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Review of the Nursing Monitoring System for Adverse Events Related to Immunotherapy in Advanced Lung Cancer

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Abstract: Immunotherapy with immune checkpoint inhibitors for advanced lung cancer is prone to inducing immune-related adverse events (irAEs), which may limit therapeutic benefits. Based on existing literature, this study systematically reviews the risk factors and epidemiological characteristics of irAEs, analyzes changes in toxicity profiles under combination therapy regimens, and examines the association between irAEs and treatment efficacy. A comprehensive nursing monitoring system was established, encompassing baseline assessment, hierarchical risk stratification, multidisciplinary collaboration, and long-term follow-up. By integrating high-risk factor identification, core element frameworks, and tiered intervention strategies, a dynamic monitoring protocol based on risk stratification and structured patient education pathways was proposed to achieve early detection and standardized management of irAEs, thereby providing evidence-based nursing practice for immunotherapy safety in advanced lung cancer.

Keywords: Immune-related adverse events; Advanced lung cancer; Nursing monitoring system; Immune checkpoint inhibitors; Risk assessment

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1. Introduction

Immune checkpoint inhibitors demonstrate definitive efficacy in the treatment of advanced lung cancer, yet the associated immune-related adverse events (irAEs) can affect multiple organ systems and, in severe cases, pose life-threatening risks, thereby limiting therapeutic benefits. In clinical practice, the occurrence of irAEs is characterized by latency, diversity, and unpredictability, making traditional adverse reaction monitoring approaches inadequate for early identification and dynamic management. Establishing a systematic and standardized nursing monitoring system is crucial for ensuring the safety of immunotherapy and improving patient outcomes. This review summarizes the risk factors, clinical assessment criteria, and the development of nursing monitoring frameworks for irAEs associated with immunotherapy in advanced lung cancer, providing a reference for clinical nursing practice.

2. Risk Factors and Epidemiological Characteristics of Adverse Events Associated with Immunotherapy

2.1. Risk Factor Analysis of Immune-Related Adverse Events

During immunotherapy for advanced lung cancer, the occurrence of immune-related adverse events (irAEs) is closely associated with multiple risk factors. Xu Wanru et al. (2023) conducted a retrospective analysis of patients with advanced lung cancer treated with immune checkpoint inhibitors (ICIs) and found that baseline characteristics such as age, gender, physical performance status scores, and history of autoimmune diseases were significant factors influencing irAE incidence. This study highlights that elderly patients and those with underlying comorbidities face a higher risk of severe irAEs, providing critical evidence for identifying high-risk populations in clinical care[1]. Qin Qiaoxi et al. (2020) systematically evaluated the spectrum of irAEs associated with ICIs in the treatment of advanced non-small cell lung cancer (NSCLC) through a systematic review and meta-analysis. After incorporating multiple high-quality randomized controlled trials, they demonstrated variations in the incidence and severity of irAEs across different ICIs, with relatively higher rates of PD-1 inhibitor-related pneumonia and colitis. These findings underscore the need for nursing staff to implement differentiated monitoring strategies tailored to specific drug types[2].

2.2. Characteristics of irAE under combination therapy regimens

With the widespread application of combined immunotherapy regimens, the spectrum and severity of immune-related adverse events (irAEs) have exhibited new characteristics. Wan Shile et al. (2026) investigated the use of neoadjuvant immunotherapy in patients with locally advanced lung cancer and found that the timing of irAE onset under neoadjuvant therapy differs from that under conventional adjuvant therapy. Some patients may develop early immune-related toxicities during the preoperative induction phase, imposing higher demands on perioperative nursing monitoring. The study recommends incorporating immune toxicity risk stratification into preoperative assessments by nursing teams[3]. Yuan Xiaoli et al. (2026) focused on the clinical value of radiotherapy combined with immunotherapy in elderly patients with advanced non-small cell lung cancer. While the combined regimen enhances antitumor efficacy, the overlapping effects of radiation pneumonitis and immune-mediated pneumonitis complicate the differential diagnosis of pulmonary irAEs[4]. This study emphasizes that elderly patients exhibit poorer tolerance to combination therapies, necessitating enhanced dynamic assessment of respiratory symptoms and the establishment of multidisciplinary collaboration mechanisms with radiation oncology and respiratory departments. Luan Tao et al. (2025), in a review of advances in immunotherapy for advanced lung cancer, noted that the irAE profiles vary across different combination regimens, and nursing monitoring should be tailored to specific treatment protocols[5].

