

Application Progress and Localization Practice of Symptom Cluster Management Model in Palliative Care for Terminal Lung Cancer Patients

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Abstract

Lung cancer is one of the leading causes of cancer-related deaths worldwide, and patients with advanced-stage lung cancer face multiple complex symptoms due to disease progression. Symptom clusters, a common phenomenon in the clinical practice of cancer patients, have become a core component of palliative care management. This review systematically analyzes the current application of symptom cluster management models in palliative care for terminally ill lung cancer patients. Based on international advancements in the theoretical framework, development of assessment tools, and clinical applications of symptom cluster management models in palliative care, and in the context of China's healthcare environment, the article focuses on the opportunities and challenges encountered in localized implementation—including healthcare professionals' awareness and training, barriers to interdisciplinary collaboration, patient and family adherence issues, and the integration of community palliative care resources. Through analysis of real-world clinical cases and observations by healthcare practitioners, this study underscores the importance of symptom cluster management models in enhancing the quality of palliative care for terminally ill lung cancer patients and improving their end-of-life experience, while offering recommendations for future research directions and clinical practice.

Keywords

Symptom Cluster, Lung Cancer, End-of-Life Care, Palliative Care, Symptom Management Theory, Review

1. Introduction

Lung cancer, as one of the most prevalent malignant tumors globally, ranks first

in both incidence and mortality among all cancers [1]. According to World Health Organization (WHO) data, approximately 85% of lung cancer patients are diagnosed at an advanced stage, making radical treatment unfeasible [2]. Patients with advanced lung cancer endure severe symptomatic burdens, encompassing not only physiological symptoms such as pain, dyspnea, and fatigue but also psychological symptoms including anxiety, depression, and fear of death. These symptoms often do not occur in isolation but are interconnected and co-occurring, forming a “symptom cluster” phenomenon that significantly impacts patients’ quality of life across multiple dimensions [3].

Palliative care, as a patient-centered medical model emphasizing quality of life, aims to help terminally ill patients achieve a “dignified end-of-life” through symptom management, psychological support, and emotional care. The Symptom Management Theory (SMT) provides a scientific theoretical framework for palliative care, emphasizing comprehensive understanding and dynamic management of patients’ symptoms [4]. Integrating symptom cluster management theory with palliative care to develop a localized management model tailored to Chinese patients represents a crucial direction for current nursing practice [5].

This study aims to systematically summarize the current application status, key practical elements, and localized innovations of the symptom cluster management model in palliative care for patients with terminal lung cancer, thereby providing evidence-based support for clinical nursing decision-making, disciplinary development, and policy formulation.

2. Theoretical Basis and Conceptual Definition of the Symptom Cluster

2.1. Core Definition of the Symptom Cluster

A symptom cluster refers to a phenomenon where two or more symptoms are interrelated, occurring simultaneously or strongly associated in time and space [6]. Unlike the concept of a single symptom, a symptom cluster emphasizes the mutual influence and synergistic effects among the symptoms. In cancer patients, the frequency of symptom clusters is significantly higher than that of individual symptoms, a phenomenon that severely impacts patients’ quality of life, treatment adherence, and prognosis [7]. For example, fatigue, sleep disturbances, and depressive mood often interact to form a “fatigue-sleep-psychological distress” triad symptom cluster, and intervention targeting any single symptom typically yields limited efficacy [8].

2.2. Theoretical Framework of the Dynamic Symptom Model

In the field of cancer care, the Revised Dynamic Symptom Model (RDSM) has become the primary theoretical framework for explaining the emergence and progression of symptom clusters [9]. The model posits that the development and evolution of symptom clusters involve three interacting factors: biological mechanisms (such as tumor burden, treatment toxicity, and abnormal neurohormonal

levels), psychological mechanisms (such as stress responses, coping styles, and psychological expectations), and social environmental factors (such as family support, social status, and healthcare accessibility). This integrated biological-psychological-social perspective aligns closely with the holistic care philosophy emphasized in palliative care.

In patients with terminal-stage lung cancer, the progressive nature of the disease results in a dynamically evolving symptom profile. In the early stages, pain and dyspnea may be the predominant symptoms; as the disease progresses and treatment continues, symptoms such as fatigue, anorexia, and sleep disturbances gradually worsen, with increasingly complex interactions among various symptoms [10]. The RDSM emphasizes longitudinal monitoring of symptom progression, providing a theoretical foundation for staged and precision-oriented nursing interventions.

