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Reliability and validity analyses of the postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery and an evaluation of patient comfort

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Abstract.
BACKGROUND: Lung cancer is one of the most common malignant tumours that threaten human health globally. Radical resection under thoracoscopic guidance has been accepted as the major therapeutic option for treating lung cancer clinically. However, the procedure still has some adverse impacts on the comfort of patients following thoracoscopic surgery.
OBJECTIVE: To analyse the reliability and validity of the postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery and to evaluate patient comfort.
METHODS: With 210 patients with lung cancer undergoing endoscopic surgery as the participants, this study was performed to assess the reliability and validity of the postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery, with the assessment performed by eight experts.
RESULTS: The postoperative comfort scale included 28 items and consisted of four dimensions (physiological, psychological, socio-cultural and environmental). The total Cronbach's alpha coefficient of the scale was 0.851, and the split-half reliability coefficient was 0.875. Meanwhile, the content validity index (CVI) was 0.875∼1, and the scale-level average CVI was 0.99. The Chi-square/degree-of-freedom ratio of construct validity was 2.844, suggesting a good model-fitting. Furthermore, the overall average score of patient comfort was 3.72 ± 0.57, with scores ranging between 3.59 ± 0.71 and 3.83 ± 1.06 across all four dimensions, with the lowest score in the physiological dimension.
CONCLUSION: The postoperative comfort scale has good reliability and validity and can be applied for the postoperative comfort assessment of patients undergoing endoscopic surgery for lung cancer. Overall, the degree of patient comfort in this assessment was moderate, meaning targeted measures may be required to further improve patient comfort, especially in the physiological dimension.

Keywords: Lung cancer, patients after endoscopic surgery, comfort assessment scale, reliability, validity, comfort evaluation

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1. Introduction

Lung cancer is one of the most common malignant tumours that threaten human health globally [1]. Radical resection under thoracoscopic guidance has been accepted as the major therapeutic option for treating lung cancer clinically [2]. Clinical studies have documented that this procedure has the advantages of small surgical incisions and minimal damage to patients' lung function [3,4]. The enhanced recovery after surgery (ERAS) protocol intervenes through the joint application of various perioperative measures to reduce patient stress response, protect organ function and shorten patients' duration of rehabilitation [5]. However, the procedure still has some adverse impacts on the comfort of patients following thoracoscopic surgery. Yang et al. [6] reported that patients with lung cancer not only experience pain during the perioperative period but also suffer from a series of psychological problems, such as fear and anxiety, which may seriously affect their physical and mental health and their perioperative recovery. With the transformation of medical models, improving the comfort of patients clinically is an issue that needs to be addressed by nursing staff [7].

Comfortable care, a new type of nursing model, advocates providing patients with safe, comfortable, aiming to achieve the most relaxed state of the body and soul and minimise the degree of discomfort [8]. The proposal and clinical practice of this theory may enrich the connotation of holistic nursing and also improve the quality of nursing. For instance, pain and comfort assessments have been implemented by American anaesthesiologists as part of daily routine nursing practice [9]. Postoperative patient comfort is also one of the important components of surgical medicine [10]. This highlights the necessity of addressing the disease concerns of patients clinically by medical staff, and, provided the illness condition allows, taking various nursing measures to alleviate or eliminate various feelings of discomfort in the patient and enhance their comfortable state.

For the purpose of evaluating the comfort status of patients, comfort care expert Katharine Kolcaba developed a general comfort questionnaire scale. After being translated into Chinese, this scale has been tested and found to have high reliability and validity by clinical nursing experts [11], and it has been applied to the study of comfort care for patients with different diseases. It should be noted that various items in the original scale are not applicable to evaluating patients with lung cancer following endoscopic surgery.

The present study was performed to analyse the reliability and validity of this scale and to use it to evaluate the degree of comfort among patients with lung cancer following endoscopic surgery. The aim was to determine the practicality of this scale for patients with lung cancer undergoing endoscopic surgery and to analyse the influential factors of comfort among these patients to provide a reference for improving patient comfort.

