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Article

The Impact of a Multidisciplinary Collaborative Palliative Care Model on the Overall Quality of Life and Medical Costs in Patients With Advanced Lung Cancer

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Abstract

Aims/Background: Patients with advanced lung cancer experience substantial symptom burden and emotional distress, highlighting the need for improved palliative models. This retrospective study aimed to analyze the impact of a multidisciplinary collaborative palliative care model on the quality of life and medical costs in patients with advanced lung cancer. **Methods**: This retrospective study enrolled 280 patients with advanced lung cancer who received palliative care at Wenzhou Central Hospital. Patients were divided into two groups based on the care they received: a group receiving routine palliative care (routine care group) and another group receiving multidisciplinary collaborative palliative care (multidisciplinary care group). Changes in depression, anxiety, quality of life scores [Functional Assessment of Cancer Therapy-Lung (FACT-L), Functional Assessment of Cancer Therapy-Lung Cancer Subscale (FACT-LCS), Functional Assessment of Cancer Therapy-Lung total outcome index (FACT-L TOI)], sleep quality score [Pittsburgh Sleep Quality Index (PSQI)], overall well-being score [General Well-Being (GWB) scale], and medical costs (daily and total costs) were compared between the two groups before and after the intervention. **Results**: After the intervention, the multidisciplinary care group had significantly lower symptoms of depression and anxiety compared to the routine care group ($p < 0.05$); significantly higher scores in all dimensions of FACT-L, FACT-LCS, and FACT-L TOI ($p < 0.05$); and a significantly lower PSQI score and a considerably higher GWB score ($p < 0.05$). Furthermore, the average daily costs and total medical expenses were lower in the multidisciplinary care group than in the routine care group ($p < 0.05$). **Conclusion**: A multidisciplinary collaborative palliative care model can significantly reduce negative emotions, enhance quality of life and overall well-being, improve sleep quality, and effectively reduce medical expenses in patients with advanced lung cancer, demonstrating high clinical application value.

Keywords: palliative care; lung cancer; quality of life; psychological distress; medical costs

1. Introduction

With the increasing aging population, persistent environmental pollution, and changing lifestyles, the incidence of lung cancer is rising annually, making it one of the most common and deadliest malignancies worldwide [1]. Global estimates for 2020 reported approximately 2.2 million new lung cancer cases, ranking first among all cancers. China has been severely affected, accounting for 37.0% of global incidence and 39.8% of global deaths, with more than 820,000 new diagnoses in that year alone. In China, early cancer screening is relatively underdeveloped, public awareness and participation are limited, and current screening strategies cover only limited tumor types. As a result, a larger proportion of patients are diagnosed at intermediate or advanced stage [2].

Patients with advanced lung cancer often experience significant symptom burden due to extensive tumor invasion and distant metastasis, including severe pain, difficulty breathing, cough, nausea, and vomiting, accompanied by anxiety, depression, fear, and pronounced death-related distress, collectively resulting in impaired quality of life [3]. In parallel, prolonged treatment and repeated hospitalization impose considerable financial hardships and psychological distress for affected families [4]. Traditional care models primarily focus on survival extension and disease control, but their effectiveness is usually limited in end-stage disease [5]. In this context, aggressive treatment interventions may not improve prognostic outcomes and increase patient suffering, reduce quality of life, and contribute to inefficient use of healthcare resources [6].

Recent evidence indicates that prompt and timely introduction of hospice care is particularly useful for patients with rapidly progressing advanced cancer and poor response to anti-tumor therapy [7]. Hospice-focused care can reduce unnecessary invasive procedures, alleviate physical and psychological distress, and provide comfort and dignity at the end of life. It may also help reduce medical costs and, to some extent, alleviate the economic burden on families [8,9].