3. Clinical Evaluation and Efficacy Correlation of Adverse Events Related to Immunotherapy

3.1. Clinical manifestations and safety evaluation of irAEs

Immunotherapy combined with chemotherapy has become a critical treatment strategy for advanced non-small cell lung cancer (NSCLC), with safety assessment being the cornerstone of nursing care. Mao Xinxin et al. (2025) conducted a prospective observation on the clinical efficacy and safety of immunotherapy combined with chemotherapy in patients with advanced NSCLC, enrolling 112 eligible patients. The results showed that the incidence rate of immune-related adverse events (irAEs) of any grade in the combination therapy group was 68.8%, significantly higher than the 42.3% in the monotherapy group, with rash, thyroid dysfunction, and immune hepatitis being the most common adverse events[6]. This study suggests that nursing staff should perform systematic symptom screening before each treatment cycle, thoroughly inquiring about new-onset symptoms such as rash, diarrhea, dyspnea, and fatigue within the past two weeks. Standardized assessment tools, such as the Common Terminology Criteria for Adverse Events (CTCAE) 5.0 edition,

should be employed to quantitatively record irAE severity on a 1–5 scale. Zhang Cuicui et al. (2025) systematically reviewed the progress in predicting the efficacy of irAEs in immunotherapy for extensive-stage small cell lung cancer. The occurrence of specific types of irAEs, such as cutaneous toxicity and thyroiditis, is often associated with better treatment responses, potentially increasing the objective response rate by 15%–20%. Although the incidence of severe irAEs is less than 5%, they may lead to treatment discontinuation or even life-threatening outcomes, with a mortality rate of 30%–40%. This study provides a new perspective for risk-benefit assessment in nursing monitoring. Nursing staff must strike a balance between encouraging patients to report mild symptoms and remaining vigilant for severe toxicity, guiding patients to distinguish between grade 1 toxicity (manageable at home) and grade 3 or higher toxicity (requiring urgent medical attention), and providing patients with a 24-hour emergency contact card[7].

3.2. Correlation between irAE and immune therapy efficacy

The correlation between immune-related adverse events (irAEs) and immunotherapy efficacy remains a focal point in clinical research. Wang Liqiang et al. (2025) proposed that the occurrence of certain irAEs could serve as a "substitute biomarker" for immune activation, indicating favorable prognosis, when investigating the balance strategy between personalized immunotherapy efficacy and immune-related adverse reactions in advanced lung cancer patients. This retrospective analysis of clinical data from 146 advanced lung cancer patients demonstrated an objective response rate of 47.3% among patients experiencing irAEs of any grade, significantly higher than the 22.6% observed in those without irAEs, with a median progression-free survival extension of 3.8 months. The study emphasized that irAE management should not be neglected in pursuit of therapeutic efficacy, particularly when grade 2 or higher pneumonia, colitis, or hepatitis occurs, necessitating immediate suspension of immunotherapy and initiation of glucocorticoid intervention. Nursing teams should assist physicians in dynamic decision-making during monitoring, including daily symptom assessment, laboratory parameter monitoring, documentation of corticosteroid dosage and therapeutic responses, and evaluation of permanent immunotherapy discontinuation[8]. Liu Qianqian et al. (2022) further reviewed the progress in studies examining the correlation between immunotherapy-related adverse events and efficacy in advanced non-small cell lung cancer, systematically synthesizing existing evidence from 17 clinical studies published between 2015 and 2021 involving a total of 3,428 patients. The study found that the association strength between irAEs and therapeutic efficacy varied across different organ systems: cutaneous toxicity showed the strongest correlation with objective response rate, with a hazard ratio of 2.35; thyroid dysfunction was positively associated with prolonged progression-free survival, with a hazard ratio of 1.89; immune-related pneumonia exhibited weaker correlation with objective response rate, with a hazard ratio of only 1.12, and severe pneumonia was often associated with poor prognosis[9].

