

REVIEW



# The role of nursing in enhancing quality of life for lung cancer patients receiving targeted and immunotherapy: Challenges, opportunities, and future directions

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## ABSTRACT

Targeted therapy and immunotherapy are two critical contemporary strategies in the management of lung cancer. Despite their success in extending survival and mitigating symptoms, they introduce complex nursing interventions. This narrative review examines the impact of these treatment strategies on patients' quality of life, assesses the efficacy of current nursing interventions, and proposes strategies for enhancing future nursing practices. A comprehensive analysis of existing literature, covering studies published between 2014 and 2024 in the databases of WOSCC- SCIE, PubMed, CINAHL, and Embase, underscores the pivotal role of nursing in managing treatment-related adverse effects, delivering psychosocial support, and educating patients. Nevertheless, challenges remain in the areas of nursing staff training, resource allocation, and the limited scope of nursing research. Future directions should focus on the development of individualized care plans, the integration of innovative nursing technologies, and the ongoing enhancement of care quality to optimize nursing practices.

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Lung cancer; targeted therapy; immunotherapy; nursing needs; quality of life

## Introduction

Lung cancer remains one of the leading causes of cancer-related mortality worldwide, with persistently high incidence and death rates.<sup>1,2</sup> Advances in medical research have increasingly integrated targeted therapy and immunotherapy into lung cancer treatment, significantly enhancing patient survival rates and quality of life.<sup>3</sup> Targeted therapy, by specifically inhibiting cancer cell growth signaling pathways such as the epidermal growth factor receptor (EGFR) and anaplastic lymphoma kinase (ALK), has demonstrated remarkable efficacy in patients with non-small cell lung cancer (NSCLC).<sup>1</sup> Immunotherapy, on the other hand, leverages the patient's immune system, particularly through immune checkpoint inhibitors like programmed death-1 (PD-1), programmed death-ligand 1 (PD-L1), and cytotoxic t-lymphocyte-associated protein 4 (CTLA-4), showcasing immense potential in lung cancer treatment.<sup>4,5</sup>

The role of nursing in lung cancer treatment is indispensable. Nursing encompasses not only the fulfillment of patients' physiological needs but also extends to providing psychological, social, and educational support.<sup>6</sup> The definition and scope of nursing needs include various aspects such as symptom management, psychological support, and patient education, which are particularly critical during targeted therapy and immunotherapy.<sup>7</sup> Research indicates that professional nursing interventions can significantly improve patients' quality of life, alleviate treatment-related side effects, and offer essential psychological support.<sup>8,9</sup>

This narrative review synthesizes evidence from diverse sources to explore the nursing needs of lung cancer patients undergoing targeted therapy and immunotherapy. Unlike systematic reviews, this narrative review integrates evidence from peer-reviewed articles, clinical guidelines, and expert opinions in a flexible manner, with a focus on identifying trends, gaps, and future directions in nursing practice. The review begins with an overview of the epidemiological background of lung cancer, emphasizing the significance of targeted therapy and immunotherapy in its treatment. It then explores the role of nursing in the treatment process, defining and clarifying the scope of nursing needs. Lastly, the review concludes by outlining the objectives and structure, offering valuable insights and guidance for future nursing practices.

Through a comprehensive narrative review and analysis of the existing literature in this research area over the past 10 years, we aim to explore the mechanisms and applications of targeted therapy and immunotherapy in lung cancer treatment. Additionally, identify the factors influencing patient quality of life, including treatment side effects, psychosocial support, and patient education. Evaluate current nursing interventions and their impact on patient outcomes.<sup>10</sup> The following sections highlight challenges and opportunities in nursing practice, such as staff training, resource allocation, and the integration of innovative technologies. Propose future directions for improving nursing care, including the development of personalized care plans and continuous quality improvement initiatives. By addressing these objectives, this review

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seeks to provide a holistic perspective on the role of nursing in enhancing the quality of life for lung cancer patients receiving targeted therapy and immunotherapy, ultimately contributing to the advancement of nursing practice and patient care.

