Assessment of Antibiotics Usage Patterns and Practices within Elmiek Nimer University Regional Hospital in the period from January 2024 to April 2024

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Abstract

Introduction: Antibiotics are vital for treating bacterial infections, but misuse has contributed to antibiotic resistance, a global health threat. Understanding healthcare professionals' prescribing practices and adherence to guidelines is essential for effective antibiotic stewardship.

Objective: This study assesses healthcare professionals' knowledge, attitudes, and practices regarding antibiotic use at Elmiek Nimer University Regional Hospital, identifying barriers to guideline adherence.

Methods: A cross-sectional study was conducted using a structured questionnaire among healthcare professionals. It covered demographics, knowledge of guidelines, prescribing practices, participation in stewardship programs, and perceived barriers. Descriptive statistics were used for analysis.

Results: Most participants were registrars (41.5%) and medical officers (34.1%), with 35.7% having 5-10 years of experience. Despite moderate to high self-rated antibiotic knowledge (60.2% moderate, 40% high), 78% were unaware of hospital guidelines. 77.2% frequently prescribed antibiotics, guided mainly by clinical symptoms (85.4%) and lab results (69.1%). Only 15.4% had engaged in stewardship programs, finding them effective. Barriers included financial constraints (47.2%) and medication-related issues (46.3%).

Conclusion: There are gaps in guideline awareness and adherence, even with moderate knowledge of antibiotics. Enhanced stewardship programs, targeted training, and hospital-specific guidelines are necessary to curb antibiotic resistance. Addressing financial and medication-related barriers is crucial for better adherence.

Recommendations: Implement comprehensive stewardship programs with tailored training. Collaborate with policymakers and pharmaceutical providers to alleviate financial and medication barriers. Develop and disseminate hospital-specific guidelines for consistent practice.

Justification:

This study is vital for enhancing antibiotic use at Elmiek Nimer University Regional Hospital, as it tackles the critical issue of antibiotic resistance—a growing global health concern. Antibiotic resistance leads to longer hospital stays, increased medical costs, and higher mortality rates. By systematically evaluating antibiotic prescription patterns, the study aims to determine the most commonly used antibiotics and assess whether their usage aligns with clinical guidelines. This assessment is crucial for understanding the adherence to standards, which has a direct impact on patient outcomes and the development of resistance.

Additionally, by analyzing local antibiotic resistance prevalence, the study will provide essential data on resistance trends among patients. This information will equip healthcare professionals with insights into the efficacy of frequently prescribed antibiotics and the rise of resistant bacterial strains. Such findings are crucial for making evidence-based recommendations to improve prescribing practices, ensuring antibiotics are utilized effectively and only when necessary. This approach is key to reducing the risks associated with antibiotic resistance and promoting better patient care.

Study Objectives

General Objective

1- To assess the overall patterns of antibiotic prescription and administration within Elmiek Nimer University Regional Hospital.

2- To identify the most commonly prescribed antibiotics, their indications, and the duration of treatment.

Specific Objectives

1- To evaluate adherence to established guidelines for antibiotic usage.
2- To assess the prevalence of antibiotic resistance in bacterial isolates from patients within the hospital.
3- To provide evidence-based recommendations for improving antibiotic prescribing practices.

Literature Review

Antibiotics have been the cornerstone of modern medicine, revolutionizing the treatment of bacterial infections. However, the misuse and overuse of antibiotics are major contributors to the emergence of antibiotic resistance, a serious global public health issue. Antibiotic resistance occurs when bacteria evolve mechanisms to withstand the drugs designed to kill them, leading to longer hospital stays, increased healthcare costs, and higher mortality rates [1,2]. Addressing the problem requires a detailed understanding of local prescribing patterns, the common types of antibiotics used, and how well healthcare professionals adhere to clinical guidelines.

