Application of high-quality nursing combined with drug therapy in lower respiratory tract infections and its effect on changes of serum IL-2 and TNF in patients

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Summary. *Background/Aim:* Lower respiratory tract infection is a common reason for outpatient medical care visits in China. Due to inadequate infrastructure and lack of competent and motivated nursing, only antibiotic prescription but without intensive care for patients with respiratory infections is common, resulting in reduced treatment outcome and prognosis. High-quality nursing provided patients to improve desired health outcomes. Compared to normal nursing, high-quality care must be safe, effective, timely, efficient, equitable, and people-centered. In this study, we aim to investigate the outcomes of the implementation of high-quality nursing combined with drug therapy in lower respiratory tract infections and compare its effect on changes of serum IL-2 and TNF. *Material and Methods:* A total of 124 patients with lower respiratory tract infections admitted to our hospital from May 2017 to May 2019 were selected. Patients in the observation group were given high-quality care in combination with sparfloxacin and amikacin. *Results:* The disappearance time of cough, moist rales and fever was significantly shorter in the observation group than that in the control group, and the differences were statistically significant. After the intervention, the anxiety self-rating scale (SAS) and the depression self-rating scale (SDS) scores of the two groups were decreased, and the observation group was significantly lower than the control group. *Conclusions:* The application of high-quality nursing combined with drug therapy in lower respiratory tract infections can effectively alleviate clinical symptoms, shorten the length of hospital stay, improve the quality of life of patients, and help regulate the levels of serum IL-2 and TNF, and further promote early recovery of patients.

Key words Quality care; medication; lower respiratory infections

Introduction

Lower respiratory tract infection is a common infectious disease caused by bacteria, viruses, and other pathogens in clinical practice, with the characteristics of acute onset, long duration, and high recurrence rate [1-2]. According to statistics, 70% ~ 80% of respiratory tract infections are caused by viruses, and 20% ~ 30% are caused by bacteria [3-4], which seriously threaten the life and health of patients. At present, the clinical treatment of the disease is mainly based on antimicrobial drug treatment, which can ef-

fectively improve the clinical symptoms of patients. However, due to the long course of the disease, long treatment process, and affected by many factors, the clinical treatment effect is not ideal, which brought much inconvenience to the lives of patients and their families. Therefore, the rational use of antibiotics and the adoption of targeted nursing measures to improve the prognosis is particularly essential. On the basis of the WHO definition, high-quality care is the extent to which health care services provided to individuals and patient populations improve desired health outcomes. In order to achieve this, health care must be safe, effective, timely, efficient, equitable and people-centered. According to relevant clinical data, high-quality nursing intervention for patients with respiratory tract infection can not only alleviate clinical symptoms, shorten hospitalization time, but also reduce the effect of the inflammatory response [5]. At present, there are few reports on the application of high-quality nursing in respiratory tract infection. In this study, 124 patients with lower respiratory tract infection admitted to our hospital from May 2017 to May 2019 were selected as research objects to discuss the application of high-quality nursing combined with drugs in the treatment of lower respiratory tract infection and the influence on the changes of serum IL-2 and TNF in patients, in order to provide a clinical reference. The report is as follows.

Materials and Methods

General information

Clinical data of 124 patients with lower respiratory tract infections admitted to our hospital from May 2017 to May 2019 were selected. Inclusion criteria :(1) compliance with the clinical diagnostic criteria for lower respiratory tract infection;(2) those who are not allergic to starbuck's drugs;(3) age > 18 years old;(4) informed consent of the patient. Exclusion criteria :(1) patients with liver and kidney function injury;(2) patients with congenital heart disease;(3) patients with coagulation dysfunction;(4) patients with speech communication disorder. A total of 124 cases finally met the standard.

