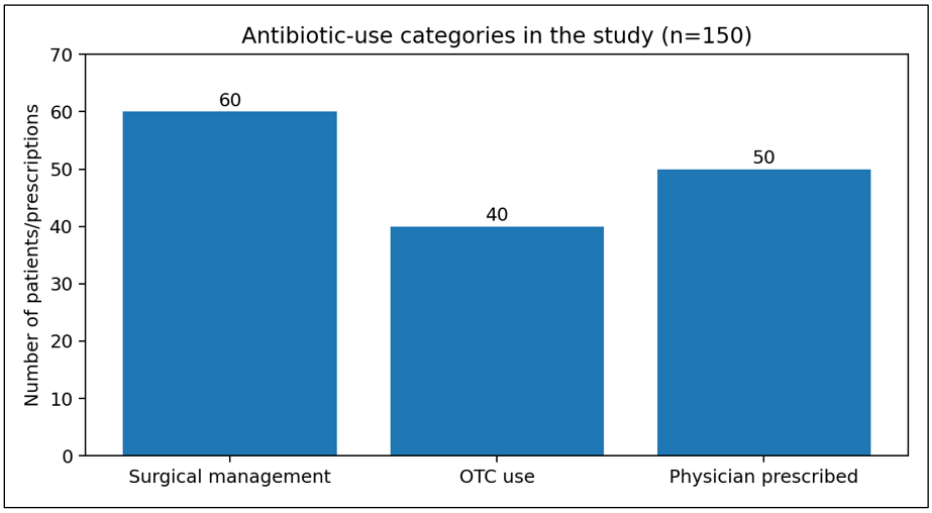


Figure 4: Number of records in each antibiotic-use category.

The findings show that use associated with surgical care formed two-fifths of the reviewed records. Antibiotics may be used around surgery for prophylaxis or treatment when clinically indicated; however, the dataset does not specify whether each use was prophylactic or therapeutic, nor does it provide procedure type, infection status, culture results, or duration of therapy. Consequently, the category totals describe utilization patterns but cannot establish whether individual prescriptions were appropriate.

OTC use represented approximately one in four records. This is an important signal for patient education and antimicrobial stewardship because antibiotics taken without appropriate assessment may be selected for illnesses that are not bacterial, taken at unsuitable doses, or stopped prematurely. Such risks can contribute to treatment failure, adverse effects, and selection of antimicrobial resistance. The present descriptive data do not, by themselves, demonstrate that resistance occurred in this population.

2.2 Demographic Distribution

The study population comprised 78 males (52.0%) and 72 females (48.0%). The difference between the two groups was six patients, indicating a relatively balanced overall gender distribution. Within the surgical-use category, 32 patients were male and 28 were female. Within the physician-prescription-only category, 26 were male and 24 were female. The figures suggest similar counts for males and females in these two categories; however, the source document does not provide a complete gender breakdown for OTC use in the narrative table beyond the overall category table.

Table 2: Demographic distribution

Category	Male	Female	Total
Surgical antibiotic use	32	28	60
Physician-prescribed use	26	24	50

These counts should be interpreted descriptively. They do not establish that gender has no influence on antibiotic utilization, because the analysis does not report diagnosis, severity, procedure type, exposure time, or statistical testing. Differences in the underlying clinical conditions could influence the number of prescriptions in each group.

2.3 Geriatric Patients

Thirty-nine patients were identified as belonging to the geriatric population, representing 26.0% of the total study population. Of these, 15 were recorded in the surgical-management category, eight in the OTC category, and 16 in the physician-prescription-only category. Physician-prescribed use therefore accounted for the largest of the three reported geriatric counts, closely followed by surgical management.

Table 3: Distribution among geriatric patients

Use category	Geriatric patients
Surgical management	15
OTC use	8
Physician prescription only	16
Total geriatric patients	39

Older adults may require particularly careful antimicrobial assessment because renal and hepatic function, comorbidities, concurrent medicines, and vulnerability to adverse drug reactions can affect treatment choices. Dose adjustment should be based on the individual medicine, renal/hepatic function where relevant, clinical indication, and current prescribing guidance—not age alone. The present dataset does not include dose, kidney function, comorbidities, or adverse-event data, so it cannot determine whether the recorded treatments were appropriately adjusted.

2.4 Antimicrobial Agents Reported

The source tables list Tazomac, Amoxyclav, azithromycin, doxycycline, albendazole, ceftriaxone, levofloxacin, and meropenem. In the surgical-management category, Amoxyclav was reported in 18 cases and Tazomac in 14 cases. The table also records four cases each for azithromycin, ceftriaxone, levofloxacin, and meropenem, and two cases each for doxycycline and albendazole. These counts are reproduced from the source and should be checked against the original data sheet before final submission because the table does not explain whether patients could receive more than one agent.