Palliative care, also known as hospice or end-of-life care, is a holistic care philosophy centered on the patient and their family [10]. It focuses on providing comprehensive physical, psychological, social, and spiritual support for patients with irreversible, terminal-stage illness, typically when life expectancy is not more than six months. Through multidisciplinary team collaboration, palliative care aims to help patients spend the final stage of their lives comfortably and as dignified as possible [11,12]. Its core objectives extend beyond pain relief and symptom control to emphasize psychological comfort, humanistic care, and family support. The World Health Organization (WHO) reports that palliative care seeks to maximize quality of life for patients and their families by identifying suffering early, managing active symptoms, and providing ongoing psychological and social support [13]. When applied scientifically and systematically, palliative care can significantly improve symptom burden and emotional well-being, reduce distress and anxiety associated with unnecessary interventions, and limit waste of resources related to overtreatment. These advantages are crucial not only for patients and families, but also for improving healthcare efficiency and promoting overall social well-being [14].

Globally, palliative care developed earlier. In 1967, British scholar Cicely Saunders established St. Christopher's Hospice in London, marking the formal establishment of the modern palliative care [15]. In China, palliative care started later and is still in the phase of development and promotion, facing several challenges such as limited resource allocation, inadequate professional capacity, and low public awareness [16]. However, as social expectations and healthcare services evolve, public interest in "living with quality" and "dying with dignity" continues to grow, and both theoretical research and implementation efforts in China are gradually expanding [17].

Existing evidence reinforces the role of palliative care in promoting patients' emotional well-being [18]; however, investigations specifically assessing interdisciplinary, collaborative palliative care models for patients with advanced lung cancer remain limited. Therefore, this study focuses on patients with advanced lung cancer and integrates a multidisciplinary framework to establish a palliative care service model tailored to end-of-life needs. Furthermore, it aims to explore its comprehensive impact on quality of life, healthcare costs, and continuity of care, thereby providing scientific evidence and practical guidance to improve end-stage cancer care and inform health policy development in China.

2. Methods

2.1 Enrollment of the Study Participants

This study included 280 patients with advanced lung cancer who received treatment and palliative care at Wenzhou Central Hospital between June 2021 and June 2024. The criteria for patient selection were as follows: (1) age $\geq$50 years; (2) diagnosis of advanced malignant lung cancer confirmed through clinical imaging and pathological findings, with staging and classification determined based on National Comprehensive Cancer Network (NCCN) guidelines and WHO pathological criteria [19]; (3) an actual survival time of $\leq$6 months after enrollment; and (4) normal cognitive function with sufficient reading, communication, and comprehension abilities. The criterion (3) was applied retrospectively during patient screening using documented outcomes from the hospital information system. However, exclusion criteria included (1) incomplete clinical records; (2) cognitive impairment or other severe mental illnesses; (3) prior receipt of palliative care or palliative care; (4) refusal of the patient and family to provide informed consent; and (5) uncontrolled heart failure or severe hepatic or renal dysfunction.

Eligible patients were divided into a routine care group and a multidisciplinary care group based on the palliative care approach they received. Both groups received standardized inpatient management according to their clinical needs throughout the treatment process.

2.2 Patient Care Plan

Patients in the routine care group received standard palliative care. The care team adopted a patient- and family-centered strategy, comprehensively addressing physical, psychological, and social needs to alleviate end-stage symptoms, improve comfort, and preserve dignity. On admission, medical staff assessed the patient's clinical status, emotional responses, and understanding of the disease. Based on disease progression and psychological tolerance, healthcare professionals communicated with patients and families about the limits of curative intervention. In line with individual preferences, patients were appropriately informed about their condition and expected prognosis to support a realistic understanding of the end-of-life stage. Psychological counseling and health education were provided to guide patients to cope with the realities of disease, reduce anxiety and fear, and promote a more positive and peaceful mindset. As the disease progressed, management priorities shifted toward comfort and symptom control. For critically ill patients with limited expected benefits from treatments, invasive resuscitation measures such as mechanical ventilation and endotracheal intubation were discontinued when appropriate, and non-invasive supportive measures were prioritized, including pain relief, postural adjustment, oxygen therapy, and other symptomatic care, enabling patients to spend their final days in a quiet and comfortable environment.

Patients in the multidisciplinary care group received a multidisciplinary collaborative (MDC) palliative care intervention. A dedicated multidisciplinary palliative care team was established, composed of attending oncologists, primary nurses, psychologists, nutritionists, rehabilitation therapists, and pain management specialists. All team members completed systematic training and competency assessment in palliative care principles and skills, including symptom management in advanced cancer, communication skills, psychological support, and humanistic care. The team performed regular case discussions and joint ward rounds to share updates on patients' clinical information and psychological well-being and to adjust care plans dynamically, ensuring individualized and continuous care.