According to the random number table method, the patients were divided into control and observation groups, with 62 cases both. There were 34 males and 28 females in the control group. The patients were 19 ~ 73 years old, with an average age of (46.3±9.2) years old, and the course of the disease was 2 ~ 9d, with an average course of disease of (5.3±1.2) d. The observation group included 32 males and 30 females. The age ranged from 20 to 75 years, with an average age of (45.0±9.5) years, and the course of disease ranged from 1 to 9 days, with an average age of (4.6±1.3) days. There was no statistically significant difference in general data between the two groups (P > 0.05).

Methods

The control group received routine nursing (including health knowledge propaganda and condition monitoring) and was orally administered sparfloxacin (Shanxi tianfeng shibaofu pharmaceutical co., LTD., national drug approval: H10980257) 0.1 ~ 0.3g/time, 1 time/day, and 0.1g/kg amikacin (Hebei shenwei pharmaceutical co., LTD., national drug approval word H13021469) was diluted with 250 ml normal saline for the intravenous drop, one time/d, continuous treatment for one week. The treatment dose and course of treatment can be adjusted according to the patient's condition. Based on the control group, the observation group provided quality care. The specific content is as follows :(1) Respiratory care: Control the air temperature and humidity in the ward, keep the room ventilated, and do the disinfection. At the same time, nursing staff should pay close attention to the patient's respiratory tract, urging patients to regularly use normal saline gargle, timely sputum aspiration and remove other airway obstruction. (2) Medical care: Nurses should be familiar with the use of relevant drugs, and use drugs according to different clinical signs of patients following the doctor's advice. In the process of medication for patients should be closely observed whether there are any adverse reactions, pay attention to follow the principle of aseptic operation during the process of medication. (3) Diet care: Make the corresponding diet plan, eat more vegetables, fruits, appropriate intake of high protein, high calorie, and other food, spicy diet is prohibited. (4) Psychological nursing: In order to enable patients to

have a correct understanding of the disease, the nursing staff should explain patient's condition, treatment, nursing methods, and adverse drug reactions patiently, to eliminate or ease the patients' fear of the disease, and help patients correctly understand the disease. 1.3 observation indicators and evaluation criteria (1) the time of disappearance of symptoms and signs and a hospital stay of the two groups were compared; (2) the nursing efficacy of the two groups was compared. Curative effect judgment [6]: Recovery: After nursing, the clinical symptoms such as cough, sore throat, and fever completely disappeared, and the patient recovered after X-ray examination of the lung. Improvement: After nursing, some of the clinical symptoms such as cough, sore throat, and fever disappeared and recovered gradually after a lung X-ray examination. Invalid: After nursing, cough, sore throat, fever, and other clinical symptoms did not change, or even worse, the lower lobe of the lung still has pathological changes. Total effective rate = (recovery rate + improvement rate)/total number of cases ×100%. (3) SAS and SDS scores before and after nursing were compared between the two groups. The two groups of patients were assessed by the anxiety self-rating scale (SAS) and the depression self-rating scale (SDS). The SAS and SDS included 20 items on average, and the total score was 80. Scoring criteria [7]: ≥50 points is considered as anxiety and depression;< 50 is considered normal. (4) serum IL-2 and TNF levels in the two groups were compared; (5) nursing satisfaction was compared between the two groups. The self-rating scale of quality nursing satisfaction was used to score the nursing satisfaction of patients. The total score was 100, ≥80 was satisfaction, 79 ~ 60 was relative satisfaction, and < 60 was dissatisfaction. Satisfaction rate = (satisfaction rate + relative satisfaction rate)/total number of cases ×100%; (6) To analyze the diagnostic value of serum IL-2 and TNF levels in lower respiratory tract infection.

Statistical methods

Spss22.0 was used for data analysis. Qualitative data were expressed by [n%], quantitative data by ($\bar{\chi}\pm$ s), and t-test was used for analysis. P < 0.05 was statistically significant.

Results

Comparison of the time of disappearance of signs and symptoms and hospital stay between the two groups

The duration of cough disappearance, rales disappearance and fever resolution in the observation group were significantly less than those in the control group, with statistically significant differences (P < 0.05, table 1).