2. Participants and methods

2.1. Participants

Using a convenient sampling method, this study selected eligible patients who underwent thoracoscopic pulmonary surgery at the Department of Thoracic Surgery of a Grade III-A hospital in Hebei Province from September 2022 to February 2023. The inclusion criteria were as follows: (1) patients aged 18–80 years; (2) patients having undergone thoracoscopic surgery for lung cancer; (3) patients with sufficient literacy, communication and presentation skills; (4) informed consent to participate in this study was provided by the patient or their families; and (5) patients who could use smartphones. The exclusion criteria included:

(1) patients with severe complications such as pulmonary infection and respiratory failure during the perioperative period; and (2) patients with severe mental illness and unclear consciousness.

Confirmatory factor analysis requires a sample size of > 200, preferably 5–10 times the number of variables [8]. Consequently, a sample size of 160–320 was required considering that the postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery used in this study includes four dimensions and 28 items, totalling 32 variables. Ultimately, a total of 210 patients completed the survey.

2.2. Methods

2.2.1. General situation questionnaire

The general condition questionnaire is obtained through inquiries by trained surveyors. The questionnaire included items on age, gender, degree of education, employment status, marital status, medical payment modes, family income, surgical methods, surgical frequency and comorbidities, as well as whether perioperative health education was received.

2.2.2. Surgical procedures and postoperative management of patients with lung cancer undergoing endoscopic surgery

The surgical procedure included wedge-shaped excision of the lung under thoracoscopic guidance, segmentectomy and lobectomy.

In postoperative pain management, in cases of unstable pain control, the intervention's effectiveness should be assessed at any time. Meanwhile, the postoperative pain relief mode employed preventive + multimodal analgesia. The conventional analgesic plan included intercostal nerve block in the surgical area, the use of a self-control analgesic pump, intravenous infusion of the non-steroidal anti-inflammatory drug, parecoxib sodium and minimising the use of opioids.

Meanwhile, the postoperative pain relief mode employed preventive + multimodal analgesia. The conventional analgesic plan included intercostal nerve block in the surgical area, the use of a self-control analgesic pump, intravenous infusion of the non-steroidal anti-inflammatory drug, parecoxib sodium and minimising the use of opioids.

In terms of early extubation, it was recommended to avoid the use of catheters or carry out the extubation as soon as possible as it might affect the patient's postoperative activities and increase the risk of infection. The catheter was generally withdrawn after the patient was fully awake. The thoracic catheter could be removed when the volume of hydrothorax was < 300 mL/d and there was no air leakage or atelectasis.

For the early feeding, the postoperative infusion volume was < 500 mL/d. The patients could drink a small amount of water provided there was no nausea or vomiting after recovery from the anaesthesia and could take fluids provided there was no coughing after drinking. The patients could take semi-liquid food on the first day after surgery before gradually transferring to a normal diet.

Regarding early activities, the patients were encouraged to undertake out-of-bed activity while effectively controlling any pain. Meanwhile, the patients were assisted in turning over 6 h after surgery (2 h/time, 3–5 times/d), with the head of the bed raised by 30°–45°, followed by simple joint movements of the upper and lower limbs on the bed, including elbow joint flexion and extension of the upper limb, wrist joint rotation, flexion, extension and rotation of foot joint, and flexion and extension of the knee joint (5 min/time, 3–5 times/d). Following this, the patients attempted to perform bedside activities gradually, with the amount of exercise increasing gradually depending on the amount the patients could tolerate due to their physical condition (15–20 min/time, 1–2 times/d) to prevent venous thrombosis of the lower limbs.

Table 1
Postoperative comfort scale for lung cancer patients undergoing endoscopic surgery

Items	Strongly disagree	Disagree	Generally agree	Agree	Strongly agree
1. I felt really painful at the site of the incision.					
2. I felt very tired now.					
3. I felt short of breath and was unable to catch my breath.					
4. I felt thirsty and my throat hurt.					
5. I felt uncomfortable with the catheter.					
6. I felt a bit nauseous, had no appetite, and did not want to eat.					
7. I felt a bit dizzy.					
8. My sleep was disturbed.					
9. I felt hungry.					
10. I had difficulty in movement.					
11. I had obvious symptoms of cough.					
12. My situation made me very frustrated.					
13. I felt confident.					
14. I was worried about the poor therapeutic effect.					
15. No one could understand how I felt currently.					
16. I needed to know more about my condition.					
17. I was afraid of a decrease in the postoperative quality of life.					
18. I felt very calm.					
19. I was down in spirits at present.					
20. I was helpless when I was alone.					
21. My relatives and friends called frequently to care about me					
22. Doctors and nurses here communicated warmly with me to meet my basic needs.					
23. I was inspired to know that others were caring for me.					
24. This bed made me very uncomfortable.					
25. This lying position made me uncomfortable.					
26. I was insecure in an unfamiliar environment.					
27. The treatment and care of the medical staff disturbed my rest.					
28. I could not rest in this noisy environment					