Several studies have examined antibiotic prescription practices in hospital environments. Research indicates that prescribing practices often do not align with established guidelines, contributing to inappropriate use [3]. A study conducted in a tertiary hospital in sub-Saharan Africa found that empirical antibiotic prescriptions were prevalent, with limited adherence to standard treatment protocols [4]. Factors influencing prescribing patterns include clinical experience, diagnostic uncertainty, and perceived patient expectations [5].

In Sudan, like in many low- and middle-income countries, antibiotics are frequently prescribed for non-specific respiratory symptoms and diarrheal diseases, sometimes without laboratory confirmation [6]. These practices have led to the widespread use of broad-spectrum antibiotics, which accelerate the development of resistant strains [7].

Adherence to clinical guidelines is crucial for rational antibiotic use. Guidelines offer standardized recommendations that improve patient outcomes and limit resistance development. A systematic review of guideline adherence in low-resource settings revealed significant gaps, with barriers including a lack of awareness, financial constraints, and limited access to updated guidelines [8]. In another study, healthcare professionals reported difficulties in following guidelines due to resource limitations and the absence of antibiotic stewardship programs [9]. These challenges highlight the need for targeted interventions and training to improve adherence.

Globally, antibiotic resistance patterns vary, influenced by regional prescription habits, infection control practices, and antibiotic availability. A study in East Africa showed high levels of resistance to commonly used antibiotics such as amoxicillin and ciprofloxacin, particularly among hospitalized patients [10]. Local studies in Sudan have reported similar trends, with high resistance rates for first-line antibiotics like ampicillin and co-trimoxazole among community-acquired infections [11]. Monitoring local resistance patterns is critical for informing antibiotic prescribing practices and ensuring effective treatment [12].

Antibiotic stewardship programs are evidence-based interventions designed to promote optimal antibiotic use. Studies indicate that these programs effectively reduce unnecessary antibiotic prescriptions and improve guideline adherence [13,14]. In a hospital in Nigeria, implementing a stewardship program led to a significant decrease in antibiotic misuse and resistance rates [15]. Despite the proven benefits, many healthcare settings, including those in Sudan, have limited or no formal stewardship initiatives [16]. Expanding these programs is crucial for combating antibiotic resistance and optimizing clinical outcomes.

Improving antibiotic prescribing practices requires a multifaceted approach, including enhancing guideline awareness, increasing participation in stewardship programs, and addressing barriers to adherence. Evidence suggests that tailored education and training, along with the development of local, context-specific guidelines, can significantly improve antibiotic use [17]. Additionally, collaboration with policymakers to address financial and medication-related challenges is essential for effective guideline implementation [18].

Methodology

Study Design: A cross-sectional study was conducted to evaluate antibiotic use patterns among healthcare professionals at Elmiek Nimer University Regional Hospital, focusing on prescribing behaviors, adherence to guidelines, and barriers to optimal use.

Study Area: The study took place at Elmiek Nimer University Regional Hospital in Shendi, Sudan. Established in 2002, the hospital is a major healthcare provider, known for its quality care and modern medical facilities. It also serves as a training center for medical and health sciences students.

Study Population: Healthcare professionals involved in direct patient care, including medical officers, registrars, specialists, and consultants, were the target population.

Duration of Study: Conducted over four months (January to April 2024), with one month each dedicated to data collection, analysis, and report compilation.

Sample Size: A total of 123 healthcare professionals from diverse specialties and varying experience levels participated.

Data Collection Tools: A structured questionnaire was used, capturing demographics, knowledge of antibiotic guidelines, prescribing practices, and perceived barriers. It included both closed and open-ended questions for quantitative and qualitative data.

Data Analysis: Descriptive statistics summarized antibiotic usage patterns, guideline adherence, and factors affecting prescribing decisions. Frequencies and percentages were used for categorical data, while means and standard deviations were calculated for continuous data.

Ethical Considerations: Informed consent was obtained from all participants, and confidentiality was maintained. Ethical approval was granted by the institutional review board of Elmiek Nimer University Hospital.

