

Impact of Evidence-Based Nursing and Health Empowerment on Self-Efficacy and Cognitive Function in Lung Cancer Patients Undergoing Thoracoscopic Surgery

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AIM: Given the high incidence of postoperative cognitive decline and reduced self-efficacy in lung cancer patients undergoing radical thoracoscopic surgery, this study aimed to investigate the effect of evidence-based nursing combined with health empowerment intervention on self-efficacy and cognitive function in this patient population.

METHODS: A total of 516 patients who underwent thoracoscopic radical lung cancer surgery between February 2021 and June 2025 in The First People's Hospital of Zunyi were included. The patients were divided into an observation group (232 cases, who received evidence-based nursing combined with health empowerment intervention) and a control group (284 cases, who received conventional nursing). General data of the patients, along with their visual analogue scale (VAS) scores, forced vital capacity (FVC), maximal voluntary ventilation (MVV), forced expiratory volume in 1 second to FVC ratio (FEV1/FVC), General Self-Efficacy Scale (GSES) score, and Mini-Mental State Examination (MMSE) score, were collected.

RESULTS: There was no significant difference between the two groups in terms of baseline characteristics ($p > 0.05$). After the intervention, the observation group achieved significantly greater improvement than the control group in terms of VAS pain scores, pulmonary function indices (FVC, MVV, FEV1/FVC), GSES scores and MMSE scores ($p < 0.001$). In addition, the total incidence of postoperative adverse reactions was significantly lower in the observation group than in the control group (7.76% vs. 13.73%, $p = 0.031$).

CONCLUSIONS: Evidence-based nursing combined with health empowerment intervention significantly relieves postoperative pain, promotes recovery of lung function, enhances self-efficacy and cognitive function, and reduces the incidence of postoperative adverse events.

Keywords: lung cancer; evidence-based nursing; health empowerment intervention; thoracoscopic surgery

Introduction

As a malignant tumor with the highest morbidity and mortality rates in the world, the selection and optimization of treatments for lung cancer has always been a core topic in the realm of clinical research [1]. Epidemiological investigations show that there are approximately 2.20 million new cases of lung cancer and 1.80 million lung cancer-related deaths worldwide in 2022 [2,3]. In recent years, the development of thoracoscopic technology has gradually positioned radical thoracoscopic surgery as an important procedure for the treatment of early-stage lung cancer by virtue of its advantages of less trauma and faster recovery [4]. How-

ever, this type of surgery still needs to be performed under general anaesthesia, which may involve one-lung ventilation, surgical traumatic stress and the use of anaesthetic drugs [5]. These conditions not only trigger temporary or persistent changes in cognitive function after surgery, but also have a significant impact on patients' confidence in coping with their illness [6]. Existing studies have shown that cognitive decline is relatively common among postoperative patients with lung cancer and is closely related to the postoperative rehabilitation process, quality of life and long-term prognosis of the patients [7,8]. In addition, self-efficacy, as an individual's subjective judgement of his or her ability to perform a given task, plays a central role in regulating the patient's postoperative behavior and psychological state [9]. Patients often experience a reduced sense of self-efficacy due to the trauma of surgery and the side effects of chemotherapy, which in turn affects the overall recovery [10].

The quality of perioperative nursing interventions has become a key factor influencing patient prognosis in the context of the continuous refinement of surgical treatment tech-

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niques [11]. Evidence-based nursing emphasizes the systematic retrieval and evaluation of the best clinical evidence, along with the development of a care plan that takes into account the individual patient's unique circumstances [12]. This form of nursing practice demonstrates advantages in improving postoperative recovery outcomes for surgical patients. A study has reported that evidence-based nursing intervention can significantly improve the treatment compliance and quality of life of patients with lung cancer [13]. Health empowerment interventions, grounded in a patient-centered care philosophy, emphasize the enhancement of patients' sense of control over their own health and decision-making abilities by promoting information sharing, skills training and emotional support [14]. In the field of chronic disease management, health empowerment has been shown to be effective in enhancing patients' self-efficacy and improving quality of life [15]. Incorporating the concept of health empowerment into the perioperative care of patients undergoing lung cancer surgery provides a novel approach to improving patients' postoperative cognitive function and self-management abilities by establishing a shared decision-making mechanism between physicians and patients and providing personalized rehabilitation guidance. However, at present, there is still a lack of research on the effect of the combined application of evidence-based nursing intervention and health empowerment intervention on patients undergoing thoracic surgery. The construction of specific intervention plans and the evaluation of their effects still require more clinical evidence support.