## Method

This narrative review synthesizes evidence from diverse sources to explore the nursing needs, interventions, and challenges in lung cancer patients receiving targeted therapy and immunotherapy. Unlike systematic reviews, narrative reviews adopt a flexible approach to integrate evidence from heterogeneous sources, providing a broad and critical perspective on the topic. Below, we outline the methodology used to conduct this review.

### Literature search strategy

A comprehensive literature search was conducted using electronic databases, including Web of Science Core Collection-Science Citation Index Expanded, PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), and Embase. The search focused on studies published between 2014 and 2024 to ensure the inclusion of recent advancements in targeted therapy, immunotherapy, and nursing practices. The following keywords and their combinations were used: “lung cancer,” “targeted therapy,” “immunotherapy,” “nursing care,” “quality of life,” “symptom management,” “psychosocial support,” “patient education.” Articles were selected based on their relevance to nursing practices and patient outcomes in lung cancer care. As a narrative review, this study does not follow the PRISMA guidelines or require protocol registration. Instead, it adopts a flexible approach to integrate diverse evidence and provide a holistic perspective on nursing practices in lung cancer care. Figure S1 indicated the flowchart of this study. Supplementary Table S1 show the detailed retrieval strategy of nursing in enhancing quality of life for lung cancer patients receiving targeted and immunotherapy in different databases.

## Results

Targeted therapy and immunotherapy are two critical contemporary strategies in the management of lung cancer. However, we noted that there is a limited scope of nursing research in the area of lung cancer care, particularly in relation to targeted therapy and immunotherapy. This observation was based on the relatively small number of studies specifically addressing the role of nursing in managing side effects, providing psychosocial support, and educating patients about emerging treatments. Based on the search strategy, we identified 97 studies in these areas, excluding 42 studies that were duplicated in different databases, and screening 55 studies, but 38 studies were either pilot projects, single-site studies, or focused on a limited patient population. As a result, these studies may not be fully representative of the broader lung cancer patient population or universally applicable across different healthcare settings. 17 studies were ultimately included (Table S2). Our study explored the mechanisms and

applications of these treatment strategies and examines the impact of them on patients’ quality of life, assesses the efficacy of current nursing interventions, and proposes strategies for enhancing future nursing practices.

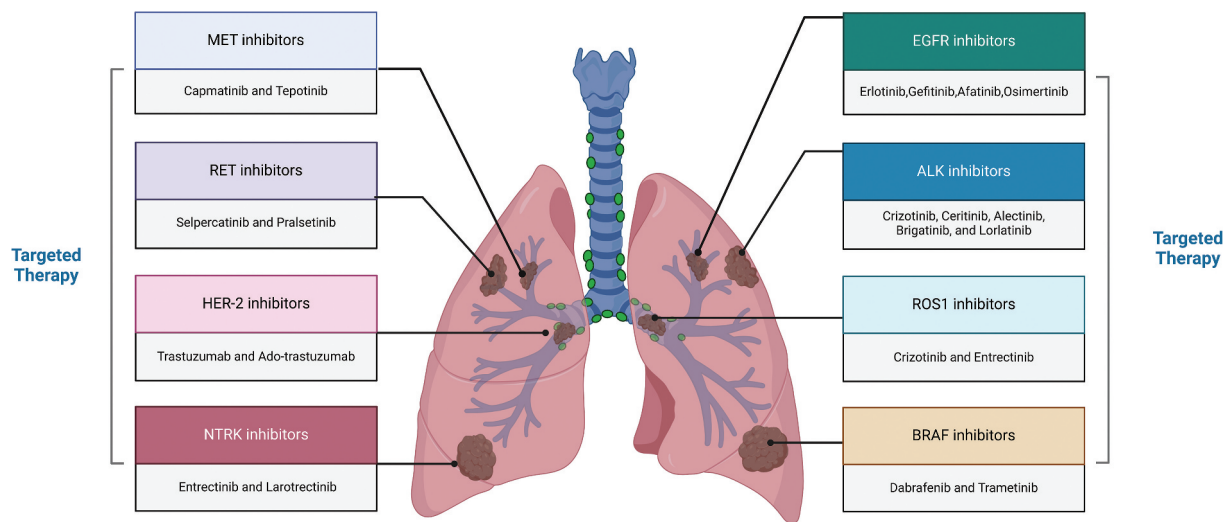
## Overview of targeted therapy and immunotherapy

