Article

Study on comprehensive evaluation of physiological stress and mental health of lung cancer patients in emergency department and its improvement of nursing effect

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Abstract: Objective: To investigate the clinical value of a dual-index comprehensive assessment of physiological stress and mental health in lung cancer patients in the emergency department, and to verify the effectiveness of comprehensive nursing interventions in improving patients' physiological and psychological status. **Methods:** A single-center retrospective study was conducted, enrolling 90 lung cancer patients hospitalized in the emergency department from January 2024 to November 2024. Serum cortisol, heart rate variability (HRV, SDNN parameter), IL-6, as well as HADS, PSS, QLQ-C30 scale scores and intervention execution status were collected within 48 h of admission and 48 to 72 h after the completion of comprehensive nursing intervention. Paired *t*-tests were used to compare the differences in each indicator before and after the intervention, and Pearson correlation analysis was performed to explore the relationships between ΔHRV and ΔHADS, ΔPSS, and ΔQLQ-C30. **Results:** After the intervention, serum cortisol was significantly lower than before the intervention ($P = 0.001$), HRV was significantly increased ($P = 0.004$), and IL-6 levels were significantly reduced ($P = 0.042$). The HADS and PSS scores significantly decreased (both $P < 0.01$), while QLQ-C30 global health, emotional, and social functioning scores significantly increased ($P = 0.002, 0.005, 0.021$, respectively). ΔHRV was significantly negatively correlated with ΔHADS and ΔPSS (both $P < 0.01$) and significantly positively correlated with ΔQLQ-C30 ($P < 0.01$). The intervention protocol adherence was high, showing good clinical feasibility. **Conclusion:** Comprehensive nursing interventions can effectively reduce physiological stress levels and improve mental health and quality of life in lung cancer patients in the emergency department. Physiological and psychological indicators are closely related, and comprehensive assessment provides empirical support for individualized nursing strategies, contributing to improved clinical nursing quality and overall patient prognosis.

Keywords: lung cancer patients; physiological stress; mental health; comprehensive nursing intervention

1. Introduction

Lung cancer is still the leading cause of cancer-related deaths worldwide. In clinical practice, many patients experience high levels of stress during diagnosis and treatment [1]. These stress factors not only stem from the disease itself and invasive treatment procedures but also involve financial issues, insufficient social support, and concerns about the uncertainty of prognosis [2]. Previous studies have focused more on the molecular mechanisms and treatment strategies of tumors, while there is still a lack of refined nursing program evaluations for lung cancer patients facing both physiological and psychological pressures in the emergency department setting. In

clinical practice, such patients simultaneously endure intense stress states and complex emotional fluctuations within a short period, exhibiting both abnormal physiological indicators and obvious anxiety, depression, and impaired social functioning [3,4]. However, existing evidence is insufficient regarding how to precisely integrate physiological stress and mental health indicators for comprehensive assessment and intervention. Nursing intervention strategies often lack multidimensional consideration, making it difficult to effectively improve the overall patient condition in the short term [5]. This deficiency brings difficulties to actual clinical work and also limits the potential space for improving patient prognosis [6]. This study aims to use a retrospective analysis method and verify the effectiveness of comprehensive nursing interventions in improving the overall condition of lung cancer patients in the emergency department through a dual-index comprehensive evaluation of key physiological and psychological indicators. By deeply exploring the correlation of bidirectional changes in physiological stress and mental health before and after nursing intervention, this study hopes to provide reproducible and quantifiable evidence for clinical practice, to help formulate more targeted and holistic nursing strategies, and ultimately to promote the treatment and nursing of lung cancer patients in the emergency department to a higher level.

2. Materials and methods

2.1. Study design and overall process

This study was a single-center retrospective study. Researchers retrieved inpatient cases of lung cancer admitted to the emergency department of this hospital from January 2024 to November 2024, confirmed by pathological or imaging diagnosis, from the hospital's electronic information system. A total of 90 eligible patients were included. The primary objective of the study was to utilize existing clinical and nursing records to compare physiological stress and mental health-related indicators at two specific time points—early after admission and after completion of nursing intervention—to assess the extent of improvement in patients' conditions due to comprehensive nursing intervention. Prior to the initiation of the study, approval was obtained from the Ethics Committee of Ganzhou People's Hospital (Approval No.: PJB2024-010-01), and all data extraction and analysis strictly adhered to medical ethical standards and privacy protection regulations.