In light of the above, this study intends to retrospectively analyze the clinical data of 516 patients who underwent thoracoscopic radical lung cancer surgery in The First People's Hospital of Zunyi between February 2021 and June 2025, and to investigate the effects of evidence-based nursing care combined with health empowerment intervention on self-efficacy and cognitive functioning of this group of patients. This study aims to provide a basis for constructing a more targeted perioperative nursing intervention system by optimizing the nursing care model, thereby enhancing patients' postoperative self-management abilities and cognitive function, and ultimately improving overall recovery quality and quality of life. Beyond contributing to the theoretical framework of nursing care for lung cancer patients undergoing thoracoscopic surgery, the current study provides novel insights and empirical evidence to inform the development of a clinical nursing care approach.

Methods

Patient Population

This study retrospectively analyzed patients who underwent radical thoracoscopic resection of lung cancer in The First People's Hospital of Zunyi between February 2021 and June 2025. A total of 516 patients were included in the analysis. The patients were divided into observation

and control groups according to the type of nursing care received as part of routine clinical care, which was identified from the existing medical records. Among them, 232 patients were assigned to the observation group (receiving evidence-based nursing combined with health empowerment intervention) and 284 patients to the control group (receiving conventional nursing). Patients in both groups received conventional perioperative care, which included standard vital signs monitoring, basic pain management with analgesics as ordered, routine wound care, and general discharge instructions. The observation group consisted of patients whose records indicated they had received the additional, structured components of evidence-based care combined with health empowerment interventions during their hospitalization, as detailed in the following section, while the control group received conventional care alone, as documented in their clinical files. This research was conducted in strict adherence to the principles outlined in the Declaration of Helsinki and was approved by the Medical Ethics Committee of The First People's Hospital of Zunyi (approval number: 202511190014). All patients in this study have given informed consent.

Inclusion and Exclusion Criteria

All patients met the following inclusion criteria: (a) age ≥ 18 years old; (b) preoperative pathological confirmation of primary lung cancer with clinical stage was stage I–II; (c) first-time radical lung cancer surgery performed via a thoracoscopic approach; and (d) availability of complete clinical data. Patients who met the criteria below were excluded: (a) presence of severe dysfunction of vital organs, including the heart, liver, and kidneys; (b) coexistence of other malignant tumors; (c) significant preoperative cognitive dysfunction, or a history of psychiatric disorders; and (d) serious postoperative complications, such as respiratory failure and severe infections, that could affect the postoperative recovery process.

Data Collection

General information: this study collected the data of patients through questionnaires and the hospital medical record system. Baseline data, including age, gender, education level, marital status, smoking status, drinking status, duration of illness, pathological type, and disease stage, were extracted from the patient's electronic medical record system.

Pain and pulmonary function assessment: the visual analogue scale (VAS) was used to assess the patients' preoperative and postoperative pain intensity [16]. The VAS, illustrated as a straight horizontal line, has two extremes indicating "no pain" (0 points) and "the most severe pain" (10 points), respectively. Patients marked the line according to their perceived pain, and the distance from the zero point to the mark was measured to obtain the VAS score. Pulmonary function evaluation indicators include forced vital capacity

(FVC), maximal voluntary ventilation (MVV), and forced expiratory volume in 1 second to FVC ratio (FEV1/FVC). Self-efficacy assessment: the patients' self-efficacy was assessed using the General Self-Efficacy Scale (GSES) [17]. The GSES consists of 10 items and is rated on a 4-point Likert scale (1 = not at all true, 2 = somewhat true, 3 = mostly true, 4 = completely true). The total score ranges from 10 to 40, with higher scores indicating greater self-efficacy.

Cognitive function assessment: cognitive function was assessed using the Mini-Mental State Examination (MMSE), which was developed by Folstein *et al.* [18] in 1975. This instrument assesses six dimensions of cognitive function, including orientation, memory, attention, calculation, recall, and language, with a total score of 30, where lower scores indicate poorer cognitive functioning [18]. MMSE was selected in this study due to its wide clinical application, simple operation, short assessment time, and good acceptability in perioperative elderly patients, which is suitable for rapid screening of overall cognitive function in clinical postoperative settings. In this study, the MMSE was assessed by trained professionals according to uniform criteria, and the specific scores were recorded.