### Mechanisms and applications of targeted therapy

Targeted therapy is a treatment modality that identifies and attacks specific molecular characteristics of cancer cells. Unlike traditional chemotherapy, targeted therapy acts more precisely on cancer cells, reducing damage to normal cells and thereby lowering side effects. The core mechanisms of targeted therapy include inhibiting cancer cell growth signaling pathways, inducing apoptosis, and blocking angiogenesis. For example, epidermal growth factor receptor (EGFR) mutation is one of the common driver gene mutations in NSCLC. Tyrosine kinase inhibitors (TKIs) targeting EGFR, such as erlotinib and osimertinib, have been widely used in clinical treatment.<sup>1,11–13</sup> Erlotinib suppresses the autophosphorylation of the EGFR cytoplasmic domain, thereby regulating continuous signaling via the PI3K/AKT pathway in NSCLC.<sup>14</sup> Additionally, anaplastic lymphoma kinase (ALK) and ROS1 gene rearrangements are significant targets in NSCLC, with drugs like crizotinib and lorlatinib showing remarkable efficacy.<sup>15–19</sup> ROS1 rearrangements are less common but are treatable with specific targeted therapies, offering significant clinical benefits, such as Crizotinib and Entrectinib.<sup>20,21</sup> BRAF mutations, though rare in lung cancer, are effectively targeted by BRAF and MEK inhibitors, similar to treatments used in melanoma, such as Dabrafenib and Trametinib.<sup>22</sup> MET inhibitors, Capmatinib and Tepotinib, target specific alterations that lead to abnormal cell signaling and tumor growth in NSCLC.<sup>23</sup> RET inhibitors are used to treat patients with NSCLC who harbor RET gene fusions, providing a more tailored treatment approach, such as Selpercatinib and Pralsetinib.<sup>24</sup> HER2 mutations are less common in lung cancer but can be targeted using therapies similar to those used in HER2-positive breast cancer, such as Trastuzumab and Adu-trastuzumab emtansine.<sup>25</sup> NTRK gene fusions are rare but can occur across various tumor types, including lung cancer. These gene fusions lead to the production of abnormal TRK proteins that drive cancer cell proliferation, and inhibitors like larotrectinib and entrectinib have shown significant efficacy in patients with NTRK fusion-positive tumors.<sup>26</sup> The application of targeted therapy has not only improved patient survival rates but also enhanced their quality of life (Figure 1).

### Mechanisms and applications of immunotherapy

Immunotherapy has become a crucial approach in lung cancer treatment by activating the patient’s immune system to recognize and attack cancer cells. Immune checkpoint inhibitors (ICIs) are currently the most commonly used immunotherapeutic drugs, primarily including programmed death receptor-1 (PD-1) inhibitors and programmed death ligand-1 (PD-L1) inhibitors, such as nivolumab and pembrolizumab.<sup>3,27–30</sup> These drugs block the PD-1/PD-L1 pathway, relieving the inhibition of T cells and enabling them to attack cancer cells more effectively. Moreover, cytotoxic T-lymphocyte-