Within 12 hours of admission, the attending physician, the responsible nurse, and the psychological counselor jointly conducted a multi-dimensional assessment covering medical history, psychological state, social support, and lifestyle factors. Patient and family expectations were incorporated into the development of a personalized palliative care plan. Key components included: (1) Environment optimization and humanistic care: Providing patients with a quiet, clean, and softly lit ward; ensuring barrier-free facilities; allowing personalized items to enhance familiarity and comfort; and providing shared spaces with greenery, books, and music corners in public areas to create a supportive atmosphere. (2) Symptom and pain management: Implementing pharmacological and non-pharmacological interventions based on standardized pain assessment, supplemented massage, hot compresses (heat therapy), aromatherapy, music therapy, and other auxiliary methods to improve comfort. (3) Dietary and nutritional support: A personalized dietary plan was developed based on clinical status and preferences, encouraging small, frequent, balanced meals and providing enteral or parenteral nutritional support when needed. (4) Psychological and spiritual support: Psychotherapists conducted regular psychological interviews and dignity therapy to help patients express emotions, alleviate anxiety and fear, and improve acceptance; encouraging family involvement to enhance emotional support. (5) Life and death education: Patients were provided with structured, capacity-appropriate education using visual and multimedia materials (pictures, texts, and videos) to help them rationally understand the end-of-life processes; respect spiritual needs and provide supportive practices such as prayer, meditation, and meaning-focused discussions on life and death. (6) Rehabilitation and activity guidance: Rehabilitation therapists developed appropriate low-intensity exercise plans, including breathing exercises, limb stretching, and light bed-based movements, to prevent muscle atrophy and improve respiratory function, with guidance for family members on approaches such as gentle massage. Throughout the treatment, the team provided structured education to family members about disease progression, caregiving skills, and emotional coping strategies to reduce their anxiety and helplessness and reinforce the family support system. After the patient's death, team members provided grief counseling and psychological support to help family members navigate the grieving period.

Prognostic communication and disclosure procedures were standardized across both groups and delivered by the same oncology physicians according to institutional guidelines. Both interventions were delivered from admission until discharge. Psychological counseling was provided 2–3 times per week, while symptom-management rounds and team discussions were conducted daily.

2.3 Socio-Demographic Characteristics

Baseline characteristics were collected for both groups, including age, sex, length of hospital stay, highest educational level, marital status (married, unmarried: single, divorced, separated, or widowed), employment status, histological type of lung cancer, disease onset (first diagnosis or recurrence), smoking history, and previous cancer treatments. If no significant differences in baseline characteristics were observed between groups, further comparisons were performed.

2.4 Assessment of Depression and Anxiety Levels

2.4.1 Assessment of Depression Levels Under Different Care Models

Depression symptoms in both groups were examined using the Zung Self-Rating Depression Scale (SDS) [20]. This SDS consists of 20 items, 10 positive and 10 negative. Study participants rate each item on a 4-point scale (1–4) based on how frequently they experienced the symptoms recently. Item scores were summed, multiplied by 1.25, and rounded to the nearest whole number to obtain a standardized score ranging from 25 to 100 [20], with higher scores indicating more severe depressive symptoms. Using a commonly applied grading threshold, a standardized score $<$50 indicates no depression, 50–59 mild depression, 60–69 moderate depression, and $\geq$70 severe depression [20].

2.4.2 Assessment of Anxiety Levels Under Different Care Models

Anxiety levels were assessed using the Zung Self-Rating Anxiety Scale (SAS) [21]. This scale contains 20 items, including 15 positive statements and 5 negative statements. Each item was rated on a 4-point scale (1 to 4) based on how frequently these symptoms occurred, with higher scores indicating greater anxiety. The scores of all items were summed, multiplied by 1.25, and rounded to obtain a standardized score ranging from 25 to 100 [21]. According to the scoring criteria, a standardized score $<$50 indicates no anxiety, 50–59 mild anxiety, 60–69 moderate anxiety, and 70 or above severe anxiety [21].