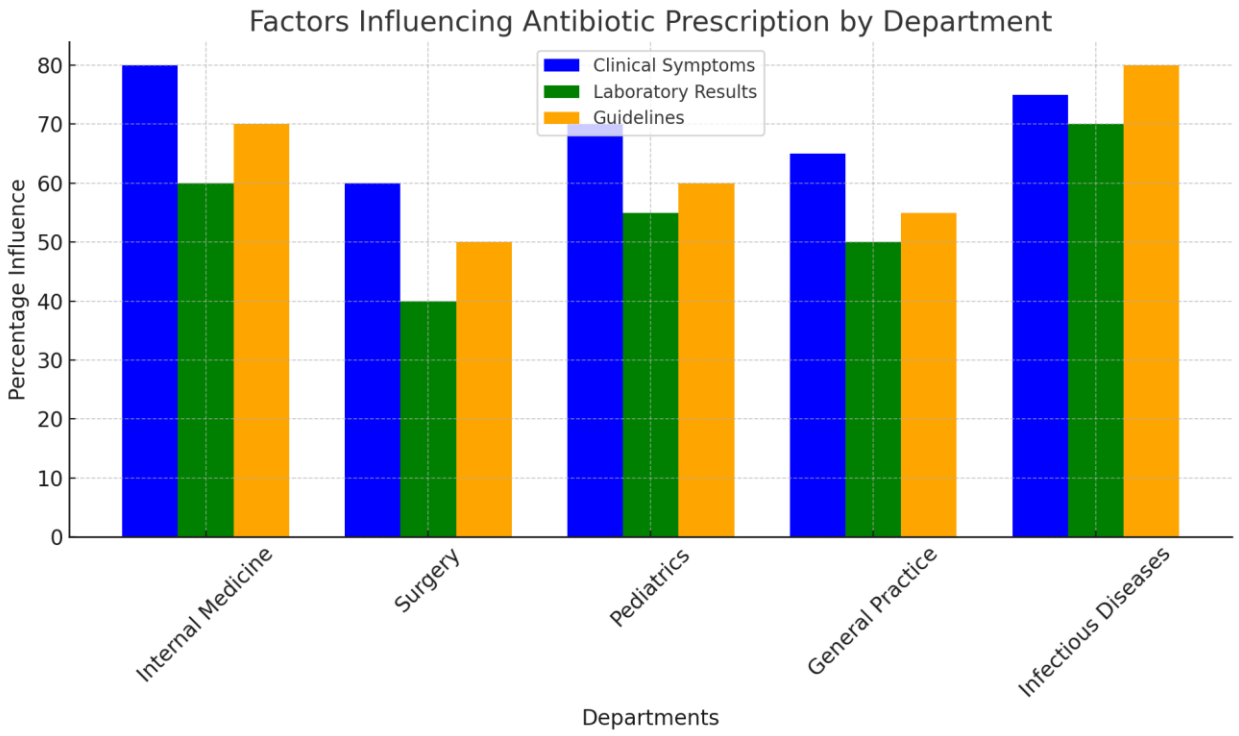
Results

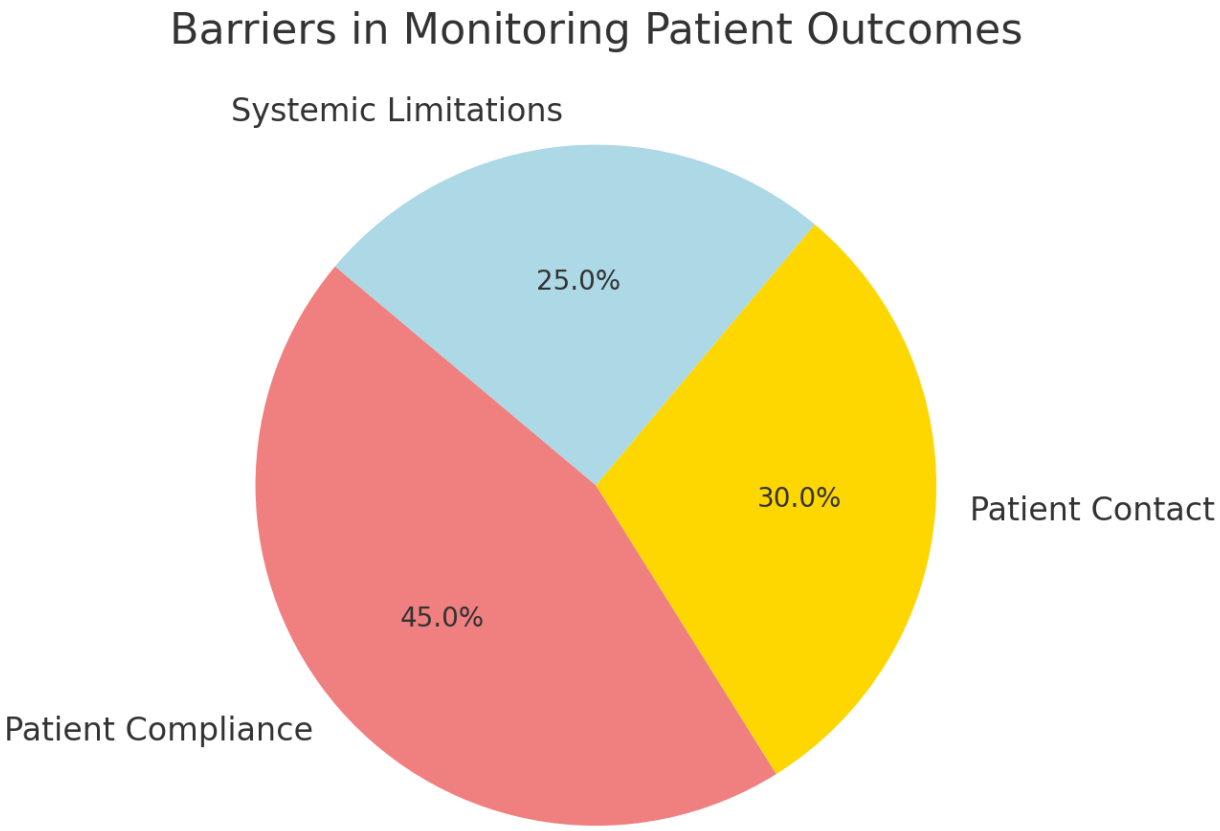
Factors Influencing Antibiotic Prescription by Department: This bar chart displays how clinical symptoms, laboratory results, and guidelines affect prescribing decisions across various departments.

Barriers in Monitoring Patient Outcomes: This pie chart illustrates the primary barriers in monitoring patient outcomes, highlighting issues like patient compliance and maintaining contact.

Concern About Antibiotic Resistance by Department: This grouped bar chart shows the level of concern regarding antibiotic resistance in different departments, categorized as low, moderate, and high.

Collaboration Among Healthcare Professionals by Experience: This line chart tracks the frequency of interdisciplinary collaboration based on the years of experience, indicating an increase with more experienced professionals





