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*Review Article*

# Specific nursing effectively improves dyspnea and sleep quality of patients with lung cancer undergoing chemotherapy

Shenghua Liu[1*], Haijie Zhang[1*], Feng Wang[2], Yanhong Zhang[3]

*[1]Department of Cardiology, Affiliated Hospital of Shandong University of Traditional Chinese Medicine, Jinan, Shandong Province, China; [2]Department of Respiratory, Jinan Infectious Diseases Hospital, Jinan, Shandong Province, China; [3]Respiratory Digestion Department, Shengli Hospital, Dongying, Shandong Province, China. [*]Equal contributors.*

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**Abstract:** Objective: To explore the effect of specific nursing on dyspnea and sleep quality of patients with lung cancer undergoing chemotherapy. Methods: A total of 243 patients with lung cancer undergoing chemotherapy who were admitted to our hospital were collected as research subjects. Of them, 123 patients with specific nursing mode were taken as the research group (RG), and 120 patients with routine nursing were taken as the control group (CG). The influence of specific nursing on dyspnea and sleep quality of patients with lung cancer undergoing chemotherapy was analyzed by observing and comparing the sleep quality index and dyspnea rating before and after nursing intervention in both groups. Results: After nursing intervention, the PSQI scores of patients decreased significantly in the two groups ($P < 0.05$), while the PSQI scores of the patients in the RG were significantly lower than those in the CG ($P < 0.05$). The SAS and SDS scores of the RG were significantly lower than those of the CG ($P < 0.05$). The VAS and mMRC scores of patients decreased significantly in the two groups ($P < 0.05$), and the VAS and mMRC scores of the RG were significantly lower than those of CG ($P < 0.05$). The quality of life scores of patients increased in the two groups ($P < 0.05$), and the quality of life scores of the patients in the RG were significantly higher than those in the CG ($P < 0.05$). The nursing error rate and complaint rate in the RG were significantly lower than those in the CG ($P < 0.05$). The adverse reactions in the RG were significantly lower than those in the CG ($P < 0.05$). The satisfaction of the RG was significantly higher than that of the CG ($P < 0.05$). Conclusion: Specific nursing can effectively improve dyspnea symptoms and sleep quality, and improve the quality of life of patients with lung cancer undergoing chemotherapy.

**Keywords:** Specific nursing, lung cancer, chemotherapy, dyspnea, sleep quality

## Introduction

Lung cancer has the highest morbidity and mortality among all cancers. It poses a serious threat to the health of the global population, with 1.6 million people dying of lung cancer every year. In many countries, especially in East Asia, the incidence of lung cancer is still very high [2]. In the United States, lung cancer accounts for the largest proportion of cancer deaths, among which 86% of lung cancer patients die in Nevada. The 5-year overall survival rate is 12.3% for males and 18.9% for females [3]. In 2015, there were about 730,000 new lung cancer patients in China, and about 610,000 people died from lung cancer [4]. As one of the treatment methods for lung cancer, chemotherapy not only kills tumor cells but also damages normal cells in patients. It may also cause the suppression of the bone marrow hematopoietic system including the decrease of leukocytes and platelets [5-8]. Lung cancer patients have many disease-related symptoms after receiving chemotherapy, such as adverse events and infection complications during treatment, which directly affect the quality of life of patients [9].

With the continuous development of modern society, people's living standards are also grad-

ually improving, clinical attention to nursing is gradually increasing, and the needs and requirements for nursing are becoming more and more strict and clear. At the same time, previous routine nursing cannot meet the requirements of modern people. Therefore, it is extremely important to find a nursing mode that can meet the needs of people to the greatest extent [10]. Specific nursing is meticulous, including interventions for individual needs and preferences, disease progression, response to treatment and tolerance [11]. Specific nursing is a patient-centered treatment plan. Good nursing care must also allow team members to establish specific plans and develop, communicate and disseminate them according to each specific patient [12]. There are reports that specific nursing plans have effectively reduced the number of emergency cases and medical expenses, and it is also well received by patients [13]. There are reports that specific nursing has reduced hospitalization for inflammatory bowel disease [14]. However, there is still a lack of research on the effects of specific nursing on dyspnea and sleep quality of lung cancer patients undergoing chemotherapy.