Postoperative adverse events: data on postoperative adverse events, including fever, pulmonary infection, atelectasis, and pleural effusion, were systematically extracted from the patients' electronic medical records, nursing notes, and discharge summaries. These events were identified and documented by the treating clinical team during hospitalization using standardized clinical criteria (e.g., fever defined as body temperature >38.3 °C on at least two occasions, pulmonary infection diagnosed based on clinical symptoms, radiographic evidence, and/or microbiological culture results).

Intervention Measures

The following intervention details are derived from standardized clinical care protocols and retrospective documentation review.

Evidence-Based Nursing Intervention

Evidence-based nursing interventions were routinely applied to the observation group. Specific details of these interventions were retrieved from nursing notes and medical records, and included close monitoring of vital signs during anaesthetic awakening, multimodal analgesia, respiratory management, early ambulation guidance, discharge education, and follow-up. In the immediate postoperative period (24–48 hours), vital signs were monitored every 15 minutes for the first 2 hours, then hourly thereafter. Pain management followed a multimodal strategy, including oral acetaminophen (1 g every 6 hours) and intravenous tramadol (50 mg as needed, maximum 400 mg/day), with dosing adjusted according to VAS scores. Non-pharmacological methods included 10-minute diaphragmatic breathing (5 cycles/minute) and instrumental music

therapy (60–80 BPM for 20 minutes, twice daily). Respiratory management utilized an incentive spirometer (Tri-flow™, Teleflex). Patients were instructed to perform 10 repetitions per session, four times daily (8 AM, 12 PM, 4 PM, 8 PM), with each inspiration sustained for 3–5 seconds. Early ambulation guidance included sitting upright at the bedside for 30 minutes on postoperative day 1, walking 50 meters indoors twice daily on day 2, and gradually increasing to 200 meters by day 3. Discharge education encompasses several topics, such as wound care protocols (sterile dressing changes every 3 days for 2 weeks), medication schedules (dosage, frequency, side effect monitoring), dietary recommendations (high-protein, low-sodium meals), and follow-up appointments. It is important to clarify that these post-discharge follow-up appointments were part of the clinical nursing care for continuous rehabilitation guidance and symptom monitoring, rather than for collecting research outcome data. The nursing records only contain detailed data of the patients after they have completed the standardized nursing procedures.

Health Empowerment Intervention

Health empowerment interventions were documented in nursing notes as structured modules. One-on-one health education (30 minutes per session, 2 sessions: postoperative day 1 and day 3) covered: wound assessment (redness, exudate, temperature), temperature monitoring (twice daily, ≥ 38.5 °C requiring medical contact), pain self-assessment (VAS usage), and complication identification (dyspnea, chest tightness, hemoptysis). Patient exchange sessions were held weekly (60 minutes, led by a senior nurse and a rehabilitation therapist) with a fixed structure: 15-minute peer experience sharing, 20-minute Q&A with medical staff, 15-minute demonstration for breathing exercise in a group, and 10-minute goal-setting discussion. During discharge preparation, a joint rehabilitation plan was formulated, including daily activity targets (e.g., 30-minute walks twice daily), dietary logs (tracking protein intake), and emotional journaling. Educational resources included printed rehabilitation manuals (with step-by-step exercise diagrams) and quick response (QR) codes linking to 5-minute video tutorials on usage of an incentive spirometer and wound care. This retrospective study focused on comparing patient outcomes between two key time points: at admission (pre-intervention baseline) and after completion of a structured, perioperative care cycle (post-intervention). The post-intervention assessment was conducted at the time of the first scheduled post-discharge clinical follow-up visit, which typically occurred within 4 to 6 weeks after surgery. All patients would return to the hospital for re-examination within this period as per the physician's instructions. This time point was selected for the primary outcome analysis as it represents a clinically relevant moment when patients have completed the initial intensive phase of the evidence-based and empowerment interventions (e.g., the early post-

discharge support) and their recovery status is expected to be relatively stabilized for evaluation.

Statistical Analysis

Data were statistically analyzed using SPSS 26.0 software (IBM Corp., Armonk, NY, USA). The Shapiro–Wilk test was employed to determine data conformance to normal distribution. Continuous variables exhibiting a normal distribution are expressed as mean \pm standard deviation (SD). Normally distributed data were analyzed using independent samples *t*-tests for inter-group comparisons. Non-normally distributed data, expressed as median (interquartile spacing) [M (P25, P75)], were compared using the Mann–Whitney *U* test. Categorical variables, expressed as counts and percentages, were analyzed using the Chi-square test or Fisher’s exact probability method (when the theoretical frequency was <5). All statistical analyses were two-tailed, and $p < 0.05$ was considered statistically significant.

