

Analysis of Antibacterial Drug Prescriptions in Our Hospital

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Abstract: *Purpose:* To provide effective support for rational clinical use of drugs by analyzing and studying the usage status of antibacterial drug prescriptions in our hospital. *Methods:* A statistical study was conducted on 1036 antibacterial drug prescriptions in our hospital in 2024, the rationality of drug use was analyzed, and the unreasonable drug use prescriptions were objectively analyzed and explained. *Results:* In the final statistical results, it was found that the total number of outpatient prescriptions in our hospital in 2024 was 17021, including 1036 prescriptions for antimicrobial drugs, and the outpatient antimicrobial drug usage rate was 6.09% (1036/17021). Among the outpatient antimicrobial drugs used in our hospital, 98.26% (1018/1036) were prescribed single drugs, 1.64% (17/1036) were prescribed combination drugs, and 0.10% (1/1036) were prescribed triple drugs. There were 16 cases of unreasonable prescriptions of antibacterial drugs, accounting for 1.54% (16/1036) of the total prescriptions of antibacterial drugs. Among them, there were mainly problems such as inappropriate indications, inappropriate usage and dosage. *Conclusion:* There is still some irrational drug use in outpatient antimicrobial drug prescriptions in our hospital, and it is necessary to further strengthen the training and education on standardized prescription and drug use to effectively reduce the occurrence of related problems.

Keywords: antibacterial drug prescription; unreasonable situations; medication analysis

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1. Introduction

Antimicrobial drugs are the core means of treating infectious diseases, and their rational application directly affects clinical efficacy and patient safety. Statistics from the World Health Organization show that about 50% of the world's antibacterial drugs are used irrationally, accelerating the spread of multi-drug-resistant bacteria. The spread and spread of bacterial resistance have led to an increasing number of drug-resistant strains, which in turn increases the difficulty of clinical treatment, aggravates patients' condition, and prolongs hospitalization time. Bacterial drug resistance has become one of the key issues of concern to the world's public health system. Therefore, standardizing the use of antibacterial drugs is a key issue that needs to be solved urgently, among which the management of antibacterial drugs in outpatient and emergency departments is particularly important^[1-2]. Rational application of antibacterial drugs is the key to improving efficacy, reducing adverse reactions, and reducing or delaying the occurrence of bacterial resistance. This study systematically analyzes the 2024 outpatient antimicrobial drug prescription data of our hospital to reveal the current status and existing problems of drug use and provide evidence-based basis for optimizing the antimicrobial drug management model.

2. Materials and methods

2.1. General information

Now we will review 1036 antimicrobial drug prescriptions in our hospital in 2024, and analyze the review results and reasons for unreasonable prescriptions.

2.2. Research methods

This study took into account the requirements of evaluation standards such as “Prescription Management Methods” and “Guiding Principles for Clinical Application of Antimicrobial Drugs” to analyze the situation of irrational drug use. (1) Reconstruction of the prescription issuance and review system. The outpatient clinic has established a hierarchical authorized prescription management system to clarify the scope of prescription authority of doctors at all levels. It is required that the prescription content must fully record core elements such as basic patient information, clinical diagnosis conclusions, common names of drugs, precise dosages, and standardized usage methods. A prescription pre-examination center composed of senior clinical pharmacists has been set up to implement a “dual-person, double-examination” mechanism to focus on checking prescription compatibility contraindications, dosage accuracy, and compliance with diagnosis and treatment plans. Simultaneously optimize the standard process of pharmaceutical services and mandate that pharmacists perform medication guidance obligations and fully explain key information such as drug interactions, possible adverse reactions, and special storage requirements to patients. (2) Multidisciplinary collaborative prescription evaluation. Integrate interdisciplinary expert resources to form a prescription quality management intervention team, whose members include professionals from dermatology, occupational diseases, traditional Chinese medicine and other fields. It implements a stepped training and certification system for them, including quarterly seminars on rational drug use, annual prescription standardization ability assessment, and the establishment of dynamic management files for physicians’ prescription rights. It is necessary to strengthen special training on high-risk varieties such as antibacterial drugs and psychotropic drugs, and implement a closed-loop management of “training-assessment-authorization”. (3) Innovation in prescription quality evaluation system. Establish a three-dimensional evaluation system that combines quantitative and qualitative aspects. The basic dimension examines the standardization of prescription writing, the clinical dimension evaluates the rationality of treatment plans, and the economic dimension analyzes the cost-effectiveness of medication. At the same time, differentiated reward and punishment plans are formulated, and core indicators such as prescription qualification rate and antibacterial drug usage intensity are incorporated into the physician performance evaluation system. (4) Continuous improvement of prescription quality. The inspection method combines “systematic sampling + key inspections” to carry out proportional random sampling of prescriptions every month, and implement full coverage review of specially managed drugs. At the same time, the drug use information monitoring platform will be improved to achieve real-time dynamic monitoring of indicators such as antibacterial drug usage intensity and injection usage rate.

