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Effect of pharmaceutical intervention on rational use of antibiotics

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Abstract. Objective: To discuss the effect of pharmaceutical intervention on improving the rationality of the use of antibiotics. Methods: A total of 168 patients treated with antibiotics in this hospital from January 2019 to March 2020 were selected, and were divided into the control group (80) and the observation group (88) based on their acceptance of pharmaceutical intervention during medication. The control group received no pharmaceutical intervention, and the observation group received pharmaceutical intervention, and the use of antibiotics was compared between the two group. Results: The usage rate of an antimicrobial, the usage rate of two antibiotics and the total usage rate in the observation group were lower than those in the control group, showing statistical differences ($P < 0.05$); there were no statistical differences in the usage rates of three or more antibiotics between the two groups ($P > 0.05$); the rates of irrational drug selection, too frequent change of drugs, too high dosage, failure to administer drugs according to pharmacokinetics, and irrational drug combination in the observation group were lower than those in the control group, showing statistical differences ($P < 0.05$); the satisfaction in the use of antibiotics in the observation group was higher than that in the control group, showing statistical differences ($P < 0.05$). Conclusion: Pharmaceutical intervention can effectively reduce the usage rate of antibiotics in clinical treatment and improve the rationality of the use of antibiotics.

Keywords. pharmaceutical intervention, rational use, antibiotics, effect.

Antibiotics are important drugs in clinical antimicrobial treatment. With the development of medicine, a growing variety of antibiotics are available in clinical practice. However, due to the lack of standards for the control of drug dosage and combination of different drugs, irrational drug use occurs frequently [1]. In 2012, the former Ministry of Health issued the *Measures for the Administration of Clinical Use of Antibacterials* to improve the rationality of the clinical use of antibiotics and maximize their positive value [2]. Our hospital has tried the pharmaceutical intervention gradually in drug use. This study analyzed the application value of pharmaceutical intervention in improving the rationality of the use of antibiotics, which is reported as follows.

1. Data and methods

1.1. General data

A total of 168 patients treated with antibiotics in this hospital from January 2019 to March 2020 were selected and were divided into the control group (80) and the observation group (88) based on their acceptance of pharmaceutical intervention during medication. The observation group consisted of 44 males and 44 females, aged 18-56 years, with the mean age of (40.15 ± 10.16) years. The control group consisted of 40 males and 40 females, aged 18-56 years, with the mean age of (42.65 ± 12.37) years. The general data showed no statistical differences between the two groups ($P > 0.05$) and were comparable. This study was reviewed and approved by the Medical Ethics Committee of the hospital, and patients participated in the study voluntarily and signed informed consent.

1.2. Methods

The control group did not receive pharmaceutical intervention, and only be educated with basic knowledge on drug use by pharmacists.

The observation group received pharmaceutical intervention. (1) Education on drug use: knowledge related to the clinical use of antibiotics was publicized to all medical staff, while ensuring that relevant requirements would be implemented in practice; pharmacists participated in the preparation of brochures on the rational use of antibiotics and distributed them to medical staff, and called physicians to analyze previous antibiotic prescriptions to find problems and summarize experience and lessons; lectures on the rational use of antibiotics were given regularly in the hospital, so as to improve the cognition of medical staff and promote the rational use of drugs from the professional point of view. (2) Pharmaceutical intervention: pharmacists actively participated in consultation and ward rounds, and guide the rational use of antibiotics in clinical treatment with their professional knowledge on pharmacy; they discussed comprehensively with physicians according to actual conditions of patients, developed the most appropriate medication plan, and specified the type, frequency, dosage, course and other aspects of antibiotics; if necessary, they entered the wards to understand patients' history of allergy and previous use of antibiotics, and educated patients in the use of antibiotics; for some special patients, effective medical monitoring should be given during the use of antibiotics, so as to avoid serious adverse reactions to the greatest extent. (3) Comments on prescription: pharmacists participated in prescription comments according to the hospital's management standards for prescription comments, checked whether the physician giving medical advice on antibiotics had corresponding rights, specially reviewed prescriptions with abnormal dose increase in the same month and summarized the results in a report and included the problems they found in the report; they focused on specific cases and input the case information in the computer to analyze the irrational use of antibiotics in patients and give guidance.

1.3. Evaluation indicators

(1) The use of antibiotics was compared between the two groups, including the usage rate of an antibiotic, the usage rate of two antibiotics, and the usage rate of three or more antibiotics.