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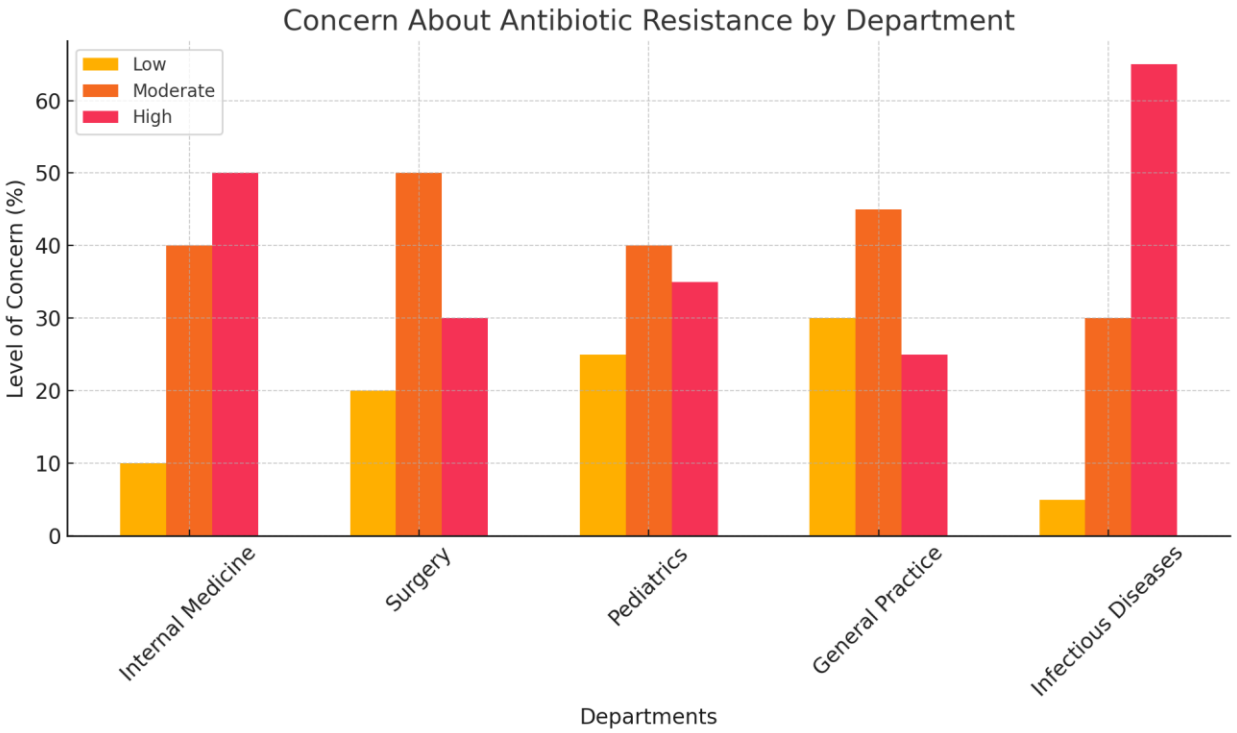
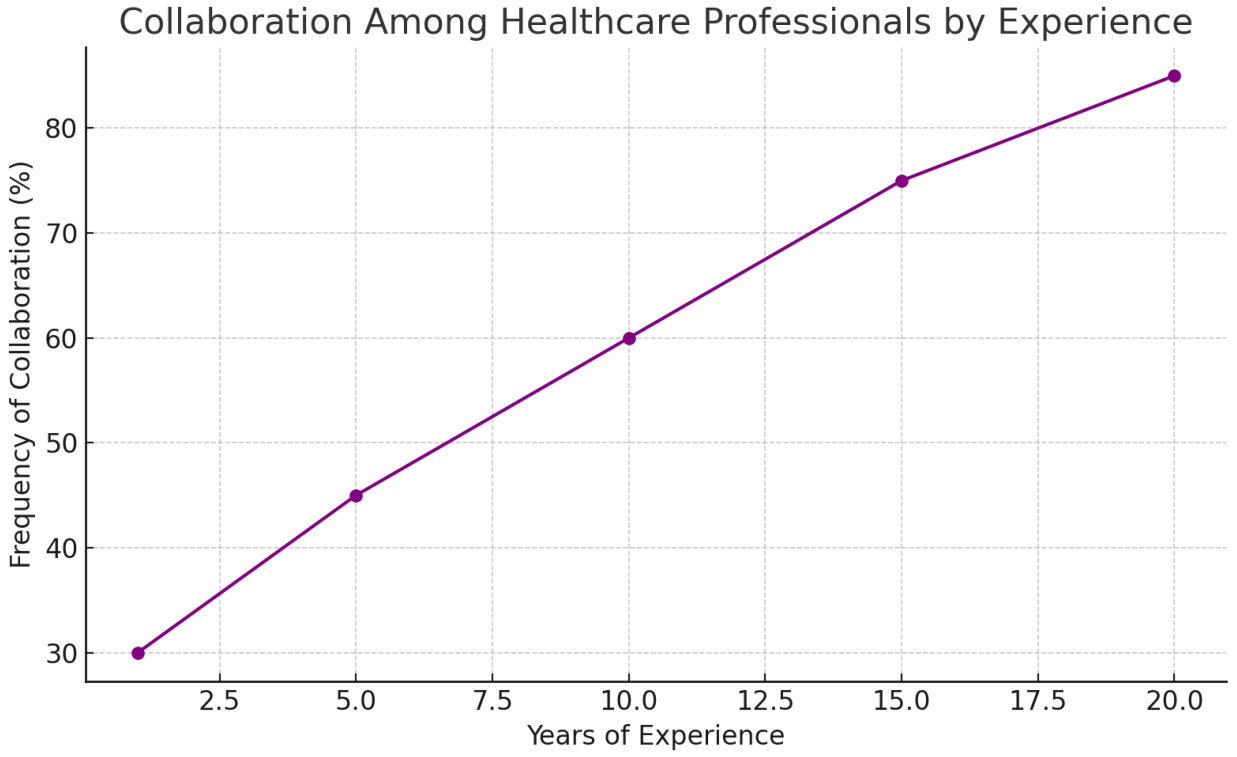

