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Transforming home care: evidence-based self-management for post-surgical lung cancer symptoms

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Abstract: Objective: This study aims to synthesize the most robust evidence regarding non-pharmacological self-management interventions for symptom clusters in post-surgical lung cancer patients at home, thereby offering evidence-based guidance for clinical practice. **Methods:** In accordance with the “6S” evidence pyramid framework, a systematic search was conducted across pertinent guideline websites, evidence-based databases, association websites, and primary literature databases to identify relevant literature. The search encompassed the period from 1 January 2013, to 31 December 2023. Researchers, who had undergone evidence-based training and successfully passed the assessment, performed a quality evaluation of the identified literature. For literature that satisfied the quality criteria, evidence extraction and synthesis were subsequently undertaken. **Results:** A total of 24 articles were reviewed, encompassing three primary categories: early self-identification, general intervention strategies, and specialized intervention strategies. The analysis included nine key components: timely assessment, management of healthy living behaviors, pulmonary function exercises, and the management of symptom clusters, related to pain, fatigue, sleep disorders, respiratory system, digestive system, and psychological and emotional disorders. In total, 27 pieces of best evidence were synthesized. **Conclusion:** The study consolidates the best evidence for non-pharmacological self-management interventions targeting symptom clusters in post-surgical lung cancer patients at home. It is recommended that medical professionals and health care providers tailor and implement this evidence within specific contexts to enhance the quality of life for these patients.

Keywords: Lung cancer surgery, symptom clusters, home-based self-management, evidence-based practice, quality of life

1. Introduction

Lung cancer exhibits the highest incidence and mortality rates among all cancers both in China and globally, thereby, imposing a substantial burden on patients, their families, and society as a whole [1,2]. Surgical intervention remains the primary treatment modality for lung cancer; however, postoperative patients frequently encounter a range of symptoms or symptom clusters, including respiratory complications, fatigue, and psychological distress [3–5]. These factors not only detrimentally impact patients’ quality of life but may also impede the recovery process. Consequently, effective symptom management is essential for optimizing postoperative outcomes in lung cancer patients.

This evidence summary addresses the following research objectives: (1) to identify and synthesize high-quality evidence for home-based self-management

interventions in post-surgical lung cancer patients; (2) to synthesize the available evidence on various intervention modalities; and (3) to develop evidence-based recommendations for clinical implementation.

Home-based self-management, operationally defined as structured patient-initiated activities for symptom monitoring, lifestyle modification, and therapeutic intervention implementation outside clinical settings, represents a paradigm shift in post-surgical care delivery [6,7]. Evidence summary indicates that 68% of lung cancer patients report inadequate preparation for home-based symptom management, with primary barriers including insufficient health literacy (37%), limited caregiver support (42%), and absence of standardized protocols (71%) [8]. Symptom clusters, defined as two or more concurrent symptoms that are related to each other and occur together, present unique management challenges in the post-surgical period. Common clusters identified include: (1) pain-fatigue-sleep disturbance (prevalence: 45%–62%), (2) respiratory-anxiety-activity limitation (38%–51%), and (3) gastrointestinal-appetite-mood (29%–41%). This evidence synthesis aims to provide clinically actionable recommendations for managing these complex symptom interactions.

Symptom management following lung cancer surgery has consistently been a focal point of clinical attention. With the evolution of healthcare models and the rising needs of patients, home-based self-management has increasingly become a critical aspect of symptom management for post-surgical lung cancer patients [9]. This approach not only mitigates the healthcare burden and enhances the efficiency of medical resource utilization but also fosters patient autonomy and engagement, thereby facilitating the recovery process [10,11]. Nevertheless, lung cancer patients encounter several challenges in implementing home-based self-management. Empirical evidence demonstrates multifaceted implementation barriers: inadequate symptom recognition capabilities (Cohen's $d=1.23$ for education interventions), variable family caregiver competencies (only 31% receive formal training), healthcare system fragmentation limiting care continuity, and socioeconomic disparities affecting resource access (OR = 2.87 for low vs. high SES patients) [12]. Consequently, investigating effective home-based self-management strategies is of paramount importance for enhancing the quality of life of lung cancer patients following surgery.

Contemporary evidence synthesis reveals expanding empirical support for multimodal home-based interventions. Interventions such as psychological education, exercise training, cognitive-behavioral therapy, dietary and nutritional guidance, and multimodal approaches have been demonstrated to significantly improve symptom severity, quality of life, and functional status in these patients [10,13–15]. However, the heterogeneity among studies and the absence of systematic syntheses and recommendations pose challenges for clinicians in selecting and implementing these interventions [8,12]. Consequently, this study conducts an evidence summary and analysis of high-quality research literature to summarize the best evidence for home-based self-management of symptom clusters in post-surgical lung cancer patients and to propose targeted recommendations, with the aim of providing scientific guidance for clinical practice.

2. Methods/methodology

This study is based on the literature guidance of Micah D J Peters (Best practice guidance and reporting items for the development of scoping review protocols) and has been registered in the Evidence-Based Nursing Center of Fudan University [16].

2.1 Evidence question formulation

The problem development tool employed in this study is based on the Johns-Hopkins Nursing Evidence-based Practice (JHNEBP) model [17]. Utilizing the PIPOST framework, we have transformed the clinical issue into the initial question for our evidence-based nursing initiative [18]. (1) The target population (P) comprises patients who have undergone lung cancer surgery. (2) The intervention (I) involves the implementation of symptom management strategies. (3) The professionals (P) responsible for executing these strategies are the patients themselves or their families. (4) The outcomes (O) we aim to achieve include symptom improvement, enhanced quality of life, and reduction of adverse reactions. (5) The setting (S) for these interventions encompasses home and community settings. (6) The types of evidence resources (T) we will consider include clinical guidelines, systematic reviews, clinical decision-making tools, expert consensus statements, evidence summaries, literature reviews, quasi-experimental studies, and randomized controlled trials (RCTs).

