

Article

Effect of individualized mental nursing intervention on anxiety, depression symptoms and treatment compliance for patients with malignant lung tumor

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Abstract: Aim: To evaluate the effect of individualized mental nursing intervention on anxiety, depression, treatment compliance and functional status of patients with malignant lung tumor. **Methods:** A total of 106 patients with malignant lung tumor who were diagnosed and treated in our hospital from January 2022 to June 2024 were selected and randomly divided into observation group and control group according to the random number table, with 53 cases in each group. The observation group received individualized mental nursing intervention on the basis of routine treatment, while the control group only received routine treatment. Self-rating anxiety scale (SAS), self-rating depression scale (SDS), treatment compliance scale [8-item Morisky medication adherence scale (MMAS-8)], serum cortisol and C-reactive protein (CRP) levels, and Karnofsky performance status score (KPS) were assessed at 4, 8, and 12 weeks after treatment. **Results:** The SAS and SDS scores of the observation group at 4, 8 and 12 weeks were significantly lower than those of the control group ($p < 0.05$). The MMAS-8 score in the observation group was also significantly higher than that in the control group, particularly at week 12, the scores in the observation group and the control group were (7.86 ± 0.91) points and (6.78 ± 0.89) points ($p < 0.05$). Serum cortisol and CRP levels were significantly reduced in the observation group, particularly at week 12, serum cortisol and CRP levels in the observation group were (298.45 ± 24.56) nmol/L and (8.98 ± 1.65) mg/L, lower than those in the control group ($p < 0.05$). The KPS score of the observation group was significantly higher than that of the control group, particularly at week 12, the KPS score of the observation group was (89.78 ± 5.03) points, and that of the control group was (79.45 ± 5.64) points ($p < 0.05$). Cox regression analysis showed that the time required for improvement of treatment compliance in the observation group was significantly shorter than that in the control group ($HR = 0.48$, $p < 0.001$). **Conclusion:** Individualized mental nursing intervention can effectively improve anxiety and depression symptoms, treatment compliance, reduce serum cortisol and CRP levels of patients with malignant lung tumor and significantly improve the functional status of patients. This indicates that the application of individualized mental nursing intervention has important clinical value in tumor treatment.

Keywords: anxiety; depression; individualized mental nursing; malignant lung tumor; treatment compliance

1. Introduction

Malignant lung tumor (Lung cancer), as a high-incidence and fatal disease, has brought great physiological, psychological and social pressure to patients [1]. According to the statistics of the World Health Organization, lung cancer is one of the

most common cancers in the world and one of the leading causes of cancer-related deaths [2]. In recent years, with the development of medical technology, the early screening and treatment of lung cancer have been continuously improved, but there is still the challenge of high mortality rate. In this case, apart from the traditional treatments such as surgery, chemotherapy, and radiotherapy, the mental health of patients and treatment compliance have gradually become an important factor affecting the therapeutic effect [3]. As a comprehensive nursing measure, mental nursing intervention has achieved significant effects in the treatment of many diseases. Particularly, in the care of cancer patients, it plays a positive role in alleviating anxiety and depression symptoms, improving psychological state and treatment compliance [4]. The diagnosis and treatment of lung cancer are often accompanied by a high risk of death, resulting in patients experiencing strong psychological stress response, manifested as persistent anxiety, depression and fear [5]. Anxiety and depression not only affect patients' emotions and quality of life, but may also have a negative impact on the enthusiasm for treatment, resulting in decreased compliance of patients during the treatment process, and affecting the treatment effect and prognosis [6]. Therefore, alleviating the anxiety and depression symptoms of patients and improving their treatment compliance have become an important task in the current lung cancer care [7]. This study aimed to explore whether individualized mental nursing intervention could help patients to establish a positive treatment attitude by providing psychological support and counseling the negative emotions, so as to improve their compliance and optimize the treatment effect.

