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Retrospective Study

Effect of nursing on postoperative respiratory function and mental health of lung cancer patients

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Abstract

BACKGROUND

Both pulmonary rehabilitation training and psychological care have been shown to have a positive effect on the postoperative recovery of patients with lung cancer. However, few studies have combined the two to explore their combined effect. Therefore, this study aimed to investigate the effects of pulmonary rehabilitation training combined with psychological care on postoperative respiratory function and mental health in lung cancer patients.

AIM

To investigate effect of nursing on postoperative respiratory function and mental health of lung cancer patients.

METHODS

122 cases of lung cancer patients who underwent surgical treatment in our hospital and were treated in our department from January 2022 to April 2023 were selected and randomly divided into the control group and observation group. The control group performed the routine care intervention. The observation group was given pulmonary rehabilitation training and psychological care based on conventional nursing interventions. Forced expiratory volume, forced vital capacity. Maximum ventilatory volume (MVV) in one second was measured,

and the patient's 6-min walking distance and dyspnoea index scale were used to assess the patient's respiratory condition. The Connor-Davidson resilience scale (CD-RISC), self-rating anxiety scale (SAS), and self-rating depression scale (SDS) were used to evaluate the mental health of the patients.

RESULTS

There was no difference between the two groups regarding age, gender, education level, surgical procedure, type of pathology, and treatment ($P > 0.05$). After treatment, MVV, 6-min walking distance, toughness, strength, optimism, and total CD-RISC scores were significantly higher in the observation group ($P < 0.05$), dyspnoea scores, SAS, and SDS scores were substantially lower in the control group compared to the observation group ($P < 0.05$).

CONCLUSION

Pulmonary rehabilitation training combined with psychological care for patients after lung cancer resection could improve lung function, enhance daily activities, effectively relieve negative emotions such as anxiety and depression, and reduce complications.

Key Words: Pulmonary rehabilitation training; Psychological care; Lung cancer; Postoperative care; Respiratory function

Core Tip: Lung cancer is the malignant tumor with the highest case fatality rate worldwide. Explore the effects of pulmonary rehabilitation training combined with psychological care on postoperative respiratory function and psychological health of lung cancer patients. Pulmonary rehabilitation training combined with psychological nursing for patients after lung cancer resection can improve lung function, improve daily activities, effectively relieve anxiety, depression, and other negative emotions, and reduce the occurrence of complications.

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INTRODUCTION

Lung cancer is a malignant tumor originating mainly from lung organs, bronchial mucosa, or glands, and is the most common primary cancer of the lungs[1,2]. The cause of lung cancer was not yet clear, but the main causative factors were smoking, diet, heredity, occupational exposure, *etc*[3]. The main symptoms were cough, sputum, and blood, fever, and dyspnoea. To date, lung cancer is still the malignant tumor with the highest mortality rate worldwide, and its incidence rate is also at a high level[4-5]. Currently, lung cancer is mainly treated with comprehensive therapy based on surgical resection and postoperative radiotherapy[6], and new treatments such as traditional Chinese medicine and targeted therapy have also developed rapidly in recent years[7]. Still, the 5-year survival rate of patients has not been significantly improved. Neoadjuvant chemotherapy was often an adjuvant therapy after surgical resection of lung cancer[8], which could reduce disease recurrence and distant metastasis and improve patients' prognosis[9]. However, chemotherapy could damage patients' healthy lung tissues[10]. In addition, as part of the lung tissues had been removed by surgery, the lungs might be squeezed, and the chest muscles might be damaged during the operation, which might easily lead to decreased respiratory and lung functions, dyspnoea, atelectasis, or even respiratory failure after the operation, and ultimately lead to death.

Some studies have been conducted to use this method in nursing interventions for lung cancer chemotherapy patients. Still, most of them mainly observe the patients' quality of life, and fewer of them study its improvement of lung function [11,12]. Pulmonary rehabilitation training could improve patients' lung function through interventions such as respiratory function training and exercise instruction[13-15]. Some studies have shown that by communicating with patients, improving their cognition, and grasping their psychological changes, negative emotions such as anxiety and depression could be effectively alleviated[16,17]. In this study, we implemented pulmonary rehabilitation training combined with psychological care for postoperative lung cancer patients and evaluated respiratory function and psychological health before and after training.