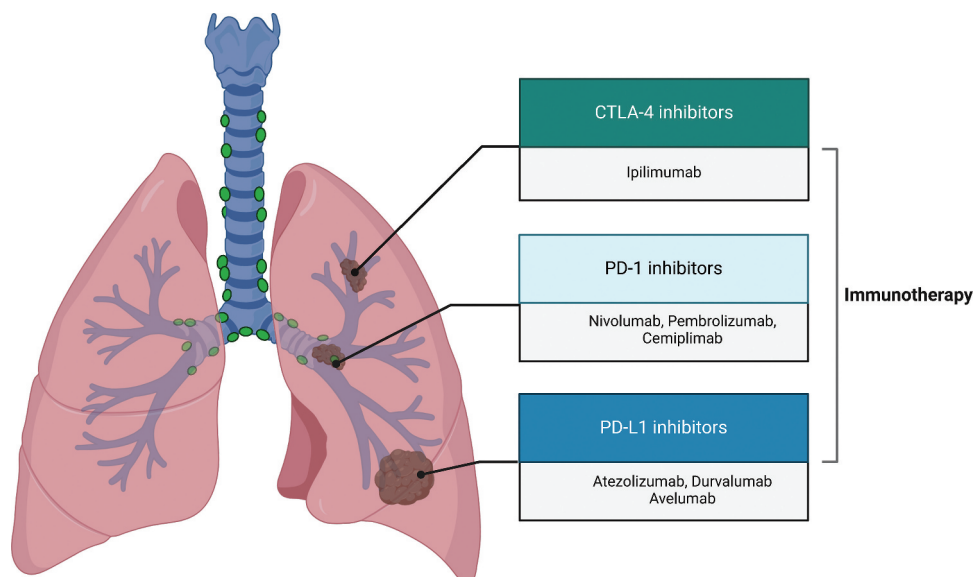
**Figure 1.** Targeted therapies in non-small cell lung cancer. The figure illustrates various classes of targeted inhibitors used in the treatment of NSCLC. These include BRAF inhibitors (dabrafenib and trametinib), ROS1 inhibitors (crizotinib and entrectinib), ALK inhibitors (crizotinib, Ceritinib, Alectinib, brigatinib, and lorlatinib), EGFR inhibitors (erlotinib, Gefitinib, afatinib, Osimertinib), NTRK inhibitors (entrectinib and larotrectinib), HER2 inhibitors (trastuzumab and Ado-trastuzumab emtansine), RET inhibitors (selpercatinib and pralsetinib), and MET inhibitors (capmatinib and tepotinib). Each of these therapies targets specific molecular alterations in cancer cells, leading to improved survival and quality of life for patients with NSCLC.

associated antigen-4 (CTLA-4) inhibitors like ipilimumab have also achieved certain successes in clinical settings.<sup>31–34</sup> The application of immunotherapy has not only extended patient survival but also significantly improved the quality of life, especially in patients with advanced and metastatic lung cancer<sup>35</sup> (Figure 2).

#### Comparison of targeted therapy and immunotherapy

Targeted therapy and immunotherapy each present distinct advantages and limitations in the treatment of lung cancer.

Targeted therapy, by directly acting on specific molecular targets of cancer cells, can swiftly inhibit tumor growth, making it suitable for patients with identified driver gene mutations. However, the issue of drug resistance is significant; patients may develop resistant mutations over time, leading to reduced efficacy of the treatment.<sup>36–38</sup> In contrast, immunotherapy activates the patient's immune system, providing a durable anti-tumor effect and is applicable to a broader patient population, especially those without clear driver gene mutations. Nonetheless, the effectiveness of



**Figure 2.** Immunotherapies in non-small cell lung cancer. The figure presents different classes of immune checkpoint inhibitors used in NSCLC treatment. These include PD-1 inhibitors (nivolumab, Pembrolizumab, Cemiplimab), PD-L1 inhibitors (atezolizumab, Durvalumab, Avelumab), and CTLA-4 inhibitors (ipilimumab). These therapies enhance the immune system's ability to recognize and attack cancer cells, improving survival rates and quality of life in patients with NSCLC.

immunotherapy varies among individuals, with some patients showing no response or experiencing severe immune-related side effects.<sup>39,40</sup> Therefore, in clinical practice, it is often necessary to consider the specific circumstances of each patient, weighing the pros and cons of both targeted therapy and immunotherapy to formulate a personalized treatment plan.<sup>15</sup>

### **Factors affecting patient quality of life**

#### **Treatment side effects and quality of life**

The application of targeted therapy and immunotherapy in NSCLC patients have significantly improved survival rates and quality of life. However, these treatments are also associated with a range of side effects that can negatively impact patients' quality of life. Common side effects of targeted therapy that associated treatment EGFR inhibitors often results in diarrhea stomatitis/mucositis, cutaneous (rash, dry skin paronychia), and liver function abnormalities, which may cause discomfort affect their quality of life,<sup>41,42</sup> while immunotherapy may induce immune-related adverse reactions such as skin toxicity, colitis, and endocrine disorders.<sup>39,43,44</sup> These side effects not only affect patients' physical health but can also lead to psychological stress and a decrease in quality of life. Studies have shown that timely symptom management and nursing interventions can effectively alleviate these side effects, thereby improving patients' quality of life.<sup>45</sup> Furthermore, personalized care plans and multidisciplinary team collaboration play a crucial role in mitigating treatment side effects.<sup>10</sup>