In terms of airway management, the patients were given antibiotics, glucocorticoids, bronchodilators and mucolytics according to the medical advice following surgery. In addition, once they were fully awake, the patients were assisted to carry out abdominal deep breathing, pursed lip breathing and effective coughing, combined with back patting or vibratory sputum excretion to promote sputum production. Bronchoscopy was used to aspirate sputum if the patient was unable to expectorate.

2.2.3. Postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery

The scale included four dimensions and 28 items. Twenty-eight items in this study scale were investigated using the general comfort questionnaire developed by Kolcaba and optimised using the Delphi technique by eight experts. The scale employed a 5-point Likert scoring system (1 point: strongly disagree; 2 points: disagree; 3 points: generally agree; 4 points: agree; and 5 points: strongly agree, while 1 point indicated strongly agree and 5 points represented strongly disagree for inverse questions). The overall comfort score of this scale ranges from 28 to 140 points, with patients with higher scores having a higher degree of comfort. Scores of < 75, 75–110 and > 110 points indicated that the patients were experiencing low, moderate and high degrees of comfort, respectively (Table 1).

2.2.4. Data collection methods

Data collection was initiated after obtaining approval from the ethics committee of our hospital. The comfort questionnaire was administered to the patients on the first day after thoracoscopic surgery for lung

cancer when they were fully awake and in a stable condition. Postoperative rehabilitation for the included patients was implemented following the ERAS protocol, including multimodal combined analgesia, early out-of-bed activity, respiratory function exercise, health education and early removal of drainage tubes. First, the assessors were subjected to unified training to clarify the content and methods of this survey. During the formal survey, the trained assessors were responsible for explaining the purpose, significance and confidentiality of the study to the eligible patients. After obtaining the patient's consent, the assessors distributed the QR code of the questionnaire and the informed consent form and guided the patients on-site in scanning the QR code and filling out the questionnaire using their mobile phones. After the questionnaire was completed, the assessors checked whether there were any missing or clearly incorrect content and requested the corresponding patient to correct and supplement when required. A total of 220 questionnaires were distributed, and 210 valid questionnaires were returned, with an effective recovery rate of 95.45%.

2.2.5. Methods for analysing the reliability and validity

2.2.5.1 Item analysis

(1) Critical ratio: The scores of the respondents on the items were sorted from high to low, and the top 27% and the bottom 27% of the respondents were divided into the high-score and low-score groups, respectively. After obtaining the average of each item in the two groups, inter-group comparisons were performed to analyse the differences between the two groups.

(2) Correlation coefficient method: Using Pearson's correlation coefficient, if the coefficient between the item and the scale was < 0.40 or did not reach a significant level, this indicated that the item was not representative enough for the scale and was thus deleted.

2.2.5.2 Reliability analysis

Cronbach's alpha (α) coefficient and split-half reliability coefficient were applied to evaluate the internal consistency of the scale. In general, the scale has a higher degree of reliability when Cronbach's α coefficient and split-half reliability coefficient are > 0.80.

2.2.5.3 Validity analysis

1) The content validity consisted of item-level content validity index (ICVI) and scale-level average CVI (S-CVI/Ave). A total of eight experts were invited to rate the correlation between each item of the scale and the relevant dimensions using a four-level scoring system (1 point = no correlation; 2 points = weak correlation; 3 points = strong correlation and 4 points = very significant correlation). Generally, the content validity is good when ICVI $\geqslant 0.78$ and S-CVI/Ave $\geqslant 0.90$.