Comparison of the curative effect after nursing between the two groups

The total effective rate of the observation group was 91.93%, which was significantly better than that of the control group (79.03%), and the difference was statistically significant (P < 0.05, table 2).

Comparison of SAS and SDS scores before and after nursing care between the two groups

Before the intervention, there was no statistically significant difference between the two groups in the SAS and SDS scores (P > 0.05). After the intervention, the SAS and SDS scores of the two groups were decreased, and the observation group was significantly lower than the control group, with statistically significant differences (P < 0.05 See table 3).

Table 1 comparison of the time of disappearance of signs and symptoms and hospital stay between the two groups ($\bar{x}\pm$s, d)

Group	cough (d)	Moist rales (d)	Fever symptom (d)	hospital stays (d)
Observation Group (n=62)	3.42±1.20	5.65±0.98	2.26±0.48	7.45±1.68
Control Group (n=62)	4.67±1.55	6.47±1.63	3.63±0.62	9.62±2.50
t	13.050	3.395	13.760	5.673
P	<0.001	<0.001	<0.001	<0.001

Note: a indicates that SAS scores in the observation group were statistically different after the intervention compared with before the intervention (P < 0.05). B indicates that the SDS score of the control group was statistically different after the intervention compared with before intervention (P < 0.05).

Comparison of nursing satisfaction between the two groups

The nursing satisfaction of the observation group was 93.54%, which was higher than 80.64% of the control group, and the difference was statistically significant (P < 0.05, Table 4).

Comparison of serum IL–2 and TNF levels between the two groups

Before the intervention, the serum levels of IL-2 and TNF in the observation group were not significantly different from those in the control group (P > 0.05). After the intervention, the serum IL-2 level of the observation group was higher than that of the control group, and the TNF level of the observation group was lower than that of the control group, with statistically significant differences (P < 0.05, table 5).

Note: indicated that the serum IL-2 level in the observation group was statistically different after the intervention compared with before intervention

Table 2 comparison of curative effect after nursing between two groups [n (%)]

Group	Recovery	Improvement	Invalid	Total effective
Observation Group (n=62)	32 (51.62)	25 (40.32)	5 (8.06)	57 (91.93)
Control Group (n=62)	27 (43.54)	23 (37.09)	13 (20.96)	49 (79.03)
χ				4.159
P				0.041

Table 3 comparison of SAS and SDS scores before and after nursing care in the two groups (n, x̄±s)

Group	SAS score		SDS score	
	before	after	before	after
Observation (n=48)	63.45±11.25	43.42±7.35a	62.58±10.15	37.48±9.24a
Control (n=48)	63.87±11.32	55.77±7.92b	63.02±11.03	45.23±9.78b
t	0.207	9.000	0.231	4.536
P	0.836	<0.001	0.817	<0.001

Table 4 comparison of nursing satisfaction between the two groups [n (%)]

Group	satisfaction	Relative satisfaction	dissatisfaction	Satisfaction rate
Observation	39 (62.90)	19 (30.64)	4 (6.45)	58 (93.54)
Control	24 (38.70)	26 (41.94)	12 (19.36)	50 (80.64)
χ				4.593
P				0.032

Table 5 Comparison of the changes of serum il-2 and TNF levels in the two groups (n, x̄±s)

Group	IL-2 (pg/ml)		TNF (ng/ml)	
	Before	After	Before	After
Observation (n=62)	4.90±0.97	5.94±0.53a	1.73±0.48	1.36±0.37a
Control (n=62)	4.62±0.92	5.37±0.58b	1.75±0.50	1.55±0.40b
t	1.649	5.712	0.003	2.746
P	0.101	<0.001	0.997	0.006

(P < 0.05). B represents the statistical difference of serum TNF in the control group after and before the intervention (P < 0.05).