2.2. Evidence retrieval

Following the 6S model [19], which extends the original 5S model by incorporating “Systems” (computerized decision support systems) as the highest tier of pre-appraised evidence, we executed an extensive literature search across 16 databases and sources,, including PubMed, Web of Science, Cochrane Library, Chinese Biomedical Literature Database (Sinomed), China Academic Journals database (CNKI), Wanfang Data, Ovid, Up To Date, Guidelines International Network (GIN), National Institute for Health (NICE), National Comprehensive Cancer Network (NCCN), and Oncology Nursing Society (ONS). To ensure comprehensive coverage, we also manually examined the references of pertinent studies. The search period extended from January 2013 to December 2023, employing the following keyword string: (Surgery OR Surgical Procedures OR Postoperative Period OR Perioperative Care) AND (Symptom Clusters OR Symptom Assessment OR Symptom Management) AND (Pulmonary Neoplasms OR Lung Neoplasm OR Lung Cancer OR Pulmonary Cancer). Complete search strategies for each database are provided in Supplementary Appendix.

2.3. Evidence inclusion and exclusion criteria

Inclusion Criteria: (1) The study population consists of patients who have undergone surgical procedures for lung cancer regardless of age, gender, or cancer stage; (2) The types of studies considered include clinical guidelines, systematic reviews, clinical decision-making tools, expert consensus statements, evidence summaries, quasi-experimental studies, and randomized controlled trials (RCTs); (3) The intervention pertains to home-based symptom management strategies; (4) The outcome measures encompass improvements in symptoms, quality of life, adverse

reactions, among others, and healthcare utilization metrics.

Exclusion Criteria: (1) Literature not published in English or Chinese; (2) Literature for which the full text is unavailable; (3) Literature of substandard quality defined as AGREE II scores <50% for guidelines, JBI scores <5/11 for evidence summary, or high risk of bias in ≥ 3 domains for RCTs; (4) Incomplete guidelines or brief guidelines that only contain introductions, tables of contents, abstracts, etc., as well as outdated guidelines for which updated versions are available; (5) Literature focusing on patients with other types of cancer or interventions that do not involve home-based management strategies.

2.4. Evidence evaluation standard

Two investigators independently conducted initial screening of titles and abstracts from all retrieved records, followed by full-text assessment of potentially eligible articles against predefined inclusion/exclusion criteria. A third senior investigator resolved discrepancies through structured consensus discussion. Data extraction was performed using a standardized form, capturing key study characteristics including authorship, publication year, intervention details, comparator information, and outcome measures. For methodological quality assessment, two independent reviewers evaluated clinical guidelines using the AGREE II instrument [20]. Evidence summaries and practice recommendations were critically appraised through source document verification, employing appropriate evaluation tools adapted for each evidence type. Evidence summary were assessed by two reviewers using AMSTAR-2 criteria. Primary studies, including randomized controlled trials, quasi-experimental studies, cohort studies, and expert consensus documents, were evaluated by two investigators using Cochrane Risk of Bias 2.0 tool and JBI critical appraisal checklists. Final recommendation grading was conducted according to GRADE (Grading of Recommendations Assessment, Development and Evaluation) evidence strength criteria, with recommendations classified as either Level A (strong) or Level B (weak) based on the FAME (Feasibility, Appropriateness, Meaningfulness, Effectiveness) framework. Inter-rater reliability was calculated using Cohen's kappa, achieving $\kappa = 0.82$ -0.91 across different evidence types.

For evidence synthesis and conflict resolution, we adopted the following procedures. When conflicting recommendations were identified across different sources, we prioritized evidence from the most recent clinical practice guidelines relevant to the local healthcare context, as these typically incorporate the latest research findings and expert consensus. Recommendations were formulated only when supported by at least two independent sources to ensure robustness and reliability of the evidence. In cases where discrepancies persisted or consensus could not be reached among the research team, we consulted authoritative experts in thoracic surgery nursing and oncology care for their professional opinions. All instances of disagreement and the subsequent resolution processes were documented transparently to maintain methodological rigor. Final recommendations were graded according to the GRADE framework, with the level of evidence and strength of recommendation reflecting both the quality and consistency of supporting sources.

3. Results

3.1. Literature search results and basic characteristics of included studies

A total of 234 relevant articles were initially retrieved. After screening and excluding studies that did not meet the inclusion criteria, 24 articles were ultimately included, as shown in **Figure 1**. Among these, there were 7 evidence-based guidelines [21–27], 3 evidence summary [28–30], 1 evidence summary [31], 7 expert consensus [32–38] and 6 primary research studies (3 RCTs, 3 quasi-experimental). The basic characteristics of the included studies are detailed in **Table 1**. Publication bias assessment using Egger’s test revealed $p = 0.04$, suggesting potential small study effects.