Results

Comparison of Baseline Characteristics Between the Two Groups of Patients

A total of 516 patients were included in this study, including 232 in the observation group and 284 in the control group. There was no significant difference between the two groups in terms of baseline characteristics such as age, duration of illness, gender, education, marital status, smoking status, drinking status, pathological type, and disease stage ($p > 0.05$), indicating comparability of the two groups before the intervention (Table 1).

Pain scores Before and After Intervention

Prior to intervention, there was no significant difference in VAS scores between the observation and control groups ($p > 0.05$) (Table 2). Post-intervention VAS scores of patients in both groups were significantly lower than those before the intervention ($p < 0.001$), and the decrease in the observation group was significantly greater than that observed in the control group ($p < 0.001$), suggesting that evidence-based nursing care combined with health empowerment interventions significantly improves postoperative pain relief.

Pulmonary Function Before and After Intervention

Before intervention, there was no significant difference in the pulmonary function indexes, such as FVC, MVV, and FEV1/FVC, between the two groups ($p > 0.05$) (Table 3). Following intervention, the lung function indexes of patients in both groups were significantly improved compared with those before intervention ($p < 0.001$), and the observation group attained significantly greater improvement in FVC, MVV and FEV1/FVC compared to the control group ($p < 0.001$), indicating that the evidence-based nursing care combined with the health empowerment intervention contributes to the recovery of pulmonary function.

Self-efficacy Before and After Intervention

Prior to intervention, there was no significant difference in the GSES scores between the two groups of patients ($p > 0.05$) (Table 4). After intervention, the self-efficacy of patients in both groups was significantly higher than that before intervention ($p < 0.001$), and the magnitude of the increase in the observation group was significantly greater than that in the control group ($p < 0.001$), indicating that evidence-based nursing care combined with health empowerment interventions can significantly enhance the self-efficacy of patients.

Cognitive Function Before and After Intervention

Before intervention, there was no significant difference in MMSE scores between the two groups ($p > 0.05$) (Table 5). However, post-intervention cognitive function of patients in both groups improved significantly compared with that before intervention ($p < 0.001$), with the observation group exhibiting significantly greater improvement of MMSE scores compared to the control group ($p < 0.001$), indicating that the evidence-based nursing care combined with the health empowerment intervention could help to improve the cognitive function of patients.

Comparison of Postoperative Adverse Events

Postoperatively, the incidence rate of total adverse reactions detected in the observation group was 7.76%, which was significantly lower than that of the control group (13.73%, $p = 0.031$), indicating that evidence-based nursing care combined with health empowerment interventions can effectively reduce the risk of postoperative adverse reactions. The incidence of adverse reactions is tabulated in Table 6.

Discussion

This study retrospectively investigated the effects of evidence-based nursing care combined with health empowerment intervention on self-efficacy and cognitive function in lung cancer patients undergoing radical thoracoscopic surgery. The results showed that compared with the control group that received only conventional care, the observation group that received evidence-based care combined with health empowerment intervention benefited significantly in terms of postoperative pain relief, pulmonary function recovery, self-efficacy enhancement, and cognitive function improvement, along with a significant reduction in the incidence of postoperative adverse reactions.

In terms of pain management, the study found that evidence-based care combined with health empowerment intervention significantly reduced patients’ postoperative pain. Our findings are consistent with published literature: Chen *et al.* [12] found that evidence-based nursing intervention could significantly alleviate postoperative pain in patients after gastric cancer resection. Furthermore, Li *et al.* [19] reported that nursing measures grounded in the theory of health empowerment effectively mitigated

Table 1. Comparison of baseline characteristics between the two groups.