MATERIALS AND METHODS

General information

One hundred and twenty-two patients with lung cancer who underwent surgical treatment in our hospital from January

2022 to April 2023 and were treated in our department were selected. The inclusion criteria were: Age ≥ 18 and < 65 years old, patients with postoperative pathological confirmation of lung cancer, no history of neurological, muscular, or joint diseases and other malignant tumors affecting movement, clear consciousness, everyday thinking, ability to hear, read, and write in Chinese, and patients signing an informed consent form.

Exclusion criteria: patients with preoperative complications such as lung infection and respiratory failure and those with cardiac, cerebrovascular, or other severe complications after surgery. Patients with combined serious organic lesions or insufficiency of other organs such as heart, brain, and kidney. Patients with an exercise participation rate of less than 80% were excluded.

Methods

Postoperative rehabilitation nursing: The control group includes health education, environmental care, observation of patients' condition changes, complications prevention, and treatment of adverse reactions during chemotherapy. After the patients are admitted to the hospital, let the patients know about the knowledge about the disease and increase the patient's understanding of their disease. Answer patients' concerns and prevent patients from infection appropriately. Give patients appropriate dietary care and instruct them to have a reasonable diet and balanced nutrition[18].

Based on the control group, the observation group was given pulmonary rehabilitation training (rehabilitation mode and intensity suitable for the patients themselves) and psychological care.

Pulmonary rehabilitation: Lung rehabilitation training is every four weeks as a rehabilitation cycle, with three consecutive cycles[14,19,20]. (1) Breathing training, including abdominal and lip-contraction breathing training. Abdominal respiratory training: the patient takes a suitable position, keeps quiet, and relaxes the whole body, inhales slowly through the nasal cavity to the maximum lung capacity, holds the breath, exhales slowly through the mouth, and then rests for 3-5 min, repeat the above training, 30-60 min per day. Contracted lip respiratory training: The patient takes a suitable position, keeps quiet and relaxes the whole body, inhales slowly through the nasal cavity to the maximum lung capacity, and then exhales slowly through the mouth; the ratio of Inhalation: exhalation time was 1:2. Inhalation: exhalation time ratio of 1:2, rest 3-5 min after repeating the above training, daily training 30-60 min; (2) Coughing sputum training: the patient's sitting position, abdominal breathing, deep Inhalation, rapid exhalation, feeling phlegm forceful coughing action; if the patient cannot cough up phlegm, the rehabilitation division could use the palm to quickly knock on the back, to promote the discharge of phlegm; and (3) Walking training: the patient first performs stretching activities for 5 min, then walks at a slow speed on the electric flatbed machine, and then gradually accelerates to the speed that the patient could be suitable for themself within 5 min, and then walks at a suitable speed, and the time for each walking training was 20-40 min, according to the patient's self-tolerance, and the training was done three times a day; or you could also choose to perform the walking training on the flat road, and the requirement was that the patient strolls for 5 min, and then gradually accelerates the speed of the walking. The patient could also walk on the level road, first stroll for 5 min, then gradually accelerate, and maintain the faster walking speed for 20-40 min under a tolerable situation.

Psychological care: The observation group implemented positive psychological intervention based on the control group. Positive psychological intervention methods[12,21-23]: (1) Establishment of psychological foundation. After the patients were admitted to the hospital, specialized medical staff assisted them in understanding the hospital environment, answered the questions raised by the patients, assessed their psychological conditions, helped eliminate their inner sense of strangeness, and made the patients feel warm; (2) Cognitive improvement. Professional healthcare workers explain cancer-related knowledge to patients, such as the causes, incidence, clinical manifestations, and treatment of cancer, *etc.*, to guide patients to understand cancer correctly, and at the same time, adopt the form of cancer health lectures and interviews to help patients and their families to understand the basic situation of cancer; (3) Establish social and family support. Medical staff encouraged family members to give emotional support to patients so that they could feel love and warmth, gradually restore self-confidence and self-esteem, and maintain their social roles and functions; (4) Excretion of negative emotions. Healthcare workers record the patient's condition changes in detail, provide targeted psychological counseling, guide the patient to control their negative emotions and encourage them to take the initiative to talk about their distress and vent their unhappiness; and (5) Positive thinking intervention. Through positive thinking breathing training, help patients cultivate emotional feeling and body awareness, learn how to get along with life's problems, learn positive thinking about interpersonal relationships, and instruct patients to practice more.

