

The Effect of Pharmaceutical Intervention in the Rational Clinical Application of Quinolones

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Abstract: *Objective:* To analyze the value of pharmaceutical intervention in the rational clinical application of quinolones. *Methods:* 90 patients treated with quinolones in our hospital were selected and divided into groups according to the order of treatment, including 45 patients in the comparison group and 45 patients in the experimental group. During the study period, the comparison group and the experimental group carried out routine medication intervention and pharmaceutical intervention respectively. The intervention status of each group was analyzed. The indicators involved include treatment effect, irrational drug use, treatment indicators and adverse reactions. The start and end times of the study are January 2025 and January 2026 respectively. *Results:* The total effective rate of treatment in the experimental group was higher, the medication time was shorter, and the medication dosage, drug utilization index, irrational medication rate, and adverse reaction rate were lower. The differences in various indicators were valuable compared with the comparison group ($P < 0.05$). *Discussion:* Pharmaceutical intervention in the clinical application of quinolones has effectively reduced irrational drug use, reduced drug dosage, and shortened medication time. It can promote drug utilization index and improve safety, and is worthy of promotion.

Keywords: quinolones; pharmaceutical intervention; rational clinical application

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1. Introduction

Quinolones are synthetic antibacterial drugs containing the basic structure of 4-quinolone. They have the advantages of strong antibacterial effect, low cross-resistance, many types, simple administration, and broad-spectrum antibacterial properties. Therefore, they are widely used in clinical practice. Common clinical quinolones include moxifloxacin, levofloxacin, etc. These drugs are suitable for the treatment of Gram-negative bacterial infectious diseases and can selectively inhibit bacterial DNA helicases^[1]. The first generation of quinolones is mainly nalidixic acid, which is poorly absorbed by the human body and has many adverse reactions. It is basically not used in clinical practice. The second generation of quinolone antibacterial drugs has stronger antibacterial properties than the first generation, but can easily cause urinary tract infections. At present, quinolones have been updated to the fourth generation, and the half-life of the drugs has been significantly extended. However, if not used rationally, it can easily induce a variety of adverse reactions and even affect the overall efficacy. Pharmaceutical intervention refers to medication intervention through effective measures, which can reduce safety risks, provide important guarantees for the rational use of drugs, and improve drug efficacy^[2]. Based on the above background, this article included 90 patients in the study to evaluate the application value

of pharmaceutical intervention.

2. Materials and methods

2.1. General information

A total of 90 patients treated with quinolones in our hospital were selected for the study. The enrollment period was between January 2025 and January 2026. The patients were divided into groups based on the order in which they were admitted to the hospital. The names of the groups were set as the comparison group and the experimental group, and 45 cases were included in each. There were 25 and 20 male and female patients in the comparison group respectively; the highest, lowest and mean ages were 82, 20 and (51.00 ± 4.93) years respectively. There were 26 male and 19 female patients in the test group respectively, the highest, lowest and mean ages were 79, 23 and (51.00 ± 4.68) years respectively. The above data were confirmed by SPSS 23.0 software to confirm the data balance, and the difference was not significant ($P > 0.05$).

2.2. Research standards

Inclusion criteria: All patients are treated with quinolones and have no allergies; they are ≥ 18 years old; they have given informed consent to the research content; the clinical data are complete and can provide support for the research, and the research complies with ethical standards.

Exclusion criteria: communication disorder or mental illness; combined with malignant tumor disease; severe blood system or immune system disease; refusal to participate in the study.

2.3. Method

All patients in the group were treated with quinolones, and patients in the control group were given routine medication intervention. The doctor issued an electronic prescription and sent it to the ward pharmacy. The pharmacist signed and confirmed it after strict verification. The patient can pick up the medicine after paying the regular fee, and the patient is clearly informed of the name of the medicine, how to take it, and the dosage.