(2) The irrational use of antibiotics was compared between the two groups, including the irrational drug selection, too frequent change of drugs, too high dosage, failure to administer drugs according to pharmacokinetics, and irrational drug combination.

(3) The satisfaction in the use of antibiotics was compared between the two groups, which was divided into the full satisfaction, general satisfaction and dissatisfaction based on the subjective feelings of patients treated with antibiotics during hospitalization, satisfaction = (cases of full satisfaction + case of general satisfaction)/total cases × 100%.

1.4. Statistical processing

SPSS 23.0 statistical software was used for data analysis. Enumeration data were expressed by $x \pm s$, and compared by *t*-test; measurement data were expressed by ratio, and compared by chi-square test. $P < 0.05$ was considered statistical differences.

2. Results

2.1. Use of antibiotics

The usage rate of an antibiotic, the usage rate of two antibiotics and the total usage rate in the observation group were lower than those in the control group, showing statistical differences ($P < 0.05$); there were no statistical differences in the usage rates of three or more antibiotics between the two groups ($P > 0.05$), as shown in Table 1.

Table 1. Use of antibiotics in the two groups [case (%)]

Group	Case	One	Two	Three or more	Total usage rate
Control group	80	26 （32.50）	21 （26.25）	15 （18.75）	62 （77.50）
Observation group	88	16 （18.18）	12 （13.64）	13 （14.77）	41 （46.59）
X^2		4.582	4.224	0.477	16.877
P		0.032	0.040	0.490	<0.001

2.2. Irrational use of antibiotics

The rates of irrational drug selection, too frequent change of drugs, too high dosage, failure to administer drugs according to pharmacokinetics and irrational drug combination in the observation group were lower than those in the control group, showing statistical differences ($P < 0.05$), as shown in Table 2.

Table 2. Comparison of irrational use of antibiotics between the two groups [case (%)]

Group	Case	Irrational drug selection	Too frequent change of drugs	Too high dosage	Failure to administer drugs according to pharmacokinetics	Irrational drug combination
Control group	80	9 (11.25)	10 (12.50)	9 (11.25)	10 (12.50)	12 (15.00)
Observation group	88	3 (3.41)	3 (3.41)	2 (2.27)	3 (3.41)	2 (2.27)
X^2		3.884	4.851	5.519	4.851	8.886
P		0.049	0.028	0.019	0.028	0.003

2.3. Satisfaction in the use of antibiotics

The satisfaction in the use of antibiotics in the observation group was higher than that in the control group, showing statistical differences ($P < 0.05$), as shown in Table 3.

Table 3. Comparison of satisfaction in the use of antibiotics between the two groups

Group	Case	Full satisfaction (case)	General satisfaction (case)	Dissatisfaction (case)	Satisfaction [case (%)]
Control group	80	30	35	15	65 (81.25)
Observation group	88	40	41	7	81 (92.05) [a]

Note: *vs*. the control group, $\chi^2 = 4.291$, [a]$P = 0.038$

3. Discussion

Antibiotics are a kind of secondary metabolites produced by microorganisms, animals, and plants, which have good sterilization and antibacterial effect. Antibiotics of a certain concentration can inhibit and kill pathogens and have good therapeutic effect on various types of bacterial infections. Since the clinical application of antibiotics, many cases have been cured. However, drug abuse causes severe drug resistance, which not only reduces the effect of antibiotics, but also may cause adverse drug reactions and affect the safety of drug use [3]. To improve the rationality of the clinical use of antibiotics, the former Ministry of Health has issued relevant regulations, guided by which the rationality of the clinical use of antibiotics has been improved. Yet, problems have not been fundamentally solved, and those such as overdose use of drugs, irrational combination of drugs, the use of antibiotics without indications, frequent change of antibiotic varieties are still prominent [4].

Reasons for irrational use of antibiotics can be summarized as the following four aspects. (1) In terms of pharmacists: influenced by the increasing varieties of antibiotics on the market, physicians' pharmaceutical knowledge reserve does not keep up with the updating of the antibiotic varieties, due to which they lack or have incomplete knowledge about the use of some new antibiotics and know little about the possible side effects of some new antibiotics and the possible diseases caused. Finally, they cannot introduce the nature, specific usage, indications and counterindications of drugs to patients in detail and accurately when prescribing drugs, and patients cannot take drugs correctly, causing the irrational use of antibiotics [5-6]. (2) In terms of the hospital: drug income occupies a high proportion in hospital income, and some hospital managers may, driven by the profit of drug sales, reduce their emphasis on the rational use of antibiotics, causing clinicians to prescribe antibiotics arbitrarily, thus leading to the irrational use of antibiotics and the unnecessary waste of the medical resource antibiotics [7]. (3) In terms of patients themselves: patients, especially those that use a certain antibiotic for the first time and cannot grasp all drug-related knowledge in a short period of time, for their lack of pharmaceutical knowledge, may determine the dosage and frequency by themselves in pursuit of curative effect rather than follow the instructions or medical advice, and such non-standard drug use leads to the irrational use of antibiotics [8]. (4) In terms of the society: as the antibiotic varieties gradually increase on the market, different manufacturers may compete viciously with each other to seek market share, and some of them even break the law and may put some non-standard antibiotics in hospitals for profit, affecting the rationality and safety of the use of antibiotics [9].