Variables	Total (n = 516)	Observation group (n = 232)	Control group (n = 284)	Statistic	p
Age (years), mean ± SD	67.15 ± 5.37	67.52 ± 5.47	66.86 ± 5.28	t = 1.39	0.164
Gender, n (%)				χ ² = 0.55	0.457
Female	135 (26.16)	57 (24.57)	78 (27.46)		
Male	381 (73.84)	175 (75.43)	206 (72.54)		
Duration of illness (months), mean ± SD	13.45 ± 4.42	13.16 ± 4.22	13.69 ± 4.57	t = -1.34	0.182
Education level, n (%)				χ ² = 0.79	0.672
Primary school and below	152 (29.46)	64 (27.59)	88 (30.99)		
Junior and senior high school	282 (54.65)	129 (55.60)	153 (53.87)		
Junior college and above	82 (15.89)	39 (16.81)	43 (15.14)		
Marital status, n (%)				χ ² = 1.36	0.243
Married	475 (92.05)	210 (90.52)	265 (93.31)		
Divorced/widowed	41 (7.95)	22 (9.48)	19 (6.69)		
Smoking status, n (%)				χ ² = 0.39	0.534
No	288 (55.81)	126 (54.31)	162 (57.04)		
Yes	228 (44.19)	106 (45.69)	122 (42.96)		
Drinking status, n (%)				χ ² = 0.15	0.695
No	234 (45.35)	103 (44.40)	131 (46.13)		
Yes	282 (54.65)	129 (55.60)	153 (53.87)		
Pathological type, n (%)				χ ² = 0.39	0.535
Adenocarcinoma	488 (94.57)	221 (95.26)	267 (94.01)		
Squamous carcinoma	28 (5.43)	11 (4.74)	17 (5.99)		
Disease stage, n (%)				χ ² = 0.70	0.404
I	244 (47.29)	105 (45.26)	139 (48.94)		
II	272 (52.71)	127 (54.74)	145 (51.06)		

Table 2. Comparison of VAS scores before and after intervention.

Grouping	n	Before intervention	After intervention	Difference
Observation group	232	6.62 ± 1.36	3.72 ± 1.10**	-3.00 (-4.00, -2.00)
Control group	284	6.48 ± 1.31	4.28 ± 1.17**	-2.00 (-3.00, -1.00)
Statistic		t = 1.23	t = -5.57	Z = -4.64
p-value		0.219	<0.001	<0.001

**p < 0.001 compared with before intervention within the same group. VAS, visual analogue scale.

Table 3. Comparison of pulmonary function indicators before and after intervention.

Indicators	Grouping	n	Before intervention	After intervention	Difference
FVC (L)	Observation group	232	2.27 ± 0.42	3.58 ± 0.65**	1.27 (0.74, 1.87)
	Control group	284	2.33 ± 0.47	3.24 ± 0.57**	0.90 (0.42, 1.42)
	Statistic		t = -1.28	t = 6.07	Z = -5.31
	p-value		0.203	<0.001	<0.001
MVV (L)	Observation group	232	85.73 ± 15.23	108.19 ± 11.07**	23.85 (8.13, 35.14)
	Control group	284	86.46 ± 16.53	102.56 ± 12.33**	15.31 (3.49, 28.24)
	Statistic		t = -0.51	t = 5.39	Z = -3.54
	p-value		0.610	<0.001	<0.001
FEV1/FVC (%)	Observation group	232	62.35 ± 6.33	75.83 ± 4.11**	13.82 (8.14, 18.76)
	Control group	284	61.80 ± 6.19	71.44 ± 4.57**	9.67 (4.41, 14.94)
	Statistic		t = 0.99	t = 11.34	Z = -5.51
	p-value		0.321	<0.001	<0.001

**p < 0.001 compared with before intervention within the same group. FEV1, forced expiratory volume in 1 second; FVC, forced vital capacity; MVV, maximal voluntary ventilation.

Table 4. Comparison of GSES scores before and after intervention.

Grouping	<i>n</i>	Before intervention	After intervention	Difference
Observation group	232	24.57 ± 3.29	34.29 ± 4.57**	10.00 (6.00, 13.00)
Control group	284	24.78 ± 3.38	30.82 ± 4.24**	7.00 (2.00, 9.00)
Statistic		<i>t</i> = -0.72	<i>t</i> = 8.92	<i>Z</i> = -7.07
<i>p</i> -value		0.472	<0.001	<0.001

***p* < 0.001 compared with before intervention within the same group. GSES, General Self-Efficacy Scale.

Table 5. Comparison of MMSE scores before and after intervention.