This study was mainly designed to explore the influence of specific nursing on dyspnea and sleep quality of patients with lung cancer undergoing chemotherapy by comparing PSQI, mMRC and VAS before and after nursing intervention in both groups.

## Methods

### *Baseline data*

Altogether, 243 patients with lung cancer who were undergoing chemotherapy and were admitted to our hospital were collected as research subjects, of which 123 patients given specific nursing mode were the RG. There were 68 males and 55 females, with an average age of (51.28±5.28) years. There were 120 patients who received routine nursing who were assigned to the CG. There were 62 males and 58 females, with an average age of (52.16±5.16) years.

Inclusion criteria: All patients were accompanied by their families when they were admitted to hospital. They were diagnosed with lung cancer by histopathology and received chemotherapy [15]. They had complete clinical data. They were expected to survive for more than 1 year.

Exclusion criteria were as follows: drug dependence history, liver and kidney insufficiency, mental illness history, autoimmune system defects, and patients with communication disorders who could not cooperate with treatment.

This study was approved by the Ethics Committee of our hospital. The details of the experiment were described clearly. The subjects and their family members agreed and signed a complete informed consent form.

### *Nursing methods*

Routine nursing was given to patients in the CG and specific nursing was given to patients in the RG. Routine nursing: After admission, the patients received routine health education. The medical staff informed the patients of the precautions for chemotherapy and any possible adverse reaction symptoms, patients were made to quit smoking and drinking, and lung function was monitored in the patients. If there was chronic lung function damage or respiratory tract infection, antibiotic treatment was given to patients and nurses ensured a clean and tidy treatment environment for patients. Specific nursing: After admission, patients were given basic knowledge of chemotherapy precautions and possible adverse reactions through knowledge lectures and other forms. After a diagnosis of cancer, patients often have panic, dysphoria and other adverse emotions, and even psychological problems such as anorexia, world-weariness and depression. During treatment, some symptoms such as nausea, dizziness and even alopecia may also affect the psychological state of patients. Nursing staff helped patients understand that birth, death, illness and old age are natural laws. They used music, crosstalk and other forms to relieve patients' bad emotions, enhance communication between patients and patients, patients and doctors, patients and their families, enhance patients' confidence in life, and make them actively cooperate with treatment. The staff encouraged the patients to keep a regular daily schedule to ensure a good quality medical environment and good bedtime at night. According to the doctor's requirements and combined with the patient's eating habits, dietary

**Table 1.** Comparison of clinical general data of patients between the two groups ($\bar{x} \pm sd$)/n [%]

| | RG (n=123) | CG (n=120) | $X^2$/t | P |
|---|---|---|---|---|
| Gender | | | 0.32 | 0.57 |
| Male | 68 (55.28) | 62 (51.67) | | |
| Female | 55 (44.72) | 58 (48.33) | | |
| Average age/year (s) old | 51.28±5.27 | 52.16±5.18 | 1.31 | 0.19 |
| BMI (kg/m$^2$) | 24.57±3.48 | 24.31±3.42 | 0.59 | 0.56 |
| Average duration (years) | 2.38±0.87 | 2.41±0.89 | 0.27 | 0.79 |
| Pathological types | | | 0.15 | 0.93 |
| Squamous cell carcinoma (cases) | 56 (45.53) | 54 (45.00) | | |
| Small cell carcinoma (cases) | 15 (12.20) | 13 (10.83) | | |
| Adenocarcinoma (cases) | 52 (42.27) | 53 (44.17) | | |
| Systolic blood pressure | 126.58±16.38 | 127.23±16.51 | 0.31 | 0.76 |
| Diastolic blood pressure | 79.71±14.27 | 79.29±13.97 | 0.23 | 0.82 |
| Drinking or not | | | 0.00 | 0.95 |
| Yes | 66 (53.66) | 64 (53.33) | | |
| No | 57 (46.34) | 56 (46.67) | | |

intervention plans were developed under the guidance of nutritionists. They advised patients to eat more foods rich in vitamins, fiber, protein and calcium, and less food with high sugar and fat. Before chemotherapy, the medical staff communicated with the patients, explained to them the common complications that might occur after chemotherapy, and bought wigs or hats for the patients. After chemotherapy, medical staff provided targeted nursing intervention and timely communication with doctors for patients with different complications, helped clean up the patients after nausea and vomiting, provided relaxation therapy for patients with severe pain, and helped recuperate the gastrointestinal function of patients with gastrointestinal disorders. Sheets and bedding were changed regularly and the room was properly ventilated to ensure a quiet and comfortable environment.