2. Materials and methods

2.1. General data

A total of 106 patients diagnosed with malignant lung tumor and receiving treatment in our hospital from January, 2022 to June, 2024 were selected and randomly divided into observation group and control group according to the random number table, with 53 cases in each group. All patients signed an informed consent form and the study was approved by the hospital ethics committee. 1) Inclusion criteria: Aged between 30–75 years old; Malignant lung tumors [including non-small cell lung cancer (NSCLC) and small cell lung cancer (SCLC)] confirmed pathologically, with TNM staging in stages I-III; Karnofsky performance status score (KPS) ≥ 70 points; Initial diagnosis and standardized treatment; Mild to moderate anxiety or depression [Self-rating anxiety scale (SAS) > 50 points, self-rating depression scale (SDS) > 53 points]; Medium or poor treatment compliance [8-item Morisky medication adherence scale (MMAS-8) < 80 points]. 2) Exclusion criteria: Combined with other severe chronic diseases (such as heart failure and hepatic and renal insufficiency) (6 cases); Patients with cognitive dysfunction or mental history (3 cases); Patients who had received psychological intervention in the past 6 months (4 cases); Patients with other malignant tumors (2 cases); Incomplete data or withdrawal from the study (4 cases). Eventually, 53 patients were included in the observation group and 53 patients were included in the control group. There was no significant difference in general data between the two groups ($p > 0.05$) (**Table 1**), indicating comparability.

Table 1. Comparison of general data of the two groups.

Factor	Observation group (n = 53)	Control group (n = 53)	χ^2/t	p
Gender (male/female)	31/22	30/23	0.006	0.937
Age (Years)	58.74 ± 9.81	59.13 ± 10.29	0.195	0.845
Pathological type	NSCLC: 41	NSCLC: 39	0.153	0.696
TNM stage	Stage I: 18, stage II: 20, stage III: 15	Stage I: 19, stage II: 21, stage III: 13	0.21	0.900
KPS score	82.53 ± 5.30	81.91 ± 6.10	0.561	0.576

Note: $p < 0.05$ indicated significant difference.

2.2. Methods

2.2.1. Treatment methods

Patients in the control group received routine treatment, including chemotherapy, basic care and psychological counseling. According to the pathological types and stages of patients, the combination chemotherapy scheme with platinum drugs was selected: Paclitaxel injection (Hengrui Pharma, specifications 30 mg/5 mL) and cisplatin injection (Qilu Pharmaceutical, specifications 20 mg/10 mL) were mainly used. Paclitaxel was administered at 175 mg/m² each time for 3 h intravenously on the first day; Cisplatin was administered intravenously at 75 mg/m² each time for 4–6 cycles, one cycle for every 21 days on the next day. The patients received basic care during chemotherapy, including nutritional support, infection prevention and symptom management. Psychological counseling was mainly carried out by specialist nurses through regular conversations, patient education and family support, once a week, 30 min each time. In the observation group, individualized mental nursing intervention was added on the basis of routine treatment in the control group. The psychological nursing team performed individualized mental evaluation on the patients and formulated the intervention plan. The nursing staff carried out psychological counseling twice a week, 40 min each time, covering emotional relief, stress management and establishment of positive treatment belief. The patient received a 30 min daily musical relaxation therapy using classical music with soothing effects and transcranial magnetic stimulation (Yiruide Medical, model CCY-I) for non-invasive stimulation of his cerebral cortex at 1 Hz for 20 min each time, three times a week for 4 weeks, aimed at improving anxiety and depressive symptoms. Under doctor's instruction, some patients received escitalopram tablets (Lexapro, specifications: 10 mg/tablet), 10 mg once daily for 6 weeks, for patients with moderate or above anxiety or depression.

2.2.2. Symptom assessment of anxiety and depression

The SAS and SDS were used to assess the anxiety and depression levels of patients. Assessments were conducted at enrollment and 4, 8, and 12 weeks after treatment. The patient was instructed to complete SAS and SDS scales of 20 items per serving, each graded on a scale 1–4 (1 = none or few, 2 = sometimes, 3 = often, 4 = always) in a quiet environment by a skilled psychological care provider. The standard score was obtained after the total SAS score was multiplied by 1.25. The standard scores were 50–59 for mild anxiety, 60–69 for moderate anxiety and ≥ 70 for severe anxiety. The standard score was obtained after the total SDS score was

multiplied by 1.25. The standard scores were 53–62 for mild depression, 63–72 for moderate depression and ≥ 73 for severe depression.

2.2.3. Treatment compliance assessment

Patients' treatment compliance was assessed using the MMAS-8. Assessments were conducted at enrollment and 4, 8, and 12 weeks after treatment. The nursing staff recorded the patients' answers in the form of questionnaires. Each question was scored according to the choice of "Yes" or "No", and the full score was 8 points. A higher score indicated better compliance. The total score ≥ 6 was high compliance, 3–5 was medium compliance, and ≤ 2 was low compliance.