2) To assess the construct validity, confirmatory factor analysis of the model was conducted using AMOS 24.0. Here, factor models were built for the analysis by drawing basic graphs in AMOS and linking the variables with multidirectional arrows. An acceptable model-fitting would be indicated when $1 <$ Chi-square/degree-of-freedom ratio < 3, root mean square error of approximation $\leqslant 0.10$, goodness of fit index $\geqslant 0.800$, comparative fit index (CFI) $\geqslant 0.800$, normed fit index (NFI) $\geqslant 0.800$ and non-NFI $\geqslant 0.800$ [12].

2.3. Statistical analysis

With the data entered into Excel after data checking and collection by two staff members, the data analysis was conducted using SPSS 20 software (IBM Corp., Armonk, NY, USA). The counting data

Table 2
General information of the respondents ($n = 210$)

Items		Cases	Percentage (%)
Gender	Male	88	41.90
	Female	122	58.10
Ages	18∼30 years	6	2.86
	30–50 years	38	18.10
	50–65 years	88	41.90
	65–75 years	78	37.14
Degree of education	Junior middle school	30	14.29
	Polytechnic school and high school	112	53.33
	Junior college and university	66	31.43
	Postgraduate	2	0.95
Employment status	On-the-job	84	40
	Retired	63	30
	Unemployed	63	30
Comorbidities	Without	30	14.29
	With	180	85.71
Surgical methods	Wedge-shaped excision	109	51.90
	Segmentectomy	19	9.05
	Lobectomy	82	39.05
Marital status	Married	197	93.81
	Unmarried	13	6.19
Medical payment modes	At own expense	15	7.14
	At public expense/medical insurance	195	92.86
Monthly family income	$\leqslant$ 5000 yuan	154	73.33
	5000∼8000 yuan	48	22.86
	$\geqslant$ 8000 yuan	8	3.81
Surgical frequency	1 time	134	63.81
	2 times	60	28.57
	$\geqslant$ 3 times	16	7.62
Whether received perioperative health education	With	200	90
	Without	10	10

were described in terms of cases (n) and percentages. Analysis of the items was performed using critical ratio and correlation coefficient methods. The internal consistency of the scale was evaluated using Cronbach's α coefficient and split-half reliability coefficient. The validity of the scale was evaluated in terms of content validity and construct validity using linear stepwise regression analysis. The difference was statistically significant when $p \leqslant 0.05$. In addition, the fitting degree between the sample data and the preset model was verified using AMOS 24.0 software.

3. Results

3.1. General information of the respondents

The patients' general information included gender, age, degree of education, employment status, comorbidities, surgical methods, marital status, medical payment modes, monthly family income and surgical frequency, as well as whether perioperative health education had been received (Table 2).

3.2. Item analysis results

1) Critical ratio: As shown in Table 3, the critical ratio of items in the high-score and low-score groups

Table 3
Analysis of critical ratio results

Items	Critical ratio (CR)	p value (CR)	Correlation with the total score of the scale	p value (correlation with the total score of the scale)
Item 1	9.012***	0.000	0.634***	0.000
Item 2	8.529***	0.000	0.603***	0.000
Item 3	8.297***	0.000	0.598***	0.000
Item 4	8.618***	0.000	0.615***	0.000
Item 5	8.579***	0.000	0.612***	0.000
Item 6	8.423***	0.000	0.604***	0.000
Item 7	8.348***	0.000	0.571***	0.000
Item 8	8.653***	0.000	0.592***	0.000
Item 9	8.785***	0.000	0.609***	0.000
Item 10	9.407***	0.000	0.581***	0.000
Item 11	10.000***	0.000	0.642***	0.000
Item 12	6.058***	0.000	0.456***	0.000
Item 13	7.028***	0.000	0.564***	0.000
Item 14	7.099***	0.000	0.534***	0.000
Item 15	5.165***	0.000	0.425***	0.000
Item 16	7.215***	0.000	0.537***	0.000
Item 17	8.067***	0.000	0.542***	0.000
Item 18	8.784***	0.000	0.594***	0.000
Item 19	6.008***	0.000	0.449***	0.000
Item 20	4.135***	0.000	0.259***	0.000
Item 21	3.727***	0.000	0.232***	0.001
Item 22	3.025**	0.003	0.180**	0.009
Item 23	3.953***	0.000	0.243***	0.000
Item 24	3.176**	0.002	0.215**	0.002
Item 25	3.309**	0.001	0.229***	0.001
Item 26.	3.249**	0.002	0.229***	0.001
Item 27	3.486***	0.001	0.227***	0.001
Item 28	2.769**	0.007	0.188**	0.007

*$p < 0.05$ **$p < 0.01$ ***$p < 0.001$.

ranged from 2.769 to 10.000, with a statistically significant difference ($p < 0.001$), suggesting good discrimination of these items.