#### **Psychosocial support and quality of life**

Psychosocial support is vital in enhancing the quality of life for lung cancer patients. Research indicates that lung cancer patients undergoing targeted therapy and immunotherapy often face significant psychological stress and social isolation, which substantially affect their quality of life.<sup>46,47</sup> Psychosocial support can be provided through various means, including counseling, support groups, and family support. Studies have found that patients participating in psychological support groups experience significant reductions in anxiety and depression symptoms during treatment, leading to an improved quality of life.<sup>10,48</sup> Additionally, non-pharmacological interventions such as music therapy have been shown to effectively reduce psychological stress and enhance quality of life.<sup>10,49</sup> Therefore, comprehensive psychosocial support is crucial for improving the quality of life in lung cancer patients.

#### **Patient education and quality of life**

Patient education is a key factor in improving the quality of life for lung cancer patients. Research shows that adequate patient education helps patients better understand their disease and treatment process, thereby enhancing their self-management capabilities and treatment adherence.<sup>45,50</sup> Specifically, educational content should cover disease knowledge, treatment plans, side effect management, and lifestyle adjustments. Through systematic education, patients can better cope with various challenges

during the treatment process, reducing anxiety and fear caused by insufficient information.<sup>7,51</sup> Moreover, studies have found that personalized education plans and continuous educational support can significantly improve patients' quality of life and treatment outcomes.<sup>52,53</sup> Therefore, patient education holds significant value in lung cancer care.

### **Nursing interventions**

#### **Symptom management and care**

Symptom management is a core component of nursing interventions for lung cancer patients undergoing targeted therapy and immunotherapy,<sup>54</sup> as these treatments frequently result in side effects such as rash, diarrhea, fatigue, and shortness of breath. Advanced care providers and nurses play a crucial role in assessing and managing immunotherapy-related dermatologic adverse events.<sup>55</sup> Effective nursing care can significantly alleviate these symptoms and improve patients' quality of life. For instance, skin rashes associated with EGFR inhibitors can be managed by using gentle skin care products and advising patients to avoid direct sunlight. Diarrhea, often triggered by certain targeted therapies, can be managed through dietary adjustments like increasing fiber intake and using antidiarrheal medications.<sup>1,45,53,56</sup> Insomnia is commonly reported as one of the most challenging symptoms experienced by cancer survivors. A study with 158 cancer patients, including individuals with lung cancer, found that bedside application of cognitive behavioral therapy for insomnia by nurses was effective in treating this condition.<sup>57</sup> Patients with NSCLC who received targeted therapy experienced significant improvements in their quality of life and a reduction in the incidence of adverse events following prolonged nursing interventions.<sup>10,58,59</sup> Furthermore, Liu et al.<sup>59</sup> found that lung cancer patients in the nursing intervention combined with PD-1 inhibitor group had higher levels of hemoglobin, platelet, and serum leucocyte compared to the control group. Additionally, the CD4+ levels and the CD4+/CD8+ ratio in the study group were higher and lower, respectively, than those in the control group after treatment. The study group also showed better outcomes in traditional Chinese medicine symptom scores, survival quality karnofsky performance scale scores, QOL scores, and lower nausea and vomiting grading compared to the control group. These results suggest that PD-1 inhibitor-assisted nursing interventions can improve the quality of life for patients following lung cancer chemotherapy. Through comprehensive symptom management, nurses can significantly improve the patient's treatment experience and quality of life.