2.2.4. Serum cortisol and C-reactive protein (CRP)

Serum cortisol and CRP level were measured at enrollment and 4, 8, and 12 weeks after treatment. In the morning, 5 mL of venous blood was collected when the patient was fasting. Serum was separated and detected using Roche Cobas e601 chemiluminescence analyzer. The reference range of serum cortisol was 6.2–19.4 $\mu\text{g/dL}$ and the normal CRP level was $< 8 \text{ mg/L}$. Abnormal range: serum cortisol $> 20 \mu\text{g/dL}$ indicated increased stress level, and CRP $> 10 \text{ mg/L}$ indicated significant inflammatory reaction.

2.2.5. KPS

KPS was measured at enrollment and 4, 8, and 12 weeks after treatment. Two independent investigators assessed the patient's daily activity according to the scoring criteria: 100 points mean completely normal and asymptomatic; 80–90 points mean mild functional limitation; 60–70 points for need of occasional assistance; < 60 points mean severe functional limitation.

2.3. Statistical methods

SPSS 26.0 was used for statistical analysis. Measurement data were expressed as mean $\pm$ standard deviation (Mean $\pm$ SD), and inter-group comparison was performed using independent sample t test, chi-square test (χ^2 test), and analysis of variance (ANOVA). Cox proportional hazard regression model was used for analysis. The time to achieve treatment compliance was taken as the dependent variable, and multiple potential influencing factors (demographic characteristics, physiological indicators, and psychological state) were taken as the independent variable to analyze the independent impact on treatment compliance. Dependent variable: Time to achieve treatment compliance (weeks of follow-up). Status variable: Whether treatment compliance was achieved (Yes = 1, No = 0). Independent variables: age (< 60 years = 0, ≥ 60 years = 1), gender (female = 0, male = 1), group (control group = 0, observation group = 1), baseline anxiety score (continuous variable), and baseline CRP level (continuous variable, mg/L). All statistical tests showed that $p < 0.05$ was the significant difference.

3. Results

3.1. Anxiety and depression symptoms

After treatment, the scores of SAS and SDS in the observation group and the control group at different time points were changed to different degrees. The SAS and SDS scores of the observation group in the 4, 8 and 12 weeks after treatment were sig-

nificantly lower than those of the baseline and the scores at the same time point were significantly lower than those of the control group ($p < 0.05$) (Table 2, Figure 1).

Table 2. Comparison of SAS and SDS scores of the two groups ($\bar{x} \pm s$, points).

Time point	Group	SAS	<i>t</i>	<i>p</i>	SDS	<i>t</i>	<i>p</i>
Baseline	Control	64.23 ± 4.15	0.321	0.749	65.12 ± 4.45	0.192	0.847
	Observation	63.97 ± 4.18			64.95 ± 4.62		
4 weeks after treatment	Control	58.32 ± 3.97	6.797	<0.001	59.45 ± 4.02	6.593	<0.001
	Observation	53.15 ± 3.86			54.23 ± 4.13		
8 weeks after treatment	Control	54.88 ± 4.02	8.751	<0.001	56.23 ± 4.25	8.202	<0.001
	Observation	48.23 ± 3.78			49.65 ± 4.01		
12 weeks after treatment	Control	52.76 ± 3.95	10.323	<0.001	54.32 ± 4.12	9.897	<0.001
	Observation	45.12 ± 3.67			46.54 ± 3.98		

Note: $p < 0.05$ indicated significant difference.