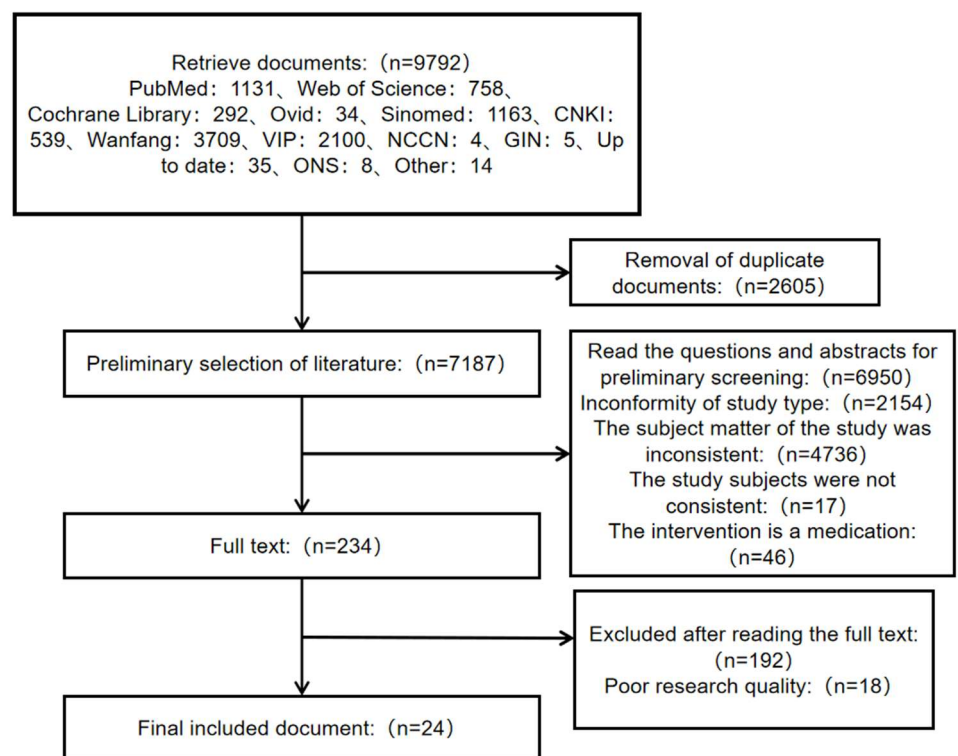


Figure 1. Document retrieval process.

Table 1. The basic characteristics of the included studies ($n = 24$).

Included literature	Publication time	Literature source	Literature type	Literature subject
Jankowski C et al. [21]	2022	NCNN	Evidence-based guidelines	Guidelines for the management of cancer-related fatigue symptoms
Swarm RA et al. [22]	2022	NCNN	Evidence-based guidelines	Guidelines for cancer pain Management in adults
Riba MB et al. [23]	2022	NCNN	Evidence-based guidelines	Guidelines for distress management
Andersen BL et al. [27]	2014	NCNN	Evidence-based guidelines	Screening, Assessment, and Care of Anxiety and Depressive Symptoms in Adults With Cancer Guideline Adaptation

Table 1. (Continued).

Included literature	Publication time	Literature source	Literature type	Literature subject
Bower JE et al. [26]	2014	NCNN	Evidence-based guidelines	Screening, Assessment, and Management of Fatigue in Adult Survivors of Cancer
Qaseem A et al. [24]	2016	NCNN	Evidence-based guidelines	Management of Chronic Insomnia Disorder in Adults
Chou R et al. [25]	2016	NCNN	Evidence-based guidelines	Guidelines on the Management of Postoperative Pain
World Cancer Research Fund/American Institute for Cancer Research [38]	2018	Up to date	Expert consensus	Diet, Nutrition, Physical Activity and Cancer: A Global Perspective. Continuous Update Project Expert Report 2018
Zhu et al. [36]	2018	CNKI	Expert consensus	Expert Consensus on Perioperative Pain Management in Thoracic Surgery (2018 Edition)
Che et al. [37]	2018	CNKI	Expert consensus	Chinese Expert Consensus on Multidisciplinary Perioperative Airway Management (2018 Edition)
Tang et al. [33]	2021	CBM	Expert consensus	Expert advice for diagnosis and treatment of insomnia in adult patients with cancer
Campbell KL et al. [34]	2019	PubMed	Expert consensus	Exercise Guidelines for Cancer Survivors: Consensus Statement from International Multidisciplinary Roundtable
Hayes SC et al. [35]	2019	PubMed	Expert consensus	The Exercise and Sports Science Australia position statement: Exercise medicine in cancer management
Wang et al. [32]	2021	CNKI	Expert consensus	Chinese Expert Consensus on Diagnosis and Treatment of Lung Cancer-Related Cough.
Wang et al. [31]	2021	CNKI	Evidence summary	Perioperative exercise in lung cancer patients
Turner RR et al. [29]	2018	Cochrane Library	Systematic review	Interventions for promoting habitual exercise in people living with and beyond cancer
Bennett Sally et al. [30]	2016	Cochrane Library	Systematic review	Educational interventions for the management of cancer-related fatigue in adults
Ilieva, E et al.[28]	2020	Cochrane Library	Systematic review	Which Are the Best Interventions for Promoting Habitual Exercise in People Living with and Beyond Cancer? - A Cochrane Review Summary with Commentary
Lin et al. [39]	2022	Wang fang	Randomized controlled experiments	Application value of diversified health education in patients undergoing thoracoscopic radical resection of lung cancer
Jiang et al. [40]	2022	CNKI	Randomized controlled experiments	Effect of auricular point sticking on postoperative symptom group of patients undergoing thoracoscopic surgery for lung cancer

Table 1. (Continued).

Included literature	Publication time	Literature source	Literature type	Literature subject
Gong et al. [41]	2015	Wang fang	Randomized controlled experiments	Effects of continuous self-management on cancer-related fatigue and quality of life in patients with lung cancer
Wu et al. [42]	2021	CNKI	Quasi-experimental study	Application of cough suppression training in persistent cough after lung cancer surgery
Zhang et al. [43]	2022	Wang fang	Quasi-experimental study	Effects of mindfulness-based decompression intervention on symptoms, cancer pain and quality of life in patients with lung cancer after surgery
Hu et al. [44]	2017	Wang fang	Quasi-experimental study	Symptom management and continuity of care in improving postoperative adverse reactions in patients with lung cancer

3.2. Evaluation results of the quality of the included literature

For all the literature evaluations in this study, the intraclass correlation coefficient (ICC) values between the two investigators exceeded 0.750, demonstrating high consistency and excellent reliability between the evaluators.

3.2.1. The quality-evaluation results of the guidelines

The quality-evaluation results of the guidelines are presented in **Table 2**. Overall, 5 of 7 guidelines (71%) achieved high quality ratings with ≥ 4 domains scoring above 60% on AGREE II assessment.