Testing indexes: Respiratory function: the lung function instrument was used to monitor the respiratory function of the patients; the patients were instructed to take the sitting position, the patients' noses were clamped to ensure that they breathed through their mouths, and they made exhalation and inhalation movements by the instructions, and the indicators of vital capacity (VC), forced expiratory volume in the first second (FEV_1), forceful vital capacity (FVC) and maximal voluntary ventilation (MVV) were monitored before and After treatment of the two groups, and the ratio of FEV_1 /FVC% was calculated. Ratio.

Dyspnoea: The patients' 6-min walking distance was measured before and After treatment, and the dyspnoea index scale was also used to assess the patient's respiratory condition, which had a total score of 0-4, with higher scores indicating more severe dyspnoea[24].

Psychological resilience: The Connor-Davidson resilience scale (CD-RISC) was used to assess the psychological resilience of the two groups of patients before and after treatment[23], which was divided into three dimensions, including resilience, strength, and optimism, with a total of 25 entries, and a 5-level scoring method, with never, rarely, sometimes, often, and consistently scoring 0-4 points, and a total score range of 0-4 points. The total score ranges from 0 to 100, with higher scores indicating higher levels of psychological resilience.

Table 1 Comparison of basic information of patients in two groups

Group	Cases	Sex (male/female)	Age (yr old)	Surgical resection site (Cases)				Pathological type (Cases)		Treatment (Cases)	
				Upper lobe	Middle lobe	Lower lobe	Partial wedge resection	Squamous	Adenocarcinoma	Radiotherapy/chemotherapy	Radiotherapy/chemotherapy+targeted therapies
Control	61	30/31	56.37 ± 9.43	12	11	14	24	13	48	19	42
Observation	61	28/33	57.82 ± 10.27	11	13	14	23	11	50	17	44
t		0.258	2.529	0.852				0.367		0.511	
P value		0.456	0.537	0.683				0.576		0.492	

Anxiety and depression evaluation[25]: Self-rating anxiety scale (SAS) was used to assess the patient's anxiety before and after nursing care. The scale contains five positive questions and 15 negative questions, and the score was the sum of the scores on a scale of 1 to 44, with 50-59 for mild anxiety, 60-69 for moderate anxiety, and ≥ 70 for severe anxiety. The self-rating depression scale (SDS) was used to rate the depression of patients and their families. The scale contains ten items, each of positive and negative questions, using a scale of 1 to 44; the score was the sum of the scores, of which 53-62 points for mild depression, 63-72 points for moderate depression, and ≥ 73 points for severe depression.

Statistical methods

SPSS 22.0 statistical software was used for data processing. Measurement data were expressed as mean ± standard deviation (mean ± SD), and a *t*-test was performed for comparison between groups. The count data were expressed as a rate (%), and the comparison between groups was conducted by χ^2 test. The difference was considered statistically significant at $P > 0.05$.

RESULTS

Basic information

After surgery, the two groups of patients chose the most appropriate treatment methods according to the patient's condition, economic situation, and wishes, including radiotherapy, targeted therapy, and so on. In a comparison of the two groups of patients in terms of age, gender, education level, surgical methods, pathological types, treatment methods, *etc.*, the difference was not significant ($P > 0.05$). It was comparable, as shown in Table 1.

Comparison of respiratory function between the two groups of patients

Before treatment, the VC, FEV_1/FVC, and MVV levels of patients in the two groups were compared, and the differences were not statistically significant ($P > 0.05$). After treatment, the levels of VC, FEV_1/FVC, and MVV of patients in the control group and the observation group were increased compared with those Before treatment, and the MVV of the observation group was increased compared with that of the control group, and the differences were statistically

significant ($P < 0.05$), as shown in Table 2.

Comparison of the degree of dyspnoea between the two groups of patients

Before treatment, the 6-min walking distance and dyspnoea scale score of the two groups of patients were compared, and the differences were not statistically significant ($P > 0.05$). After treatment, the 6-min walking distance of patients in both groups increased, and the increase of patients in the observation group was more significant than that of the control group. The dyspnoea scores of patients in both groups decreased, and the patients in the observation group were lower than those in the control group. The differences were statistically significant ($P < 0.05$), as shown in Table 3.

Comparison of CD-RISC between the two groups before and after treatment

Before treatment, the comparison of toughness, strength, optimism, and total CD-RISC scores between the two groups was not statistically significant ($P > 0.05$). After treatment, the toughness, stability, and full CD-RISC scores of those in the control group and the toughness, strength, optimism, and total CD-RISC scores of the observation group improved significantly compared with the before-treatment period. The observation group's toughness, stability, optimism, and total CD-RISC scores were enhanced considerably compared to the control group. The differences were statistically significant ($P < 0.05$), as shown in Table 4.