2.5 Assessment of Patients' Quality-of-Life Indicators

Overall quality of life was evaluated using the Functional Assessment of Cancer Therapy-Lung (FACT-L). FACT-L is a lung cancer-specific tool developed by Cella *et al.* [22] to assess patients' physical, psychological, and social functioning. The scale consists of 36 items across two components: the Functional Assessment of Cancer Therapy-General (FACT-G) core scale and the Lung Cancer

Subscale (LCS). FACT-G covers four dimensions: physical, social/family, emotional, and functional well-being. The LCS covers seven items focusing on lung cancer-specific symptoms such as cough, dyspnea, and chest pain. Each item is rated on a 5-point scale (0–4), with higher scores indicating better quality of life [22].

Furthermore, the Functional Assessment of Cancer Therapy-Lung total outcome index (FACT-L TOI) was used as a comprehensive indicator of quality of life. The total outcome index contains 21 items and is calculated by integrating FACT-G physical well-being and functional well-being subscales with the LCS, thereby offering a combined measure of a patient's physical condition and disease-related symptom burden [22]. Accordingly, FACT-L, Functional Assessment of Cancer Therapy-Lung Cancer Subscale (FACT-LCS), and FACT-L TOI reflect overall quality of life, lung cancer-specific symptoms, and changes in functional outcomes, respectively. Using these three measures in combination enables a more systematic assessment of how different palliative care models affect quality of life.

2.6 Assessment of Sleep Quality and Overall Well-Being Across Study Participants

Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI), developed by Buysse and colleagues [23] to assess sleep over the past month. The PSQI comprises seven domains: subjective sleep quality, sleep onset time (latency), sleep duration, sleep efficiency, sleep disturbances, use of hypnotics, and daytime dysfunction. Each domain is scored from 0 to 3, yielding a total score of 0 to 21; higher scores indicate poorer sleep quality [23].

Subjective well-being was evaluated using the General Well-Being (GWB) scale [24]. This scale was originally developed by the National Institutes of Health (NIH) and later revised by Chinese experts, and applied to the Chinese population [25]. The scale assesses overall well-being across six dimensions: health concerns, energy level, interest and satisfaction with life, emotional state (pleasure or depression), emotional and behavioral control, and tension versus relaxation. Items 1–14 are rated on a scale of 1 to 6, and the final four items are rated on a scale of 0 to 10. Total scores are summed, with higher total scores indicating a stronger sense of well-being [25]. The GWB scale provides an integrated measure of mental health and life satisfaction.

2.7 Evaluation of Medical Cost-Related Data

Patient medical cost-related data were collected from the hospital information system and included all direct medical expenses incurred during hospitalization. Average daily medical cost (in Chinese yuan/day) was calculated based on the length of hospitalization, and total medical cost (in Chinese yuan) was recorded. All medical expenses were expressed in Chinese yuan and calculated using uniform price standards applicable to the same time period.

2.8 Statistical Analysis and Data Collection

All outcomes (SDS, SAS, FACT-L, PSQI, and GWB) were assessed at two time points: baseline (within 24 hours of admission) and post-intervention (within 24 hours before discharge). The post-intervention assessment was uniformly scheduled at this time point to maintain consistency across participants despite differences in hospital stay length.

Assessments were conducted by two research nurses who were not involved in direct patient care and were blinded to group allocation. Both assessors received standardized training on scale administration and scoring to ensure accuracy and consistency. They entered the scores independently, and discrepancies were reviewed and resolved through discussion.

Statistical analysis was performed using SPSS version 22.0 (IBM Corp., Armonk, NY, USA). Normality of continuous variables was evaluated using the Kolmogorov–Smirnov test to determine whether assumptions for parametric statistics were met, along with tests for homogeneity of variance. For normally distributed variables, the Levene test was applied to assess homogeneity of variance. When assumptions for both normality and homogeneity of variance were satisfied, independent samples t-tests were used for between-group comparisons; if homogeneity of variance was not satisfied, Welch's t-test was used. Paired-sample t-tests were used to analyze within-group changes from baseline to post-intervention. Normally distributed continuous variables were expressed as mean ± standard deviation (mean ± SD).