2) Correlation coefficient analysis: The correlation coefficient between each item and the total score was 0.524–0.874 ($r > 0.40$), showing a statistically significant difference ($p < 0.001$); hence, all these items were retained.

3.3. Reliability analysis results

The total Cronbach's α coefficient of the scale was 0.851, indicating high internal consistency. Specifically, the Cronbach's α coefficients for the four dimensions were 0.971, 0.944, 0.924 and 0.948, respectively (all > 0.80). Meanwhile, the total split-half reliability coefficient of the scale was 0.875, and the separate coefficients of the four dimensions were 0.951, 0.878, 0.866, and 0.922, respectively (all $>$ 0.80). All these data indicated that the scale met the requirements for assessment.

3.4. Validity analysis results

3.4.1. Content validity

As shown in Table 4, the results indicated that the I-CVI of each item was 0.875–1, and the S-CVI/Ave was 0.99, indicating good content validity of the scale after the evaluation by eight experts.

Table 4
Analysis of expert scoring results for each item

Item	Mean	Standard deviation	I-CVI	S-CVI/Ave
1	5.00	0.00	1	0.99
2	5.00	0.00	1	
3	5.00	0.00	1	
4	5.00	0.00	1	
5	5.00	0.00	1	
6	5.00	0.00	1	
7	5.00	0.00	1	
8	5.00	0.00	1	
9	3.875	0.354	0.875	
10	5.00	0.00	1	
11	5.00	0.00	1	
12	5.00	0.00	1	
13	5.00	0.00	1	
14	5.00	0.00	1	
15	5.00	0.00	1	
16	5.00	0.00	1	
17	5.00	0.00	1	
18	5.00	0.00	1	
19	5.00	0.00	1	
20	5.00	0.00	1	
21	5.00	0.00	1	
22	5.00	0.00	1	
23	5.00	0.00	1	
24	5.00	0.00	1	
25	5.00	0.00	1	
26	5.00	0.00	1	
27	3.875	0.354	0.875	
28	5.00	0.00	1	

Table 5
Evaluation results of comfort status of patients after endoscopic surgery for lung cancer ($n = 210$)

	Overall comfort	Environmental dimension	Socio-cultural dimension	Psycho-spiritual dimension	Physiological dimension
Average score of each dimension	3.72 ± 0.57	3.79 ± 1.07	3.83 ± 1.06	3.79 ± 0.87	3.59 ± 0.71

3.4.2. Construct validity

3.4.2.1 Results of confirmatory factor analysis

The Chi-square/degree-of-freedom ratio was 2.844, the goodness of fit index was 0.814, the CFI was 0.899, the root mean square error of approximation was 0.094, the NFI was 0.853, the non-NFI was 0.889 and the incremental fit index was 0.901, suggesting an acceptable model fitting.

3.5. Evaluation results of comfort status of patients following endoscopic surgery for lung cancer

Table 5 shows the evaluation results for the comfort status of the patients following endoscopic surgery for lung cancer, which included overall comfort and the environmental, socio-cultural, psycho-spiritual and physiological dimensions.

3.6. Analysis of influencing factors

There was no significant difference in the degree of comfort among the patients following endoscopic

Table 6
Influence of demography characteristics and surgical conditions on the degree of comfort of patients with lung cancer after endoscopic surgery ($n = 210$)