Comparison of patient's anxiety and depression scores

Before treatment, the SAS and SDS scores of patients in the two groups were compared, and the differences were not statistically significant ($P > 0.05$). After treatment, the SAS and SDS scores of the patients in the control group and the observation group were significantly lower than those before treatment, and the SAS and SDS scores of the observation group were significantly lower than those of the control group, and the differences were statistically significant ($P < 0.05$), as shown in Table 5.

DISCUSSION

Globally, the incidence rate and mortality rate of lung cancer had been at a high level and were constantly rising, followed by radiotherapy and chemotherapy, *etc*[26]. However, it would cause damage to the patient's body, destroying internal organs and bronchial tubes, *etc.*, increasing inflammatory reaction of the body, affecting postoperative compliance, aggravating psychological and physiological pain, and leading to a decline in the quality of life[6,9].

After lung cancer resection, patients' lung volume and lung capacity were reduced, which was easy to cause hypoxemia. The body overflows with inflammatory factors, reducing lung surface-active substances and decreasing lung compliance. The lumen narrowed, which led to a decrease in the function of gas exchange and lung ventilation[27]. Pulmonary rehabilitation exercise improved the contraction function of abdominal muscles and diaphragm through abdominal breathing to increase the airway pressure and achieve the effect of correcting hypoxia[14,15]. Positive pressure at the end of respiration was generated through lip-contracted breathing, which reduces the functional residual air volume in the alveoli and helps the reexpansion of atrophied lung tissues. Effective cough and sputum expectoration training could reduce the deposition of secretions, keep the airway open, and reduce lung infection and pulmonary atelectasis[28]. Postoperative activities, such as out-of-bed and limb exercise, could promote lung expansion and blood circulation, which improves ventilation function and the body's adaptive ability[29]. The result of this study showed that After treatment, levels of VC, FEV1/FVC, and MVV in the control group patients and the observation group increased compared with those before the intervention, and MVV in the observation group increased compared with those in the control group, which indicated that pulmonary rehabilitation exercises combined with psychological care could effectively improve the lung function of patients. After treatment, the 6-min walking distance of both groups increased, and the increase in patients in the observation group was more significant than that of the control group. The dyspnoea score of both groups was reduced. The patients in the observation group were lower than those in the control group, which indicated that getting out of bed as early as possible could avoid the dyspnoea problem caused by prolonged lying in bed and resting.

Psychological care could help patients understand lung cancer and resection-related knowledge[21], introduce successful cases of surgery, and let family members participate in psychological counseling to make patients clear that taking the initiative to accept treatment was the key to recovery[30], establish self-confidence in treatment, and thus actively cooperate with postoperative rehabilitation training[31]. Psychological resilience refers to an individual's ability to handle and cope with adversity, which allows individuals to protect themselves[32]. Good psychological resilience enables patients to handle adversity optimistically when encountering hardship or bad luck. The improvement of psychological resilience determines the improvement of the psychological quality of cancer patients to cope with adverse events, and they were able to face their cancer condition calmly and rationally, and their bad moods could be improved. In this study, After treatment, the resilience, strength, and CD-RISC total scores of the control group and the resilience, strength, optimism, and CD-RISC total scores of the observation group improved significantly compared to the before-treatment period, and the resilience, strength, optimism and CD-RISC full scores of the observation group improved significantly compared to the control group. This indicates that psychological care could improve the psychological resilience of cancer patients. Positive psychological intervention taps the patients' inner positive potential through cognitive improvement, positive thought training, negative emotion discharge, instilling positive energy, and other measures to improve their adaptability and coping ability, thus enhancing their resilience, strength, and optimism. Anxiety and depression were common emotions in patients with advanced cancer and were the main reasons affecting the quality of their survival[33].

Table 2 Comparison of respiratory function indexes between the two groups before and after treatment

Group	Cases	Vital capacity (%)		Forceful vital capacity$_1$/forceful vital capacity (%)		Maximal voluntary ventilation (%)	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control	61	59.84 ± 6.25	72.47 ± 8.02[a]	64.58 ± 8.34	71.83 ± 7.26[a]	51.62 ± 5.92	57.39 ± 5.02
Observation	61	60.61 ± 5.93	79.95 ± 7.39[a]	64.95 ± 7.39	80.64 ± 8.31[a]	50.97 ± 6.02	66.48 ± 5.43[a]
t		0.827	3.141	0.256	4.362	-1.249	2.345
P value		0.568	0.186	0.682	0.136	0.721	0.042

[a]*P* < 0.05 *vs* before treatment.