2.3. Observation indicators

Statistics on the usage and unreasonable prescriptions of these antibacterial drugs were carried out, and statistical and comparative analysis was conducted.

3. Results

3.1. Statistical status of antibacterial drug use

3.1.1. Distribution of diseases among patients prescribed antibacterial drugs

Among the 1036 prescriptions, 436 were male and 600 were female, aged 4–90 years old. The disease distribution of the patients mainly included 414 cases of respiratory system infections, 666 cases of skin and soft tissue infections, 44 cases of periodontal disease, 27 cases of urinary system infections, 35 cases of gastrointestinal infections, and 6 cases of sexually

transmitted infections.

3.1.2. Use of antibacterial drugs and routes of administration

There are 10 kinds of antibacterial drugs used in 1036 prescriptions. The three most frequently used antibacterial drugs are cefaclor sustained-release tablets, itraconazole capsules (Spirano), and doxycycline hydrochloride tablets. The usage rates are respectively 39.38%(408/1036), 18.44%(191/1036), 14.29%(148/1036). Among them, there were 1020 prescriptions for oral administration (98.46%) and 16 prescriptions for intramuscular injection (1.54%). See **Table 1** for details.

Table 1. Number of prescriptions and utilization rate of antimicrobial drugs in outpatient clinics

Medicines	Number of prescriptions	Usage rate (%)
Cefaclor extended-release tablets	408	39.38%
Itraconazole capsules (Spirano)	191	18.44%
Doxycycline hydrochloride tablets	148	14.29%
Roxithromycin dispersible tablets	83	8.01%
Ornidazole tablets	76	7.34%
Levofloxacin tablets	60	5.79%
Cefaclor dry suspension	36	3.47%
Itraconazole capsules (Meifu)	21	2.03%
Azithromycin tablets	17	1.64%
Benzathine penicillin for injection	5	0.48%

3.1.3. Combined use of antibiotics

Among these 1,036 prescriptions, 1,018 (98.26%) were for single antibiotics and 17 (1.64%) were for dual antibiotics, mainly ornidazole dispersible tablets combined with cefaclor sustained-release tablets or ornidazole dispersible tablets combined with amoxicillin capsules for the treatment of periodontal diseases such as gum abscesses. The triple drug prescription is 1 (0.10%) for the treatment of urinary tract infections.

3.2. Unreasonable types of antibacterial drug prescriptions

3.2.1. Among the 1036 outpatient antimicrobial drug prescriptions, 16 unreasonable prescriptions were found (unreasonable rate $16/1036 = 1.54\%$). The main types of unreasonable prescriptions were 6 prescriptions with inappropriate indications (unreasonable rate $6/1036 = 0.57\%$), and 10 prescriptions with inappropriate usage and dosage (unreasonable rate $10/1036 = 0.97\%$). See **Table 2** for details.

Table 2. Records of irrational use of antibacterial drugs

Category	n	Total proportion
Inappropriate indications	6	0.57
Inappropriate usage and dosage	10	0.97
Unreasonable rate (%)	16	1.54

Through investigation and research, it was found that 16 of the 1,036 antimicrobial drug prescriptions had unreasonable problems, with a total unreasonable rate of 1.54% (16/1036). Among them, there were mainly problems such as inappropriate indications, inappropriate usage and dosage.

