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Effect of pharmaceutical intervention on clinical rational use of antibiotics

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Abstract. Objective: To analyze and compare the effect of pharmaceutical intervention on the clinical rational use of antibiotics. Methods: A total of 190 patients treated with antibiotics in the Respiratory Medicine Department of a hospital were divided into the conventional group and the intervention group based on pharmaceutical intervention, and indicators such as the rate of drug combination, rate of irrational drug use, rate of pathogenic detection, adverse reaction rate, length of stay, patient satisfaction, duration of antibiotic use and treatment expense were compared between the two groups. Results: These indicators in the intervention group were better than those in the conventional group, and the differences were statistically significant. Conclusion: Pharmaceutical intervention can promote the clinical rational use of antibiotics, improve the treatment effect and ensure the safety, and also save medical resources, reduce patients' economic burden and improve their satisfaction, which has high practical value and is worthy of promotion.

Keywords. pharmaceutical intervention, antibiotics, Respiratory Medicine Department, rational use, satisfaction.

There are a variety of antibiotics, of which such varieties as penicillins, cephalosporins and macrolides are common in clinical practice. With such characteristics as rapid absorption, long half-life and wide antibacterial spectrum, they are widely used for the prevention and treatment of various infective diseases. In recent year, as China's climate environment changes and the number of elderly population and smokers increases, the number of patients suffering from respiratory diseases is on the rise, and the use of antibiotics is also growing year-on-year. While antibiotics have a therapeutic effect, non-standard and irrational drug use also occurs, which not only leads to drug resistance and delays treatment, but also increases adverse reactions, brings risks in medication safety and prolongs the treatment, and aggravates patients' economic burden. In addition to its presence in China, the irrational use of antibiotics is also a serious public safety and health problem in the world. Pharmaceutical intervention, as a systematic intervention mode of clinical drug use, can effectively improve the rationality, effectiveness, safety and economy of clinical drug use. Therefore, strengthening the pharmaceutical intervention of antibiotics has practical significance for the clinical rational use of antibiotics. In this study, 190 patients treated with antibiotics in the Respiratory Medicine Department of a hospital were included to analyze and compare the effect of pharmaceutical intervention on the clinical rational use of antibiotics. Details are reported as follows.

1. Data and methods

1.1. Basic data

A total of 190 patients treated with antibiotics in the Respiratory Medicine Department of a hospital from August 2019 to August 2020 were included, including 105 males and 85 females, aged 26-75 years, with the mean age of (46.98±3.26) years. They were divided into the conventional group (95) and the intervention group (95) based on pharmaceutical intervention, and the gender and age showed no significant difference between the two groups ($P > 0.05$) and were comparable. Patients with psychiatric disorders, dysfunction in important organs such as liver and kidney, and unable to cooperate with treatment were excluded, and all included patients signed informed consent.

1.2. Methods

The conventional group was given conventional pharmaceutical management: patients were required to take drugs according to medical advice and told the usage and precautions. The intervention group was given pharmaceutical intervention management based on conventional pharmaceutical management. 1) Patients were fully evaluated to identify whether they met the indications for using antibiotics, and antibiotics were determined according to the drug sensitivity test; clinical pharmacists entered the Respiratory Medicine Department to participate in ward rounds and disease discussion, developed drug use plans for patients with competent physicians, monitored the drug use process of patients, communicated with physicians on problems they found, and optimized and adjusted the drug use regime. 2) Knowledge lectures such as guiding principles of antibiotic use, scientific drug compatibility and adverse reactions were regularly held to improve physicians' cognition of antibiotics; antibiotic prescriptions were reviewed regularly, and the irrational drug use that was found was circulated to strengthen physicians' sense of responsibility and professional ethics. 3) The training and learning of clinical pharmacists were strengthened to improve their professional capacities and levels, so that they could accurately judge the rationality of physicians' prescriptions, and scientific suggestions and opinions were given. 4) An antibiotic prescription system was established and improved to standardize the process of issuing prescriptions to ensure rational, safe, and scientific drug use.