Concern About Antibiotic Resistance by Department
Low
Moderate
High
Level of Concern (%)
0
10
20
30
40
50
60
Internal Medicine
Surgery
Pediatrics
General Practice
Infectious Diseases
Departments


Collaboration Among Healthcare Professionals by Experience
Frequency of Collaboration (%)
30
40
50
60
70
80
2.5
5.0
7.5
10.0
12.5
15.0
17.5
20.0
Years of Experience

Discussion

The findings of this study highlight several critical aspects of antibiotic use and stewardship at Elmiek Nimer University Regional Hospital. These observations are consistent with previous research in similar contexts and emphasize the importance of targeted interventions to enhance antibiotic practices.

The study revealed that a significant portion of healthcare professionals at Elmiek Nimer University Regional Hospital are unaware of hospital-specific guidelines for antibiotic use, despite reporting moderate to high knowledge of antibiotics. This gap between knowledge and practice is a common issue in low-resource settings. Similar studies, such as those conducted in Sudan and other sub-Saharan African countries, have noted that empirical antibiotic prescriptions often take precedence over adherence to clinical guidelines [4, 6]. This misalignment can result in inappropriate use of antibiotics, increasing the risk of resistance.

Enhanced awareness and adherence to guidelines are essential for optimizing antibiotic use. Evidence suggests that targeted education and the development of accessible, locally relevant guidelines can significantly improve compliance [8, 17]. Incorporating hospital-specific protocols, regular training, and updates can ensure that healthcare professionals are better equipped to make evidence-based decisions.

The study found that only 15.4% of participants had engaged in antibiotic stewardship programs, although those who did participate reported their effectiveness. Globally, stewardship programs are recognized as one of the most effective strategies for promoting rational antibiotic use and combating resistance. Research indicates that such programs can reduce unnecessary antibiotic prescriptions, improve patient outcomes, and decrease resistance rates [13, 15]. In Nigeria, for instance, implementing stewardship initiatives led to significant improvements in prescribing practices [15]. This underscores the need for Elmiek Nimer Hospital to strengthen and expand its stewardship efforts.

Key components of effective stewardship programs include multidisciplinary teams, regular audits, feedback mechanisms, and ongoing education [14]. Integrating these elements into Elmiek Nimer's practices could foster more consistent antibiotic use and adherence to guidelines.

Financial constraints and medication-related issues emerged as significant barriers to appropriate antibiotic prescribing in this study. These challenges are not unique to Elmiek Nimer Hospital; similar barriers have been reported in other developing countries, where limited resources and the high cost of medications hinder optimal prescribing [8, 9]. Addressing these barriers requires collaboration between healthcare institutions, policymakers, and pharmaceutical companies to ensure the availability of affordable and essential medications.