3.2.2. Analysis of reasons for unreasonable prescriptions

(1) Inappropriate indications: 6 prescriptions. For example ① The diagnosis is: occupational silicosis stage 1.

Prescription: Cefaclor sustained-release tablets, 0.375 g*4, po bid. There is no obvious indication of infection in the prescription diagnosis. Therefore, it is not suitable to use cefaclor sustained-release tablets. ② Diagnosis: hypokalemia, urethritis. Prescription: Levofloxacin tablets, 0.5 g*10 0.5 g/time qd po + potassium chloride sustained-release tablets, 0.5 g*48 0.5 g/time tid po. In the instructions for levofloxacin tablets, it is pointed out that some fluoroquinolone drugs can prolong the QT interval of the electrocardiogram, and a few patients may develop arrhythmia. Spontaneous reports of torsade de pointes in patients treated with fluoroquinolones have been rare during postmarketing surveillance and may worsen hypokalemia; therefore, levofloxacin tablets should be avoided in patients with uncorrected hypokalemia. The above prescriptions are for inappropriate indications.

(2) Inappropriate usage and dosage. 10 prescriptions. For example, patient ① is a 68-year-old male. Diagnosis: seborrheic dermatitis, infectious dermatitis. Prescription: azithromycin tablets, 0.25 g*6 0.25 g/time po bid. Azithromycin should be taken orally once a day, swallowed whole, and can be taken with food, rather than twice a day. Therefore, the usage and dosage of this prescription are not appropriate. ② The patient is a 45-year-old female. Diagnosis: rosacea, xerosis, and trunk skin infection. Prescription: ornidazole tablets 0.25 g*24; 0.25 g/time po bid. Ornidazole tablets are used to treat skin infections caused by sensitive anaerobic bacteria: adults and children weighing 35 kg or above, 0.5 g (2 tablets) each time, twice a day; the patient in this prescription is 45 years old, and the single dose is 0.25 g, which is low, so the above prescription is not suitable.

4. Discussion

In this study on the outpatient antimicrobial prescriptions in our hospital, we conducted a systematic analysis of 1036 outpatient antimicrobial prescriptions throughout 2024. The research results show that the usage rate of antimicrobial drugs in our hospital is 6.09% (1036/17021). This data reflects the certain frequency of application of antimicrobial drugs in outpatient treatment in our hospital. Among them, single drug prescriptions accounted for 98.26%, combination drug prescriptions accounted for 1.64%, and triple drug prescriptions accounted for 0.001%. From the perspective of the overall medication structure, single medication occupies a dominant position, which to a certain extent shows that the outpatient department of our hospital has a relatively reasonable basis for the use of antibacterial drugs. However, what cannot be ignored is that among all statistical prescriptions, there were 16 cases of irrational drug prescriptions, accounting for 1.54% of the total prescriptions.

Irrational drug use mainly focuses on inappropriate indications, inappropriate usage and dosage, etc. Improper medication is manifested by the selection of antibacterial drugs that are not suitable for the patient's condition, which may delay the treatment opportunity and even lead to aggravation of the condition. Unreasonable combination use involves that the synergistic or antagonistic effects between antibacterial drugs are not reasonably considered, resulting in the combination of drugs failing to achieve the expected therapeutic effect. Unqualified usage and dosage, whether the dose is too large or too small, or the frequency of medication is unreasonable, may affect the pharmacokinetic process of the drug in the body, thereby affecting the therapeutic effect or causing adverse reactions.