1.3. Observation indicators

These indicators included the rate of drug combination, rate of irrational drug use, adverse reaction rate, rate of pathogenic detection, duration of antibiotic use, treatment expense, length of stay, patient satisfaction, and so on. Of them, patient satisfaction was statistically calculated according to the self-prepared patient satisfaction questionnaire, in which 100 points indicated great satisfaction, 90-99 points indicated satisfaction, 60-89 points indicated general satisfaction, and 60 points and below indicated dissatisfaction, patient satisfaction = (great satisfaction + satisfaction) cases ÷ total cases × 100%; other indicators were reviewed using the hospital information system (HIS).

1.4. Statistical processing

The SPSS 20.0 software was used for data statistics and processing. Measurement data and enumeration data were compared by *t*-test and chi-square test, respectively. $P < 0.05$ was considered statistical differences for the comparison of indicators between groups.

2. Results

2.1. Comparison of indicators for intervention effect

Indicators such as the rate of drug combination, rate of irrational drug use, duration of antibiotic use, length of stay and treatment expense in the intervention group were significantly lower than those in the conventional group, and the rate of pathogenic detection was significantly higher than that in the conventional group, and the differences were statistically significant ($P < 0.05$). Details are shown in Table 1.

Table 1. Comparison of indicators for intervention effect

Group	Case	Rate of drug combination	Rate of irrational drug use	Rate of pathogenic detection	Duration of antibiotic use (d)	Length of stay (d)	Treatment expense (yuan)
Conventional group	95	30 (31.58)	27 (28.42)	36 (37.89)	11.64±1.09	13.89±1.38	4235.74±415.22
Intervention group	95	15 (15.79)	3 (3.16)	53 (55.79)	9.24±0.81	10.13±1.06	3283.52±328.49

2.2. Comparison of adverse reaction rate

Cases such as allergy, gastrointestinal upset and infection in the intervention group were less than those in the conventional group, and the adverse reaction rate was significantly lower than that in the conventional group, and the differences were statistically significant ($P < 0.05$). Details are shown in Table 2.

Table 2. Comparison of adverse reaction rates (case, %)

Group	Case	Allergy	Gastrointestinal upset	Infection	Adverse reaction rate
Conventional group	95	6	10	5	22.11
Intervention group	95	1	2	0	3.16

2.3. Comparison of patient satisfaction

Total cases of great satisfaction and satisfaction in the intervention group were more than those in the conventional group, and the patient satisfaction was significantly higher than that in the conventional group, and the differences were statistically significant ($P < 0.05$). Details are shown in Table 3.

Table 3. Comparison of patient satisfaction (case, %)

Group	Case	Great satisfaction	Satisfaction	General satisfaction	Dissatisfaction	Patient satisfaction
Conventional group	95	39	36	12	8	78.95
Intervention group	95	70	23	2	0	97.89

3. Discussion

Antibiotics are a chemical semi-synthetic or synthetic drug that is common in clinical practice, which has sterilization, antibacterial, anti-inflammatory, and other effects, and is effective to clinical symptoms caused by bacterial infection, such as chills, high fever and rash. Different antibiotics have different mechanisms of action and different sensitivity to pathogenic bacteria, and the sensitivity is also related to individual differences of patients. Therefore, before the official use of antibiotics, the drug sensitivity test and evaluation on patients' physical conditions are required, and targeted antibacterial treatment is carried out on this basis. Rational drug use is predicated on medical theories and focuses on the effectiveness, safety, and economy of drug use. Thus, physicians need to rationally select antibiotics according to patients' conditions, types of pathogens, infected sites, constitution, and other factors, and specify the methods, dosage of administration, interval time, course, and other aspects of drug use on the basis of strict observance of the usage specification of antibiotics. It should be noted that the dosage of administration not exceed the safe dose of drugs. Particularly, in combined administration, the rationality of antibiotics compatibility should be ensured, and then the