#### **Psychosocial support and care**

Psychosocial support plays a crucial role in the care of lung cancer patients. Nurses should also be attentive to the patient's psychological state, providing psychological support to help them cope with the stress and anxiety associated with treatment.<sup>10,60</sup> Studies have shown that patients undergoing targeted therapy and immunotherapy often face significant psychological stress and feelings of social isolation, which can further impact their treatment outcomes and quality of life.<sup>45</sup>



Nurses should actively provide psychological support to help patients develop a positive mind-set. For example, regular psychological counseling and support group activities can help patients express their inner confusion and emotions, thereby reducing their psychological burden.<sup>61</sup> Additionally, nurses should be attentive to the patient's social support network, encouraging family and friends to participate in the patient's care, providing both emotional support and practical assistance.<sup>62</sup> Furthermore, randomized controlled clinical trials evaluating nurse-led supportive and motivational counseling on this issue are already in progress.<sup>63,64</sup> Through comprehensive psychosocial support, nurses can help patients better cope with their illness, improving treatment adherence and quality of life.

### **Patient education and care**

Patient education is a key strategy for improving treatment adherence and quality of life in lung cancer patients. Research indicates that adequate patient education can significantly enhance patients' understanding and cooperation with treatment, reducing the incidence of complications during therapy.<sup>7,56</sup> Nurses should develop personalized education plans based on the patient's specific condition, covering topics such as disease knowledge, treatment plans, side effect management, and lifestyle adjustments. For instance, knowledge can be conveyed to patients and their families through various methods, including face-to-face education, brochures, and online resources.<sup>52</sup> Furthermore, nurses should regularly assess the effectiveness of patient education, promptly addressing any questions or concerns to ensure that patients correctly understand and follow the care recommendations.<sup>65</sup> Through systematic patient education, nurses can help patients better manage their disease, leading to improved treatment outcomes and quality of life.

### **Challenges and opportunities in nursing practice**

#### **Training and education of nursing staff**

The training and education of nursing staff are crucial in the care of lung cancer patients. With the rapid development of targeted therapy and immunotherapy, nurses need to continuously update their knowledge and skills to meet the demands of new treatment methods and care requirements.<sup>66</sup> Studies have shown that the professional knowledge and skills of nursing staff directly impact patient treatment outcomes and quality of life.<sup>1</sup> For instance, managing the side effects of targeted therapy and immunotherapy requires nurses to possess specific knowledge and skills to promptly identify and address these issues, thereby reducing patient discomfort and distress. Some cross-sectional studies involving lung cancer patients receiving immune checkpoint inhibitors indicates that practicing nurses should be mindful of the various factors impacting health-related quality of life (HRQOL) and offer patients personalized interventions early to support improved HRQOL outcomes.<sup>67,68</sup> Moreover, nurses must understand individual patient differences and develop personalized care plans to meet their unique needs.<sup>45</sup> For example, oncology nurses play a crucial role in regularly assessing the quality of life, health status or risk,

and self-perceived burden of lung cancer patients undergoing immunotherapy.<sup>69</sup> They should also assist these patients in understanding the potential financial risks of different treatment options and encourage them to take a more active role in managing their routine clinical care. Therefore, regular training and continuing education are essential for enhancing the professional competence of nursing staff and improving the quality of care.

### **Allocation and management of nursing resources**

The effective allocation and management of nursing resources are key to ensuring that lung cancer patients receive high-quality care. As the demand for nursing services increases with the widespread use of targeted therapy and immunotherapy, there is a greater need for efficient distribution of nursing resources. Research indicates that rational allocation of nursing resources can significantly enhance patient treatment outcomes and quality of life.<sup>3</sup> For example, in resource-limited settings, prioritizing care for critically ill patients and optimizing nursing processes to improve efficiency can alleviate the strain on nursing resources. Additionally, utilizing information technology tools, such as electronic health record systems, can improve the management of nursing resources, ensuring continuity and consistency in care.<sup>46</sup> Therefore, scientific allocation and management of nursing resources are crucial for improving the quality of care and patient satisfaction.