Patients in the experimental group were given pharmaceutical intervention, specifically: (1) Standardizing medication guidelines. Department experts are responsible for the formulation of standardized medication guidelines, and use the “Guiding Principles for Clinical Application of Antimicrobial Agents” as the standard to clarify the specifications for the use of quinolones. During the actual implementation period, it needs to be fully integrated with hospital drug handling regulations or guidelines to fully ensure the systematicness and standardization of the guidelines for the use of quinolones. Drug guidelines need to clarify indications, medication precautions, drug contraindications, usage and dosage, combined medication, adverse reactions, etc. Distribute standardized medication guidelines to medical staff in various departments to help them better master the relevant knowledge of quinolones and facilitate pharmacists to review prescriptions. (2) Establish a pharmaceutical intervention team. A pharmaceutical intervention team is jointly established by physicians, pharmacists, and pharmaceutical experts. Pharmacists can participate in clinical rounds to sort out and record problems existing in daily work. Regularly organize team members to conduct training and study, guide personnel in various departments to maintain close communication and contact, clearly point out problems in the medication process and propose countermeasures. (3) System evaluation. Based on the actual use of quinolones in our hospital, quantitative evaluation measures were developed with reference to the “Research on Reasons for Irrational Drug Use and Interventions”. The pharmaceutical intervention team comprehensively evaluates the standard prescription and understands the administration method, medication frequency, dosage, drug utilization index, combined medication, drug resistance, etc. in the prescription. Prescriptions are checked regularly every month, drug resistance rates of Gram-negative bacteria are regularly summarized, the rationality of prescriptions is comprehensively evaluated, the evaluation results are compared with medication guidelines, and irrational drug use is analyzed in depth or the reasons are summarized

and summarized to adopt improvement strategies to further standardize the use of drugs. (4) Strengthen the functions of pharmaceutical personnel. Analyze the use of quinolones in various departments of the hospital, and organize pharmacy staff to regularly participate in health lectures to improve their professional capabilities and lay the foundation for rational clinical use of drugs. Pharmacists' performance is regularly assessed and linked to personal performance to further enhance their subjective initiative. If irrational drug use is discovered during the evaluation process, the person directly responsible must be punished. For more serious cases, the prescribing authority of the responsible physician may be suspended when necessary to promote the comprehensive strengthening of the functions of pharmaceutical personnel. (5) Optimize consulting services. Pharmacy personnel, as special operators for optimizing consultation services, provide patients and medical staff with consultation on clinical drug use knowledge, promptly solve problems existing during medication, and fully ensure the effectiveness and safety of medication. (6) Prescription authority setting. The prescription authority is divided according to the doctor's level or professional title. During the work period, the doctor can only issue prescriptions within his own authority. If the doctor needs to issue a prescription outside the scope, he must submit it to the superior physician or pharmacist for approval to provide guarantee for the rational use of medicines. After issuing a prescription, doctors need to check the drug usage records to learn more about the drug's adverse reactions, efficacy, etc., and deal with existing problems immediately. (7) Quality improvement. The hospital's Pharmacy Management Committee has established a supervision group to conduct regular surveys on clinicians' medication use. At the beginning of the month, it summarized the use of quinolones and fed back the results to relevant departments. Organize doctors and pharmaceutical personnel to conduct seminars to analyze the situation and causes of irrational drug use, encourage all staff to propose improvement plans, and determine the best plan after discussion. Team members strictly supervise the implementation of the improvement plan, comprehensively control drug use, and minimize the unreasonable use of drugs.

2.4. Observation indicators

(1) Therapeutic effect. Based on the patient's clinical symptoms, infection and control status, the judgment content is ineffective (no significant changes in infection symptoms and body functions), markedly effective (infection symptoms are controlled, body functions return to normal), and effective (infection symptoms are basically controlled, body functions are significantly improved). (2) Treatment indicators. It mainly involves medication time, medication dosage, and drug utilization index (drug utilization rate/medication time, if <1 , it means the medication is reasonable). (3) Irrational use of medication. It mainly involves improper dosage, improper administration method, improper combination of drugs, and contraindicated drugs. (4) Adverse reactions. Record whether the patient develops papules, erythema, nausea and vomiting during medication.

2.5. Statistical processing

The data involved in the study were processed with SPSS 23.0 software. The counting and measurement data were expressed as "[n/(%)]" and " $\bar{x} \pm s$ " respectively. The data differences passed the " χ^2 " and " t " tests. $P < 0.05$ indicates that the differences have value.

3. Results

3.1. Evaluation of treatment effects

In **Table 1**, the total effective rate of treatment in the experimental group was higher than that in the comparison group ($P < 0.05$).

Table 1. Treatment effect evaluation [n/(%)]

Group	Invalid	Valid	Effective	Efficient
Experimental group (n = 45)	1 (2.22)	13 (28.89)	31 (68.89)	44 (97.78)
Comparison group (n = 45)	6 (13.33)	15 (33.33)	24 (53.33)	39 (86.67)
χ^2	--	--	--	3.872
<i>P</i>	--	--	--	0.049

3.2. Evaluation of treatment indicators

The experimental group had shorter medication time, lower medication dosage and lower drug utilization index, and the differences were more meaningful than those in the control group ($P < 0.05$). As shown in **Table 2**.