*Outcome measures*

Before and after nursing intervention, PSQI scale [16] was used to evaluate the sleep quality of patients in the two groups. VAS scale [17] and mMRC scale [18] were used to evaluate the dyspnea symptoms of patients in the two groups. The worse the sleep quality of the patients, the more severe the dyspnea, and the higher the corresponding scale score. QLQ-C30 score [19] was used to evaluate the quality of life of patients. A better quality of life of patients, was reflected by a higher score. The emotional changes of patients were evaluated with self-rating anxiety scale (SAS) [20] and self-rating depression scale (SDS) [21]. The more significant the anxiety and depression was, the higher the score. The incidence rate of nursing errors, complaint rate, nursing satisfaction and adverse reactions of patients were counted in the two groups.

*Statistical analysis*

SPSS 20.0 (IBM Corp, Armonk, NY, USA) was used for statistical analysis of all data in this study. All graphical results were plotted by using GraphPad Prism 7 (San Diego Graphpad Software, Inc.). The count data were represented by [n (%)]. Chi-square test was used for intergroup comparison. The measured data were expressed by ($\bar{x} \pm s$). The two groups were compared by t test. The difference was statistically significant with $P < 0.05$.

## Results

*Comparison of baseline data between the two groups*

The general clinical data were recorded in the two groups (**Table 1**). There was no significant difference between the RG and CG in gender, average age, body mass index (BMI), average duration, pathological types, systolic blood pressure, diastolic blood pressure and history of drinking ($P > 0.05$).

*Comparison of PSQI scores between the two groups before and after nursing intervention*

The PSQI scores were compared between the two groups before and after nursing intervention (**Figure 1**). There was no significant difference in PSQI scores with the 7 items before nursing intervention between the two groups ($P > 0.05$). However, PSQI scores of the 7 items after nursing intervention were significantly reduced ($P < 0.05$), and the score in the RG was significantly lower than the CG ($P < 0.05$).

*Comparison of psychological status between the two groups before and after nursing intervention*

The psychological status scores were compared between the two groups before and after nursing intervention (**Figure 2**). There was no significant difference in SAS score and SDS score before nursing intervention between the two groups ($P > 0.05$). After nursing intervention, SAS score and SDS score were significantly decreased ($P < 0.05$), while the score in the RG was significantly lower than the CG ($P < 0.05$).

*Comparison of dyspnea symptoms between the two groups before and after nursing intervention*

The dyspnea symptoms were compared between the two groups before and after nursing intervention (**Figure 3**). There was no significant difference in dyspnea symptoms between the two groups before nursing intervention ($P > 0.05$). VAS score and mMRC score were significantly reduced after nursing intervention ($P < 0.05$), while the scores in the RG were significantly lower than the CG ($P < 0.05$).

*Comparison of quality of life between the two groups before and after nursing intervention*

In the two groups, the quality of life of patients was compared from five aspects of role (RF), body (PF), cognition (CF), emotion (EF) and society (SF) (**Figure 4**). There was no significant difference in QLQ-C30 scores of patients between the two groups before nursing intervention ($P > 0.05$). However, the RF, PF, CF, EF and SF scores of patients were significantly improved in the two groups after nursing intervention ($P < 0.05$), and the scores of the patients in the RG were significantly higher than those in the CG ($P < 0.05$).

*Comparison of nursing error rate and complaint rate of patients in the two groups*

After nursing intervention, the nursing error rate and complaint rate of patients were compared in the two groups. The nursing error rate of the RG (2.44%) was significantly lower than that of the CG (9.17%) ($P < 0.05$); and the complaint rate of the RG (6.50%) was significantly lower than that of the CG (15.83%) ($P < 0.05$) (**Table 2**).

*Comparison of adverse reactions after nursing intervention in the two groups*

The adverse reactions were compared between the two groups after nursing intervention (**Table 3**). After nursing intervention, the adverse reactions (nausea, vomiting, sleepiness, poor appetite and neutropenia) in the RG were significantly lower than those in the CG ($P < 0.05$).