SAS and SDS Score Trends Over Time for Control and Observation Groups

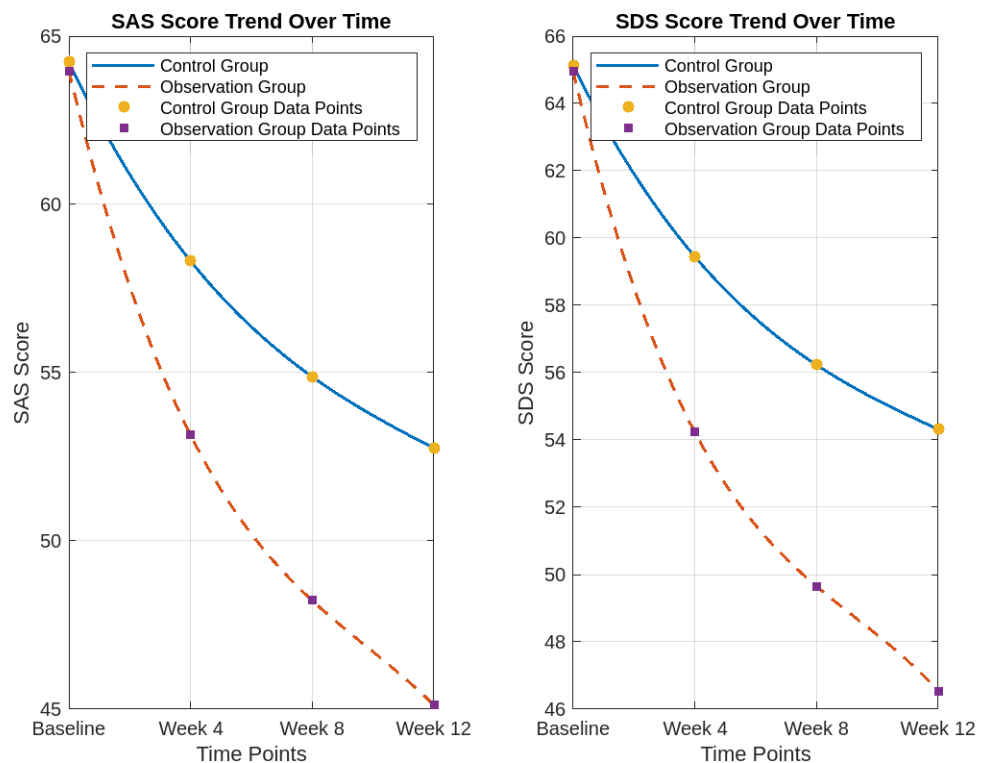


Figure 1. Changes of anxiety and depression symptom assessment results in two groups.

3.2. Assessment of treatment compliance

The MMAS-8 scores of patients in the observation groups and the control group were gradually improved over time, but the improvement in the observation group was significantly greater than that in the control group ($p < 0.05$). The MMAS-8 scores of the observation group at each time point after treatment was significantly higher than that of the control group ($p < 0.05$). Particularly at week 12, the MMAS-8 score of the observation group was (7.86 ± 0.91) points, which was higher than (6.78 ± 0.89) points of the control group (Table 3, Figure 2).

Table 3. Comparison of MMAS-8 scores of the two groups ($\bar{x} \pm s$, points).

Time point	Group	MMAS-8 score	<i>t</i>	<i>p</i>
Baseline	Control	5.12 ± 0.87	0.241	0.81
	Observation	5.08 ± 0.84		
4 weeks after treatment	Control	5.98 ± 0.92	−3.184	0.002
	Observation	6.54 ± 0.89		
8 weeks after treatment	Control	6.45 ± 0.95	−4.385	<0.001
	Observation	7.23 ± 0.88		
12 weeks after treatment	Control	6.78 ± 0.89	–	<0.001
	Observation	7.86 ± 0.91		

Note: *p* < 0.05 indicated significant difference.