Non-normally distributed variables were reported as median and interquartile range [M (Q_1, Q_3)], and between-group comparisons were performed using the Mann–Whitney U test. Categorical variables were expressed as frequency (n) and percentage (%). Between-group comparisons were conducted using the Chi-square (χ^2) test, with corresponding χ^2 values and p-values reported; Fisher's exact test was applied when expected cell counts were <5. All statistical tests were two-tailed, with a significance level set at $p < 0.05$.

3. Results

3.1 Comparison of Baseline Characteristics Between the Two Groups

This study included 280 patients in the final analysis, who were divided into two groups based on the palliative care they received: a routine care group (n = 153) receiving routine palliative care, and a multidisciplinary care group (n = 127) receiving multidisciplinary palliative care. Analysis of baseline demographic and clinical characteristics showed no statistically significant differences between the two groups ($p > 0.05$), indicating comparability between groups (Table 1).

Table 1. Comparison of baseline characteristics between the two study groups.

Variable	Routine care group (n = 153)	Multidisciplinary care group (n = 127)	Statistic	*p*-value
Age (years)	67.59 ± 5.48	68.75 ± 6.65	$t = -1.56$	0.120
Length of stay (days)	33.07 ± 7.56	32.11 ± 7.01	$t = 1.10$	0.271
Gender, n (%)			$\chi^2 = 0.00$	0.945
Female	44 (28.76)	37 (29.13)		
Male	109 (71.24)	90 (70.87)		
Marital status, n (%)			$\chi^2 = 0.31$	0.578
Having a spouse	72 (47.06)	64 (50.39)		
Unmarried	81 (52.94)	63 (49.61)		
Employment situation, n (%)			-	0.891
Retired	128 (83.66)	106 (83.46)		
Full-time or part-time	20 (13.07)	18 (14.17)		
Temporarily unemployed	5 (3.27)	3 (2.36)		
Highest level of education, n (%)			$\chi^2 = 0.13$	0.935
≤9 years	119 (77.78)	101 (79.53)		
10–12 years	20 (13.07)	15 (11.81)		
≥13 years	14 (9.15)	11 (8.66)		
Smoking history, n (%)			$\chi^2 = 0.85$	0.653
Once upon a time	103 (67.32)	79 (62.20)		
Now	22 (14.38)	20 (15.75)		
Never	28 (18.30)	28 (22.05)		
Histological type, n (%)			$\chi^2 = 0.02$	0.886
Non-small cell lung cancer	139 (90.85)	116 (91.34)		
Small-cell lung cancer	14 (9.15)	11 (8.66)		
Incidence, n (%)			$\chi^2 = 0.01$	0.914
First	132 (86.27)	109 (85.83)		
Relapse	21 (13.73)	18 (14.17)		
Treatment type, n (%)			$\chi^2 = 0.95$	0.967
Chemotherapy	17 (11.11)	14 (11.02)		
Radiation therapy	25 (16.34)	21 (16.54)		
Chemotherapy combined with radiotherapy	60 (39.22)	55 (43.31)		
Surgery combined with chemotherapy	14 (9.15)	9 (7.09)		
Immunotherapy	23 (15.03)	16 (12.60)		
Stereotactic therapy	14 (9.15)	12 (9.45)		

3.2 Comparison of Depression Symptoms Between Groups

Depression symptoms were analyzed in both groups before and after the palliative care interventions using the Zung Self-Rating Depression Scale (Table 2). Before the intervention, there were no significant differences between groups in SDS scores or in the distribution of depression severity (mild, moderate, and severe) ($p > 0.05$). After the intervention, SDS scores in the multidisciplinary care group decreased significantly, and the proportion of patients with mild depression increased, whereas the proportion of patients with moderate to severe depression decreased significantly. The post-intervention differences were statistically significant compared with the routine care group ($p < 0.05$).

3.3 Comparison of Anxiety Levels Between Groups

Anxiety levels were evaluated between groups using the Zung Self-Rating Anxiety Scale. Before the intervention, there were no statistically significant differences between the two groups in SAS scores or in the distribution of anxiety categories (no anxiety, mild, moderate, and severe) ($p > 0.05$). After the intervention, SAS scores in the multidisciplinary care group were significantly lower than those of the routine care group. The proportions of patients reporting no anxiety or mild anxiety increased in the multidisciplinary care group, while the proportions of patients with moderate to severe anxiety decreased significantly, indicating statistically significant differences compared with the routine care group ($p < 0.05$) (Table 3).