2.6 Analysis of the diagnostic value of serum IL-2 and TNF levels and lower respiratory tract infection
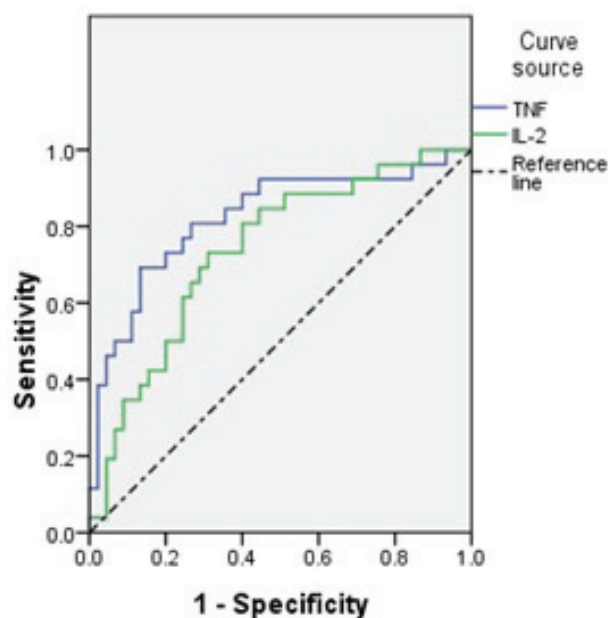
The ROC curve area for the diagnosis of lower respiratory tract infection with serum IL-2 and TNF levels was 0.736 and 0.775, respectively. When the serum IL-2 critical value was 26.5pg/ml, the diagnostic sensitivity was 65.5%, and the specificity was 80.0%. When the serum TNF critical value was 11.4ng/ml, the diagnostic sensitivity was 83.6%, and the specificity was 64.4% (Figure 1).

Discussion

Lower respiratory tract infections are the fatal infectious diseases. Most of the patients show pneumonia, tracheitis, and other diseases, especially the elderly [8]. Due to the low immune function of the elderly, they are easy to be infected with pathogens and suffer from lower respiratory tract infection. If not treated properly, they will easily cause respiratory failure and

Figure 1: ROC curve of serum IL-2 and TNF levels in the diagnosis of lower respiratory tract infection

even death [9] Antibiotic treatment is the preferred clinical treatment for this disease, and the appropriate early use of antibiotics and the formulation of a reasonable anti-infection program play a decisive role in the treatment of respiratory tract infection [10]. However, with the increase of hospital stay and the increasing number of antibiotics in clinical practice, drug-resistant bacteria are gradually increasing. The abuse of antibiotics not only results in the waste of clinical drug resources but also increases the economic burden of treating diseases [11]. It can be seen that full preoperative assessment of the severity of the disease, and the formulation of the correct treatment program intervention measures, plays an important role in the treatment of patients with lower respiratory tract infection. Relevant studies indicate that before the use of antibiotics, bacterial culture and drug sensitivity tests should be carried out on the patient's sputum, and daily nursing should be strengthened to monitor the adverse drug reactions, which can effectively reduce the occurrence of adverse events.

With the continuous development of immunological research, most scholars believe that the occurrence of lower respiratory tract infection is mainly due to the participation of the body's immune response. Serum levels of IL-2 and TNF are used as early diagnostic indicators for patients with lower respiratory tract infections. Through early screening of inflammatory indicators, the judgment of severity can provide a basis for the grasp of disease severity and early intervention treatment [12-13]. Research has shown that, according to the patient's capital data, disease characteristics, and inflammatory indicators, more specific intervention measures can achieve the goal of improving the nursing and treatment effect [14]. Quality nursing intervention is a patient-centered model that comprehensively implements the nursing responsibility system, deepens the professional content, expands the nursing scope, and improves the overall nursing quality by strengthening the basic nursing [15].This nursing mode is based on the idea of "people-oriented," and all nursing activities are carried out around the patients to eliminate unsafe factors, reduce nursing risk events, promote patients' recovery, shorten hospitalization time and improve patients' psychological state [16]. The results of this study showed that the