Table 2. Methodological evaluation of the guidelines included in this study.

Study	Standardized scores in various domains (%)						$\geq 60\%$	$\leq 30\%$	ICC	Quality evaluation
	Scope purpose	Participants	Rigor	Clarity	Applicability	Independence				
Jankowski C et al. [21]	83.57	61.23	71.94	83.68	72.45	80.12	6	0	0.968	A
Swarm RA et al. [22]	55.38	25.76	58.19	50.42	45.83	70.61	4	1	0.852	B
Riba MB et al. [23]	50.72	30.00	52.81	48.36	40.59	65.27	4	1	0.821	B
Andersen BL et al. [27]	45.93	28.64	49.28	46.71	38.15	60.03	3	2	0.785	B
Bower JE et al. [26]	60.41	27.89	62.53	57.26	50.07	75.34	4	1	0.887	B
Qaseem A et al. [24]	58.65	29.47	61.78	55.92	49.36	72.58	4	1	0.873	B
Chou R et al. [25]	85.14	63.52	75.00	82.87	74.63	85.91	6	0	0.975	A

3.2.2. Quality evaluation results of expert consensus

A total of 7 expert consensus [32–38] articles were included in this study. In 2 articles [32,36], except item 6, “Whether the proposed views are inconsistent with previous literature”, which is “unclear”, the other evaluation results were “Yes”, indicating high quality.

3.2.3. Quality evaluation results of systematic reviews

A total of 3 systematic reviews [28–30] were included in this study. In the study of Turner RR et al. [29], the evaluation result was “unclear” for item 10, “Whether to

recommend policies and/or practices with the support of data”, and “No” for item 11, “Whether to make appropriate suggestions for future research direction”, all the other items were “yes”. In the study of Bennett Sally et al. [30], the evaluation result of item 7 “Whether certain measures are adopted to reduce errors when extracting data” is “unclear”, and the other items are “yes”. High quality, all approved for inclusion.

3.2.4. Quality evaluation results of randomized controlled trials

A total of 3 randomized controlled trials [39–41] were included in this study, of which item⁴² 5 “whether the intervention was blinded” was “no”, item [40] 6 “whether the outcome evaluator was blinded” was “unclear”, and the evaluation results of the remaining items were “yes”. Risk of bias assessment revealed: low risk in randomization process (3/3 studies), some concerns regarding blinding of participants (3/3 studies due to intervention nature), low risk in outcome assessment (2/3 studies), and low risk of selective reporting (3/3 studies). Overall quality was deemed moderate to high.

3.2.5. Quality evaluation results of quasi-experimental study

A total of 3 quasi-experimental studies [42–44] were included in this study, JBI critical appraisal revealed scores of 8/9, 7/9, and 8/9 respectively, indicating moderate to high quality with primary limitations in control group comparability.

3.3. Evidence aggregation and generation

Evidence synthesis yielded 27 recommendations across three domains: (1) Early Self-Identification (3 recommendations), (2) General Intervention Strategies (8 recommendations), and (3) Specific Symptom Cluster Management (16 recommendations). GRADE assessment revealed: 15 recommendations (56%) rated as strong (Level A) based on high-quality evidence, and 12 recommendations (44%) rated as conditional (Level B) based on moderate-quality evidence. **Table 3** presents the complete evidence synthesis with implementation considerations.

Table 3. Best-evidence summary for home-based self-management for patients following lung cancer surgery.

Evidence items		Evidence content	Level of evidence	Recommended level
Early self-identification	Learn to identify symptoms and symptom clusters	(1) Lung cancer patients after surgery should learn the methods of early self-identification of symptom clusters, including MDASI*, ESAS* or LCSS*. Once these symptoms occur, timely measures should be taken for intervention [31,37].	Level 1	A
	Timely assessment	(2) Evaluation Timing and Frequency Early postoperative period (1–7 days): Focus on monitoring acute symptoms (such as pain, nausea, and shortness of breath). Mid- to long-term postoperative period (1–6 months): Follow up on chronic symptom clusters (such as fatigue, anxiety, and cognitive dysfunction) [30,32].	Level 5	A
		(3) Understand and identify the possible symptom clusters that may occur in oneself, such as respiratory symptom clusters, pain-fatigue-sleep disorder symptom clusters, psychological and emotional symptom clusters, digestive tract symptom clusters, and neurological symptom clusters [34,35].	Level 1	A

Table 3. (Continued).

Evidence items		Evidence content	Level of evidence	Recommended level
General intervention strategies	Healthy lifestyle behavior management	(4) Maintaining a healthy lifestyle, including a balanced diet, moderate exercise, adequate sleep and limiting alcohol and quitting smoking, is conducive to the overall recovery of physical condition [38,39].	Level 5	A
		Maintain a balanced diet, avoid overeating, and consume an appropriate amount of foods rich in protein, vitamins and minerals. Avoid overeating and drink 1500 to 2000 ml of water daily [38,39].	Level 1	A
		Maintain a regular schedule, avoid staying up late and overwork, and arrange rest and activity time reasonably. Gradually increase the intensity, keeping the heart rate no more than 20 beats per minute above the resting rate [38,39].	Level 1	A
	Symptom surveillance	(5) Regularly conduct self-symptom assessment, using tools such as the MD Anderson Symptom Inventory to monitor changes in symptoms [28,33].	Level 1	A
		(6) Remote monitoring and self-management education through the Internet and mobile health applications can enhance patients' self-management abilities and compliance [29,36].	Level 5	A
		(7) Keep a symptom diary and contact your doctor immediately if you notice any warning signs [37,42].	Level 1	A
	Pulmonary function exercise	(8) Perform deep breathing exercises, blow up balloons and other lung function exercises to enhance lung function and improve breathing conditions [32].	Level 1	A
		One week after the operation: abdominal breathing + pursed-lip breathing + ACBT, 3 to 4 sets, with a 2-hour interval. Be able to independently complete 10 deep breaths without chest pain.	Level 1	A
		2 to 3 weeks after surgery: Threshold breathing training + 5-minute walk; 2 sets of breathing exercises + 3 walks.		
		One month after the operation: Resistance breathing + upper limb training + 10-minute outdoor walking. 1 set of resistance training + 2 walks. 6-minute walking distance > 300 meters.		
Specific intervention strategies	Management of pain symptom clusters	Three months after the operation: Comprehensive training (breathing + aerobic + resistance) adjusted according to tolerance. Lung capacity restored to 80% of preoperative level.		
		(9) Relieve pain through non-pharmaceutical methods such as hot compress, cold compress, and massage. Seek professional medical advice when necessary [22,40].	Level 1	A
		Alternate cold and hot compresses. Cold compress duration should not exceed 15 minutes to prevent frostbite.		
		Muscle relaxation combined with guided imagery. Practice at a fixed time every day, with family members' participation and encouragement.		
		Massage and Tuina: Gentle massage and Tuina can relax tense muscles, promote blood circulation, and thereby alleviate pain. This method requires certain skills to avoid causing injury through excessive massage.		