Items	Environmental dimension		Socio-cultural dimension		Psycho-spiritual dimension		Physiological dimension		Overall comfort	
	Regression coefficient	P	Regression coefficient	P	Regression coefficient	P	Regression coefficient	P	Regression coefficient	P
Gender	0.494	0.622	0.908	0.365	−0.003	0.997	−0.706	0.481	0.060	0.952
Age	3.034	0.030	2.755	0.044	0.199	0.897	2.732	0.045	0.132	0.941
Degree of education	1.731	0.180	1.446	0.238	4.235	0.016	3.642	0.028	6.523	0.002
Employment status	8.943	0.000	6.766	0.001	4.181	0.017	4.829	0.009	13.734	0.000
Comorbidities	−4.998	0.000	−4.987	0.000	−5.937	0.000	−2.822	0.006	−7.704	0.000
Surgical methods	1.130	0.325	1.370	0.256	1.853	0.159	1.296	0.276	2.059	0.130
Marital status	1.441	0.151	1.339	0.182	2.631	0.009	3.320	0.001	3.706	0.000
Medical payment modes	0.431	0.651	0.573	0.565	2.613	0.076	1.561	0.212	2.185	0.115
Monthly family income	0.805	0.448	0.195	0.823	1.017	0.363	1.240	0.291	0.271	0.763
Surgical frequency	1.174	0.311	0.892	0.411	0.396	0.674	0.012	0.988	0.205	0.815
Whether received perioperative health education	3.004	0.003	2.457	0.015	3.863	0.000	3.659	0.000	5.587	0.000

surgery in terms of different genders, ages, surgical methods, medical payment methods, monthly family income and surgical frequency. However, significant differences in the degree of comfort were observed among the patients with different educational degrees, employment status, comorbidities and marital status, as well as in terms of whether perioperative health education had been received ($p < 0.05$) (Table 6). These results indicated that the degrees of comfort were higher among the patients who were married, retired, were without comorbidities and had had more health and senior high school education than among those who were unmarried, unemployed/on-the-job, had comorbidities, had received less health education and had other educational backgrounds.

4. Discussion

4.1. Scientificity of the postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery

In this study, in strict accordance with the process of reliability and validity tests of the scale, corresponding items were comprehensively screened and summarised using multiple-item analysis methods to ensure the rationality and strictness of the involved items. In the internal consistency test, the total Cronbach's α coefficient of the scale was 0.851, with the separate coefficients of the four dimensions 0.971, 0.944, 0.924 and 0.948, respectively (all > 0.80), indicating that the scale has good internal consistency and confirming the high reliability of the results [13]. Meanwhile, the total split-half reliability coefficient of the scale was 0.875, and the separate coefficients of the four dimensions were 0.866–0.951 (all $>$ 0.80), suggesting good inter-item homogeneity and intrinsic correlation [14]. The S-CVI was 0.99 and the I-CVI was 0.875–1, indicating good content validity of the scale [15]. In addition, confirmatory factor analysis was conducted to verify the accuracy of the model [16], with the presence of good construct validity. Overall, the postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery developed in this study demonstrates good scientificity.

4.2. Overall comfort status of the patients following endoscopic surgery for lung cancer

A modified comfort scale established by Zhu et al. [11] was used to evaluate the patients after thoracic surgery, and the total score for comfort was 91.27 ± 8.63, indicating a high degree of comfort, with the lowest average score in the physiological dimension and the highest in the psychological dimension. In this study, the postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery was employed for the post-surgery assessment of the patients. Here, the total score for comfort was 104.10 ± 15.83, indicating a moderate degree of comfort, with the lowest average score in the physiological dimension, which can be explained primarily by the significant physiological trauma caused by the surgery itself. Following surgery, the patients would likely experience pain in the wound, accompanied by aggravated physiological discomfort induced by coughing and expectoration, dry mouth, thirst, catheter stimulation, etc., which was consistent with the research by Zhu et al. [11]. As previously reported [17, 18], thoracic surgery may produce the most severe pain among all surgical operations. After the surgery, when the patients have awoken, they undergo back tapping with coughing and expectoration. The incision may be stretched when coughing, causing severe pain for the patient. Therefore, preoperative health education should be emphasised by medical staff to ensure the patients understand the causes of pain and the postoperative recovery process. Furthermore, attention should be paid to protecting the wound when patting the back or when coughing is induced. At the same time, the pain assessment should be