Table 3 Comparison of the degree of dyspnoea between the two groups of patients

Group	Cases	6 min walking distance (m)		Dyspnoea scale score	
		Before treatment	After treatment	Before treatment	After treatment
Control	61	320.64 ± 43.28	399.83 ± 34.26[a]	2.84 ± 0.53	2.06 ± 0.37[a]
Observation	61	321.73 ± 38.45	452.65 ± 37.46[a]	2.88 ± 0.35	1.45 ± 0.22[a]
t		11.247	8.305	0.132	-0.083
P value		0.637	0.032	0.593	0.002

[a]*P* < 0.05 *vs* before treatment.

Table 4 Comparison of between the two groups before and after treatment

Group	Cases	Toughness		Strength		Optimism		Total scores	
		Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Control	61	20.46 ± 2.93	25.62 ± 3.11[a]	14.89 ± 1.63	17.76 ± 2.21[a]	8.06 ± 1.02	9.75 ± 1.21	43.41 ± 4.32	53.13 ± 5.98[a]
Observation	61	20.13 ± 3.14	31.59 ± 2.89[a]	15.02 ± 1.75	20.94 ± 2.85[a]	8.12 ± 0.92	13.26 ± 1.93[a]	43.27 ± 5.01	65.79 ± 6.75[a]
t		-0.252	2.561	1.257	1.683	0.731	4.523	-1.953	8.247
P value		0.453	0.012	0.682	0.045	0.472	0.015	0.583	0.007

[a]*P* < 0.05 *vs* before treatment.

Table 5 Comparison of self-rating anxiety scale and self-rating depression scale between the two groups before and after treatment

Group	Cases	SAS scores		SDS scores	
		Before treatment	After treatment	Before treatment	After treatment
Control	61	53.15 ± 6.03	43.25 ± 5.64[a]	52.89 ± 6.24	45.79 ± 5.75[a]
Observation	61	53.68 ± 5.82	32.15 ± 5.02[a]	53.34 ± 5.89	30.46 ± 4.93[a]
t		1.464	-3.285	1.245	-4.845
P value		0.574	0.000	0.634	0.000

[a]*P* < 0.05 *vs* before treatment. SAS: Self-rating anxiety scale; SDS: Self-rating depression scale.

This study showed that after treatment, the SAS and SDS scores of the patients in the control and observation groups were significantly lower than those before the treatment. The SAS and SDS scores of the observation group were significantly lower than those of the control group, indicating that the pulmonary rehabilitation exercise combined with psychological care improved the negative emotions of patients, such as anxiety and depression, and improved the ability of patients to perform activities of daily living.However, this study has some shortcomings, such as a small sample size, a single study subject, and geographical restrictions on the source of cases. Therefore, it is necessary to increase the sample size, include multi-center study subjects, and expand the source range of cases in future studies to confirm the accuracy of this study.

CONCLUSION

In conclusion, the implementation of pulmonary rehabilitation exercise combined with psychological care for patients after lung cancer resection could effectively alleviate negative emotions such as anxiety and depression, improve lung function, enhance daily activity ability, and reduce the occurrence of complications.

ARTICLE HIGHLIGHTS

Research background

Lung cancer is a malignant tumor arising from the pulmonary organs, bronchial mucosa or glands, and it is also the most common primary lung cancer. For many people, lung cancer is a fatal disease, but with the continuous progress of medical technology, the treatment methods and prognosis of lung cancer have also been greatly improved.

Research motivation

We also found that pulmonary rehabilitation training and psychological care have a positive impact on the treatment of lung cancer patients, which is worth further promotion and application.

Research objectives

This paper conducts a comprehensive analysis on the effects of pulmonary rehabilitation training combined with psychological care on postoperative respiratory function and psychological health of lung cancer patients.

Research methods

This study used the design of a randomized controlled trial to divide patients after lung cancer surgery meeting the inclusion criteria into two groups, control and experimental groups. The control group received conventional treatment and nursing care, while the experimental group received pulmonary rehabilitation training combined with psychological nursing care on the basis of the control group.

Research results

By comparing the respiratory function and mental health indicators of the observation group and the control group before and after the intervention, it was found that the respiratory function and mental health status of the patients in the experimental group were significantly improved.