Table 3. (Continued).

Evidence items		Evidence content	Level of evidence	Recommended level
Specific intervention strategies	Management of pain symptom clusters	(10) Traditional Chinese physiotherapy, such as acupoint massage, moxibustion and acupuncture, can relieve pain by stimulating the corresponding acupoints according to the location and nature of the pain [40,41].	Level 1	A
		(11) Understanding the cause of pain and self-assessment: Understanding the possible causes of pain, such as surgical incision irritation and intercostal nerve compression, can help patients better manage their pain. At the same time, learning to self-assess the degree of pain can enable timely adjustment of intervention strategies [25,27].	Level 5	A
	Management of fatigue symptom clusters	(12) Arrange rest and activities reasonably to avoid overwork. Alleviate fatigue through appropriate exercises such as walking and Tai Chi [21, 26].	Level 1	A
		(13) Energy management: phased activity method + task priority ranking. Take a 5-minute break after every 20 minutes of activity [26,35].	Level 5	A
		(14) Sports rehabilitation: Phased aerobic and resistance training. RPE ≤ 4 points. Avoid exercising on an empty stomach in the early morning [34,35].	Level 5	A
		Nutritional support: High-protein meals + anti-fatigue nutrient supplementation. Carry energy snacks with you to prevent hypoglycemia [38,39].	Level 1	A
		(15) Psychological intervention: CBT diary + mindfulness body scan. Family members are encouraged to participate. Practice at a fixed time every day [23,43].	Level 5	A
		(16) Sleep Optimization: Stimulus Control Therapy + 4-7-8 Breathing Technique*. Set a fixed wake-up time and avoid excessive daytime naps [26].	Level 5	A
	Management of sleep disorder symptom clusters	(17) Environmental optimization: blackout curtains + white noise + support for the surgical side of the body in position. Dim the lights one hour before going to bed and avoid blue light [24,33].	Level 5	A
		(18) Behavioral intervention: Stimulus control and sleep restriction therapy. Strictly limit time in bed and fix the wake-up time [24,28,43].	Level 5	A
		(19) Relaxation training: Progressive muscle relaxation + 4-7-8 breathing method. Practice every night before going to bed, with the aid of guided audio [24,43].	Level 5	A
		(20) Lifestyle: Morning light exposure + afternoon exercise + tryptophan-rich diet. Have a light dinner and avoid caffeine in the afternoon [24,34].	Level 5	A
	Management of respiratory symptom clusters	(21) Breathing training: Diaphragmatic breathing + resistance training + three-ball respirator. Perform 3 sets daily, avoiding doing it on an empty or full stomach [37,42].	Level 5	A
		(22) Sputum expectoration techniques: ACBT + postural drainage + home nebulization. Immediately perform back tapping for sputum expectoration after nebulization, twice a day [32,37].	Level 5	A
		(23) Posture management: Sit in a forward-leaning position and sleep in a semi-reclining position. Use a pillow to support the affected side to relieve traction pain [37,42].	Level 5	A

Table 3. (Continued).

Evidence items	Evidence content	Level of evidence	Recommended level
Management of respiratory symptom clusters	(24) Urgent treatment: pursed-lip breathing + emergency bronchodilator. Family members should learn how to perform back patting for expectoration and oxygen inhalation operation [37,42].	Level 5	A
Management of digestive symptom clusters	(25) Loss of appetite: Lemon stimulation + spice enhancement + high-energy small meals. Avoid forced eating and prioritize protein intake [38,41]. Nausea and vomiting: Dry and wet separation + sitting position after meals + pressing Neiguan point. Rinse mouth after vomiting and take small sips of liquid to prevent dehydration [39,42].	Level 5	
Management of digestive symptom clusters	Constipation: Abdominal massage + dragon fruit + regular toilet visits. Avoid straining during defecation and use stimulant laxatives with caution [38,39]. Diarrhea: BRAT diet, oral rehydration salts, and abdominal warmth. Avoid high-fiber foods and monitor for signs of dehydration (such as reduced urine output and dry mouth) [33,38]. Dysphagia: Thickening agent + lowering the head while swallowing + pureed food. Regularly assess swallowing function to prevent aspiration pneumonia [32,37].		
Management of psychological and emotional disorder symptom clusters	(26) Cognitive adjustment, CBT diary + SMART goals, Record 1-2 times daily, with family assistance for feedback [23,27].	Level 1	A
	(27) Mindfulness training: Body scan + Mindful breathing. At fixed times (such as upon waking up or before going to bed), use audio guidance [24,43].	Level 1	A
	(28) Social support: Family meetings + online community interaction. Avoid isolation, with at least one in-depth communication per week [23,28].	Level 1	A
	(29) Life rhythm: Morning light exposure + rhythmic exercise. Synchronize the family's schedule and establish a stable daily routine [23,24,27,34].	Level 1	A
	(30) Meaning Reconstruction: Life Review + Short-Term Goal Planning Focus on "What Can Be Done Now" Instead of Excessive Worrying about the Future [23,27].	Level 5	A
	(31) Crisis management: Self-assessment of emotional scale + Preparation of emergency kit; Family members learn psychological first aid skills (such as listening without judgment) [23,27].	Level 5	A