duration of cough disappearance, rales disappearance and fever resolution in the observation group was significantly less than that in the control group, with statistically significant differences (P < 0.05). The total effective rate of the observation group was 91.93%, which was significantly better than that of the control group (79.03%), and the difference was statistically significant (P < 0.05). Before the intervention, there was no statistically significant difference between the two groups in the SAS and SDS scores (P > 0.05). After the intervention, the SAS and SDS scores of the two groups decreased, and the observation group was significantly lower than the control group, with statistically significant differences (P < 0.05). It is suggested that the combination of sparfloxacin and amikacin in the treatment of patients with lower respiratory tract infection in quality care can alleviate the clinical symptoms, shorten hospitalization time, and reduce the positive effect of inflammatory response. The reason is that high-quality nursing is based on routine nursing services, such as respiratory nursing, medicine nursing, diet nursing, and psychological guidance. It follows the principles of aseptic operation and current use and matching, provides more meticulous nursing services for patients, so as to significantly improve patients' compliance with medication and nursing satisfaction. Before the intervention, the serum levels of IL-2 and TNF in the observation group were not significantly different from those in the control group (P > 0.05).After the intervention, the serum ILIL-2 level of the observation group was higher than that of the control group, and the TNF level of the observation group was lower than that of the control group, with statistically significant differences (P < 0.05).According to ROC curve analysis, the ROC curve areas for diagnosing lower respiratory tract infections with serum IL-2 and TNF levels were 0.736 and 0.775, respectively. When the serum IL-2 critical value was 26.5pg/ml, the diagnostic sensitivity was 65.5%, and the specificity was 80.0%. When the serum TNF critical value was 11.4ng/ml, the diagnostic sensitivity was 83.6%, and the specificity was 64.4%. Prompt IL-2 is a kind of Th1 cells secrete cytokines has the effect of the hormone with strong immune enhancement effect, not only can activate macrophages, T cells, B cells, increasing the damage of pathogenic microor-

ganisms ability, also can promote the formation of helper T cells. Its level can reflect the helper T cells in the body function, and most of the clinical infectious disease immune damage process is closely related to the generation of helper T cells (17-18). When antigens invade the body, helper T cells are stimulated by antigens to activate the expression of ILIL-2 gene and bind with the IL-2 receptor, resulting in a positive feedback reaction, thus inducing the proliferation of helper T cells and regulating the immune function of the body. TNF is a cytokine with a variety of biological activities and an important regulator of inflammation and immunity. Currently, the bacterial infection is found to be most closely related to TNF, which is an important mediator of g-bacterial sepsis and septic shock [19]. Increased TNF levels can cause local inflammation, organ damage, and even damage to multiple systems. It can be seen that in the treatment of lower respiratory tract infection, in addition to antibiotic treatment, proper administration of IL-2 preparation should be given, and attention should be paid to block the excessive secretion of TNF, balance the cytokine level of microenvironmental disorder in vivo, and restore the normal immune function of the body [20]. The high-quality nursing model can monitor the patient's condition in real-time, give targeted drug treatment, detect abnormalities in time, and take immediate treatment measures, which is conducive to reducing the risk of prognosis. Respiratory nursing can ensure the patients' respiratory tract is unobstructed to avoid dyspnea and other symptoms caused by excessive secretion and sputum.

In summary, the implementation of high-quality nursing combined with medication in the treatment of lower respiratory tract infection can effectively relieve clinical symptoms, shorten hospitalization time, improve patients' quality of life, and facilitate the regulation of serum IL-2 and TNF levels to promote patients' early recovery. As a result, high-quality nursing is very important for the treatment of diseases, and it is also useful for the prognosis of other diseases with substantial savings to the health care system. The impact of current study will not be limited to lower respiratory tract infections, as the results have a wider significance, and this study provides the foundation and reference for high-quality nursing on other diseases.

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