

Original Article

Evidence-based nursing intervention can improve the treatment compliance, quality of life and self-efficacy of patients with lung cancer undergoing radiotherapy and chemotherapy

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Abstract: Objective: To investigate the improvement effect of evidence-based nursing intervention on treatment compliance, quality of life and self-efficacy of patients with lung carcinoma (LC) undergoing radiotherapy and chemotherapy. Methods: From May 2018 to August 2019, 183 patients with LC who received radiotherapy and chemotherapy in our hospital were selected and divided into two groups in accordance with different nursing methods. Among them, 85 patients who received routine nursing intervention were included in the control group (CG), and 98 patients who received evidence-based nursing intervention were included in the research group (RG). The improvement of pulmonary function indexes [(FVC), forced expiratory volume in one second (FEV_1), ratio of forced expiratory volume in one second to forced vital capacity (FEV_1/FVC)] was observed before and after nursing. The pain degree was evaluated by the visual analogue scale (VAS). The treatment compliance between groups was compared. The psychological emotions of the patients were evaluated by a self-rating anxiety scale (SAS) and a self-rating depression scale (SDS). The General Self-efficacy Scale (GSES) was applied to assess the self-efficacy and the Quality of Life (SF-36) scale was applied to evaluate the quality of life. The incidence of secondary infection was observed in the two groups. The nursing satisfaction was evaluated by a nursing satisfaction questionnaire made by our hospital. Results: After nursing, the improvement of FEV_1 , FVC and FEV_1/FVC levels in the RG were obviously better than that in the CG; The scores of VAS, SAS and SDS and total incidence of secondary infection in the RG were obviously lower than those in the CG; The treatment compliance, GSES and SF-36 scores, and nursing satisfaction scores of patients in the RG were obviously higher than that in the CG. Conclusion: Evidence-based nursing intervention can improve treatment compliance, lung function, self-efficacy and quality of life for patients with LC undergoing radiotherapy and chemotherapy.

Keywords: Evidence-based nursing, radiotherapy and chemotherapy for lung carcinoma, treatment compliance, quality of life, self-efficacy

Introduction

LC is a common malignant tumor with high morbidity and mortality, which seriously threatens the health of patients [1]. When most patients are diagnosed, their condition has deteriorated, cancer cells have metastasized and spread, and the disease stage is mostly in the middle and late stages [2]. Therefore, patients are given chemotherapy intervention in clinic. Chemotherapy intervention can not only assist surgical treatment, but also reduce the recur-

rence rate of postoperative diseases [3]. It can also be independently implemented to improve patients' symptoms and prolong patients' life to a certain extent [4]. However, most chemotherapy drugs will cause different degrees of stimulation to patients' bodies [5], so it is necessary to give effective nursing intervention during chemotherapy.

Studies have shown that most patients will have different stress reactions when they receive chemotherapy intervention [6], as well

as adverse reactions such as nausea and vomiting and decreased appetite [7]. These adverse reactions will also cause physical and mental unrest to patients, so that some patients' compliance with the treatment is reduced, or some even give up treatment [8]. Other studies have shown that there is a correlation between the curative effect after chemotherapy and the life quality, and the quality of life will be decreased in most patients after receiving chemotherapy intervention [9]. Research even shows that most patients who receive chemotherapy for LC will have serious adverse reactions, which will reduce the curative effect of chemotherapy and cause adverse prognosis [10]. Therefore, it is particularly important to reduce the adverse reactions caused by chemotherapy and improve the quality of life [11]. However, the routine nursing has many limitations at this stage [12], such as giving intervention measures only to prevent various complications, or focusing on diseases and ignoring the needs of patients themselves, thus patients' negative emotions cannot be fully and effectively alleviated [13]. Evidence-based nursing is a kind of targeted nursing for individuals, which can help patients grasp their progress, the course of treatment, strengthen patients' understanding of diseases, and give targeted psychological guidance to patients, so that patients can face treatment with a positive attitude and improve therapeutic effect [14, 15]. It can also be designed to provide educational guidance to family members, so that the family members of the patients can correctly understand the nursing intervention methods, and the patients can have higher quality nursing intervention after discharge [16]. For example, studies by XX et al. have shown that effective nursing intervention can lessen the decline of patients' body function, reduce the unhealthy emotions during chemotherapy and improve the therapeutic effect for patients with neurotoxic chemotherapy [17].