Research conclusions

Pulmonary rehabilitation training combined with psychological nursing for patients after lung cancer resection can improve lung function, improve daily activities, effectively relieve anxiety, depression, and other negative emotions, and reduce the occurrence of complications.

Research perspectives

The importance of rehabilitation care.

FOOTNOTES

Co-first authors: Xiang Yang and Dan Yin.

Author contributions: Yang X and Yin D designed the research; Chen SQ contributed new reagents/analytic tools; Chen SQ, Yang X, and Yin D analyzed the data; Yang X and Yin D wrote the paper; All authors were involved in the critical review of the results and have contributed to, read, and approved the final manuscript. Yang X and Yin D contributed equally to this work as co-first authors equally to this work. The reasons for designating Yang X and Yin D as co-first authors are threefold. First, the research was performed as a collaborative effort, and the designation of co-corresponding authorship accurately reflects the distribution of responsibilities and burdens associated with the time and effort required to complete the study and the resultant paper. This also ensures effective communication and management of post-submission matters, ultimately enhancing the paper's quality and reliability. Second, the

overall research team encompassed authors with a variety of expertise and skills from different fields, and the designation of co-first authors best reflects this diversity. This also promotes the most comprehensive and in-depth examination of the research topic, ultimately enriching readers' understanding by offering various expert perspectives. Third, Yang X and Yin D contributed efforts of equal substance throughout the research process. The choice of these researchers as co-first authors acknowledges and respects this equal contribution, while recognizing the spirit of teamwork and collaboration of this study. In summary, we believe that designating Yang X and Yin D as co-first authors of is fitting for our manuscript as it accurately reflects our team's collaborative spirit, equal contributions, and diversity.

Institutional review board statement: This study protocol was approved by the First People's Hospital of Jiangxia District, and all the families have voluntarily participated in the study and have signed informed consent forms.

Informed consent statement: All study participants or their legal guardian provided informed written consent about personal and medical data collection prior to study enrolment.

Conflict-of-interest statement: All the authors declared no conflict of interest existing in this paper.