The existence of these irrational drug use phenomena may not only pose a potential threat to patients' health, but may also exacerbate the development of bacterial resistance. The increase in bacterial resistance will make future treatment of infectious diseases more challenging, leading to increased treatment costs, longer treatment cycles, and even the possibility of no drugs being available. Therefore, it is urgent to improve the rationality of outpatient antimicrobial drug prescriptions in our hospital^[3]. In order to reduce the phenomenon of irrational medication use, hospitals should further strengthen training and education on standardized prescription and medication use. For doctors, regular training courses on the rational use of antimicrobial drugs are carried out, covering the latest clinical application guidelines of antimicrobial drugs, knowledge of drug interactions, and indications of antimicrobial drugs for different diseases. Through case analysis, special lectures and other forms, we can improve doctors' understanding and professional level of the rational use of antibacterial drugs. At the same time, establish and improve the prescription review system, strengthen the review of prescriptions, and

promptly discover and correct irrational drug prescriptions. In addition, information technology can also be used, such as embedding a rational drug use reminder function in the hospital information system. When the doctor writes a prescription, the system will automatically prompt the possible irrational drug use to provide a reference for the doctor^[4]. Therefore, in order to ensure the safety and efficacy of medication for patients, the following targeted intervention measures can be taken based on the reasons for unreasonable combination prescriptions.

4.1. Strengthen the education of medical staff

Medical institutions should regularly organize medical staff to participate in training on rational drug combination prescriptions to improve doctors and pharmacists' understanding of drug pharmacology, pharmacokinetics, drug interactions, etc. Medical staff are encouraged to participate in continuing education courses and academic exchange activities to learn about the latest developments and best practices in rational drug combination prescription. Through specific case analysis, the hazards of unreasonable combined prescriptions of drugs and the principles of rational combined prescriptions are introduced to improve the practical capabilities of medical staff. Regularly conduct assessments on rational drug combination prescriptions for medical staff to assess their mastery to ensure training effectiveness. Organize pharmacists to comment on doctors' prescriptions, focusing on unreasonable drug combination prescriptions, and provide timely feedback and suggestions. Strengthen patient education, improve patients' understanding of rational medication use, and enable them to actively participate in the formulation of their own medication plans. Develop norms and guidelines for rational drug combination prescriptions to help medical staff make reasonable decisions in actual diagnosis and treatment.

4.2. Promote the concept of rational drug use

Carry out publicity and education activities on rational drug use, popularize the knowledge of rational drug use to the public through the media, the Internet, communities and other channels, and improve the public's awareness of the concept of rational drug use. Establish a drug information platform or provide relevant mobile applications for patients and medical staff to query drug indications, contraindications, side effects, interactions and other information to help them make more informed medication decisions. Develop clinical guidelines for rational drug use, clarify indications, contraindications, medication principles, etc. for combined use of drugs, and provide doctors with scientific basis for medication use. Doctors are encouraged to communicate fully with patients, explain the principles and necessity of rational use of drugs, and help patients understand and cooperate with rational drug use plans. Strengthen the concept of individualized treatment, formulate personalized treatment plans based on the patient's specific conditions, and avoid unnecessary combined use of drugs. In addition, medical institutions are encouraged to increase the deployment of pharmacists, provide professional guidance and consulting services in rational medication use, and provide rational medication recommendations to doctors and patients^[5-6].

4.3. Establish a standardized prescription review mechanism

Medical institutions can set up a prescription review committee, composed of doctors from multiple disciplines, to review prescriptions, especially prescriptions for combined use of drugs. The committee can formulate unified review standards and guidelines to clarify the definition, contraindications, interactions, etc. of unreasonable drug combinations in order to unify review standards. Introducing an electronic prescription review system, combined with modules such as clinical path management and drug order management, to conduct real-time review of prescriptions, reduce interference from human factors, and improve review efficiency and accuracy. Provide relevant knowledge training to medical staff on unreasonable drug combinations, improve doctors' knowledge and awareness of rational drug use, and reduce the risk of unreasonable drug combination prescriptions. Medical staff are encouraged to use authoritative clinical guidelines when prescribing, refer to standardized treatment plans, and avoid unnecessary combined use of drugs^[7-8].

5. Conclusion

In summary, although the overall medication structure of our hospital's outpatient antimicrobial drug prescriptions is reasonable to a certain extent, there are still irrational drug use phenomena that cannot be ignored. By strengthening training and education, improving the audit system, and using information technology and other measures, it is expected to further improve the level of rational use of antibacterial drugs, ensure patient medication safety, reduce the occurrence of bacterial resistance, and provide stronger support for clinical treatment.

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Disclosure statement

The author declares no conflict of interest.

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