In this study, evidence-based nursing intervention was given to patients with LC who received chemotherapy intervention to explore the improvement effect of this model on treatment compliance, self-efficacy after intervention and quality of life of patients, aiming to provide a feasible nursing plan for patients with LC during chemotherapy.

Materials and methods

Baseline data

From May 2018 to August 2019, 183 patients with LC who received radiotherapy and chemotherapy in Tangshan Central Hospital were selected and divided into two groups in accordance with different nursing methods. Among them, 85 patients who received routine nursing intervention were included in the CG, and 98 patients who received evidence-based nursing intervention were included in the RG.

Inclusion criteria: In both groups, patients were diagnosed with LC by pathological examination [18], and they were treated with radiotherapy and chemotherapy in our hospital. Their general data were complete in the two groups, and the predicted survival time was > 6 months. The patients had clear thinking and could communicate with medical staff normally. The study plan was submitted to the hospital ethical committee for review. The research subjects and their families were informed and signed a completely informed consent form.

Exclusion criteria were as follows: Communication barriers; Comorbid with autoimmune diseases or hematological diseases; Contraindications of radiotherapy and chemotherapy drugs; Those who quit the experiment halfway; Those who were not interviewed.

Nursing methods

In the CG, patients received routine nursing: After admission, the patients were given basic health and disease education, and the changes of vital signs were closely observed. According to the doctor's orders, the medical staff provided various drugs, guided the patients to pay attention to the matters needing attention when taking drugs, and informed them about adverse reactions after radiotherapy and chemotherapy or the corresponding treatment measures of adverse reactions after medication, so as to relieve the patients' worries. The patients were also told to stay in bed more often.

In the RG, patients received evidence-based nursing: 1. Disease explanation: Before radiotherapy and chemotherapy, patients were informed of the related medication and use

methods, so that patients could understand the frequency of medication. While explaining the significance of chemotherapy and radiotherapy to patients, the medical staff listened patiently to their suggestions and feedback, and actively provided patients with effective information about their illness and chemo-radiotherapy, so as to make patients felt respected and cared for psychologically. In addition, the medical staff actively informed patients of adverse reactions that may develop in the process of chemo-radiotherapy, so that patients could be psychologically prepared and knew the importance of persistence, so as to fully cooperate with the work of nursing staff.

2. Psychological guidance: Patients were generally seriously ill, so patients were prone to various unhealthy emotions. Therefore, nursing staff actively adjusted patients' unhealthy emotions and mobilized their families to provide comfort and support for patients. When the patient was in a low mood, it was necessary to actively communicate with the patient to help the patient eliminate the negative feelings of treatment and enhance their confidence in treatment.

3. Dietary intervention: Radiotherapy and chemotherapy can lead to the decrease of gastrointestinal reaction and appetite of patients, which can result in lower nutrition intake and affect their physical skills and therapeutic effect. According to the patients' eating habits, the medical staff gave corresponding dietary guidance and told the patients to eat more foods high in protein, with fruit and other healthy foods.

4. Pain intervention: During radiotherapy and chemotherapy, pain can affect treatment compliance and increase negative emotions. According to their personality and hobbies, they were provided with recreational activities to divert their attention and relieve pain. If necessary, they were given appropriate painkillers.

5. Adverse reaction intervention: Medical staff monitored the patient's condition changes or adverse reaction symptoms in real time, and timely reported them to the doctor, making the corresponding treatment, and doing a good job of appeasement.

Outcome measures

Lung function indicators: Before and after treatment, the forced vital capacity (FVC), forced expiratory volume in one second (FEV_1), and the ratio of forced expiratory volume in

one second to forced vital capacity (FEV_1/FVC) in the two groups were measured with a lung function instrument (Zea Medical Technology Co., Ltd., Beijing, China, z00502).

VAS score [19]: There were 10 points in the scale: 0 meant painless, 1-3 meant slight pain, 4-6 meant medium pain, and 7-10 meant serious pain.

Compliance: This was divided into three parts: very compliant, compliance and non-compliance. Patients who highly cooperated with nursing staff and finished treatment on time were very compliant; Patients who cooperated with nursing staff were compliant; Patients who did not fully cooperate with nursing staff and evaded treatment were incompliant. Total compliance rate = (partial compliance + full compliance)/total cases $\times 100\%$.

Negative emotion [20]: The total score of SAS scale was 100 points. After nursing intervention, patients' score of 50-70 indicated mild anxiety, patients' score of 71-90 indicated moderate anxiety, and patients' score of > 90 indicated severe anxiety. The higher the score, the more severe the anxiety. The total score of SDS scale was 100 points. After nursing intervention, a patients' score of 50-70 indicated mild depression, a patients' score of 71-90 indicated moderate depression, and a patients' score of > 90 indicated severe depression. The higher the score, the more serious the depression.