4. Establishment of a Nursing Monitoring System for Adverse Events Related to Immunotherapy

4.1. Core Elements of Nursing Monitoring and Baseline Assessment

The establishment of a scientific nursing monitoring system requires first clarifying core elements. Wang Yuehong et al. (2020) systematically summarized adverse reactions related to immune checkpoint inhibitor therapy in advanced lung cancer and advancements in diagnosis and treatment, emphasizing that baseline assessment serves as the starting point for irAE nursing monitoring. Nursing staff must complete comprehensive evaluations prior to initial immunotherapy, covering the patient's autoimmune disease history, infection history, baseline pulmonary function, thyroid function, cardiac enzyme profiles, and skin condition. This study proposes that creating individualized "immunotoxicity risk cards" can facilitate precise monitoring. The cards include high-risk irAE categories, warning symptoms, and emergency contact information. Beyond baseline assessment, the establishment of a dynamic monitoring system requires standardized procedures. Nursing teams may adopt chronic disease management models, dividing irAE monitoring into three phases: pre-treatment, treatment, and post-treatment. During treatment, a tiered warning strategy is implemented: Level 1 requires daily

assessment and documentation by the responsible nurse; Level 2 involves increased assessment frequency and physician reporting; Levels 3 and above trigger rapid response protocols. Patient-reported outcomes serve as critical components of nursing monitoring, with encouragement for self-recording through symptom diaries or mobile health applications [10].

4.2. Hierarchical Nursing Intervention and Multidisciplinary Collaboration

Implementing graded nursing interventions for irAEs of varying severity is crucial for patient safety. For grade 1 irAEs, the focus of nursing care lies in symptom management and patient education, including guidance on local medication application, ensuring adequate rest, and avoiding triggering factors. Grade 2 irAEs require suspension of immunotherapy and initiation of corticosteroid therapy. Nursing staff must closely monitor vital signs, fluid balance, and laboratory parameter changes, while paying attention to the patient's psychological state and explaining the necessity of treatment adjustments to alleviate anxiety. Grade 3 and above irAEs necessitate immediate hospitalization, with nursing teams collaborating with physicians to administer high-dose corticosteroid pulses, immunosuppressant therapy, and organ function support, while establishing intensive care unit (ICU)-level special care records. Multidisciplinary collaboration is essential for improving irAE nursing quality. Wang Yuehong et al. (2020) emphasized that irAEs can affect any organ system, and no single department can independently manage the entire process [10]. An ideal nursing monitoring system should establish the role of an "Immunotherapy-Oncology Nursing Coordinator," with professionally trained nurses responsible for coordinating with oncology, respiratory, endocrinology, dermatology, cardiology, and emergency departments. Weekly multidisciplinary case discussions should be conducted to review severe irAE cases and refine monitoring protocols. Nursing staff should participate in developing departmental-level irAE emergency plans, specifying response procedures for different event levels, medication preparations, and referral pathways.

4.3. Patient Education and Long-term Follow-up Management

Patient education is an indispensable component of the nursing monitoring system. Immune-related adverse events (irAEs) can occur at any time after the initiation of immunotherapy, necessitating that patients and their families possess the ability to recognize early warning signs. Nursing education content encompasses symptom recognition of common irAEs, appropriate timing for contacting healthcare institutions, adherence to hormone therapy, and prohibition of self-administration of medications that may mask symptoms (e.g., nonsteroidal anti-inflammatory drugs). Educational approaches combine one-on-one guidance, illustrated manuals, and video resources, with knowledge consolidation during each follow-up visit. Long-term follow-up management extends irAE nursing monitoring. Post-immunotherapy, patients remain at potential irAE risk, particularly for endocrine system irAEs which may lead to permanent sequelae. Nursing staff should conduct telephone or outpatient follow-ups at 3 months, 6 months, and 12 months post-treatment to assess long-term toxicity and guide alternative therapies. Establishing an irAE patient registry database to record irAE types, severity, management measures, and outcomes facilitates individualized subsequent treatment decisions and provides evidence-based support for nursing quality improvement. Wang Yuehong et al. (2020) concluded that structured long-term follow-up protocols enhance early detection rates of irAEs and patient satisfaction, serving as the final link in refining the nursing monitoring system [10].

5. Epilogue

The nursing monitoring system for adverse events related to immunotherapy in advanced-stage lung cancer should span the entire treatment process, with a focus on early identification of high-risk populations, graded early warning interventions, and effective integration of multidisciplinary collaboration mechanisms. Nursing staff should strengthen baseline risk assessment and dynamic symptom screening, standardize graded nursing procedures, and enhance patients' self-management capabilities through patient education and long-term follow-up. Establishing a standardized and operational monitoring system can reduce the incidence of severe adverse events while ensuring immunotherapy continuity and patient

survival benefits. Future efforts should explore intelligent monitoring models based on information technology tools to advance nursing practices toward precision medicine.

Disclosure statement

The author declares no conflict of interest.

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