### **Nursing research and evidence-based practice**

Nursing research and evidence-based practice are important avenues for advancing the nursing discipline. Conducting nursing research allows for a deeper understanding of the care needs of lung cancer patients undergoing targeted therapy and immunotherapy, and explores effective nursing interventions, providing a scientific basis for clinical practice.<sup>10</sup> For example, studies have shown that personalized nursing interventions can significantly improve patients' quality of life and psychological well-being.<sup>7</sup> Moreover, evidence-based practice emphasizes the application of the latest research findings in clinical nursing practice to enhance the scientific and effective nature of nursing services.<sup>45</sup> Several emerging management models, including randomized controlled trials focused on telenursing on supportive care needs in lung cancer patients, are currently being developed.<sup>70</sup> By establishing a close connection between nursing research and clinical practice, care plans can be continuously optimized, improving care quality and meeting the diverse needs of lung cancer patients during treatment. Therefore, nursing research and evidence-based practice are of great significance for advancing the nursing discipline and enhancing the quality of nursing services.

### **Discussion**

This narrative review highlights the critical role of nursing in enhancing the quality of life for lung cancer patients receiving targeted therapy and immunotherapy. By synthesizing evidence from diverse sources, we have identified key themes and trends in nursing practices, challenges, and opportunities for improvement. Below, we discuss the main findings, their

implications for nursing practice, and future directions for research and clinical care.

### ***Nursing interventions and patient outcomes***

Our review underscores the importance of nursing interventions in managing treatment-related side effects, providing psychosocial support, and educating patients. Effective symptom management, such as addressing skin rashes from EGFR inhibitors or diarrhea from targeted therapies, significantly improves patients' physical comfort and treatment adherence.<sup>43,71,72</sup> These interventions not only alleviate discomfort but also prevent more severe complications, which may otherwise lead to discontinuation or delay in treatment. This proactive approach directly enhances treatment efficacy by promoting uninterrupted therapy cycles and encouraging patient compliance. Psychosocial support, including counseling and support groups, has been shown to reduce anxiety and depression, enhancing patients' mental well-being and overall quality of life.<sup>10,46</sup> The evidence from studies suggests that patients who receive regular psychosocial care report better emotional resilience, which contributes to a more positive outlook on their treatment journey.<sup>47</sup> However, while this support is vital, the challenges related to its consistent delivery remain significant. Many healthcare settings lack sufficient resources or structured programs to integrate psychosocial support into routine care. If we were to enhance these efforts, a more systematic approach to training nurses in providing mental health support could address this gap, thereby improving the overall quality of care. Patient education, particularly on disease knowledge and side effect management, empowers patients to actively participate in their care, leading to better outcomes.<sup>7,49</sup> This finding is consistent with literature showing that when patients are well-informed, they are more likely to adhere to prescribed treatments and recognize early signs of side effects, which can be addressed promptly.<sup>73</sup> However, the challenge we observed is the variability in educational interventions across different healthcare settings. In some instances, patients were provided with generalized information that did not account for individual patient needs, which led to suboptimal patient engagement. To improve this, personalized education programs tailored to the patient's specific treatment regimen could be developed, allowing for more effective patient empowerment and better overall outcomes.

### ***Challenges in nursing practice***

Despite the advancements in nursing care, several challenges remain. These include the need for ongoing training and education for nursing staff to keep pace with evolving treatment modalities.<sup>1,43</sup> Resource allocation and management also pose significant challenges, particularly in resource-limited settings where optimizing nursing processes is essential to meet patient needs.<sup>3,44</sup> Additionally, the limited scope of nursing research highlights the need for more studies to validate and optimize nursing interventions. Furthermore, there is currently a lack of clearly defined research priorities for nurses and allied health professionals working in the field of thoracic malignancies. An international cross-sectional survey has

highlighted the need to prioritize intervention studies aimed at improving quality of life and symptom management – particularly in areas such as pain, dyspnea, and fatigue – as well as addressing healthcare system challenges and advancing screening efforts.<sup>6</sup>

### ***Opportunities for improvement***

The integration of innovative nursing technologies, such as remote monitoring and artificial intelligence (AI), offers promising opportunities to enhance care quality and efficiency.<sup>15,36</sup> Personalized care plans, tailored to individual patient needs, can further improve treatment outcomes and patient satisfaction.<sup>1,3</sup> Continuous quality improvement initiatives, supported by robust evaluation and feedback systems, are essential to ensure the delivery of high-quality nursing care.<sup>43,57</sup>

### ***Implications for nursing practice***

The findings of this review have several implications for nursing practice: (a) Training and education: nursing staff should receive regular training on the latest treatment modalities and nursing interventions to enhance their professional competence. (b) Resource management: efficient allocation and management of nursing resources are crucial to meet the growing demand for high-quality care. (c) Patient-centered care: emphasizing personalized care plans and patient education can empower patients and improve their quality of life.