*Survey on nursing satisfaction of patients in the two groups*

The nursing satisfaction of patients was investigated in the two groups (**Figure 5**). In the RG, 76 patients were very satisfied, 42 patients were satisfied, and 5 patients were not satisfied. In the CG, 67 were very satisfied, 37 were satisfied, and 16 were not satisfied. The satisfaction rate of the patients in the RG (95.93%) was significantly higher than that in the CG (86.67%) ($X^2=6.61$, $P < 0.05$).

## Discussion

Patients with lung cancer often suffer from fatigue, dizziness, pain, sleep disorders and respiratory symptoms [22, 23]. Some studies have shown that about 78% of lung cancer patients are affected by dyspnea symptoms and about 62% are affected by sleep disorders [24]. Adequate sleep time is essential to maintain normal physiological function and it is also related to cancer risk. Sleeping more than or less than 8 hours per day at different age stages may be related to increased lung cancer mortality [25]. In lung cancer patients, poor sleep quality also reduces their quality of life. Compared with depression or anxiety, sleep disorder is more related to lung cancer. It can

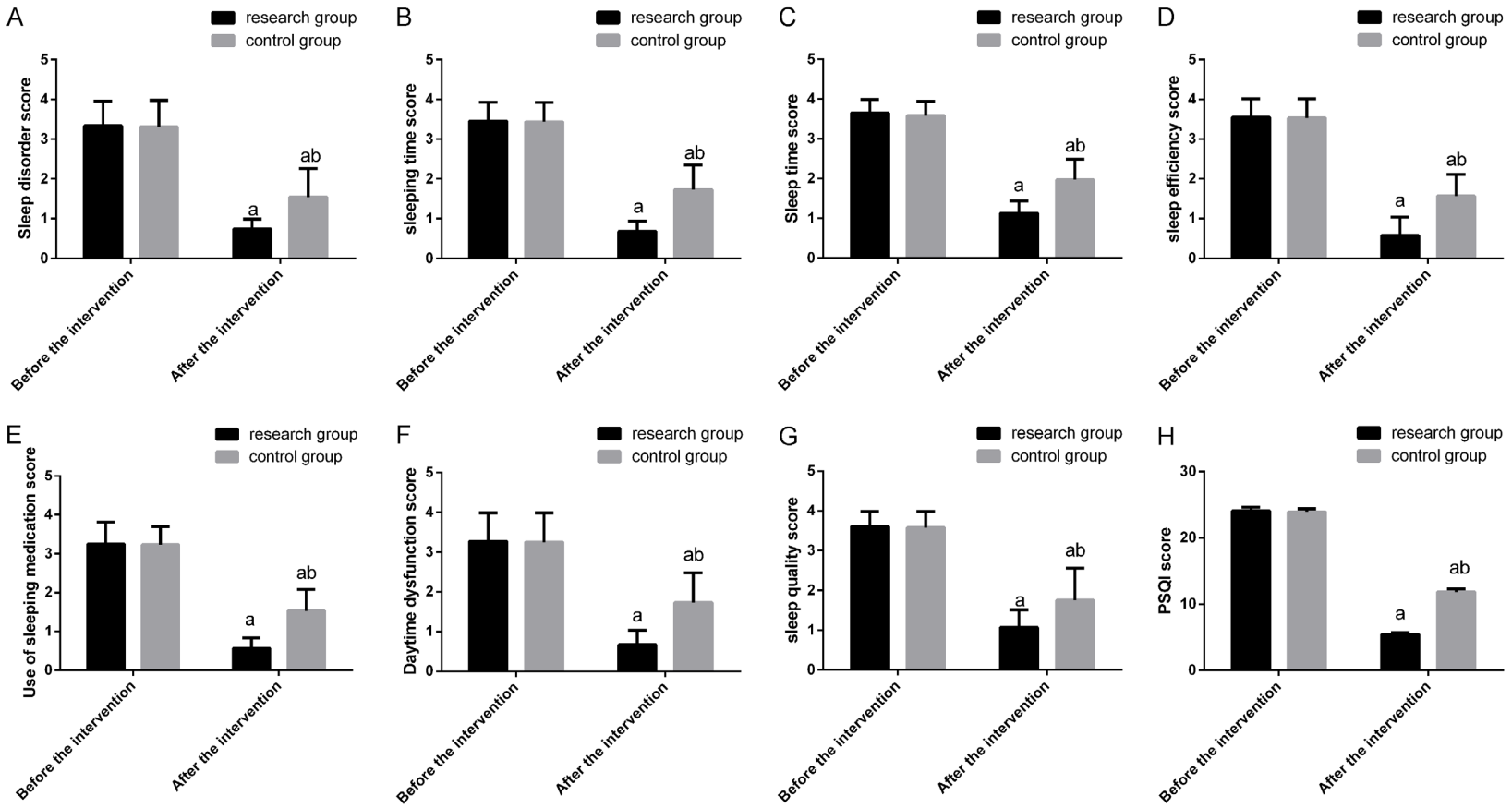


**Figure 1.** Comparison of PSQI scores of patients in the two groups before and after nursing intervention. A. After nursing intervention, the sleep quality scores of patients decreased in the two groups, and the patients in the RG were significantly lower than those in the CG. B. After nursing intervention, the sleep disorder scores of patients decreased in the two groups, and the patients in the RG were significantly lower than those in the CG. C. After nursing intervention, the sleep time scores of patients