Table 4: Antibiotics agents reported

Agent as written in source	Surgical use	OTC use	Physician-prescribed use
Amoxyclav	18	5	6
Tazomac	14	3	9
Azithromycin	4	14	4
Doxycycline	2	12	2
Albendazole	2	10	2
Ceftriaxone	4	0	16
Levofloxacin	4	0	10
Meropenem	4	0	14

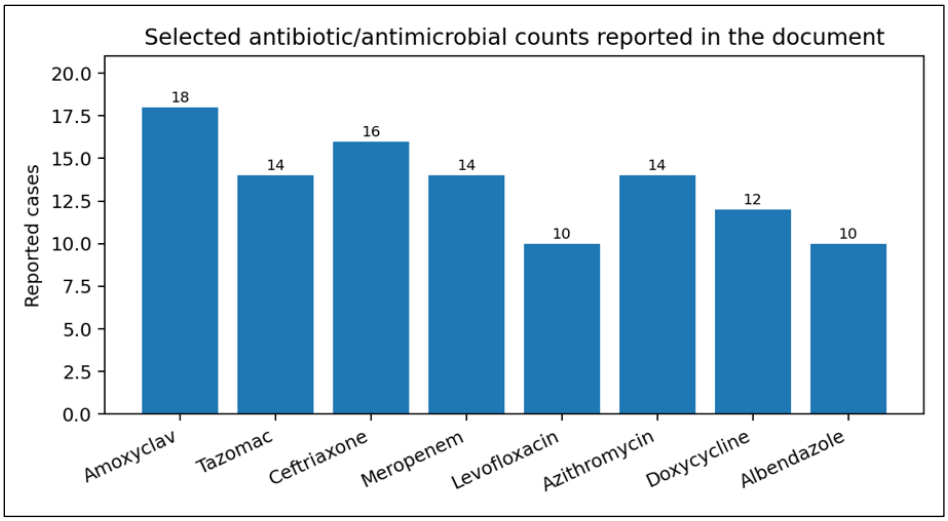


Figure 5: Selected reported counts from the source tables; categories are not necessarily mutually exclusive.

Amoxicillin and clavulanic acid are combined in a formulation known as co-amoxiclav, which provides antibacterial activity. Its use should be guided by the suspected or confirmed infection, local susceptibility patterns, allergy history, and applicable treatment guidelines. "Tazomac" is a brand name; the exact generic composition should be verified from the product label or hospital formulary before discussing its spectrum. Ceftriaxone is a third-generation cephalosporin, levofloxacin is a fluoroquinolone, and meropenem is a carbapenem. Meropenem is generally reserved for selected serious infections where its spectrum is needed, guided by clinical assessment and local antimicrobial policy.

Among physician-prescribed agents, ceftriaxone was the most frequently reported (16 cases), followed by meropenem (14 cases) and levofloxacin (10 cases). This pattern may reflect the clinicians' treatment choices in the study setting, but it cannot confirm infection severity or the presence of resistant organisms because diagnoses, culture and sensitivity reports, and treatment outcomes were not supplied.

In the OTC category, azithromycin (14 cases) and doxycycline (12 cases) were the most frequently listed agents, followed by albendazole (10 cases). An important terminology point is that albendazole is an anthelmintic medicine used against certain parasitic worm infections; it is not an antibacterial antibiotic. It is retained in the reproduced table because it appears in the original dataset, but it should be analyzed separately from antibiotics in any final antimicrobial-utilization calculation.

2.5 Diagrammatic Representation of Antimicrobial Stewardship

The following diagram illustrates a general decision pathway for responsible antibiotic use. It is a conceptual educational diagram and does not represent an observed process measured in the 150 records.