3. Main Symptom Groups and Characteristics in Terminal Lung Cancer Patients

3.1. The Predominant Symptom Cluster of Dyspnea

In lung cancer patients, dyspnea is the most characteristic symptom due to the unique anatomical nature of the primary tumor site, occurring in 60% - 80% of cases. Studies indicate that dyspnea is closely associated with psychological symptoms such as anxiety and fear, forming a “dyspnea-anxiety-fear of death” symptom cluster [11]. Xiao J systematic review highlights that the respiratory symptom cluster primarily includes cough, shortness of breath, and sputum production, which persist and are commonly observed across various treatment modalities, with cough identified as the key sentinel symptom.

The patient’s sensation of suffocation stems not only from airway obstruction or pleural effusion caused by the tumor, but is also significantly influenced by the profound psychological fear of respiratory arrest. The presence of this symptom cluster markedly increases the difficulty of intervention: oxygen therapy or pharmacological interventions alone are insufficient to alleviate the symptoms, necessitating concurrent psychological intervention and respiratory training [12].

3.2. Fatigue-Related Composite Symptom Cluster

Cancer-Related Fatigue (CRF) is one of the most common symptoms in lung cancer patients, with an incidence rate of 70%-85%, and it is also the symptom that causes the greatest distress [13]. Among patients receiving immunotherapy for lung cancer, studies have demonstrated a particularly strong correlation between fatigue symptoms and other clinical manifestations, forming a composite symptom cluster of “fatigue–decreased motor function–psychological distress” [13]. Patient fatigue manifests not only as a loss of physical energy but also triggers a cascade of adverse effects, including social withdrawal, impaired self-care abilities, and a diminished sense of life meaning. Chronic severe fatigue is directly associated with both patients’ quality of life and mortality outcomes [14].

3.3. Symptom Cluster of Pain and Sleep Disorders

Although the incidence of pain caused by lung cancer is slightly lower than that of certain other cancer types, pain in patients with advanced-stage lung cancer often exhibits a multifactorial nature (including tumor infiltration, bone metastasis, and treatment-related pain). Pain and sleep disturbances frequently form a vicious cycle: pain disrupts sleep and impairs sleep quality [15], while sleep deprivation further reduces the patient's pain threshold and exacerbates the pain experience. Concurrently, anxiety and depression act as modulatory factors that further aggravate the severity of this symptom cluster.

4. Application Strategies of Symptom Management Theory in Palliative Care

4.1. Systematic Assessment and Identification of Symptom Clusters

Based on the symptom management theory, the primary task of palliative care is to conduct a comprehensive and systematic assessment of symptom clusters [16]. This differs from traditional single-symptom evaluations, requiring caregivers to utilize structured assessment tools (such as the Revised Symptom Cluster List [RSCL] and the Quality of Life Assessment [QOL]) to quantify, qualitatively describe, and longitudinally monitor patients' multidimensional symptoms. The assessment must identify correlations and temporal relationships among symptoms: whether a particular symptom occurs simultaneously with others at specific time points, whether causal relationships exist between symptoms (e.g., pain causing sleep disturbances), and the trend in symptom cluster severity changes.

The assessment of symptom clusters in patients with end-stage lung cancer should focus on two key aspects: first, identifying the dominant symptoms and related symptoms to clarify the hierarchical structure of the symptom cluster; second, evaluating the specific impact of these symptoms on the patient's functional capacity, emotional state, and daily life participation. Nursing staff must conduct an in-depth understanding based on the patient's reports, integrating the patient's subjective experiences with objective health indicators [17].

4.2. Multidisciplinary Collaborative Personalized Intervention

The symptom management theory emphasizes that multidisciplinary collaboration is a prerequisite for effective intervention. The multidisciplinary team for palliative care should include oncology specialists, nurses, psychological counselors, social workers, and religious care providers, with each discipline working together to develop a collaborative intervention plan tailored to the patient's specific symptom profile [18].

For patients with advanced-stage lung cancer presenting with distinct symptom clusters, collaborative intervention strategies must be tailored accordingly. For the "dyspnea-anxiety" symptom cluster, the medical team should develop a well-designed medical intervention plan (including airway management and optimized

medication use), while psychologists provide anxiety management support and nurses teach patients and their families respiratory relaxation techniques. For the “fatigue-motor impairment” symptom cluster, a combination of moderate exercise guidance, nutritional support, and psychological encouragement should be considered [14]. The development of personalized intervention plans should be based on a comprehensive understanding of the patient’s overall condition, including disease characteristics, treatment stage, patient goals, and cultural background.