decreased in the two groups, and the patients in the RG were significantly lower than those in the CG. D. After nursing intervention, the time for falling asleep in patients decreased in the two groups, and the time for patients in the RG was significantly lower than those in the CG. E. After nursing intervention, the sleep efficiency scores of patients decreased in the two groups, and the scores of patients in the RG were significantly lower than those in the CG. F. After nursing intervention, the scores of sleeping drugs used decreased in the two groups, and the patients in the RG had significantly lower use than those in the CG. G. After nursing intervention, the daytime dysfunction scores of patients decreased in the two groups, and the patients in the RG were significantly lower than those in the CG. H. After nursing intervention, the PSQI scores of patients decreased in the two groups, and the scores in patients in the RG were significantly lower than those in the CG. Note: a means the comparison with before intervention, aP < 0.05; b means the comparison with RG after intervention, bP < 0.05.

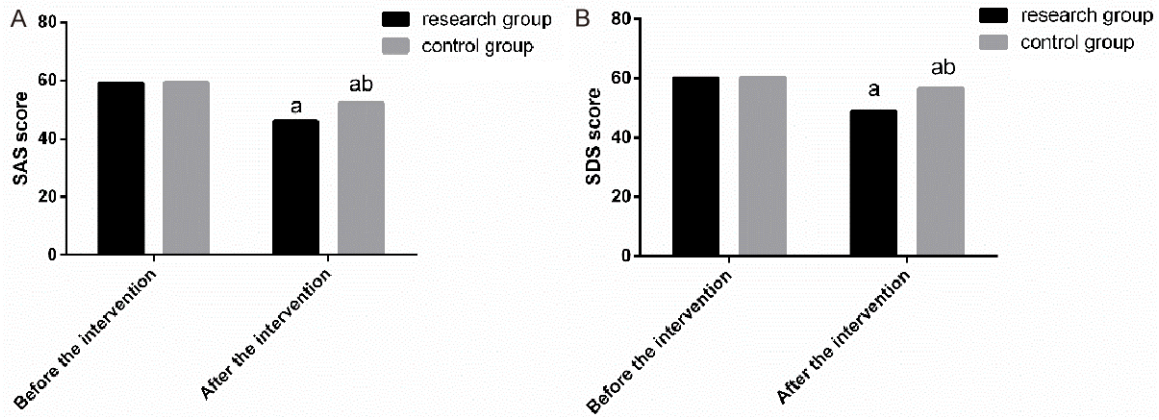


**Figure 2.** Comparison of SAS score and SDS score of patients in the two groups before and after nursing intervention. A. After nursing intervention, the SAS scores of patients decreased in the two groups, and the scores in the RG were significantly lower than those in the CG. B. After nursing intervention, the SDS scores of patients decreased in the two groups, and the scores in the RG were significantly lower than those in the CG. Note: a means the comparison with before intervention, aP < 0.05; b means the comparison with RG after intervention, bP < 0.05.