GSES score [21]: There were 10 items in the scale, and each item scored 1-4 points, with a total score of 40 points. The higher the score, the higher the patient's self-efficacy.

SF-36 score [22]: There were 8 items in the scale (general health, social function, physical function, emotional function, physiological role, physical pain, mental health, vitality). The percentile scoring system was used. The higher the score, the higher the quality of life.

Incidence of secondary infection: The incidence of secondary infection such as upper respiratory tract infection, lower respiratory tract infection, gastrointestinal tract infection and urinary tract infection was observed. In patients with more than two sites of infection, only the first infection was recorded without repeated counting.

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Table 1. Comparison of baseline data between the two groups [n (%)] (mean ± SD)

Categories	RG (n=98)	CG (n=85)	t/ χ^2 value	P value
Gender			0.281	0.595
Male	58 (59.18)	47 (55.29)		
Female	40 (40.82)	38 (44.71)		
Average age (years old)	57.53±5.18	57.62±5.21	0.116	0.907
BMI (kg/m ²)	22.64±2.34	22.34±2.37	0.859	0.391
Smoking history			0.372	0.541
Yes	54 (55.10)	43 (50.59)		
No	44 (44.90)	42 (49.41)		
Drinking history			0.022	0.882
Yes	61 (62.24)	52 (61.18)		
No	37 (37.76)	33 (38.82)		
Exercise history			0.030	0.861
Yes	52 (53.06)	44 (51.76)		
No	46 (46.94)	41 (48.24)		
TNM staging			0.805	0.369
Stage I + II	50 (51.02)	49 (57.65)		
Stage III	48 (48.98)	36 (42.35)		
Degree of pathological differentiation			0.261	0.609
Well and middle differentiated	61 (62.24)	56 (65.88)		
Poorly differentiated	37 (37.76)	29 (34.12)		
Disease types			1.655	0.647
Low differentiated squamous cell carcinoma	22 (22.45)	18 (21.18)		
Middle and well differentiated squamous cell carcinoma	19 (19.39)	20 (23.53)		
Small cell lung cancer	34 (34.69)	23 (27.06)		
Low differentiated adenocarcinoma	23 (23.47)	24 (28.24)		
Disease site			0.153	0.695
Left lung	56 (57.14)	51 (60.00)		
Right lung	42 (42.86)	34 (40.00)		

Nursing satisfaction: A self-made Satisfaction Questionnaire was used for scoring, which consisted of five items, namely, service timeliness, management normalization, service attitude, hospitalization environment and comprehensive quality of nursing staff. The higher the score, the higher the patient's satisfaction with service.

Statistical methods

SPSS 22.0 (Beijing Baiao Yijie Technology Co., Ltd., China) was applied for statistical analysis. Graphpad 6 software package was used for data analysis and image illustration. The count data within the group were represented by the number of cases/percentage [n (%)]. Chi-squared test was applied for comparison of counting data between groups. When the theoretical frequency in Chi-square test was less than 5, the continuous correction chi-squared

test was used. The quantitative data were expressed by mean number ± standard deviation (mean ± SD). The quantitative data between groups were compared by t test of independent samples. Paired t test was applied for comparison in the group before and after nursing. The difference was statistically significant with $P < 0.05$.

Results

Baseline data

There was no obvious difference in general clinical baseline data such as gender, average age, body mass index, smoking history, drinking history, exercise history, TNM stage, pathological differentiation degree, pathological type and disease site between the two groups ($P > 0.05$) (**Table 1**).

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Table 2. Comparison of improvement of lung function indexes between the two groups before and after nursing (mean \pm SD)

Grouping	n	FEV ₁ /L		FVC/L		FEV ₁ /FVC/%	
		Before nursing	After nursing	Before nursing	After nursing	Before nursing	After nursing
RG	98	66.43 \pm 6.08	80.05 \pm 7.59	52.05 \pm 5.18	68.26 \pm 6.29	61.28 \pm 6.13	73.15 \pm 7.06
CG	85	67.94 \pm 6.12	46.58 \pm 4.73	52.09 \pm 5.14	71.95 \pm 7.07	60.07 \pm 6.02	67.45 \pm 6.28
t	-	1.670	35.160	0.052	3.736	1.343	5.732
P	-	0.096	< 0.001	0.958	0.001	0.181	< 0.001