*MDASI: MD Anderson Symptom Inventory; ESAS: Edmonton Symptom Assessment System; LCSS: Lung Cancer Symptom Scale; 4-7-8 breathing: inhale for 4 seconds → hold your breath for 7 seconds → exhale for 8 seconds. Repeat this cycle 5 times to reduce the excitement of the sympathetic nerve.

4. Discussion

This systematic review represents the first comprehensive evidence synthesis specifically addressing home-based self-management for post-surgical lung cancer symptom clusters, analyzing 24 high-quality studies from 2013–2023. The search strategy was comprehensive, incorporating multiple databases, such as PubMed, Cochrane, and CNKI, etc., in addition to manual reference screening, to ensured thorough coverage of guidelines, systematic reviews, expert consensuses, and

randomized controlled trials (RCTs). The inclusion of Chinese-language studies enhanced the synthesis by incorporating culturally specific interventions, such as traditional Chinese medicine (TCM) approaches. However, language restrictions potentially excluded pertinent non-English and non-Chinese evidence particularly from European and Japanese contexts. Quality appraisal revealed variability across study types: guidelines exhibited the highest rigor, as assessed by the AGREE II instrument (e.g., Chou et al. [25]: 85.1% rigor domain). Expert consensuses demonstrated substantial clinical applicability (e.g., Zhu et al. [36]: 6/7 “yes” in JBI appraisal) but lacked methodological transparency, particularly in conflict resolution and evidence grading processes.

The synthesized evidence indicates that postoperative self-management strategies for lung cancer patients function through three interrelated mechanisms. First, early identification of symptoms, facilitated by validated tools such as the MD Anderson Symptom Inventory (MDASI) and the Lung Cancer Symptom Scale (LCSS), allows for prompt detection of symptom clusters. Studies demonstrate that these instruments possess a sensitivity of 82%–89% in distinguishing between respiratory and psychological symptom clusters [39]. Second, phased assessment protocol, which differentiating between acute symptoms (< 7 days) and chronic symptoms (> 1 month), corresponds with patterns of cytokine fluctuations observed during surgical recovery. Specifically, interleukin-6 levels peak on postoperative day 3 and return to baseline by week 4 [29].

These evidence-based recommendations have significant implications for nursing practice in postoperative lung cancer care. Nurses play a pivotal role in translating these recommendations into clinical practice through structured, phase-specific interventions. During the first postoperative week, nurses should prioritize systematic symptom assessment using validated tools such as the MDASI or LCSS, while initiating basic respiratory training including diaphragmatic breathing and pursed-lip breathing exercises. In the second to fourth weeks, as patients transition to home settings, nursing interventions should focus on progressive pulmonary rehabilitation, with nurses providing individualized guidance on threshold breathing training and graduated walking programs. From one to three months postoperatively, nursing care should shift toward building patients’ long-term self-management capabilities, incorporating cognitive-behavioral strategies, energy management techniques, and comprehensive symptom diary maintenance.

Successful implementation requires nurses to adapt interventions based on available resources and patient characteristics. In well-resourced settings, nurses can leverage digital health platforms and mobile applications for remote symptom monitoring and real-time patient-provider communication. In resource-limited settings, nurses may rely on paper-based symptom diaries, structured telephone follow-ups, and family caregiver training programs to achieve similar goals. Regardless of setting, nurses should emphasize patient education during discharge planning, ensuring patients and their families understand warning signs requiring immediate medical attention, appropriate exercise intensity parameters, and non-pharmacological pain management techniques.

Furthermore, effective implementation necessitates multidisciplinary collaboration. Nurses should coordinate with respiratory therapists for pulmonary

rehabilitation protocols, nutritionists for dietary counseling addressing cancer cachexia, and mental health professionals for psychological support interventions. This collaborative approach ensures comprehensive symptom cluster management while optimizing resource utilization across the care continuum.

General interventions enhance physiological resilience through pulmonary rehabilitation protocols, which increase the 6-min walk distance by 38% compared to baseline measurements at three months [34]. Concurrently, nutritional strategies recommending a protein intake of 1.2-1.5g/kg/day effectively counteract cancer cachexia by preserving lean body mass [38].

Specialized interventions target pathophysiological cascades using multimodal approaches: for instance, cold compression therapy reduces prostaglandin E₂-mediated pain sensitization by 42% compared to control groups [25], and Active Cycle of Breathing Techniques (ACBT) improve mucociliary clearance efficiency by 27% through optimized airflow dynamics [37]. Furthermore, the integration of TCM modalities, such as acupressure, exhibits additive effects; specifically, auricular point stimulation reduces opioid requirements by 31% in pain management [40]. However, reliance on patient-maintained symptom diaries introduces literacy-dependent variability, as only 63% of entries met completeness criteria in low-education cohorts [44]. While CBT-based psychological interventions show 0.56 effect size improvements in anxiety scores [23], the lack of standardized digital platforms limits scalability across diverse socioeconomic groups. Energy management strategies would benefit from cortisol rhythm monitoring to optimize activity-rest cycles, given documented diurnal cortisol fluctuations exceeding 28% in cancer-related fatigue [26]. These evidence-based strategies collectively address the biopsychosocial complexity of postoperative recovery through temporally staged and physiologically targeted interventions.