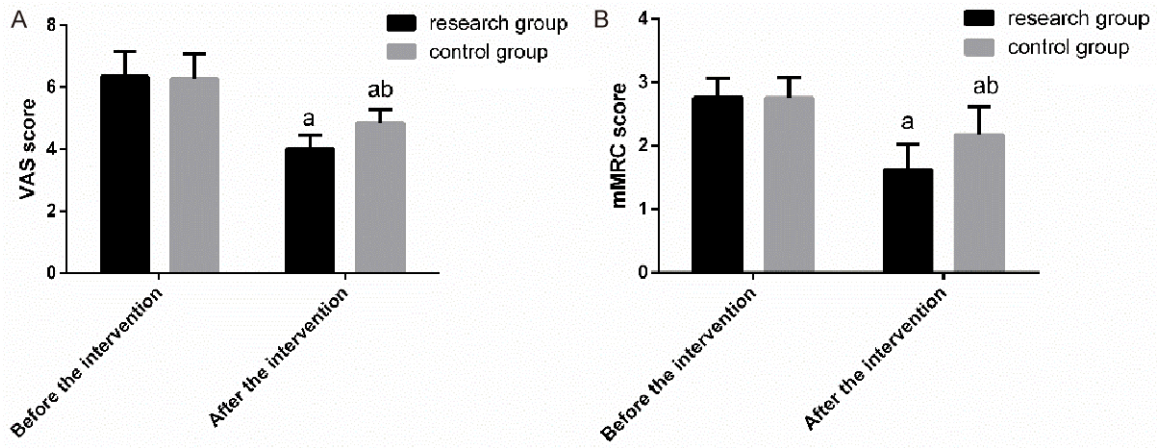


**Figure 3.** Comparison of VAS score and mMRC score between the two groups before and after nursing intervention. A. After nursing intervention, the VAS scores of patients decreased in the two groups, and the scores in the RG were significantly lower than those in the CG. B. After nursing intervention, the mMRC scores of patients decreased in the two groups, and the scores in the RG were significantly lower than those in CG. Note: a means the comparison with before intervention, aP < 0.05; b means the comparison with RG after intervention, bP < 0.05.

also help make sleep better to improve dyspnea symptoms of lung cancer patients [26]. Specific nursing can improve patients' accurate cognition of prognosis and make patients' mood healthier. It is related to the increase of anxiety and depression level of patients. This provides a basis for patients to obtain psychosocial nursing and support immediately after diagnosis [27].

Some studies have shown that the prevalence rate of sleep disordered breathing is very high among lung cancer patients, and sleep disordered breathing is related to intermittent hypoxia and daytime sleepiness [28]. This study concluded that PSQI scores of patients decreased significantly in the two groups after nursing intervention. Previous studies have found that professional health personnel need to provide health education and emotional support on sleep hygiene to lung cancer patients to help them maintain regular sleep-wake rhythms, thus improving their quality of life [29]. Combined with the results of this article, it showed that nursing intervention could improve the sleep quality of lung cancer patients and it had important value in the treatment process of patients. In addition, the PSQI score of