strengthened, and multimodal combined analgesia should be used to alleviate the postoperative pain for patients undergoing surgery. Meanwhile, indwelling catheterisation can prevent dysuria due to the anaesthesia; however, this also has many disadvantages, such as reducing patient comfort, affecting early out-of-bed activity and inducing a high risk of urinary tract infections [19,20]. The results obtained in the present study were essentially consistent with the above findings. Similarly, in another study performed by Ni [21], thoracoscopic surgery without indwelling catheterisation can reduce the incidence of urinary tract infections, improve postoperative comfort, shorten the first time of out-of-bed activity and promote rapid recovery. Hence, in clinical practice, thoracoscopic surgery with a duration of < 2 h could be performed without indwelling catheterisation to reduce the postoperative discomfort caused by the urinary catheter. However, the bladder should be emptied prior to surgery, and the patient's urination and bladder filling should be monitored post-surgery. Appropriate measures should be taken in a timely manner in the case of dysuria.

In addition, this study revealed that the socio-cultural dimension had the highest score. This may be related to the specialised care provided by experienced medical staff after the patient returned to the care unit postoperatively, which includes explaining the postoperative precautions, assisting in coughing and expectoration, maintaining a comfortable position, meeting the patient's needs and enabling frequent communication with family members and receiving family companionship.

4.3. Analysis of factors influencing the comfort status of patients following endoscopic surgery for lung cancer

In the present study, the patients with senior high school education and those who were married had higher degrees of comfort than those with other degrees of education and who were unmarried. These results were inconsistent with those reported by Zhu et al. [22], which could be explained by the significant differences in the sample distribution of the two factors. Moreover, the scores of the retired patients were higher than those who were unemployed or were in work. This can be attributed to the fact that most retirees are older, bear less social pressure and have relatively good social security. Meanwhile, similar to the findings of this study, it was reported [23] that certain major complications, such as in the heart, lungs and kidneys, can lead to increased morbidity and mortality following pneumonectomy, while patients without complications have a single condition of illness, which may facilitate a rapid postoperative recovery. In addition, in terms of the socio-cultural dimension, patients receiving health education have a better understanding of the perioperative precautions, resulting in relatively good compliance and better cooperation with medical staff to promote a smooth recovery following surgery.

The present study revealed that different genders, ages, surgical methods, medical payment modes, monthly family income and surgical frequency had no impact on patient comfort. In contrast, Zhu et al. [22] reported that there was a statistically significant difference in the physiological comfort of patients with different genders 24 h after surgery. At the same time, different family economic statuses also affected the postoperative physiological comfort among the patients 24 h after surgery, with a higher degree of discomfort among patients with a higher economic income. It can be speculated that patients with higher economic status may have higher social status and thus more psychological needs, leading to a more obvious feeling of discomfort. However, surgical frequencies and surgical modes had no impact on the postoperative comfort of patients, which was consistent with the results of the present study. According to Kolcaba [2] and İbrahimoğlu [24], the comfort of patients might increase with age. However, this finding should be investigated in future research based on an expanded sample size.

However, this study has some limitations. First, the small sample size resulted in limited scalability. Second, the impact of education degree, comorbidities and marital status on the postoperative comfort

of the patients with lung cancer undergoing laparoscopic surgery remained undetermined due to the significant differences in sample distribution. Collectively, the findings of this study should be interpreted with caution, with further high-quality research with a larger sample size required for their validation.

Future research directions should focus on expanding the applicability of the postoperative comfort scale to diverse surgical populations, investigating its responsiveness to longitudinal changes in patient comfort, and exploring the effectiveness of interventions guided by the scale's findings to improve patient comfort outcomes. Additionally, further studies should address the timing and methods of assessing overall patient comfort status to enhance transparency in data collection and reporting. These efforts will contribute to a more comprehensive understanding of patient comfort and facilitate its effective management across various clinical settings.

5. Conclusion

The postoperative comfort scale for patients with lung cancer undergoing endoscopic surgery developed in this study has good reliability and validity, and it can be used to evaluate the degree of postoperative comfort among patients with lung cancer undergoing endoscopic surgery. Meanwhile, the survey results indicated an overall moderate degree of comfort among the patients undergoing endoscopic surgery, meaning further improvement is required, especially in the physiological dimension. The findings of this study suggest that during clinical nursing, it is important to apply individualised interventions according to the specific conditions of the patient, and measures should be taken to reduce their postoperative physiological discomfort.

Conflict of interest

None to report.

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