Results of this study showed that the usage rate of an antibiotic, the usage rate of two antibiotics and the total usage rate in the observation group were lower than those in the control group, the rates of the irrational drug selection, too frequent change of drugs, too high dosage, failure to administer drugs according to pharmacokinetics and irrational drug combination in the observation group were lower than those in the control group, and the satisfaction in the use of antibiotics in the observation group was higher than that in the control group, suggesting that pharmaceutical intervention could reduce the irrational use of antibiotics. Similar studies also showed that the rate of rational use of antibiotics significantly increased, the medical expenses of patients significantly decreased, and the satisfaction of patients and physicians was higher after pharmaceutical intervention [10]. Under the pharmaceutical intervention, pharmacists focused on monitoring and checking the rationality and appropriateness of the prescriptions of antibiotics, and paid attention to the education of medical staff, participated in consultation and ward rounds, monitored the use of antibiotics in patients, and actively found the irrational use of drugs, and discussed with physicians to develop a more reasonable plan for the use of antibiotics, which was an important reason for the reduction of irrational use of antibiotics [11].

In conclusion, pharmaceutical intervention can effectively reduce the usage rate of antibiotics in clinical treatment and improve the rationality of the use of antibiotics.

References

[1] LUO Zhi-hong, LI Xin-gui, CHEN Hui-ying, *et al*. Effect analysis of rational use of carbapenems antibiotics by clinical pharmacist intervention[J]. Anhui Medical and Pharmaceutical Journal, 2019, 23(10):2098-2100.

[2] LIU Li, JI Xiao-peng, CHENG Jing-min, *et al*. Effect of pharmaceutical intervention on preventing the use of antibiotics in type I incision surgery[J]. Chinese Remedies & Clinics, 2019, 19(15):2577-2578.

[3] HUANG Xiao-si. Effect of clinical drug intervention on patients by evidence-based pharmacy theory[J]. Contemporary Medicine Forum, 2019, 17(13):61-62.

[4] WU Chuan-hong, CHEN Yun-bei, WANG Xiao-ling, *et al*. Effectiveness evaluation on pharmaceutical intervention of the perioperative antimicrobial drugs use in type I incision in Orthopedic Department[J]. China Medical Herald, 2018, 15(11):139-142.

[5] ZHAI Ying, OUYANG Hui-zi, LIU Fang. Effect of 5-year intervention in rational use of antibiotics by Pharmacy Department and Medical Department of our hospital[J]. Strait Pharmaceutical Journal, 2019, 31(12):250-252.

[6] LIU Shuang-shuang. Effect of clinical pharmaceutical intervention on improving the rationality of antibiotic use[J]. Contemporary Medicine Forum, 2019, 17(18):120-122.

[7] NI Jia, LIU Ye-fang. Analysis of rational use of carbapenems antibiotics by pharmaceutical intervention[J]. Shanxi Medical Journal, 2019, 48(4):486-489.

[8] MA Xiao-ping, YU Jiang. Observation on effect of pharmaceutical service intervention in the application of antibiotics in Respiratory Department[J]. Chinese Journal of Clinical Rational Drug Use, 2019, 12(29):101-103, 109.

[9] WANG Hai-tao, WANG Na, LIU Na, *et al*. Influence of pharmaceutical intervention on drug cost and clinical prognosis of infected patients in intensive care unit[J]. Pharmaceutical Care and Research, 2019, 19(4):288-291.

[10] FAN Wei-hua. Effect of comprehensive pharmaceutical intervention on patients with orthopedic diseases who used antibiotics during type I incision surgery[J]. Contemporary Medicine Forum, 2017, 15(20):148-149.

[11] CAO Zhong-wen. Analysis of the effect of clinical pharmacy in the rational use of antibiotics[J]. China Health Standard Management, 2019, 10(20):90-91.