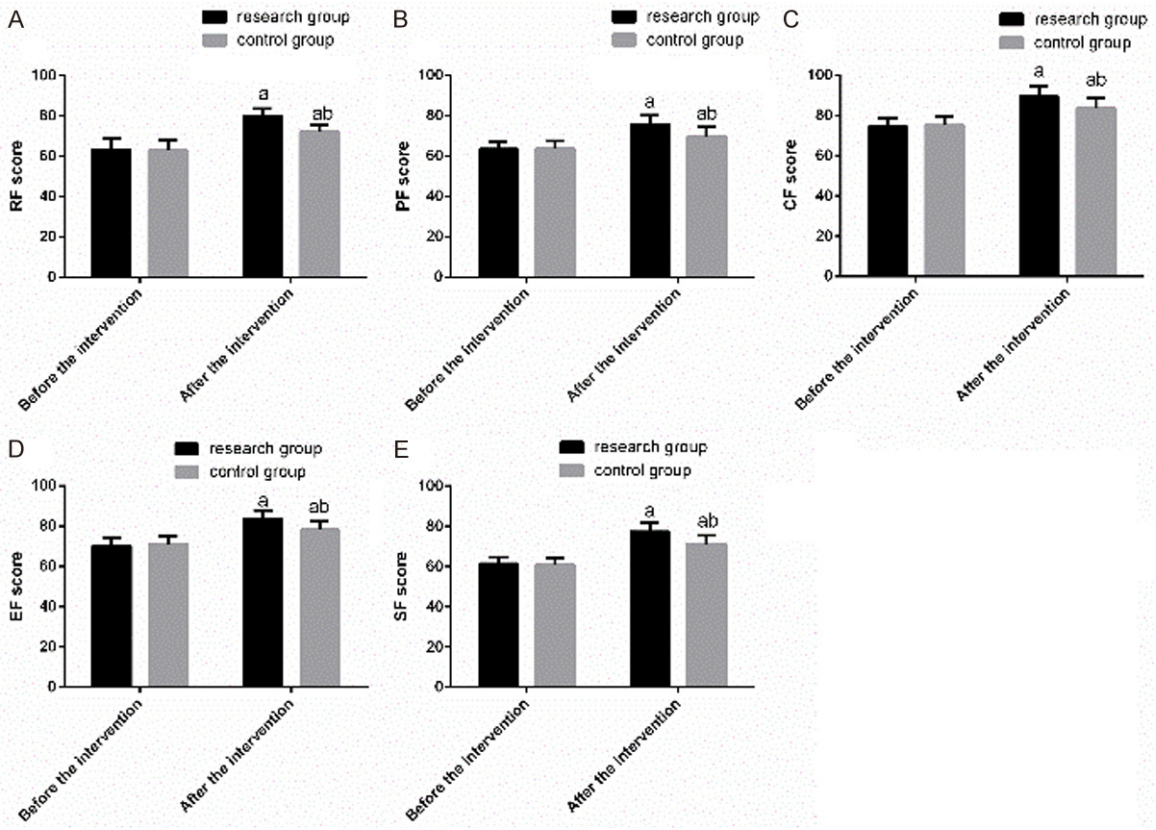


**Figure 4.** Comparison of QLQ-C30 scores of patients in the two groups before and after nursing intervention. A. After nursing intervention, RF scores of patients increased in the two groups, and the scores in the RG were significantly higher than those in the CG. B. After nursing intervention, PF scores of patients increased in the two groups, and the scores in the RG were significantly higher than those in the CG. C. After nursing intervention, CF scores of patients increased in the two groups, and the scores in the RG were significantly higher than those in the CG. D. After nursing intervention, EF scores of patients increased in the two groups, and the scores in the RG were significantly higher than those in the CG. E. After nursing intervention, SF scores of patients increased in the two groups, and the scores in the RG were significantly higher than those in the CG. Note: a means the comparison with before intervention, aP < 0.05; b means the comparison with RG after intervention, bP < 0.05.

**Table 2.** Comparison of incidence rates of nursing risk events in the two groups

| | Incidence of nursing errors | Complaint rate |
|---|---|---|
| RG (n=123) | 3 (2.44) | 8 (6.50) |
| CG (n=120) | 11 (9.17) | 19 (15.83) |
| $X^2$ | 5.06 | 5.35 |
| P | 0.02 | 0.02 |

patients in the RG was significantly lower than that in the CG, which indicated that specific nursing could better improve the sleep quality of lung cancer patients. Some studies have shown that depression is very common in lung cancer, which can seriously affect the rehabilitation and mental health of patients [30]. This study concluded that the SAS score and SDS score of patients decreased significantly in the two groups after the nursing intervention, which showed that the nursing intervention had certain effects in relieving the patients' bad emotions. According to the patients' different personalities and educational backgrounds, specific nursing was designed to provide patient counseling from the psychological level. After the intervention, the SDS and SAS scores of lung cancer patients decreased significantly, and its effect was better than that of routine nursing. Dyspnea is one of the most common and devastating symptoms of advanced lung cancer [31, 32]. Some studies have shown that dyspnea may be an important prognostic factor for patients with non-small cell lung cancer [33]. The VAS score and mMRC score of patients were significantly reduced in the two groups

**Table 3.** Comparison of adverse reactions after nursing intervention in the two groups n [%]

| | Nausea and vomiting | Sleepiness | Poor appetite | Neutropenia | Dizziness |
|---|---|---|---|---|---|
| RG (n=123) | 34 (27.64) | 4 (3.25) | 26 (21.14) | 27 (21.95) | 31 (25.20) |
| CG (n=120) | 62 (51.67) | 15 (12.50) | 58 (48.33) | 49 (40.83) | 64 (53.33) |
| $X^2$ | 14.67 | 7.21 | 19.86 | 10.08 | 20.19 |
| P | 0.00 | 0.01 | 0.00 | 0.00 | 0.00 |