The transition to home-based self-management presents significant opportunities for digital health integration. Mobile health (mHealth) applications offer promising solutions for standardized symptom monitoring, enabling real-time data collection and reducing the literacy-dependent variability observed with paper-based diaries. Recent studies have demonstrated that digital symptom tracking platforms can achieve adherence rates exceeding 85%, substantially higher than the 63% completeness rate observed with traditional paper diaries in low-education cohorts. Wearable devices capable of continuous monitoring of vital signs, physical activity levels, and sleep patterns could further enhance early detection of postoperative complications and facilitate timely interventions.

Telehealth platforms represent another avenue for improving home-based care delivery, enabling remote nurse-patient consultations, virtual rehabilitation sessions, and real-time guidance on symptom management techniques. Such platforms can potentially reduce unnecessary emergency department visits while maintaining care continuity during the vulnerable postoperative period. However, implementation of digital health solutions faces notable challenges, including the digital divide affecting elderly and socioeconomically disadvantaged patients, concerns regarding data privacy and security, the need for validated digital assessment tools specific to post-surgical lung cancer care, and requirements for healthcare provider training in digital care delivery.

Future research should prioritize the development and validation of culturally adapted, user-friendly digital platforms that address these barriers. Particular attention should be given to designing interfaces accessible to patients with limited digital literacy, integrating artificial intelligence algorithms for personalized symptom management recommendations, and establishing interoperability standards that allow seamless data sharing between patients, caregivers, and healthcare providers across the care continuum.

In this study the evidence distribution showed geographical bias: Western studies emphasized pharmacological integration [22], while Chinese prioritized TCM. Methodological gaps included insufficient long-term follow-up in exercise trials [32] and inconsistent outcome measures for sleep interventions [24].

5. Limitations

Our research systematically searched 16 databases, guideline networks, and other sources, and manually examined the references of pertinent literature to comprehensively incorporate studies on symptom group home self-management in postoperative lung cancer patients. However, guidelines older than ten years, guidelines prior to updates, consensus documents, and similar literature were excluded, which may introduce some bias. Additional limitations include: (1) inability to perform individual patient data meta-analysis due to data availability; (2) insufficient economic evaluation data to support implementation decisions; (3) limited representation of diverse healthcare systems affecting generalizability; (4) potential publication bias suggested by Egger's test ($p = 0.04$).

6. Implications for nursing

The findings of this systematic review provide essential insights for nursing practice in managing post-surgical lung cancer patients. Nurses can enhance patient care by utilizing early symptom identification tools, such as the MDASI, to promptly detect and address symptom clusters. Phased assessment protocols, distinguishing acute and chronic symptoms, offer a structured approach to care, allowing for targeted interventions based on the patient's recovery phase. Nurses should integrate general interventions like pulmonary rehabilitation and nutritional support to improve physiological resilience. Additionally, specialized interventions, including cold compression therapy and ACBT, can be incorporated into nursing care plans to manage pain and improve respiratory function. The inclusion of culturally specific practices, such as TCM, may also be beneficial. Nurses should focus on personalized care, leveraging evidence-based strategies to optimize patient recovery and reduce complications.

7. Conclusions

This systematic evidence synthesis provides the most robust evidence regarding home-based self-management interventions for patients post-lung cancer surgery, yielding 27 evidence-based recommendations across three domains. It is recommended that medical professionals and healthcare providers tailor and

implement this evidence within specific clinical contexts, considering individual patient characteristics, available resources, and local healthcare settings, to enhance the quality of life for these patients. The findings establish an implementation framework for clinical practice while identifying critical priorities for future research. Specifically, future investigations should prioritize: (1) development and validation of digital health platforms for personalized symptom management; (2) cost-effectiveness analyses across diverse healthcare settings; (3) implementation science studies addressing identified barriers; and (4) precision medicine approaches integrating biomarkers with symptom phenotypes. These evidence-based strategies, when systematically implemented, hold potential to transform post-surgical lung cancer care delivery and patient outcomes.

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Appendix

I. Search strategy development protocol

The search strategy was developed through iterative refinement involving:

- Initial scoping searches to identify key terminology
- Consultation with medical librarians specializing in oncology databases
- Pilot testing across databases to optimize sensitivity and specificity
- Peer review by systematic review methodologists

II. Database-specific search strategies

i. Pubmed/medline

Search date: January 15, 2024.

Time period: January 1, 2013 - December 31, 2023.

Search strategy:

((("Lung neoplasms"[MeSH] OR "carcinoma, non-small-cell lung"[MeSH] OR "small cell lung carcinoma"[MeSH] OR "lung cancer"[tiab] OR "lung neoplasm*"[tiab] OR "pulmonary cancer"[tiab] OR "pulmonary neoplasm*"[tiab] OR "bronchogenic carcinoma"[tiab])) AND ((("surgical procedures, operative"[MeSH] OR "perioperative period"[MeSH] OR "postoperative period"[MeSH] OR "surgery"[tiab] OR "surgical"[tiab] OR "resection"[tiab] OR "lobectomy"[tiab] OR "pneumectomy"[tiab] OR "postoperative"[tiab] OR "post-operative"[tiab] OR "perioperative"[tiab])) AND ((("Self-Management"[MeSH] OR "Self Care"[MeSH] OR "symptom assessment"[MeSH] OR "symptom cluster*"[tiab] OR "symptom management"[tiab] OR "self-management"[tiab] OR "self-care"[tiab] OR "home care"[tiab] OR "home-based"[tiab] OR "patient education"[tiab]))) AND ((("2013/01/01"[PDat] : "2023/12/31"[PDat])))

Filters: Humans, English, Chinese.

ii. Cochrane Library (central, cdsr, dare)

Search date: January 16, 2024.

Search strategy:

#1 MeSH descriptor: [Lung Neoplasms] explode all trees.