4.3. Synergistic Application of Non-Pharmacological and Pharmacological Interventions

In palliative care, symptom management should not rely solely on pharmacological treatment. Studies have demonstrated that non-pharmacological nursing interventions based on symptom management theory—such as psychological interventions, relaxation therapy, activity guidance, and music therapy—when combined with medical pharmacotherapy, significantly enhance symptom management efficacy [15]. For the “dyspnea-anxiety” symptom cluster in terminally ill lung cancer patients, non-pharmacological interventions include progressive muscle relaxation, mindfulness meditation, and postural care, which improve psychological adaptation and alleviate physiological symptoms. Concurrently, appropriate pharmacotherapy (e.g., sedatives for anxiety relief) exhibits synergistic effects with non-pharmacological interventions [15].

4.4. Phased and Continuous Symptom Monitoring

The symptom management theory emphasizes the dynamic nature of symptoms, and palliative care requires the establishment of a continuous, phased symptom monitoring mechanism. In patients with advanced lung cancer at different clinical stages (disease remission phase, progression phase, and terminal phase), the manifestation and priority of symptom clusters change, necessitating corresponding adjustments to nursing interventions. The nursing team should develop a regular monitoring plan, utilize structured tools to reassess symptoms, monitor the effectiveness of interventions, and promptly adjust nursing strategies. This dynamic, reactive management approach ensures that nursing interventions consistently align with the patient’s current needs.

5. Localized Practices and Innovations in Symptom Cluster Management within Palliative Care

5.1. The Humanistic Care Model Integrating the Theory of Life Meaning

In the context of China’s culture, terminally ill patients exhibit a particularly prominent pursuit of “the meaning of life.” The humanistic care model centered on the meaning of life has been applied in palliative care for patients with terminal lung cancer [3]. Research by Breitbart W *et al.* demonstrates that this humanistic

approach significantly enhances patients' self-management efficacy, reduces stress and fatigue, improves their attitudes toward death, and strengthens their sense of life meaning among terminally ill lung cancer patients undergoing chemotherapy, making it worthy of clinical promotion and application.

This model builds upon the theory of symptom management while incorporating care for spiritual dimensions such as patients' life values, life reflections, and intergenerational inheritance. Through activities like encouraging patients to share their life stories, organize their life experiences, and pass on life wisdom to future generations, patients experience significant relief from psychological distress and enhanced sense of life meaning, thereby improving overall quality of life and symptom control efficacy. This localized innovation integrates the technical framework of Western symptom management theory with the humanistic spirit of China's traditional culture, ensuring that nursing interventions are both scientifically standardized and deeply rooted in cultural identity [3].

5.2. Comprehensive Nursing Model Based on Dignity Therapy

Dignity Therapy, as an innovative approach in palliative care, has been integrated into the management of symptom clusters in patients with end-stage lung cancer [11]. This model emphasizes maintaining patients' personal dignity, life dignity, and existential dignity alongside symptom management. Research by Xiao J *et al.* demonstrates that dignity-based palliative care significantly enhances patients' sense of life dignity while markedly alleviating physiological symptoms and improving quality of life [11].

The core of this localized approach lies in establishing dignity maintenance as the intrinsic driving force for symptom management. When patients feel respected, understood, and that their lives are meaningful, their psychological perception of symptoms improves, their compliance with treatment increases, and certain psychologically related symptoms (such as anxiety and depression) naturally alleviate [11]. This underscores that symptom cluster management must address patients' holistic humanistic needs.

5.3. Localized Exploration of Multidisciplinary Teams and Social Work Intervention

The role of medical social work in palliative care has garnered increasing recognition. Through a "people-centered" professional approach, social workers integrate multidisciplinary resources—including medical, psychological, and ethical expertise—to facilitate the localized implementation of palliative care in primary healthcare institutions [18]. With social workers' involvement, symptom cluster management extends beyond medical and psychological interventions to encompass family resource mobilization, community support network development, and cultural-ethical dialogue [18].

For example, for terminally ill lung cancer patients facing family conflicts or social isolation, social workers can facilitate communication between patients and

their families and coordinate community resource support, thereby improving the patients' psychological state and symptom management capacity. This multidimensional, localized approach makes symptom cluster management more aligned with the patients' actual living contexts [18].