Table 3. Comparison of VAS scores between the two groups before and after nursing (mean \pm SD)

Grouping	n	VAS score	
		Before nursing	After nursing
RG	98	7.05 \pm 0.24	2.15 \pm 0.11
CG	85	7.01 \pm 0.26	5.31 \pm 0.14
T	-	1.082	170.800
P	-	0.280	< 0.001

Comparison of improvement of lung function indexes between the two groups before and after nursing

There was no obvious difference in lung function indexes (FEV₁, FVC and FEV₁/FVC levels) between the two groups before nursing ($P > 0.05$). The improvement of FEV₁, FVC and FEV₁/FVC levels in the two groups after nursing was obviously better than that before nursing ($P < 0.05$), and the improvement of FEV₁, FVC and FEV₁/FVC levels in the RG after nursing was obviously better than that in the CG ($P < 0.05$) (**Table 2**).

Comparison of VAS scores between the two groups before and after nursing

There was no obvious difference in VAS scores between the two groups before nursing ($P > 0.05$). After nursing, the VAS scores of patients in the two groups were obviously lower than that before nursing ($P < 0.05$), and the VAS score of patients in the RG after nursing was obviously lower than that in the CG ($P < 0.05$) (**Table 3**).

Comparison of treatment compliance between the two groups after nursing

The treatment compliance was compared after nursing in both groups. The total compliance

rate of patients in the RG was 96.94%, while that in the CG was 78.82%. The results revealed that the treatment compliance of patients in the RG was obviously higher than that in the CG after nursing ($P < 0.05$) (**Table 4**).

Comparison of psychological emotions between the two groups before and after nursing

There was no obvious difference in scores of SAS and SDS in both groups before nursing ($P > 0.05$). After nursing, the scores of SAS and SDS in both groups were obviously lower than those before nursing ($P < 0.05$). After nursing, the scores of SAS and SDS in the RG were obviously lower than those in the CG ($P < 0.05$) (**Figure 1**).

Comparison of GSES scores between the two groups before and after nursing

There was no obvious difference in GSES scores in both groups before nursing ($P > 0.05$). After nursing, GSES scores of patients in both groups were significantly higher than those before nursing ($P < 0.05$). After nursing, the GSES scores in the RG were obviously higher than those in the CG ($P < 0.05$) (**Figure 2**).

Comparison of SF-36 scores between the two groups after nursing

After nursing, the SF-36 scores (overall health, social function, physical function, emotional function, physiological role, physical pain, mental health and vitality) in the RG were significantly higher than those in the CG ($P < 0.05$) (**Table 5**).

Comparison of incidence of secondary infection between the two groups after nursing

After nursing, the total incidence of secondary infection was 6.12% in the RG and 25.88% in

Table 4. Comparison of treatment compliance between the two groups after nursing [n (%)]

Grouping	Number of cases	Very compliance	Compliance	Non compliance	Compliance rate (%)
RG	98	75 (76.53)	22 (22.45)	3 (3.06)	95 (96.94)
CG	85	29 (34.12)	38 (44.71)	18 (21.18)	67 (78.82)
X ²	-	-	-	-	14.701
P	-	-	-	-	< 0.001

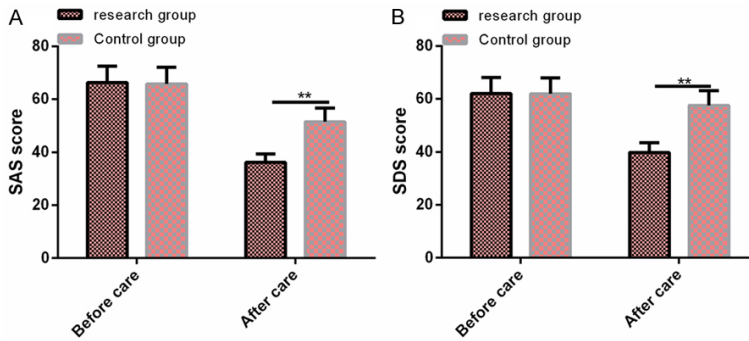


Figure 1. Comparison of psychological emotion between the two groups before and after nursing. A: There was no significant difference in SAS between the two groups before nursing. After nursing, the SAS scores in the RG were significantly lower than those in the CG. B: There was no significant difference in SDS between the two groups before nursing. After nursing, the SDS scores in the RG were significantly lower than those in the CG. Note: Compared with before treatment, * < 0.05; Compared with the two groups after treatment, ** < 0.01.

