

# Impact of Different Antibiotic Regimens on Patients with Respiratory Tract Infection

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**Abstract:** To assess impact of different antibiotic regimens on patients with respiratory tract infection, we establish a randomized controlled trial for comparison of different antibiotic regimens. From May 2019 to February 2021, we collected valid data from 182 patients in the hospital. This study consisted of 3 steps. First, we invited the patients with respiratory tract infection who meet the inclusion criteria. Also, patients were divided into control group (n=98) and intervention group (n=84) according to the antibiotic regimen they received. Second, we collected the data by questionnaires, including basic patient characteristics, treatment period, treatment cost, and treatment effect. Third, we analyze the data by software. In this study, the less days of treatment period and less payment of treatment in intervention group patient than control group patients, that their results between were significantly different. Also, treatment effect of two antibiotic regimens were similar, that the rates of treatment effective were no significantly different. In summary, we found that the patients who received levofloxacin lactate sodium chloride injection treatment had shorter treatment period and less treatment cost than the patients who received ceftazidime treatment, but their treatment effects were similar.

**Keywords:** Antibiotic Regimen, Respiratory Tract Infection, Treatment Period, Treatment Cost

## 1. Introduction

Lower respiratory infections (LRI) are a major public health problem in patients of all ages. Globally, the reports indicated that hospitals received more than 420 million of patients with lower respiratory infections [1, 2]. Although antibiotics can provide effective treatment to patients with lower respiratory infections, there are still 1.4 million deaths a year among patients [3, 4]. Doctor often use antibiotics to treat patients with lower respiratory infections. To prevent infections, antibiotic prophylaxis is commonly used in these patients, either as a standalone measure or as an adjunct to immunoglobulin replacement therapy [1, 5, 6]. However, different antibiotic regimens provided different treatment effect and treatment cost in similar patients with lower respiratory infections [7-9]. Those are reasons why exploring Impact of different antibiotic regimens on patients with respiratory tract infection.

The patients with lower respiratory infections consisted of milder phenotypes and recurrent infections [10]. milder phenotypes patients are generally treated with antibiotic prophylaxis alone. Also, recurrent infections patients are generally treated with replacement immunoglobulin [11-13]. The use of antibiotic prophylaxis in the recurrent infection population varies significantly [14]. Therefore, assessing impact of different antibiotic regimens on patients with respiratory tract infection is worth studying. The aim of this study was to assess impact of different antibiotic regimens on patients with respiratory tract infection.

## 2. Methods

### 2.1. Participants Enrollment and Survey Methods

From May 2019 to February 2021, we collected the data from 200 patients who were diagnosed as respiratory tract infection. But 18 patients were excluded as they lack

necessary information during study, so we only collected valid data from 182 patient in the hospital. This study consisted of 3 steps. First, we invited the patients with respiratory tract infection who meet the inclusion criteria. Also, patients were divided into control group (n=98) and intervention group (n=84) according to the antibiotic regimen they received. Second, we collected the data by questionnaires, including basic patient characteristics, treatment period, treatment cost, and treatment effect. Third, we analyze the data by software.

Control group patients received cephalosporin antibiotics and ceftazidime for injection during treatment. According to the patient's condition, the doctor took 1~2 g of the injection, dissolved in 100mL 0.9% sodium chloride solution, and took the mixed solvent to drip the patient, twice a day, until the patient's symptoms improved significantly.

In intervention group, patients received floxacillin antibiotics and levofloxacin lactate sodium chloride injection during treatment. According to the patient's condition, 0.5~1 g of the injection was dissolved in 100 mL of 0.9% sodium chloride

solution, and the mixed solvent was taken to drip the patient, twice a day.

## 2.2. Statistical Analysis

Excel and SPSS22.0 were used to establish a database and analyzed the valid data. In addition, we described the results by mean and standard deviation (SD). Statistical significance was observed at level of 0.05.