3.4 Comparison of Quality-of-Life Indicators Between Groups

Quality of life was assessed using FACT-L, FACT-LCS, and FACT-L TOI before and after the intervention (Table 4). Before the intervention, there were no statistically significant differences between the two groups in FACT-L, FACT-LCS, and FACT-L TOI scores (all $p > 0.05$), indicating comparable pre-intervention quality of life. After the intervention, all these scores increased sub-

Table 2. Comparison of depression symptoms between the two groups.

Variable	Routine care group (n = 153)	Multidisciplinary care group (n = 127)	Statistic	p-value
SDS—pre-intervention	67.49 ± 9.78	67.67 ± 9.03	$t = -0.15$	0.877
SDS—after intervention	56.36 ± 7.36*	54.72 ± 4.55*	$t = 2.27$	0.024
Depression level—before intervention, n (%)			$\chi^2 = 0.27$	0.874
Mild	34 (22.22)	25 (19.69)		
Moderate	54 (35.29)	46 (36.22)		
Severe	65 (42.48)	56 (44.09)		
Depression level—after intervention, n (%)			-	<0.001
None	30 (19.61)	13 (10.24)		
Mild	72 (47.06)	92 (72.44)		
Moderate	43 (28.10)	22 (17.32)		
Severe	8 (5.23)	0 (0.00)		

*: This indicates that the values in this group after the intervention were significantly different from the pre-intervention values ($p < 0.05$). SDS, Self-Rating Depression Scale.

Table 3. Comparison of anxiety levels between the two groups.

Variable	Routine care group (n = 153)	Multidisciplinary care group (n = 127)	Statistic	p-value
SAS—pre-intervention	64.86 ± 7.87	64.02 ± 7.31	$t = 0.92$	0.356
SAS—post-intervention	51.99 ± 4.73*	50.09 ± 6.41*	$t = 2.77$	0.006
Anxiety level—before intervention, n (%)			-	0.536
No anxiety	5 (3.27)	4 (3.15)		
Mild	35 (22.88)	30 (23.62)		
Moderate	68 (44.44)	65 (51.18)		
Severe	45 (29.41)	28 (22.05)		
Anxiety level—after intervention, n (%)			$\chi^2 = 7.22$	0.027
No anxiety	42 (27.45)	53 (41.73)		
Mild	101 (66.01)	64 (50.39)		
Moderate	10 (6.54)	10 (7.87)		

*: This indicates that, post-intervention, the values in this group were significantly different from the pre-intervention values ($p < 0.05$). SAS, Self-Rating Anxiety Scale.

stantially in the multidisciplinary care group compared with pre-intervention and were significantly higher than the corresponding scores in the routine care group ($p < 0.05$).

3.5 Comparison of Sleep Quality, Overall Well-Being, and Medical Costs Between Groups

For sleep quality and overall well-being, pre-intervention PSQI and GWB scores did not differ between the two groups before the intervention ($p > 0.05$). After the intervention, PSQI scores decreased significantly in both groups; however, the multidisciplinary care group showed lower PSQI scores, indicating better sleep quality than the routine care group, and the difference between groups was statistically significant. Post-intervention, GWB scores improved significantly in both groups, with greater improvement in the multidisciplinary care group than in the routine care group.

Regarding medical costs, both average daily costs and total hospitalization costs were lower in the multidisciplinary care group than in the routine care group. These observations indicate that multidisciplinary collaborative palliative care can reduce medical costs to some extent ($p < 0.05$, Table 5).

4. Discussion

This retrospective study assessed the effects of a multidisciplinary collaborative palliative care model in patients with advanced lung cancer, comprehensively evaluating emotional state, quality of life, sleep quality, and medical costs. The findings showed that patients receiving multidisciplinary collaborative palliative care had significantly lower depression and anxiety scores than the routine care group, alongside greater improvements in quality of life, sleep quality, and overall well-being. Additionally, both daily and total hospitalization costs were also lower in the multidisciplinary care group, indicating that the multidisciplinary collaborative model can improve palliative care outcomes for patients with end-stage lung cancer while also decreasing healthcare costs.