Additionally, resource limitations can impact the ability of healthcare professionals to follow guidelines strictly, as diagnostic tests and alternative treatments may not always be accessible. Therefore, efforts to overcome these obstacles should involve the provision of necessary resources and the establishment of systems that support evidence-based decision-making.

The study noted a prevalent use of empirical antibiotic prescriptions based on clinical symptoms and laboratory results. While clinical judgment is vital, reliance on empirical treatment without adequate diagnostic support can

contribute to the development of resistance. Previous studies in East Africa and Sudan have shown high resistance levels to commonly used antibiotics, such as amoxicillin and ciprofloxacin [10, 11]. This trend underscores the importance of local surveillance of antibiotic resistance patterns.

By monitoring local resistance trends, healthcare professionals can make informed decisions regarding the most effective antibiotics for specific infections, thereby reducing the risk of resistance. This aligns with the recommendations of global health organizations, which emphasize the need for localized data to guide antibiotic prescribing [12].

Although healthcare professionals at Elmiek Nimer Hospital report moderate to high knowledge of antibiotics, there is a clear need for more comprehensive education and training. Continuous professional development (CPD) focusing on rational antibiotic use, resistance prevention, and adherence to guidelines is critical. Tailoring training programs to address specific departmental needs can enhance their effectiveness. Studies have shown that such targeted interventions improve prescribing practices and increase guideline compliance [17].

Educational initiatives should not only focus on healthcare professionals but also extend to patients, highlighting the importance of completing prescribed antibiotic courses and understanding the risks of misuse. This two-pronged approach can foster a more informed patient population and support better health outcomes.

Conclusion

This study provides an in-depth analysis of antibiotic prescribing practices at Elmiek Nimer University Regional Hospital, revealing a substantial gap between healthcare professionals' awareness of antibiotic resistance and their adherence to hospital-specific guidelines. The findings underscore a pattern of frequent antibiotic prescriptions based primarily on clinical symptoms and laboratory results, pointing to the necessity for better education on evidence-based guidelines and more consistent adherence to them.

Enhanced antibiotic stewardship programs are essential to improve antibiotic use and combat resistance. Addressing barriers such as financial and medication-related challenges will be critical to achieving better patient outcomes and curbing the spread of resistance. Although healthcare professionals report moderate to high knowledge of antibiotics, the lack of consistent practice and guideline adherence indicates that targeted interventions are necessary.

Recommendations

To address the identified gaps and improve antibiotic prescribing practices, the following actions are recommended:

Strengthen Antibiotic Stewardship Programs: Introduce comprehensive antibiotic stewardship initiatives with mandatory participation from healthcare professionals. This should include routine audits, feedback on prescribing patterns, and the formation of multidisciplinary teams to support appropriate antibiotic use.

Increase Guideline Awareness and Compliance: Create and distribute hospital-specific antibiotic guidelines, ensuring clarity and accessibility. Conduct regular training sessions to familiarize all healthcare staff with these guidelines and promote adherence.

Enhance Education and Training: Implement continuous professional development programs focused on rational antibiotic use, resistance prevention, and the importance of completing prescribed courses. Tailor educational content to address the specific knowledge gaps within different departments and specialties.

Address Financial and Access Barriers: Work with policymakers, pharmaceutical companies, and hospital administrators to minimize financial and access-related obstacles to proper antibiotic prescribing. Ensure the availability of affordable and essential medications.

Bolster Patient Education and Follow-Up: Develop educational initiatives for patients to emphasize the importance of adhering to prescribed antibiotic regimens. Establish follow-up systems, especially in departments like surgery and general practice, to monitor treatment efficacy and outcomes.

Foster Interdepartmental Collaboration: Encourage collaboration between various departments to facilitate comprehensive decision-making in complex cases involving antibiotics. Utilize regular interdisciplinary meetings to enhance communication and improve the quality of care.

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