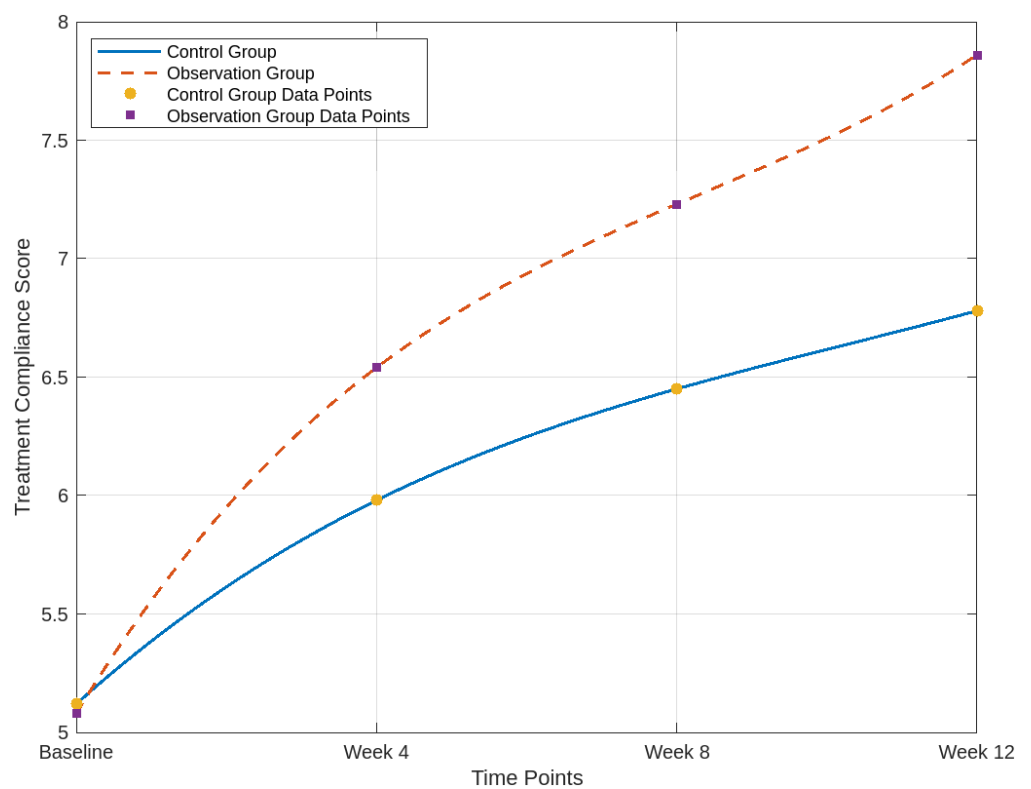


Figure 2. Changes in treatment compliance scores of patients in the two groups.

3.3. Detection of serum cortisol and CRP

Serum cortisol and CRP levels of patients in the two groups at different time points after treatment were changed ($p < 0.05$). Serum cortisol and CRP levels in the observation group at the 4, 8, and 12 weeks of treatment were significantly lower than those at baseline and significantly lower than those in the control group at the same time points ($p < 0.05$) (Table 4).

3.4. KPS score

The KPS score of patients in the observation group gradually increased during the treatment period, and was significantly higher than that of the control group in the 4, 8, and 12 weeks of treatment ($p < 0.05$). Specifically, at week 12, the KPS score of the observation group was (89.78 ± 5.03) points, as compared with (79.45 ± 5.64) points in the control group, showing a significant difference ($p < 0.05$) (Table 5).

Table 4. Comparison of serum cortisol and CRP levels of the two groups ($\bar{x} \pm s$).

Time point	Group	Serum cortisol (nmol/L)	CRP (mg/L)
Baseline	Control	456.23 $\pm$ 30.45	18.45 $\pm$ 2.12
	Observation	457.12 $\pm$ 29.98	18.32 $\pm$ 2.08
4 weeks after treatment	Control	412.87 $\pm$ 28.76	15.43 $\pm$ 1.97
	Observation	375.45 $\pm$ 26.34	12.78 $\pm$ 1.88
8 weeks after treatment	Control	386.23 $\pm$ 27.89	13.89 $\pm$ 1.85
	Observation	332.12 $\pm$ 25.45	10.23 $\pm$ 1.72
12 weeks after treatment	Control	364.76 $\pm$ 26.43	12.34 $\pm$ 1.78
	Observation	298.45 $\pm$ 24.56	8.98 $\pm$ 1.65
<i>f</i>		45.340	181.32
<i>p</i>		<0.001	<0.001

Note: $p < 0.05$ indicated significant difference.

Table 5. Comparison of KPS scores of the two groups ($\bar{x} \pm s$, points).

Time point	Group	KPS score	<i>t</i>	<i>p</i>
Baseline	Control	65.32 $\pm$ 6.12	−0.203	0.841
	Observation	65.56 $\pm$ 6.08		
4 weeks after treatment	Control	72.43 $\pm$ 5.98	−5.666	< 0.001
	Observation	78.67 $\pm$ 5.34		
8 weeks after treatment	Control	76.12 $\pm$ 5.87	−7.664	< 0.001
	Observation	84.32 $\pm$ 5.12		
12 weeks after treatment	Control	79.45 $\pm$ 5.64	−9.951	< 0.001
	Observation	89.78 $\pm$ 5.03		

Note: $p < 0.05$ indicated significant difference.

3.5. Cox proportional hazards regression analysis

Patients ≥ 60 years of age took longer to achieve improvement in treatment compliance ($HR = 1.59$, $p = 0.015$). The time required for patients in the observation group to achieve improvement in treatment compliance was significantly shorter than that in the control group ($HR = 0.48$, $p < 0.001$). A higher anxiety score indicated a longer time for patients to achieve improvement in treatment compliance ($HR = 1.04$, $p = 0.004$). The higher the CRP level, the longer it would take for patients to achieve improvement in treatment compliance ($HR = 1.12$, $p = 0.012$) (Table 6).

4. Discussion

In this study, we found that in the observation group, the SAS score and SDS score were significantly improved in the 4, 8, and 12 weeks after treatment, and were

Table 6. Cox proportion risk regression analysis results.