At a psychological level, patients in the multidisciplinary care group showed significantly lower depression and anxiety scores than those in the routine care group, indicating that multidisciplinary collaborative care can effectively alleviate negative emotions in advanced lung cancer. Patients with advanced lung cancer commonly experience significant anxiety, depression, and despair due to the irre-

Table 4. Comparison of the quality of life between the two groups.

Variable	Routine care group (n = 153)	Multidisciplinary care group (n = 127)	Statistic	p-value
FACT-L				
Before intervention	83.31 ± 13.10	82.42 ± 9.52	$t = 0.66$	0.512
After intervention	93.37 ± 11.28*	95.76 ± 5.29*	$t = -2.32$	0.021
FACT-L TOI				
Before intervention	51.88 ± 13.76	52.76 ± 8.60	$t = -0.65$	0.515
After intervention	54.41 ± 6.72*	56.22 ± 5.58*	$t = -2.47$	0.014
FACT-LCS				
Before intervention	13.86 ± 3.91	14.40 ± 3.61	$t = -1.20$	0.231
After intervention	16.13 ± 4.19*	17.19 ± 3.71*	$t = -2.21$	0.028

*: This indicates that the values in this group after the intervention were significantly different from the pre-intervention values ($p < 0.05$). FACT-L, Functional Assessment of Cancer Therapy-Lung; FACT-LCS, Functional Assessment of Cancer Therapy-Lung Cancer Subscale; FACT-L TOI, Functional Assessment of Cancer Therapy-Lung total outcome index.

Table 5. Comparison of sleep quality, well-being, and medical costs between the two groups.

Variable	Routine care group (n = 153)	Multidisciplinary care group (n = 127)	Statistic	p-value
PSQI—pre-intervention	15.58 ± 2.27	15.86 ± 2.35	$t = -1.00$	0.319
PSQI—post-intervention	11.50 ± 1.15*	7.38 ± 1.69*	$t = 23.44$	<0.001
GWB—pre-intervention	63.88 ± 4.23	63.65 ± 3.02	$t = 0.53$	0.599
GWB—after intervention	70.93 ± 4.47*	73.25 ± 3.11*	$t = -5.10$	<0.001
Average daily consumption (Chinese yuan)	378.00 (358.00, 399.60)	301.20 (268.15, 324.35)	Z = –13.71	<0.001
Total medical expenses (Chinese yuan)	13,401.30 (12,906.60, 13,980.60)	12,686.80 (12,029.70, 13,147.90)	Z = –8.13	<0.001

*: This indicates that the values in this group after the intervention were significantly different from the pre-intervention values ($p < 0.05$). PSQI, Pittsburgh Sleep Quality Index; GWB, General Well-Being; 1 US dollar = 6.9414 Chinese yuan.

versibility of the disease, prolonged treatment, significant symptom burden, and severe pain [26]. While routine palliative care can alleviate pain and physical discomfort to some extent, it often provides limited personalized, structured support for emotional management and psychological coping, which may constrain its overall benefits.

This study introduced a multidisciplinary intervention involving coordinated input from psychologists, social workers, and nurses. Using targeted psychological counseling, dignity therapy, and facilitated family communication, the intervention aimed to help patients cope with their illness and reduce psychological distress. Consistent with previous studies, multidisciplinary care interventions have been observed to improve emotional well-being and quality of life in patients with advanced cancer [27,28]. Furthermore, team-based management strengthened the dynamic monitoring and timely responses to changes in patients' psychological status, preventing aggravation of anxiety and depression, which is consistent with our results [29].