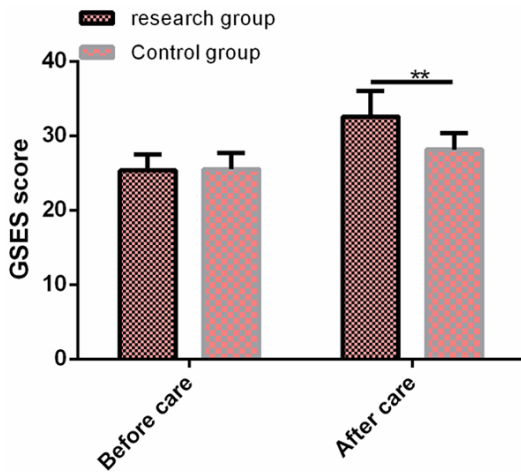


Figure 2. Comparison of GSES scores between the two groups before and after nursing. There was no significant difference in GSES between the two groups before nursing. After nursing, the GSES scores in the RG were significantly higher than those in the CG. Note: Compared with before treatment, * < 0.05; Compared with the two groups after treatment, ** < 0.01.

the CG, and the results revealed that the total incidence of secondary infection in the RG was

obviously lower than that in the CG (P < 0.05) (Table 6).

Comparison of nursing satisfaction between the two groups after nursing

The scores of nursing satisfaction (nursing quality, nursing effect, nursing procedure and nursing service) in the RG were significantly higher than that in the CG (P < 0.05) (Table 7).

Discussion

LC is a common malignant tumor of the respiratory system that is seen in the clinic.

Because of its nonspecific clinical manifestations, most patients are in the middle and late stages at the time of diagnosis [23]. The clinical symptoms of these patients are often accompanied by chest pain, low fever, cough and other symptoms, and the mortality rate is high [24]. Surgical treatment, radioactive therapy, chemotherapy and other interventions are often used in clinic [25]. Although chemotherapy can alleviate the clinical symptoms of patients to a certain extent, the side effects of chemotherapy are relatively serious [26]. Due to the disease progression, most patients will have tremendous psychological pressure, thus affecting the prognosis of patients [27]. Therefore, it is particularly important to provide effective nursing services in clinic during chemotherapy and improve the prognosis and recovery of patients.

In this study, evidence-based nursing was used to intervene in treatment compliance, self-efficacy improvement, adverse reaction of chemotherapy and life quality of patients with LC undergoing chemotherapy. It was found that the patients' health was significantly improved

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Table 5. Comparison of SF-36 scores between the two groups after nursing (mean \pm SD)

Grouping	Number of cases	Overall health	Social function	Physical function	Emotional function	Physiological role	Physical pain	Mental health	Vitality score
RG	98	89.41 \pm 8.15	84.24 \pm 8.06	88.46 \pm 8.14	82.46 \pm 8.15	84.19 \pm 8.13	85.46 \pm 8.25	90.34 \pm 9.01	91.58 \pm 9.05
CG	85	74.19 \pm 7.29	66.11 \pm 6.41	71.57 \pm 7.22	73.14 \pm 7.17	62.78 \pm 6.28	77.51 \pm 7.31	66.49 \pm 6.73	72.49 \pm 7.34
t	-	13.230	16.660	14.750	8.155	19.710	6.852	20.030	15.520
P	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Table 6. Comparison of incidence of secondary infection between the two groups after nursing [n (%)]

Categories	RG (n=98)	CG (n=85)	χ^2 value	P value
Upper respiratory tract infection	3 (3.06)	8 (9.41)	3.249	0.071
Lower respiratory tract infection	2 (2.04)	5 (5.88)	1.826	0.176
Gastrointestinal infection	0 (0.00)	3 (3.53)	3.516	0.060
Urinary system infection	1 (1.02)	6 (7.06)	4.512	0.033
Overall incidence	6 (6.12)	22 (25.88)	13.711	0.001