### ***Future directions for improving nursing practice***

#### ***Development of personalized care plans***

The development of personalized care plans is one of the key directions for future nursing practice.<sup>74</sup> Lung cancer patients undergoing targeted therapy and immunotherapy exhibit significant individual differences, leading to varying care needs. Research has shown that personalized care plans can significantly enhance patients' quality of life and treatment adherence. For instance, by conducting detailed assessments of patients' physical conditions, psychological states, and social support systems, nursing staff can formulate more precise care plans that better meet the patients' needs.<sup>1</sup> Furthermore, personalized care plans can be dynamically adjusted to address various issues that may arise during treatment, thereby further improving the effectiveness of care.<sup>3</sup>

#### ***Application of nursing technology and innovation***

The application of nursing technology and innovation is crucial for enhancing the quality of care. In recent years, with the advancement of technology, many new techniques have been introduced into nursing practice. For example, remote monitoring technology enables nursing staff to monitor patients' health status in real-time, promptly identifying and addressing potential issues, which can reduce hospitalization rates and the occurrence of complications.<sup>36</sup> Additionally, artificial intelligence (AI) shows great potential in the nursing field, as it can analyze large amounts of data to assist nursing staff in developing more scientifically sound care plans, improving the

accuracy and efficiency of nursing decisions.<sup>15</sup> Digital patient monitoring and management tools may improve clinical practice by allowing real-time symptom reporting.<sup>75</sup> The application of these technologies not only enhances the quality of care but also reduces the workload of nursing staff, allowing them to focus more on meeting the personalized care needs of patients.

### Continuous improvement of nursing quality

The continuous improvement of nursing quality is essential for ensuring effective care outcomes. To achieve this goal, nursing staff must engage in ongoing professional training, updating their knowledge and skills to adapt to the ever-changing medical environment and patient needs.<sup>62</sup> Additionally, a robust system for evaluating and providing feedback on nursing quality is indispensable. By regularly assessing care outcomes and collecting patient feedback, nursing teams can identify issues and make necessary improvements, thereby continuously enhancing the quality of care.<sup>45</sup> Studies have demonstrated that systematic nursing quality management and continuous improvement measures can significantly increase patient satisfaction and quality of life.<sup>76</sup>

### Limitations

As a narrative review, this study does not follow the structured methodology of systematic reviews, such as the use of the PICO framework or PRISMA guidelines, which may affect the reproducibility and transparency of the study. Finally, the time frame of the literature search (2014–2024) and the selection of databases (Web of Science Core Collection- Science Citation Index Expanded, PubMed, CINAHL, and Embase) may limit the comprehensiveness of the study, as not all relevant literature may have been included, particularly relevant studies prior to 2014. These limitations may have impacted the breadth of the study's conclusions to some extent. In addition, many studies are small or exploratory and often lack reliable methodologies such as randomized controlled trials or multicenter studies. These factors may limit the generalizability of findings and the strength of evidence regarding the effectiveness of specific nursing interventions.

### Conclusion

Professional nursing interventions can significantly improve patients' quality of life, alleviate treatment-related side effects, and offer essential psychological support for lung cancer patients receiving targeted therapy and immunotherapy. Future directions should focus on personalized care plans, technological innovations, and continuous quality improvement in nursing practice. These efforts will help address current challenges and optimize patient outcomes.

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### Author contributions

Sun YY: Writing- Original draft, Data curation, Methodology, Software.

Wei YM: Writing- Original draft, Data curation, Methodology, Software.

Qian Y: Conceptualization, Data curation, Methodology, Software, Writing – review & editing, Project administration.

### Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

### Ethics approval and consent to participate

This study does not involve human participants or animals requiring ethical approval.

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