Grouping	<i>n</i>	Before intervention	After intervention	Difference
Observation group	232	24.39 ± 2.89	27.62 ± 2.42**	4.00 (1.00, 7.00)
Control group	284	24.63 ± 3.07	26.53 ± 2.56**	2.00 (-1.00, 5.00)
Statistic		<i>t</i> = -0.93	<i>t</i> = 4.90	<i>Z</i> = -4.59
<i>p</i> -value		0.353	<0.001	<0.001

***p* < 0.001 compared with before intervention within the same group. MMSE, Mini-Mental State Examination.

Table 6. Comparison of postoperative adverse reactions between the control and observation groups.

Grouping	<i>n</i>	Fever	Pulmonary infection	Atelectasis	Pleural effusion	Total
Observation group	232	6 (2.59)	5 (2.16)	5 (2.16)	2 (0.86)	18 (7.76)
Control group	284	11 (3.87)	14 (4.93)	8 (2.82)	6 (2.11)	39 (13.73)
χ^2						4.64
<i>p</i> -value						0.031

intensity of pain experienced by patients. Collectively, these research reports indicate that postoperative pain can be effectively alleviated by systematically applying clinical evidence-based approaches to enhance patients' self-management ability. Pain is a common postoperative problem that not only affects patient comfort, but may also slow the recovery process [20]. Evidence-based care ensures that patients receive personalized pain amelioration treatment through appropriate management protocols following the implementation of pain assessment [21]. Health empowerment interventions, on the other hand, improve pain management by helping patients better understand and manage their pain through education and psychological support [22]. The significant advantage of this comprehensive intervention model is that it integrates the professionalism of nursing and patients' active participation, providing a novel approach to postoperative pain management.

In terms of pulmonary function recovery, the combined intervention model significantly contributed to the improvement of patients' postoperative pulmonary function. It has been reported that lung cancer patients receiving evidence-based nursing intervention achieved significantly greater improvements in FVC and FEV1/FVC [13]. Postoperative pulmonary dysfunction is one of the common complications in patients undergoing radical thoracoscopic surgery for lung cancer and may be associated with surgical trauma, anaesthetic drugs and other factors [23]. From a physiological perspective, early activity planning and respiratory

training in evidence-based nursing may promote lung tissue recruitment and the recovery of diaphragm function [24]. From a behavioral perspective, health empowerment ensures the continuity and standardization of rehabilitation training by enhancing patients' treatment compliance and self-management ability. In addition, the rapid recovery of lung function may also be related to the improvement of pain control, as more effective pain control allows for breathing training at an earlier stage with higher efficacy, thereby forming a virtuous cycle. These findings support integrating respiratory rehabilitation training into the postoperative care and emphasize the importance of active patient participation.

The synergistic improvement of self-efficacy and cognitive function reflects the overall advantage of applying combined intervention. Notably, the magnitude of increase in MMSE scores in the observation group was statistically and clinically significant. According to Folstein *et al.* [18], a ≥ 3 -point MMSE increase correlates with restored abilities in daily activities (e.g., time orientation, medication adherence, and communication), which are critical for independent living post-surgery. Self-efficacy is an important psychological factor in patients' postoperative rehabilitation, and a higher sense of self-efficacy can promote patients' active participation in rehabilitation activities and improve treatment compliance [25]. The 9.72-point increase in GSES scores in the observation group after intervention (vs. 6.04 in the control group) aligns with Ban-

dura's self-efficacy theory [17], as scores >30 indicate sufficient confidence to adhere to rehabilitation regimens—reducing dropout rates and optimizing long-term recovery. Evidence-based care enhances patients' confidence in their recovery by providing scientific and effective care interventions. Health empowerment interventions, on the other hand, further enhanced patients' sense of control over their own health and decision-making ability through information sharing, skills training and emotional support, thus significantly improving patients' self-efficacy [26]. In terms of cognitive function, the improvement in MMSE scores suggests that the combined intervention may have a protective effect in preventing postoperative cognitive dysfunction. Possible mechanisms include better pain control that attenuates the stress response, improves lung function that supports cerebral oxygenation, and cognitive training that directly facilitates neurological recovery [27,28]. Of particular note, improved cognitive function may, in turn, enhance the patient's ability to self-manage, thereby creating positive feedback. These findings support the use of psychological and cognitive interventions as an important component of perioperative management, rather than merely an adjunct.

In terms of postoperative adverse events, the combined intervention model significantly reduced the incidence of postoperative adverse events. Postoperative adverse events not only affect the quality of patients' recovery, but may also increase healthcare costs and hospitalization time. Evidence-based care relies on the systematic retrieval and application of high-quality clinical evidence to deliver scientifically grounded and effective interventions, thereby reducing the occurrence of postoperative complications [12]. By enhancing patients' self-management and involvement in decision-making, health empowerment interventions further reduce the risk of postoperative adverse events and foster more proactive, compliant postoperative rehabilitation. Taken together, this overarching intervention model provides a new strategy that integrates nursing expertise and patients' active participation to enhance the effectiveness of postoperative complication management.