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REFERENCES

1 **Bade BC**, Dela Cruz CS. Lung Cancer 2020: Epidemiology, Etiology, and Prevention. *Clin Chest Med* 2020; **41**: 1-24 [PMID: 32008623 DOI: 10.1016/j.ccm.2019.10.001]
2 **Wu F**, Wang L, Zhou C. Lung cancer in China: current and prospect. *Curr Opin Oncol* 2021; **33**: 40-46 [PMID: 33165004 DOI: 10.1097/CCO.0000000000000703]
3 **Schabath MB**, Cote ML. Cancer Progress and Priorities: Lung Cancer. *Cancer Epidemiol Biomarkers Prev* 2019; **28**: 1563-1579 [PMID: 31575553 DOI: 10.1158/1055-9965.EPI-19-0221]
4 **Malhotra J**, Malvezzi M, Negri E, La Vecchia C, Boffetta P. Risk factors for lung cancer worldwide. *Eur Respir J* 2016; **48**: 889-902 [PMID: 27174888 DOI: 10.1183/13993003.00359-2016]
5 **Schmeck B**, Bertrams W, Lai X, Vera J. Systems Medicine for Lung Diseases: Phenotypes and Precision Medicine in Cancer, Infection, and Allergy. *Methods Mol Biol* 2016; **1386**: 119-133 [PMID: 26677183 DOI: 10.1007/978-1-4939-3283-2_8]
6 **Hoy H**, Lynch T, Beck M. Surgical Treatment of Lung Cancer. *Crit Care Nurs Clin North Am* 2019; **31**: 303-313 [PMID: 31351552 DOI: 10.1016/j.cnc.2019.05.002]
7 **Shen G**, Zheng F, Ren D, Du F, Dong Q, Wang Z, Zhao F, Ahmad R, Zhao J. Anlotinib: a novel multi-targeting tyrosine kinase inhibitor in clinical development. *J Hematol Oncol* 2018; **11**: 120 [PMID: 30231931 DOI: 10.1186/s13045-018-0664-7]
8 **Saw SPL**, Ong BH, Chua KLM, Takano A, Tan DSW. Revisiting neoadjuvant therapy in non-small-cell lung cancer. *Lancet Oncol* 2021; **22**: e501-e516 [PMID: 34735819 DOI: 10.1016/S1470-2045(21)00383-1]
9 **Chaft JE**, Shyr Y, Sepesi B, Forde PM. Preoperative and Postoperative Systemic Therapy for Operable Non-Small-Cell Lung Cancer. *J Clin Oncol* 2022; **40**: 546-555 [PMID: 34985966 DOI: 10.1200/JCO.21.01589]
10 **Leo F**, Pelosi G, Sonzogni A, Chilosi M, Bonomo G, Spaggiari L. Structural lung damage after chemotherapy fact or fiction? *Lung Cancer* 2010; **67**: 306-310 [PMID: 19477548 DOI: 10.1016/j.lungcan.2009.04.013]
11 **Rueda JR**, Solà I, Pascual A, Subirana Casacuberta M. Non-invasive interventions for improving well-being and quality of life in patients with lung cancer. *Cochrane Database Syst Rev* 2011; **2011**: CD004282 [PMID: 21901689 DOI: 10.1002/14651858.CD004282.pub3]
12 **Xiao J**, Chow KM, Choi KC, Ng SNM, Huang C, Ding J, Chan WHC. Effects of family-oriented dignity therapy on dignity, depression and spiritual well-being of patients with lung cancer undergoing chemotherapy: A randomised controlled trial. *Int J Nurs Stud* 2022; **129**: 104217 [PMID: 35339908 DOI: 10.1016/j.ijnurstu.2022.104217]
13 **Spruit MA**. Pulmonary rehabilitation. *Eur Respir Rev* 2014; **23**: 55-63 [PMID: 24591662 DOI: 10.1183/09059180.00008013]
14 **Cornelison SD**, Pascual RM. Pulmonary Rehabilitation in the Management of Chronic Lung Disease. *Med Clin North Am* 2019; **103**: 577-584 [PMID: 30955523 DOI: 10.1016/j.mcna.2018.12.015]
15 **Cameron-Tucker HL**, Wood-Baker R, Owen C, Joseph L, Walters EH. Chronic disease self-management and exercise in COPD as pulmonary rehabilitation: a randomized controlled trial. *Int J Chron Obstruct Pulmon Dis* 2014; **9**: 513-523 [PMID: 24876771 DOI: 10.2147/COPD.S58478]
16 **Ball H**, Moore S, Leary A. A systematic literature review comparing the psychological care needs of patients with mesothelioma and advanced lung cancer. *Eur J Oncol Nurs* 2016; **25**: 62-67 [PMID: 27865254 DOI: 10.1016/j.ejon.2016.09.007]
17 **Aubin M**, Vézina L, Verreault R, Simard S, Desbiens JF, Tremblay L, Dumont S, Fillion L, Dogba MJ, Gagnon P. Effectiveness of an

intervention to improve supportive care for family caregivers of patients with lung cancer: study protocol for a randomized controlled trial. *Trials* 2017; **18**: 304 [PMID: 28676071 DOI: 10.1186/s13063-017-2044-y]

18 **Wang M**, Sun Y, Zhang M, Yu R, Fu J. Effects of high-quality nursing care on quality of life, survival, and recurrence in patients with advanced nonsmall cell lung cancer. *Medicine (Baltimore)* 2022; **101**: e30569 [PMID: 36123938 DOI: 10.1097/MD.0000000000030569]

19 **Chen Z**, Cai R, Liao X, Huang X, Zhao C, Chen M. The efficacy of pulmonary rehabilitation exercise training on complications and mortality after lung cancer resection: a systematic review and meta-analysis. *Transl Cancer Res* 2022; **11**: 1321-1329 [PMID: 35706789 DOI: 10.21037/tcr-22-978]

20 **Zhou T**, Sun C. Effect of physical manipulation pulmonary rehabilitation on lung cancer patients after thoracoscopic lobectomy. *Thorac Cancer* 2022; **13**: 308-315 [PMID: 34882313 DOI: 10.1111/1759-7714.14225]

21 **Tu M**, Wang F, Shen S, Wang H, Feng J. Influences of Psychological Intervention on Negative Emotion, Cancer-Related Fatigue and Level of Hope in Lung Cancer Chemotherapy Patients Based on the PERMA Framework. *Iran J Public Health* 2021; **50**: 728-736 [PMID: 34183922 DOI: 10.18502/ijph.v50i4.5997]

22 **Krebber AH**, van Uden-Kraan CF, Melissant HC, Cuijpers P, van Straten A, Becker-Commissaris A, Leemans CR, Verdonck-de Leeuw IM. A guided self-help intervention targeting psychological distress among head and neck cancer and lung cancer patients: motivation to start, experiences and perceived outcomes. *Support Care Cancer* 2017; **25**: 127-135 [PMID: 27585808 DOI: 10.1007/s00520-016-3393-x]