5.4. Tiered Referral and Home-Based Continuation of Care

To promote the widespread adoption and accessibility of palliative care, many regions have established tiered referral systems and home-based continuous care frameworks [10]. The Symptom Management Theory is applied within these systems: hospital nurses provide comprehensive symptom cluster assessments and intervention training to hospitalized patients, while community nurses and home care providers continuously monitor symptoms using standardized tools, ensuring seamless transition from hospital to community and then to home settings. This localized management system not only enhances palliative care capabilities at primary healthcare institutions but also improves patient comfort and family satisfaction [10].

6. Current Challenges and Improvement Directions in Practice

6.1. Issues of Localization and Adaptability of Assessment Tools

Many internationally recognized symptom assessment tools (such as MDASI-C and FACT-L) have Chinese versions, but their reliability, validity, and cross-cultural applicability among China patients still require further validation [17]. The item designs of some tools do not align with patients' actual linguistic expressions, resulting in prolonged assessment times and low patient compliance. Additionally, these tools primarily focus on biological-psychological dimensions and inadequately address critical aspects of concern for China patients, such as "psychological significance" and "dignity of life."

The improvement directions should include: conducting large-scale psychometric validation studies to ensure the tool's applicability; simplifying and optimizing the tool based on the characteristics of China's patients; integrating qualitative research methods to gain a deeper understanding of patients' symptom experiences and nursing needs, thereby developing assessment tools that better align with local contexts [8].

6.2. Allocation of Medical Resources and Development of Professional Teams

The standardized and theoretical application of palliative care requires substantial resource investment. Currently, many primary healthcare institutions face severe shortages of nursing staff, limited training opportunities, and a lack of specialized knowledge, making it difficult to implement systematic symptom cluster management [9]. Additionally, the establishment of multidisciplinary teams—particularly the deployment of professionals such as psychologists and social workers—re-

mains inadequate in many settings.

The directions for improvement include: enhancing policy and financial support to ensure adequate staffing in palliative care departments; establishing a standardized training system to improve nursing staff's theoretical knowledge and practical skills in symptom management; and expanding the coverage of professionals through innovative approaches such as telemedicine [10].

6.3. The Disconnection between Theoretical Translation and Clinical Practice

Although the syndrome management theory has gained consensus in the international academic community, its translation into clinical practice in China remains insufficient. Nursing practices in many medical institutions still remain at the stage of traditional, single-symptom management, with inadequate understanding of the interactions between symptoms and holistic care [19]. The disconnect between theory and practice limits the effectiveness of nursing interventions.

The directions for improvement should include: formulating clinical practice guidelines to provide nursing staff with specific and actionable symptom cluster management protocols; establishing a platform integrating research with clinical practice to facilitate rapid translation of theoretical findings; conducting case analysis and experience sharing in teaching to enhance the theoretical understanding of practitioners [20].

7. Conclusions

The Symptom Cluster Management Theory provides a scientific and systematic theoretical framework and practical guidance for palliative care of patients with terminal lung cancer. Through multidimensional literature analysis, this review elucidates the core characteristics, theoretical foundations, and clinical manifestations of symptom clusters, summarizes the primary application strategies of this theory in palliative care—including systematic assessment, multidisciplinary collaboration, personalized interventions, and dynamic monitoring—and outlines innovative explorations in China's localized practices, such as integrating life meaning, dignity therapy, social work interventions, and tiered referral systems. Currently, the application of symptom cluster management in end-stage lung cancer care has demonstrated significant clinical efficacy, with improvements observed in patients' quality of life, psychological status, and quality of life after death. However, challenges such as insufficient localization of assessment tools, uneven distribution of medical resources, and delayed translation of theoretical findings into clinical practice remain urgent issues to address.

Future development directions should focus on: 1) Refining localized symptom cluster assessment tool systems tailored to the characteristics of Chinese patients; 2) Strengthening the establishment of multidisciplinary palliative care teams and personnel training; 3) Advancing the development of theoretical guidelines and their translation into clinical practice; 4) Actively promoting the improvement of

tiered referral systems and home-based continuity of care; 5) Continuing to deepen theoretical and empirical research on localized innovative models for symptom cluster management. Through these systematic efforts, palliative care guided by symptom cluster management theory will undoubtedly provide high-quality, dignified end-of-life care services to more patients with advanced-stage lung cancer.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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