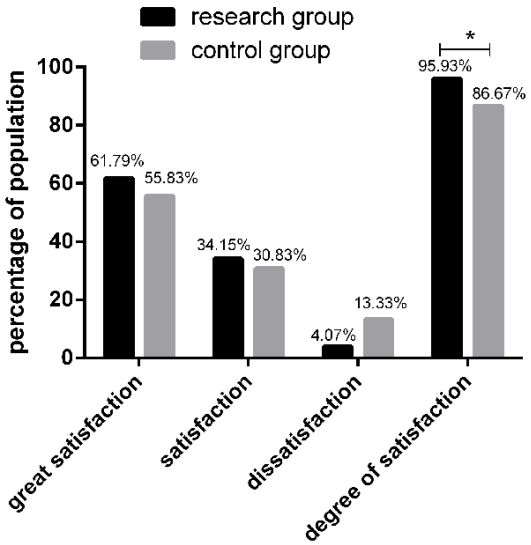


**Figure 5.** Nursing satisfaction survey. The satisfaction of RG was 95.93%. The satisfaction of the CG was 86.67%. The satisfaction of the patients in the CG was significantly lower than that of RG ($P < 0.05$). Note: *indicates a comparison between the two groups, *$P < 0.05$.

after the nursing intervention in this study, which indicated that the nursing intervention had an effect on improving the dyspnea symptoms of patients. Meanwhile, the VAS score and mMRC score of lung cancer patients after the specific nursing intervention were significantly lower than those of the CG, which indicated that specific nursing was more beneficial to improving the respiratory function of patients. Chemotherapy for lung cancer patients can cause adverse reactions such as nausea, vomiting and sleepiness [34]. However, this study concluded that there were certain differences in adverse reactions after intervention of different nursing modes. Specific nursing generated significantly lower scores than routine nursing in adverse reactions such as nausea, vomiting, sleepiness, poor appetite and neutropenia. It may be because specific nursing always pays attention to the clinical signs of patients before the development of adverse reactions. In case of any abnormal situations, the medical staff promptly took certain measures to report to the doctor and ensure reasonable and timely treatment. The longer the duration of having a malignant disease is, the lower the quality of life of patients. This paper concluded that the RF, PF, CF, EF and SF scores of patients in the RG were significantly higher than those in the CG after nursing intervention. Combined with research, it was concluded that fatigue, sleep problems, cough and analgesia were factors affecting the quality of life of patients with non-small cell lung cancer [35]. We speculated that the sleep quality, psychological adjustment, dyspnea and adverse reactions of patients after specific nursing intervention in this study were clearly superior to routine nursing, so the quality of life scores of patients in the RG were superior to that in the CG. This study was designed to investigate the nursing satisfaction, nursing error rate and complaint rate in the two groups. The results showed that patient satisfaction was better after specific nursing intervention, and the error rate and complaint rate were lower. This indicated that the application of specific nursing to patients with lung cancer undergoing chemotherapy could effectively improve the nursing relationship, reduce the occurrence of adverse events such as disputes and complaints about nursing staff, improve the doctor-patient relationship, bring a better medical experience to patients and help patients heal more comfortably and cooperatively.

This study was designed to comprehensively discuss the influence of specific nursing on dyspnea and sleep quality of lung cancer patients undergoing chemotherapy. However, there are still some limitations and long-term follow-up investigation has not been conducted on the prognosis of patients. Moreover, there are many influencing factors that affect the recovery of patients with lung cancer undergoing chemotherapy. In future research, the impact of different hospital environmental nursing on

the recovery of patients with lung cancer undergoing chemotherapy can also be specifically analyzed, so as to better improve the poor prognosis of patients.

To sum up, specific nursing can effectively improve dyspnea symptoms and sleep quality, reduce the adverse reactions, and improve the quality of life of patients with lung cancer undergoing chemotherapy, which has high application value.

## Disclosure of conflict of interest

None.

**Address correspondence to:** Yanhong Zhang, Respiratory Digestion Department, Shengli Hospital, Dongying, Shandong Province, China. E-mail: zhangyihuan07@126.com

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