after nursing intervention. For example, research has revealed that nursing intervention can effectively ameliorate the dyspnea for LC patients with dyspnea, thus improving the blood gas exchange in the lungs and arteries [28]. The findings of this research showed that the improvement of FEV₁, FVC and FEV₁/FVC levels in the RG after nursing was significantly better than that in the CG, which indicated that the intervention of evidence-based nursing could promote the curative treatment effect more effectively, thus improving the pulmonary function of patients. Studies have shown that cancer patients often suffer from uncontrolled pain, which has a negative impact on patients' life and treatment, and leads to negative physical and mental conditions. Due to the lack of conventional nursing intervention methods, the prognosis of patients is aggravated [29]. However, this study revealed that the VAS scores in the RG after evidence-based nursing intervention were significantly lower than those in the CG. This is because evidence-based nursing is designed to use visual and auditory dispersion during chemotherapy to help patients relieve chemotherapy pain. This is similar to studies by XX. Effective nursing intervention can reduce pain and anxiety for patients receiving chemotherapy in chemotherapy center [30]. Studies have shown that most patients receiving chemotherapy are affected to different degrees in terms of treatment compliance due to various adverse conditions or the emergence of adverse emotions [31]. For example, research by xx have shown that the different

intervention strategies will affect the dialysis compliance of dialysis patients with end-stage renal disease, and the nursing intervention can effectively improve their dialysis compliance [32]. This is similar to the findings of this research, which shows that

effective nursing guidance can ameliorate patients' treatment compliance. The findings of this research revealed that the treatment compliance of patients in the RG after nursing was obviously higher than that in the CG. This is also because evidence-based nursing is designed to provide professional help to patients in various aspects through health guidance, thus improving patients' confidence in chemotherapy treatment and treatment compliance.

Patients suffering from LC must receive surgery, radiotherapy and chemotherapy, targeted therapy or other treatments, which may lead to deformity, physical dysfunction and a series of side effects, resulting in a series of psychological barriers such as anxiety and depression [33]. The findings of this study revealed that the scores of SAS and SDS in the RG were significantly lower than those in the CG after nursing, which was similar to the study by xx. The study showed that the psychological nursing intervention could effectively reduce the symptoms of anxiety and depression for cancer patients undergoing chemotherapy, thus improving their sleep quality [34]. This is also because evidence-based nursing has targeted psychological intervention for each patient in this study, thus eliminating their negative emotions, helping patients face treatment with positive attitude and improving recovery. Studies have revealed that the self-efficacy of most patients is generally low during chemotherapy, and patients with low self-efficacy will also have a negative regulatory effect on cognitive behav-

Table 7. Comparison of nursing satisfaction between the two groups after nursing (mean \pm SD)

Grouping	n	Service timeliness	Management normalization	Service attitude	Hospitalization environment	Comprehensive quality of nursing staff
RG	98	25.81 \pm 2.19	24.51 \pm 2.41	13.98 \pm 1.16	14.64 \pm 1.05	11.08 \pm 1.02
CG	85	20.25 \pm 2.08	19.25 \pm 2.07	10.14 \pm 1.03	11.27 \pm 1.01	7.56 \pm 0.57
t	-	17.530	15.710	23.520	22.040	28.220
P	-	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

ior [35]. Effective nursing intervention can significantly ameliorate the self-efficacy of patients [36]. This is similar to the results of this study: the GSES scores of patients in the RG were obviously higher than those in the CG after nursing, suggesting that evidence-based nursing could effectively improve self-efficacy, so that patients could cooperate with nursing intervention and accelerate the recovery of disease. Studies have shown that most patients with LC develop various adverse reactions, depression and other symptoms, which can also have a certain impact on the quality of life of patients. Therefore, effective nursing intervention can effectively ameliorate the quality of life and unhealthy emotions of patients with LC after diagnosis [37]. This is similar to the results of this study: the total incidence of secondary infection in the RG was obviously lower than that in the CG, indicating that evidence-based nursing intervention could effectively reduce the secondary infection rate of patients with LC caused by radiotherapy. The SF-36 score of quality of life in the RG was obviously higher than that in the CG after nursing, indicating that evidence-based nursing could effectively raise the curative effect, thus improving their quality of life of patients. We further compared the satisfaction of patients in the two groups after nursing, and the results revealed that the satisfaction of patients in the RG after nursing was obviously higher than that in the CG, suggesting that evidence-based nursing could help patients and it was highly recognized by patients, so this also provided a powerful reference for subsequent clinical application.

Although this study has revealed that evidence-based nursing intervention can bring better benefits to patients with LC undergoing radiotherapy and chemotherapy, there is still room for improvement in this study. For example, we can analyze the risk factors affecting the poor prognosis of patients undergoing radiotherapy and chemotherapy, which will help nurses to

identify which risk factors need additional attention. In the future, we will gradually carry out supplementary research from the above perspectives.

To sum up, evidence-based nursing intervention can improve treatment compliance, lung function, self-efficacy and quality of life for patients with LC undergoing radiotherapy and chemotherapy.

Disclosure of conflict of interest

None.

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