dosage of administration, interval time and other aspects are determined according to the types, half-life, dependence, and other factors of the drugs used. For example, in the combination of aminoglycosides and lactams, the dose of aminoglycosides, a concentration-dependent drug with such side effects as damage to the renal cortex, needs to be moderately reduced and the interval time needs to be moderately extended, so as to reduce adverse reactions. Nevertheless, physicians specialize in disease diagnosis and treatment, and master little pharmaceutical knowledge and have certain limitations in clinical rational drug use. Finally, non-standard and irrational drug use occurs, resulting in a large number of drug-resistant strains or dysbacteriosis in the patient's body and even double infection, which poses serious threat to the safety of patients. Based on this, China has issued the *Guiding Principle of Clinical Application of Antibacterials*, and established the bacterial drug-resistance monitoring network and antibiotic monitoring network, which reduces the irrational use of antibiotics to a certain extent. However, there is still a large gap compared to the use levels of antibiotics in developed countries. Pharmaceutical intervention is clinical pharmacists' systematic and standardized management of the whole process of drug use, which reflects the concept of patient-centered pharmaceutical service and aims to improve the quality of drug use for patients. Practice has proved that pharmaceutical intervention can not only ensure the standard writing of drug prescriptions and realize the comprehensive evaluation of drug prescriptions to minimize the irrational drug use, but also ensure the safe and reliable clinical drug use, minimize the economic burden of patients and avoid the waste of medical resources. Thus, pharmaceutical intervention is necessary for the clinical application of antibiotics.

In this study, the conventional group was given conventional pharmaceutical management, and clinical pharmacists were responsible for reviewing prescriptions and counting and reporting irrational ones to relevant physicians. In the conventional group, the rate of drug combination was 31.58%, including 21.05% for combination of two antibiotics and 10.53% for combination of three antibiotics; the rate of irrational drug use was 28.42%, including 6.32% for improper drug selection, 3.16% for drug use without indications, 3.16% for frequent change of drugs, 6.32% for improper dosage and usage, and 9.47% for irrational drug combination; the rate of pathogenic detection was 37.89%; the duration of antibiotic use was (11.64±1.09) days; the length of stay was (13.89±1.38) days; the treatment expense was (4235.74±415.22) yuan; the adverse reaction rate was 22.11%, including 6.32% for allergy, 10.53% for gastrointestinal upset, and 5.26% for infection; patient satisfaction was 78.95%, including 41.05% for great satisfaction, 37.89% for satisfaction, 12.63% for general satisfaction, and 8.82% for dissatisfaction. The intervention group was given pharmaceutical intervention management on the basis of conventional pharmaceutical management, and clinical pharmacists entered the Respiratory Medicine Department. First, they developed drug use plans for patients with competent physicians according to the drug sensitivity test; then, they timely communicated with competent physicians in problems they found during the monitoring of patients' drug use process, and optimized and adjusted the drug use plans to make them more conductive to patients' treatment, so as to promote the early recovery of patients; finally, they participated in ward rounds and disease discussion with medical staff to comprehensively understand patients' overall conditions, so as to develop or adjust more targeted drug use plans. In the intervention group, the rate of drug combination was 15.79%, including 9.47% for combination of two antibiotics and 6.32% for combination of three antibiotics; the rate of irrational drug use was 3.16%, including 1.05% for improper drug selection, 0.00% for drug use without indications, 0.00% for frequent change of drugs, 1.05% for improper dosage and usage, and 1.05% for irrational drug combination; the rate of pathogenic detection was 55.79%; the duration of antibiotic use was (9.24±0.81) days; the length of stay was (10.13±1.06) days; the treatment expense was (3283.52±328.49) yuan; the adverse reaction rate was 3.16%, including 1.05% for allergy, 2.11% for gastrointestinal upset, and 0.00% for infection; patient satisfaction was 97.89%, including 73.68% for great satisfaction, 24.21% for satisfaction, 2.11% for general satisfaction, and 0.00% for dissatisfaction. This indicated that compared with the conventional group, the intervention group was more advantageous in such indicators as the rate of drug combination, rate of irrational drug use, adverse reaction rate, rate of pathogenic detection, length of stay, duration of antibiotic use, treatment expense and patient satisfaction, proving the value of pharmaceutical intervention in the clinical rational use of antibiotics. This was consistent with the results of CHEN and LIU et al., indicating that pharmaceutical intervention has a broad development prospect in clinical application.

In conclusion, 190 patients treated with antibiotics in the Respiratory Medicine Department of a hospital were studied by grouping and control to analyze and compare the effect of clinical rational use of antibiotics between two groups. The results showed that pharmaceutical intervention was of high practical application value in antibiotics, and worthy of further promotion. The scope of its application should be continuously expanded.

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