The results of this study showed that the multidisciplinary care group had significantly higher FACT-L, FACT-LCS, and FACT-L TOI scores than the routine care group. These findings suggest that multidisciplinary collaborative palliative care can not only alleviate physical symptom burden but also improve patients' social functioning and daily activity capacity. The FACT-L scale comprehensively assesses the physical, emotional, and social domains of health and is widely used to examine the effectiveness of palliative care interventions. In this study, the multidisciplinary care group achieved synergistic effects across multiple dimensions, including pain control, nutritional support, sleep management, and psychological care, through multidisciplinary collaboration, promoting an improvement in overall quality of life. Consistent with our results, Chen *et al.* [30] reported substantially higher FACT-L scores among patients receiving a multidisciplinary care intervention. Similarly, Temel *et al.* [31] observed that comprehensive palliative care can significantly improve physical comfort and reduce negative emotions through systematic management, thereby improving their quality of life.

Regarding sleep quality and overall well-being, the multidisciplinary care group demonstrated lower PSQI scores and higher GWB scores than the routine care group, suggesting better sleep and stronger psychological well-being under multidisciplinary palliative care. Patients with advanced lung cancer often experience sleep disorders due to pain, dyspnea, and anxiety [32]. A multidisciplinary care can improve patients' subjective sleep experience through pain assessment, pharmacological analgesia, and non-pharmacological interventions such as music therapy and aromatherapy. Simultaneously, psychological support and environmental optimization may promote sleep by reducing distress. Similarly, Wang and Pan [33] indicated that psychological intervention and environmental management can improve sleep quality in patients with cancer, consistent with the current results. Potential mechanisms may involve stress-related pathways, including the regulation of cortisol and other neuroendocrine responses.

Overtreatment and ineffective resuscitation at the end of the line are major contributors to unnecessary resource utilization. In our study, both the average daily cost and total medical cost were lower in the multidisciplinary care group, indicating that a structured palliative care model helps reduce the end-stage treatment costs. By comprehensively assessing disease progression, appropriately limiting invasive treatments, and optimizing care procedures, multidisciplinary teams may improve efficiency while reducing unnecessary economic burdens. Sharafi *et al*. [34] revealed that palliative care can significantly reduce medical costs and support more rational allocation of healthcare resources, further validating the present results.

The interpretation of our findings is subject to certain limitations. The generalizability of the results may be constrained by the single-center, retrospective design and the limited sample size. Although the groups were comparable at baseline, this non-randomized approach inherently carries a risk of residual confounding and selection bias. Additionally, blinding of patients and care providers was not feasible in these palliative care settings, which may have influenced subjective endpoints, particularly psychological scores. Finally, the follow-up period was inherently short given the end-of-life context, preventing evaluation of the durability of the observed benefits and limiting assessment of long-term outcomes, including family bereavement experiences.

5. Conclusion

In conclusion, a multidisciplinary collaborative palliative care model can significantly improve emotional well-being, quality of life, and overall well-being in patients with advanced lung cancer, while also reducing medical expenses, demonstrating promising potential for clinical implementation. By operationalizing a “patient-centered” care philosophy, this care model may significantly optimize end-stage cancer care in China and promote the standardization and widespread adoption of palliative care services.

Key Points

- This retrospective analysis aimed to evaluate the effects of a multidisciplinary collaborative palliative care model in the quality of life and healthcare costs in patients with advanced lung cancer.
- The results showed that, compared with the routine care group, the multidisciplinary care group had significantly lower depression and anxiety scores, and significantly improved quality of life, sleep quality, and overall well-being.
- Regarding healthcare costs, both average daily costs and total healthcare costs were significantly lower in the multidisciplinary care group than in the routine care group.
- A multidisciplinary collaborative palliative care model can effectively improve physical health and mental well-being in patients with advanced lung cancer and can preserve healthcare resources.

Availability of Data and Materials

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

Author Contributions

YYX and HHL designed the research study. YYX and SCL performed the research. SCL and HHL analyzed the data. YYX and HHL drafted this article. All authors contributed to the important editorial changes in the manuscript. All authors read and approved the final manuscript. All authors have participated sufficiently in the work and agreed to be accountable for all aspects of the work.

Ethics Approval and Consent to Participate

The study was approved by the Ethics Committee of Wenzhou Central Hospital (approval number: 2024-K011), and all procedures followed the principles of the Declaration of Helsinki. Informed consent was waived for this retrospective study by the Ethics Committee because the data in this study were de-identified before analysis, there is no potential risk to patients.

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Conflict of Interest

The authors declare no conflict of interest.

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