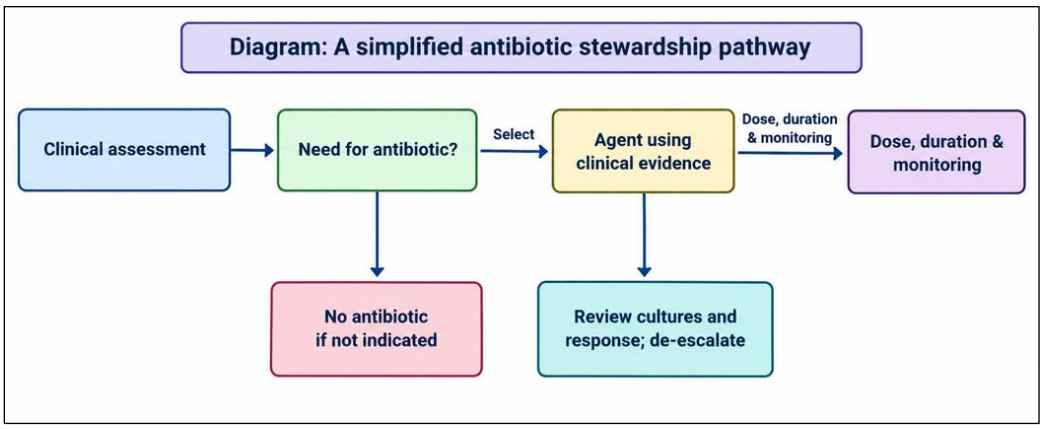


Figure 6: Simplified antibiotic stewardship pathway.

Responsible antibiotic use involves assessing the patient and likely source of infection, deciding whether an antibacterial medicine is indicated, selecting an appropriate agent, and reviewing dose, route, duration, clinical response, and microbiology results when available. When culture results or clinical progress support a narrower-spectrum option, treatment can be reviewed and de-escalated according to local guidance. Antibiotics should not be used to treat viral infections unless a separate bacterial indication exists.

2.6 Clinical and Public-Health Implications

First, the 40% share of surgical-management records indicates that perioperative and surgical-care pathways were a major part of the recorded antimicrobial use. A review of surgical prophylaxis protocols, timing, and duration could help determine whether prescribing aligns with institutional guidance. The present data do not state the timing or duration, so no conclusion about compliance can be made.

Second, OTC use in 40 records (26.7%) highlights a need to reinforce public awareness that antibiotics should be used only after appropriate clinical assessment and according to a qualified prescriber's directions. Community education should address the risks of sharing medicines, using leftover tablets, starting antibiotics for common colds without assessment, and altering treatment without advice. Any regulatory or practice recommendations should be aligned with applicable local rules.

Third, the recorded use of broad-spectrum agents supports the value of antimicrobial stewardship review. Hospitals can strengthen prescribing documentation, culture sampling when clinically appropriate, regular review of empirical therapy, and de-escalation when justified. Broad-spectrum use is not inherently inappropriate; its suitability depends on the clinical indication, severity, likely pathogens, local resistance patterns, and patient-specific factors.

Fourth, geriatric patients represented 26% of the sample. Medication review, allergy checks, renal-function assessment where relevant, and monitoring for adverse drug reactions are important components of safe prescribing in older adults.

2.7 Limitations and Data-Quality Considerations

The findings should be interpreted in light of several limitations. The study includes 150 records from a selected healthcare setting, and the document does not describe the sampling method or study period. It does not provide diagnoses, specimen/culture results, dose, route, duration, clinical outcomes, adverse drug reactions, or criteria used to classify use as OTC or physician-prescribed. Counts alone cannot establish prescribing appropriateness or causal relationships.

Some entries require verification before submission. The source tables list the same agent across multiple use categories, and it is unclear whether these are unique patients, prescriptions, or drug mentions. The narrative also describes "antibiotics" while including albendazole, which is an anthelmintic rather than an antibacterial agent. The spelling and generic composition of brand names, particularly Tazomac, should be confirmed against the original prescription records. Percentages have been calculated from the stated category totals; individual-drug percentages have not been inferred because the denominator and overlap between drugs are not clearly defined.

3 CONCLUSION

In this descriptive review of 150 records, surgical-management use accounted for 60 records (40.0%), physician-prescribed use for 50 (33.3%), and OTC use for 40 (26.7%). The population included 78 males, 72 females, and 39 geriatric patients. Amoxyclav was the most frequently recorded agent in the surgical category, while ceftriaxone, meropenem, and levofloxacin were prominent in the physician-prescribed category. Azithromycin and doxycycline were the most frequently listed agents in the OTC category, alongside albendazole, which should be classified separately as an anthelmintic.

Overall, the results support the importance of careful prescribing, patient education, and antimicrobial stewardship. Further analysis using verified patient-level records, diagnoses, culture results, treatment duration, and outcomes would be needed to assess the appropriateness of individual prescriptions and the impact of antibiotic use in this setting.

The objectives of the present study are to identify the most commonly prescribed antibiotics in hospital and community pharmacy settings and determine the percentage of prescriptions involving generic and branded antibiotics. The study also aims to assess the average duration of antibiotic therapy and evaluate prescribing patterns in terms of dosage, frequency, and route of administration. Furthermore, it seeks to analyse the commonly reported side effects and adverse

drug reactions associated with antibiotic use to identify potential medication-related problems and promote the rational use of antibiotics.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Disclosure of conflict of interest

The authors declare no conflicts of interest regarding this manuscript.

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