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Effect of pharmaceutical intervention on rational use of antibiotics in acute exacerbation of chronic obstructive pulmonary disease

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Abstract. Objective: To analyze the effect of pharmaceutical intervention in patients with acute exacerbation of chronic obstructive pulmonary disease (AECOPD) on the rational use of antibiotics. Methods: In this study, 95 patients with AECOPD treated in our hospital from January 2019 to December 2019 were randomly selected, numbered, and divided into the control group and the observation group by odd or even number, of which the control group was given conventional medication guidance, and the observation group was given pharmaceutical intervention. The varieties of antibiotics used in patients were counted, the irrational use of antibiotics in each group was recorded, the total incidence rate was calculated, and quality scores of antibiotics use before and after intervention were evaluated. Results: Common clinical antibiotics mainly included cephalosporins, macrolides and quinolones; the incidence rate of irrational use of antibiotics in the observation group was significantly lower than that in the control group ($P < 0.05$). The scores of antibiotics use between the two groups showed no statistical difference before intervention ($P > 0.05$), and significantly increased after intervention, of which those in the observation group were significantly higher than those in the control group ($P < 0.05$). Conclusion: Pharmaceutical intervention given during the use of antibiotics in patients with AECOPD can effectively improve the rationality of the use of drugs and ensure the safety of drugs use of patients, and thus is worthy of promotion.

Keywords. pharmaceutical intervention, chronic obstructive pulmonary disease, acute exacerbation, antibiotics, rational use.

Chronic obstructive pulmonary disease (COPD) is a clinically common and multiple chronic respiratory disease that is characterized by incompletely reversible airflow limitation, and patients have such symptoms as shortness of breath, expectoration and dyspnea. It poses a serious threat to the health and even safety of patients [1]. When patients with COPD are in the acute exacerbation, symptoms of the disease change rapidly, which may easily lead to respiratory failure or heart failure, and even pulmonary encephalopathy, and prompt and effective treatment should be given. At present, drugs are often clinically used to help improve patients' symptoms, of which antibiotics are essential and have good effect. However, with the improvement of the medical level, the varieties and number of antibiotics gradually increase, and rational drug use is frequent, which not only affects the curative effect, but may even cause secondary damage to patients. Thus, ensuring the rationality of the use of antibiotics becomes an issue requiring in-depth research by the medical community need [2]. In this paper, 95 patients with AECOPD treated in our hospital from January 2019 to December 2019 were study and given pharmaceutical intervention to improve the rationality of the use of antibiotics. Details are reported as follows.

1. Data and methods

1.1. General data

In this study, 95 patients with AECOPD treated in our hospital from January 2019 to December 2019 were randomly selected, numbered and divided into the control group and the observation group by odd or even number. In the control group, 47 patients were included, including 26 males and 21 females, aged between 55 and 86 years, with the mean age of (67.6±1.4) years. In the observation group, 48 patients were included, including 27 males and 21 females, aged between 56 and 87 years, with the mean age of (67.7±1.3) years. The inclusion criteria were: 1) patients diagnosed with COPD and in acute exacerbation, which met the relevant provisions of *Diagnosis and Treatment of AECOPD in 2017* [3]; 2) patients aged between 55 and 87 years; 3) patients who volunteered to participate in the study and signed the informed consent. The exclusion criteria were: 1) patients with stable COPD; 2) patients who rejected the study. The basic data of both groups showed no statistical differences ($P > 0.05$) and were comparable. This study was approved by the Ethics Committee of the hospital.

1.2. Methods

Patients in both groups received treatment with antibiotics. The control group was given conventional medication guidance, that is, patients were informed of the frequency and times of drug use and advised to take drugs on time or follow other advice.

The observation group was given pharmaceutical intervention. The content is as follows:

1.2.1. The drug intervention system was developed: pharmacists should specify the relevant system and usage specification of drug intervention according to different characteristics of the hospital's departments and the usage pattern of existing antibiotics, the types of diseases of patients and other factors, and printed the system in written form and posted

it in each department office, corridor, and other obvious locations [4,5]. Meanwhile, special persons were selected from doctors of each department to oversee the intervention coordination of the use of antibiotics, and the respective responsibility of pharmacists, intervention supervision persons in each department and primary medical staff in the implementation of drug intervention was clarified, so as to help pharmacists better complete the drug intervention to ensure that the work could be implemented in all aspects of the actual treatment.

1.2.2. The performance-based pay system was development: while implementing the drug intervention system, each department should link the intervention system with the personal performance of medical staff, that is, the use of antibiotics was directly included in the annual assessment, and the pharmacist group in charge of drug intervention summarized and evaluated the specific prescription [6]. Medical staff who never had irrational use of antibiotics in their work should be given material rewards, and those who achieved this for consecutive years should be encouraged to preferentially participate in title selection. Those with any irrational use of antibiotics in the work should be fined a certain percentage of awards and, for severe cases, banned from participating in title selection.