23 **Sun V**, Kim JY, Raz DJ, Chang W, Erhunmwunsee L, Uranga C, Ireland AM, Reckamp K, Tiep B, Hayter J, Lew M, Ferrell B, McCorkle R. Preparing Cancer Patients and Family Caregivers for Lung Surgery: Development of a Multimedia Self-Management Intervention. *J Cancer Educ* 2018; **33**: 557-563 [PMID: 27542378 DOI: 10.1007/s13187-016-1103-5]

24 **Rutkowska A**, Jastrzebski D, Rutkowski S, Żebrowska A, Stanula A, Szczegielniak J, Ziora D, Casaburi R. Exercise Training in Patients With Non-Small Cell Lung Cancer During In-Hospital Chemotherapy Treatment: A RANDOMIZED CONTROLLED TRIAL. *J Cardiopulm Rehabil Prev* 2019; **39**: 127-133 [PMID: 30801436 DOI: 10.1097/HCR.0000000000000410]

25 **Lei J**, Yang J, Dong L, Xu J, Chen J, Hou X, Bai Z. An exercise prescription for patients with lung cancer improves the quality of life, depression, and anxiety. *Front Public Health* 2022; **10**: 1050471 [PMID: 36466452 DOI: 10.3389/fpubh.2022.1050471]

26 **Provencio M**, Calvo V, Romero A, Spicer JD, Cruz-Bermúdez A. Treatment Sequencing in Resectable Lung Cancer: The Good and the Bad of Adjuvant Versus Neoadjuvant Therapy. *Am Soc Clin Oncol Educ Book* 2022; **42**: 1-18 [PMID: 35561296 DOI: 10.1200/EDBK_358995]

27 **Yin X**, Liao H, Yun H, Lin N, Li S, Xiang Y, Ma X. Artificial intelligence-based prediction of clinical outcome in immunotherapy and targeted therapy of lung cancer. *Semin Cancer Biol* 2022; **86**: 146-159 [PMID: 35963564 DOI: 10.1016/j.semcancer.2022.08.002]

28 **Okura K**, Takahashi Y, Hatakeyama K, Saito K, Kasukawa Y, Imai K, Minamiya Y. Preoperative inspiratory muscle training in a patient with lung cancer and comorbid chronic obstructive pulmonary disease and respiratory sarcopenia: A case report. *Physiother Res Int* 2023; **28**: e1987 [PMID: 36533560 DOI: 10.1002/pri.1987]

29 **Dreyfus JF**, Kassoul A, Michel-Cherqui M, Fischler M, Le Guen M. A French version of Ringsted's questionnaire on pain-related impairment of daily activities after lung surgery: A cohort study. *Anaesth Crit Care Pain Med* 2019; **38**: 615-621 [PMID: 30826390 DOI: 10.1016/j.accpm.2019.02.014]

30 **Avancini A**, Sartori G, Gkountakos A, Casali M, Trestini I, Tregnago D, Bria E, Jones LW, Milella M, Lanza M, Pilotto S. Physical Activity and Exercise in Lung Cancer Care: Will Promises Be Fulfilled? *Oncologist* 2020; **25**: e555-e569 [PMID: 32162811 DOI: 10.1634/theoncologist.2019-0463]

31 **Brown NM**, Lui CW, Robinson PC, Boyle FM. Supportive care needs and preferences of lung cancer patients: a semi-structured qualitative interview study. *Support Care Cancer* 2015; **23**: 1533-1539 [PMID: 25394711 DOI: 10.1007/s00520-014-2508-5]

32 **Temel JS**, Petrillo LA, Greer JA. Patient-Centered Palliative Care for Patients With Advanced Lung Cancer. *J Clin Oncol* 2022; **40**: 626-634 [PMID: 34985932 DOI: 10.1200/JCO.21.01710]

33 **Wang YH**, Li JQ, Shi JF, Que JY, Liu JJ, Lappin JM, Leung J, Ravindran AV, Chen WQ, Qiao YL, Shi J, Lu L, Bao YP. Depression and anxiety in relation to cancer incidence and mortality: a systematic review and meta-analysis of cohort studies. *Mol Psychiatry* 2020; **25**: 1487-1499 [PMID: 31745237 DOI: 10.1038/s41380-019-0595-x]

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