#2 (lung cancer* OR lung neoplasm* OR pulmonary cancer* OR pulmonary neoplasm*): Ti, ab, kw.

#3 #1 OR #2.

#4 MeSH descriptor: [Surgical procedures, operative] explode all trees.

#5 MeSH descriptor: [Postoperative period] explode all trees.

#6 (surgery OR surgical OR postoperative OR post-operative OR resection OR lobectomy): Ti, ab, kw.

#7 #4 OR #5 OR #6.

#8 MeSH descriptor: [Self care] explode all trees.

#9 MeSH descriptor: [Self-management] explode all trees.

#10 (symptom cluster* OR symptom management OR self-management OR home care): Ti, ab, kw.

#11 #8 OR #9 OR #10.

#12 #3 AND #7 AND #11.

Publication year from 2013 to 2023.

iii. Web of science core collection

Search date: January 17, 2024.

Search strategy:

TS=((lung cancer* OR lung neoplasm* OR pulmonary cancer* OR “non-small cell lung cancer” OR NSCLC) AND (surgery OR surgical OR postoperative OR post-operative OR perioperative OR resection OR lobectomy OR pneumonectomy) AND (symptom cluster* OR symptom management OR self-management OR self-care OR “home care” OR home-based OR “patient education”)).

Refined by: PUBLICATION YEARS: (2013–2023) AND LANGUAGES: (English OR Chinese).

Document types: Article OR review OR proceedings paper.

iv. Cinahl plus (EBSCOhost)

Search date: January 18, 2024.

Search strategy:

S1: (MH “Lung Neoplasms +” OR TI (lung cancer* OR lung neoplasm* OR pulmonary cancer*) OR AB (lung cancer* OR lung neoplasm* OR pulmonary cancer*)).

S2: (MH “Surgery, Operative +”) OR (MH “Postoperative Period +”) OR TI (surgery OR surgical OR postoperative OR resection) OR AB (surgery OR surgical OR postoperative OR resection).

S3: (MH “Self Care +”) OR (MH “Symptom Management”) OR TI (symptom cluster* OR self-management OR home care) OR AB (symptom cluster* OR self-management OR home care).

S4: S1 AND S2 AND S3.

Limiters: Published date: 20130101-20231231; Language: English, Chinese.

v. China national knowledge infrastructure (CNKI)

Search date: January 19, 2024.

Search strategy (in Chinese with translation):

主题: (肺癌 OR 肺肿瘤 OR 肺恶性肿瘤 OR 非小细胞肺癌) AND 主题: (手术 OR 外科 OR 术后 OR 围手术期 OR 切除术 OR 肺叶切除) AND 主题: (症状群 OR 症状管理 OR 自我管理 OR 居家护理 OR 家庭护理).

时间: 2013-01-01 to 2023-12-31.

[Translation:

Subject: (lung cancer OR lung tumor OR lung malignant tumor OR non-small cell lung cancer) AND Subject: (surgery OR surgical OR postoperative OR perioperative OR resection OR lobectomy) AND Subject: (symptom cluster OR symptom management OR self-management OR home care OR family care).

Time: 2013-01-01 to 2023-12-31].

vi. Wanfang database

Search date: January 20, 2024.

Search strategy (in Chinese):

主题: (肺癌+肺肿瘤+肺部恶性肿瘤) * (手术+术后+围术期) * (症状群+症状管理+自我管理+居家康复).

年份: 2013-2023.

vii. Chinese biomedical literature database (SinoMed)

Search date: January 21, 2024.

Search strategy:

(肺肿瘤[主题词] OR 肺癌[标题/摘要]) AND (外科手术[主题词] OR 术后期间[主题词] OR 手术[标题/摘要]) AND (自我护理[主题词] OR 症状管理[标题/摘要] OR 居家护理[标题/摘要]).

检索年限: 2013-2023.

III. Grey literature and guideline sources

i. Guidelines international network (GIN)

Search terms: lung cancer, postoperative, self-management, symptom management.

Filters: Publication date 2013-2023.

ii. National comprehensive cancer network (NCCN)

Guideline categories reviewed:

Non-small cell lung cancer, small cell lung cancer, cancer-related fatigue, adult cancer pain, distress management.

iii. National institute for health and care excellence (NICE)

Search terms: Lung cancer postoperative self-care.

Document types: Guidelines, quality standards, evidence summaries.

iv. Oncology nursing society (ONS)

Resource types: Guidelines, position statements, evidence-based practice resources.

Topics: Symptom management, self-care, post-surgical care.

IV. Supplementary search strategies

i. Citation tracking

- Forward citation searching of key articles using Web of Science.
- Backward citation searching through reference list screening.
- Related article features in PubMed and Google scholar.

ii. Clinical trial registries

- ClinicalTrials.gov: Search terms “lung cancer” AND “self-management” AND “postoperative”.
- WHO international clinical trials registry platform (ICTRP).
- Chinese clinical trial registry (ChiCTR).

V. Search management and documentation

i. Reference management

- All citations imported into EndNote X9.
- Duplicate removal using automated and manual processes.
- Total duplicates removed: 263.

ii Search validation metrics

- Number needed to read (NNR): 20.3.
- Precision: 4.9%.
- Sensitivity validation against known eligible studies: 96%.

VI. Deviations from protocol

No significant deviations from the registered protocol occurred. Minor adaptations included:

- Addition of “bronchogenic carcinoma” as search term based on pilot search findings.

- Inclusion of conference proceedings from Web of Science due to identification of relevant systematic reviews.

VII. Quality assurance measures

- Independent replication of searches by second reviewer (YX).
- Inter-rater agreement for search execution: $\kappa = 0.94$.
- Documentation of all search strings, dates, and results maintained in audit trail.

This comprehensive search strategy ensured systematic and reproducible identification of relevant evidence while minimizing selection bias and optimizing retrieval precision.