1.2.3. Involvement in clinical ward rounds was required: pharmacists should strengthen their involvement in clinical ward rounds during the implementation of drug intervention, and their entry in the clinical first-line could help them understand the use of antibiotics more accurately and communicate with patients face to face, so as to avoid the non-objective description in medical records written by medical staff. Pharmacists could further judge whether drugs were used accurately and whether they met patients' treatment needs by ward rounds. Meanwhile, difficult and complicated cases found in clinical departments during ward rounds should be immediately reported to the pharmacists group, and the group discussed the specialty of the cases, the rationality of drug use and other aspects, and the improvement in the usage regimen of antibiotics for the cases, so as to meet the treatment needs for these cases [7-9].

1.2.4. Clinical communication was strengthened: when encountering any question during the implementation of drug intervention, pharmacists should communicate with primary medical staff in time to clarify the reasons for the question, determine the solutions, and identify whether there was irrational use of antibiotics in the question, so as to ensure that treatment of patients with COPD could not be delayed [10].

1.3. Observation indicators

The varieties of antibiotics used in patients were counted, the irrational drug use in each group was recorded, and the total probability was calculated. The drug use quality of each group before and after intervention was evaluated, including the quality of drug selection, the quality of drug combination, the quality of course and the quality of dosage. The full score of each item was 25 points. The higher the score, the better the drug use quality, and vice versa.

1.4. Statistical analysis

After collation of research results, statistical processing was conducted using SPSS 18.0 software. Enumeration data were expressed by (%) and compared by chi-square test, and measurement data were expressed by ($x \pm s$) and compared by t-test; $P < 0.05$ was considered statistical differences ($P < 0.05$).

2. Results

2.1. Analysis on the varieties of antibiotics

Common varieties of antibiotics for clinical treatment of AECOPD mainly included cephalosporins, macrolides and quinolones (Table 1).

Table 1. Analysis on the varieties of antibiotics n (%)

Variety	Drug name	Case
Cephalosporin	Cfuroxime	33 (34.74)
	Cfathiamidine	25 (26.32)
	Cefoxitin	41 (43.16)
	Cefotaxime	17 (17.89)
Macrolides	Clindamycin	32 (33.68)
	Lincomycin	11 (11.58)
Quinolones	Levofloxacin	16 (16.84)
	Ciprofloxacin	34 (35.79)

2.2. Calculation of probabilities of irrational use of antibiotics

The statistical analysis showed that the total probability of irrational use of antibiotics in the observation group was significantly lower than that in the control group ($P < 0.05$) (Table 2).

Table 2. Calculation of probabilities of irrational use of antibiotics *n* (%)

Name	Case	Improper varieties	Improper drug combination	Improper dosage and usage	Improper course	Improper upgrading and downgrading	Total incidence rate
Observation group	48	0 (0.00)	1 (2.08)	0 (0.00)	1 (2.08)	1 (2.08)	3 (6.25)
Control group	47	2 (4.26)	3 (6.38)	1 (2.13)	4 (8.51)	3 (6.38)	13 (27.66)

Note: $\chi^2 = 11.23$, $P < 0.05$

2.3. Comparison of drug use quality evaluation before and after intervention

The drug use quality scores showed no statistical difference between the two groups before intervention ($P > 0.05$), and significantly increased after intervention, of which those in the observation group were significantly higher than those in the control group ($P < 0.05$) (Table 3).

Table 3. Comparison of drug use quality evaluation before and after intervention ($x \pm s$)

Name	Drug selection		Drug combination		Course		Dosage	
	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention	Before intervention	After intervention
Observation group	11.45±2.03	22.41±1.07	10.96±1.33	21.99±0.57	12.39±1.16	23.13±0.44	12.42±0.96	23.95±0.37
Control group	11.46±2.01	22.02±1.05	10.98±1.31	17.94±0.56	12.38±1.17	20.49±0.45	12.45±0.93	20.15±0.36
t	0.45	8.33	0.78	12.13	0.22	10.12	1.03	11.74
p	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

3. Discussion

Chronic obstructive pulmonary disease (COPD) is a typical chronic disease of the respiratory system. At present, the incidence of COPD is increasing year by year in China, and its clinical mortality that is the fourth highest in China cannot be ignored, which seriously affects the health and life of patients. According to clinical studies, the older the patients developing COPD, the higher the clinical risk, and the more significant the impact on patients' quality of life and prognosis. Patients, after the onset of the disease, not only bring huge economic burden to their families, but also inevitably causes physical pain to themselves [11]. At present, there are no specific drugs for the treatment of COPD in the world, and the disease can only be alleviated by long-term combination of several drugs, during which period antibiotics are required to avoid further bacterial infection. Due to the large variety and complex effects of antibiotics, clinical irrational drug use often occurs, which results in the inability to effectively treat patients with COPD and, in severe cases, the infection. Therefore, pharmacists should carry out drug intervention in time according to the actual situation to supervise and guide the clinical rational use of antibiotics. Studies show that factors for the irrational use of antibiotics include drug combination, frequent change of drugs and so on, all of which may significantly increase the probability of drug-resistant bacteria [12]. By the pharmaceutical intervention under the guidance of pharmacists, the selection of antibiotics is strictly specified according to the designated drug usage standards, and the responsibility of personnel in each department is clarified during the drug use, thereby transforming the passive attempt into active risk avoidance, and maximizing the rationality of drug use. In addition, in case of difficult and complicated cases in the department, a pharmacist group should be formed to study the antibiotics usage plan for these cases, and finally determine the most rational medication guidance, to further ensure the rational use of antibiotics.

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