## 3. Result

To explore impact of different antibiotic regimens on patients with respiratory tract infection, we established a randomized controlled trial for comparison of different antibiotic regimens. In patient characteristics, the patients were no significantly different between intervention group and control group, including gender, age, and type of respiratory tract infection ( $p > 0.05$ ), as shown in Table 1. This result ruled out as patient characteristics on the results of deviation.

**Table 1.** Basic patient characteristics.

Item	Gender (female) (n, %)	Age (year) (mean±SD)	Bronchitis [n (%)]	Chronic bronchitis [n (%)]	Pneumonia [n (%)]
Intervention group (n=84)	44 (52.4%)	40.51±7.44	22 (26.2%)	25 (29.8%)	27 (32.1%)
Control group (n=98)	56 (57.1%)	41.25±7.12	28 (28.6%)	31 (36.9%)	39 (46.4%)
t/X <sup>2</sup>	4.161	3.562	1.445	1.194	1.081
P value	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05

The Table 2 shown that the comparison of treatment period and treatment cost between two groups. Compared with control group, intervention group patients had shorter treatment period and less treatment cost in study (5.35±1.08 vs

7.26±1.52 & 272.67±26.77 vs 449.57±30.95). The comparison between intervention group and control were significantly different ( $p=0.0142$  &  $p=0.004$ ).

**Table 2.** Comparison of treatment period and treatment cost (mean±SD).

Item	treatment period (day)	treatment cost (RMB)
Intervention group (n=84)	5.35±1.08	272.67±26.77
Control group (n=98)	7.26±1.52	449.57±30.95
t	6.118	24.955
P value	0.0142	0.004

In the result of treatment, two antibiotic regimen groups had similar results, that they were no significantly different in outcome of treatment result. Most treatment results were significant effect of treatment in patients with respiratory tract

infection. Although control group had lower rate of treatment effective compare with intervention group, their results were no significantly different in this study (Table 3).

**Table 3.** Comparison of treatment effect [n (%)].

Item	Effective treatment	Significant effect of treatment	Ineffective treatment	Total rate of treatment effective
Intervention group (n=84)	30	49	5	79 (94.0%)
Control group (n=98)	25	61	12	86 (87.8%)
X <sup>2</sup>				0.784
P value				0.681

## 4. Discussion

In this study, we demonstrated that the antibiotic regimen of intervention group can improve treatment period and treatment cost for patients with respiratory tract infection. To clarify impact of different antibiotic regimens on patients with

respiratory tract infection, we established a randomized controlled trial and analyzed comparison of different antibiotic regimens. The result shown that intervention group patients had shorter treatment period and less treatment cost in their treatment, but their treatment effects were similar.

As shown in Table 2, we found that the less days of treatment period and less payment of treatment in intervention

group patient than control group patients. The possible reasons were that ceftazidime for injection has a good bactericidal effect on *Escherichia coli*, *Bacillus pneumoniae* and other bacteria, and has a good bacteriostatic effect on nitrate negative bacilli and Alkali-producing bacilli, which can realize the effective relief and treatment of symptoms of patients with lower respiratory tract infection. Levofloxacin lactate sodium chloride injection has a wide antibacterial spectrum, and its antibacterial effect is relatively strong, and has good bactericidal and bacteriostatic effects on most of the bacteria of lower respiratory tract infection. As shown in Table 3, treatment effect of two antibiotic regimens were similar, that the rates of treatment effective were no significantly different. This result demonstrated that the two antibiotic regimens had similar treatment effect.

Several studies in related fields clearly demonstrated that levofloxacin lactate sodium chloride injection has good bactericidal and bacteriostatic effects on most of the bacteria of lower respiratory tract infection [15, 16]. Likewise, levofloxacin lactate sodium chloride injection provided shorter treatment period and less treatment cost compare with ceftazidime.

In limitation, our subject were patients with respiratory tract infection, so it is not known whether our results are application to the patient with other diseases. Also, we examined only 182 patients, the result of this study may have been due to chance. The results must be confirmed in a large study.

## 5. Conclusion

In conclusion, the patients who received levofloxacin lactate sodium chloride injection treatment had shorter treatment period and less treatment cost than the patients who received ceftazidime treatment, but their treatment effects were similar.

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