Independent variable	β	<i>SE</i>	<i>HR</i>	95% <i>CI</i>	<i>p</i>
Age (≥ 60 years)	0.462	0.19	1.59	1.09–2.32	0.015
Group (observation group)	−0.729	0.202	0.48	0.33–0.70	<0.001
Baseline anxiety score	0.037	0.013	1.04	1.01–1.06	0.004
Baseline CRP level	0.115	0.045	1.12	1.03–1.22	0.012

Note: $p < 0.05$ indicated significant difference.

significantly lower than those in the control group. This result is consistent with many previous studies. For example, studies have found that psychological intervention can significantly reduce anxiety and depression symptoms of cancer patients and improve the quality of life [8]. Other studies have also shown that through psychological intervention, the psychological burden of patients is effectively reduced, especially during the chemotherapy period, the anxiety and depression symptoms of patients are significantly improved [9,10]. Individualized mental nursing intervention helps patients to relieve emotional pressure and improve psychological coping ability through emotional counseling, stress management and the establishment of positive belief in treatment [11]. Non-drug interventions such as musical relaxation therapy and transcranial magnetic stimulation also had a positive effect on the cerebral cortex, improving the patient's emotional state. Individualized mental nursing pays more attention to patients' individual differences and emotional needs, thus making the intervention more significant, in line with the theoretical basis of personalized and accurate psychological care [12,13]. In terms of treatment compliance, it was found in the present study that the compliance scores of the observation group at each time point after treatment were significantly higher than those of the control group, especially at week 12. This result was consistent with previous studies, and indicated that individualized mental nursing had a positive promoting effect on patients' compliance. Mental intervention can effectively improve treatment compliance by enhancing patients' treatment belief and self-efficacy, especially in patients with chronic diseases or cancer requiring long-term treatment [14]. In this study, individualized mental intervention helped patients overcome anxiety and depression during the treatment process, and improved their treatment motivation and treatment compliance. According to the self-determination theory, the individual's intrinsic motivation is affected by autonomy, competence and relevance. In the present study, individualized mental nursing was adopted to provide emotional support, enhance the patients' understanding and positive attitude towards the treatment process, thereby enhancing the patients' intrinsic motivation and enhancing their treatment compliance [15,16].

Serum cortisol and CRP are important biomarkers for measuring stress level and inflammatory response in the body. The results showed that the cortisol and CRP levels of patients in the observation group were significantly lower than those in the control group, indicating that individualized mental nursing intervention not only improved the psychological state of patients, but also had a positive physiological effect [17]. This result is consistent with previous studies. For example, some scholars pointed out that psychological intervention can reduce the serum cortisol level of patients by reducing psychological stress response, thus exerting a favorable effect on the immune system [18]. The decrease of CRP level may also reflect the alleviation effect of individualized mental nursing intervention on inflammatory response in patients [19], which is particularly important for cancer patients, because inflammation is closely related to the occurrence and development of tumors. From the mechanism, psychological intervention can improve the psychological state of patients by reducing their psychological pressure, so as to regulate the endocrine system and reduce the secretion of stress hormones (such as cortisol), and thus affect the immune

response and inflammatory response. The regulatory effect of mental nursing on the immune system has been confirmed in many studies [20]. In this study, *Cox* proportional risk regression analysis showed that the time required for patients in the observation group to achieve improvement in treatment compliance was significantly shorter than that in the control group, and the anxiety score and CRP level were the independent factors affecting treatment compliance. This finding is consistent with previous studies, and indicates that the psychological state of patients (especially anxiety and depression symptoms) and inflammatory response have a significant impact on treatment compliance [21]. The alleviation of anxiety and depression as well as the alleviation of inflammatory reaction provide patients with stronger treatment motivation and better physiological state, and promote the improvement of treatment compliance [22].

In summary, this study verified the significant effect of individualized mental nursing intervention on anxiety, depression and treatment compliance of patients with lung cancer, which provided a strong support for clinical care of patients with malignant lung tumor. Compared with the traditional routine care, individualized mental nursing is more effective and promotional in that it can intervene in accordance with the specific conditions of patients.

Author contributions: Conceptualization, BZ and FY; methodology, FY; software, BZ; validation, BZ and FY; formal analysis, BZ; investigation, FY; resources, BZ; data curation, FY; writing—original draft preparation, BZ; writing—review and editing, FY; visualization, BZ; supervision, FY; project administration, FY. All authors have read and agreed to the published version of the manuscript.

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Conflict of interest: The authors declare no conflict of interest.

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