Table 2. Assessment of treatment indicators ($\bar{x} \pm s$)

Group	Medication time (d)	Dosage (g)	Drug utilization index
Experimental group (n=45)	3.17±0.46	2.09±0.68	0.94±0.10
Comparison group (n=45)	3.98±0.52	2.39±0.63	1.16±0.11
<i>t</i>	7.826	2.170	9.927
<i>P</i>	0.000	0.032	0.000

3.3. Analysis of irrational drug use

In **Table 3**, the rate of irrational drug use in the experimental group was lower, and the difference was more meaningful than that in the control group ($P < 0.05$).

Table 3. Analysis of irrational drug use [n/(%)]

Group	Improper dosage	Improper administration method	Improper use of combined medications	Contraindications	incidence
Experimental group (n = 45)	1	0	0	0	1 (2.22)
Comparison group (n = 45)	2	2	1	1	6 (13.33)
χ^2	--	--	--	--	3.872
<i>P</i>	--	--	--	--	0.049

3.4. Assessment of adverse reactions

The adverse reaction rate of the experimental group was lower, and the difference was more meaningful than that of the control group ($P < 0.05$). As shown in **Table 4**.

Table 4. Assessment of adverse reactions [n/(%)]

Group	Papules	Erythema	Nausea and vomiting	Incidence
Experimental group (n = 45)	1	0	1	2 (4.44)
Comparison group (n = 45)	3	2	3	8 (17.78)
χ^2	--	--	--	4.050
<i>P</i>	--	--	--	0.044

4. Discussions

Quinolones are new antibacterial drugs derived from nalidixic acid. These drugs target bacterial DNA and achieve antibacterial effects by inhibiting DNA helicase^[3]. Studies have shown that quinolones have a long half-life, a bioavailability of more than 70%, and ideal tissue permeability and oral absorption. The blood concentration will reach a peak 1 hour after entering the blood. These drugs are mainly used clinically for infections of the genitourinary tract and digestive system^[4]. In recent years, with the widespread and large-scale use of drugs, many irrational drug use phenomena have emerged, which will not only increase the risk of adverse reactions, but also affect the efficacy and even cause more serious consequences. Therefore, it is of great significance to take effective measures to improve the safety and rationality of drug use^[5].

In this article, after pharmaceutical intervention, the total effective rate of treatment in the experimental group was 97.78%, which is more valuable than the control group ($P < 0.05$). The reason for the analysis is: pharmaceutical intervention is based on modern medical concepts and belongs to a new pharmaceutical service model. Its service principle is people-oriented and can improve the rationality and safety of drug use through multiple channels, which can provide a guarantee for effective treatment^[6]. In this article, the experimental group took shorter medication time, lower medication dosage, and lower drug utilization index. The difference was more meaningful than that of the control group ($P < 0.05$). The main reason is that pharmaceutical intervention work is based on the properties and pharmacology of the drugs and based on relevant standards. Comprehensive intervention in the use of drugs can ensure the rational use of drugs and reduce irrational drug use. Compared with conventional medication services, pharmaceutical intervention is based on drug usage and makes full use of pharmaceutical knowledge to formulate intervention plans, especially clarifying dosage, treatment duration, usage methods, etc., which can further optimize drug usage^[7]. In this article, the irrational drug use rates in the test group and the comparison group were 2.22% and 13.33% respectively. The difference between the groups was valuable ($P < 0.05$). The reason for the analysis is: irrational drug use is a relatively rare clinical situation, but it is related to the overall hospital. Through standardized and scientific pharmaceutical intervention, drug dosage, contraindications, indications, etc. are fully considered, and pharmacists participate in the entire clinical medication process, which can provide more scientific guidance and comprehensively reduce the risk of irrational medication^[8]. In this article, the adverse reaction rates of the experimental group and the comparison group were 4.44% and 17.78% respectively. The difference between the groups is valuable ($P < 0.05$). Comprehensive analysis shows that pharmaceutical intervention can provide theoretical guidance through measures such as establishing standardized medication guidelines, strengthening ethical functions, building teams, and continuous quality improvement, avoiding empirical medication. At the same time, it can also reduce adverse reactions, and the intervention effect is more ideal^[9].

In summary, pharmaceutical intervention in the clinical application of quinolones can effectively reduce irrational drug use, reduce drug dosage, shorten medication time, promote drug utilization index and improve safety, and is worthy of promotion.

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Disclosure statement

The author declares no conflict of interest.

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