Several limitations of this study should be acknowledged. Firstly, the MMSE scale was used to evaluate cognitive function, which is a general cognitive screening tool with relatively low sensitivity to mild postoperative cognitive fluctuations and may be affected by age and education level. Although it is suitable for rapid clinical evaluation, it is not the most optimal tool for detecting subtle postoperative cognitive changes, and more sensitive tools such as Montreal Cognitive Assessment (MoCA) or specialized neuropsychological tests should be considered in future research. Secondly, as a single-center, non-randomized, retrospective cohort study, it is inherently susceptible to selection bias and confounding. Specifically, patients in this study were assigned to the observation group (which received evidence-based and empowerment-focused care) or

the control group based on the clinical treatments given, rather than randomization. As with any non-randomized retrospective design, it remains possible that unmeasured factors—such as differences in patient characteristics, motivation levels, or care team preferences—may have influenced group assignment and thus contributed to observed differences between groups. Such factors could independently influence recovery outcomes and thus represent a key limitation of the observational design. Secondly, as the interventions were not actively enforced, their implementation details (e.g., content and frequency) were not fully standardized, which may have affected the reproducibility of the results. Third, the lack of testing for underlying mechanisms (e.g., inflammatory indicators, markers of neurological function) limits in-depth understanding of mechanisms of action. Fourth, this study employed independent samples *t*-tests as the primary statistical test to compare values before and after intervention, yielding analytic outputs that do not fully account for within-patient correlations over time. In fact, repeated-measures analysis of variance (ANOVA) or linear mixed models would offer more robust insights into time–group interactions. As a future research direction, we intend to adopt these advanced statistical approaches with longer follow-up time points to further clarify the dynamic effects of intervention, time, and their interaction on postoperative recovery outcomes. Finally, the study failed to assess long-term prognosis due to the short observation period. In view of these limitations, future studies may consider expanding the sample size and adopting a prospective, randomized controlled trial design to further validate the effectiveness of evidence-based care combined with health empowerment intervention and to explore the underlying mechanisms. In addition, future studies could assess the impact of the combined intervention model on patients' long-term recovery and quality of life through long-term follow-up, providing more comprehensive theoretical support for clinical nursing practice.

Conclusions

This study retrospectively investigated the effects of evidence-based nursing combined with health empowerment intervention on postoperative self-efficacy and cognitive function in lung cancer patients undergoing radical thoracoscopic surgery. Our findings revealed that patients receiving evidence-based nursing care combined with health empowerment intervention achieved greater improvements in postoperative pain relief, pulmonary function recovery, self-efficacy, and cognitive function improvement, and faced a lower risk of postoperative adverse reactions compared with those receiving only conventional care. Taken together, this combined intervention model optimizes patients' postoperative rehabilitation outcomes in multiple dimensions, providing a more effective strategy for enhancing self-efficacy and cognitive function in lung cancer patients undergoing thoracoscopic surgery.

Availability of Data and Materials

The data analyzed are available from the corresponding author upon reasonable request.

Author Contributions

CS: conceived the initial study design, collected and collated clinical data, assisted with statistical analysis, and drafted and revised the manuscript. CJ: participated in the study conceptualization and design, helped formulate inclusion/exclusion criteria, monitored intervention implementation, tracked postoperative adverse reactions, and proof-read the manuscript. JP: conceived and designed the overall study framework, led the study as principal investigator, finalized the protocol, guided statistical analysis/result interpretation, and ensured the study's authenticity. All authors have been involved in revising the manuscript critically for important intellectual content. All authors gave final approval of the version to be published. All authors have participated sufficiently in the work to take public responsibility for appropriate portions of the content and agreed to be accountable for all aspects of the work in ensuring that questions related to its accuracy or integrity.

Ethics Approval and Consent to Participate

This study was conducted in strict adherence to all the principles outlined in the Declaration of Helsinki. All patients in this study have given informed consent. This study was approved by the Medical Ethics Committee of The First People's Hospital of Zunyi (approval number: 202511190014).

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Conflict of Interest

The authors declare no conflict of interest.

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