During data extraction and analysis, the researchers strictly followed these steps: (1) Retrieve case numbers and basic information of all lung cancer patients hospitalized in the emergency department within the specified time frame from the hospital's electronic information system; (2) conduct independent reviews by two individuals based on predetermined inclusion and exclusion criteria to confirm whether each patient's basic clinical data and nursing records contained complete physiological and psychological assessment data as well as the implementation of nursing intervention. In case of any disagreement between the two reviewers, a third researcher with extensive clinical experience would re-check the original data and make the final decision; (3) after the review was completed, export the basic clinical data, physiological stress indicators, mental health and quality of life scale scores, and nursing intervention implementation records of all 90 eligible patients from the

hospital's information system, and establish a unified database; (4) Perform paired data matching and statistical analysis of various indicators before and after the nursing intervention to verify the impact of the intervention on physiological stress and mental health indicators.

2.2. Inclusion and exclusion criteria

Inclusion criteria: (1) Age $\geq$ 18 years; (2) Pathologically or radiologically confirmed small cell or non-small cell lung cancer with complete tumor staging data; (3) completion of serum cortisol, heart rate variability (HRV), and IL-6 testing within 48 h of admission to the emergency department, and the availability of re-measurement data for the same indicators within 48 to 72 h after the end of nursing intervention; (4) completion of the Hospital Anxiety and Depression Scale (HADS), Perceived Stress Scale (PSS), and QLQ-C30 scale assessments within 48 h of admission, and repeat assessment with the same scales within 48 to 72 h after the end of nursing intervention; (5) clear records in the nursing information system regarding the implementation plan of comprehensive nursing intervention and patient compliance information.

Exclusion criteria: (1) Patients for whom it was not possible to match physiological and psychological assessment data before and after the intervention; (2) cases with uncontrollable severe infection (e.g., diagnosed sepsis) at the initial stage of admission, making it impossible to independently evaluate stress indicators; (3) cases with a history of severe mental disorders for which reliable psychological scale results could not be obtained.

2.3. Data collection and time point settings for measurements

All data in this study were derived from existing clinical records and the nursing information system, without any additional interventions or follow-up. The study strictly defined the time points to ensure comparability of data before and after the intervention:

Pre-intervention data: Within 48 h of admission, serum cortisol concentration testing, heart rate variability (SDNN parameter) measurement, and IL-6 level testing were completed. Under conditions where the patient's consciousness was clear and comprehension allowed, trained nursing staff completed the HADS, PSS, and QLQ-C30 scale assessments (HADS total score range: 0–42 points, with higher scores indicating more severe anxiety and depression symptoms; PSS total score range: 0–40 points, with higher scores indicating higher perceived stress levels; QLQ-C30 total and domain scores all range from 0–100 points, and higher scores indicate better corresponding health function dimensions or overall quality of life). The data at this time point served as the baseline for this study.

Post-intervention data: Twenty-four hours after the completion of the comprehensive nursing intervention measures, the nursing team terminated the intervention according to the plan. Within 48 to 72 h thereafter, serum cortisol, HRV, and IL-6 tests were conducted again, and a second assessment of HADS, PSS, and QLQ-C30 scales was completed. The researchers extracted the final records of the above indicators from the electronic system and ensured that each patient obtained

clearly timed, paired data without any missing values.

2.4. Comprehensive nursing intervention measures and definition of compliance

The nursing intervention measures reviewed in this study were a standardized comprehensive nursing program uniformly implemented for lung cancer patients in the emergency department during the study period. This program was strictly executed by a specially trained nursing team in accordance with nursing standards, including (1) psychological support: Nursing staff conducted one-on-one interviews with patients in a quiet environment, explained disease-related information, relieved anxiety, and noted the interview duration and the patient's subjective feedback in the nursing records; (2) pain management: Individualized analgesic measures were adjusted according to the patient's pain score, and the patient's subjective satisfaction with pain control during the intervention period was recorded; (3) breathing training and rehabilitation guidance: The nursing team provided breathing exercise guidance to patients at fixed times daily and recorded the number of times and duration of execution.

Compliance was defined as the proportion of patients who completed each of the above steps according to the prescribed frequency and requirements of the standard program during the intervention period. The nursing information system automatically generated an intervention execution log, including time points, frequency of execution, and patient cooperation. The researchers extracted the final compliance data from this system.

2.5. Data matching and verification

After data extraction was completed, two researchers independently checked and matched all patient data. Each patient's data was matched between the baseline (pre-intervention) and post-intervention data sets using a unique medical record number. If any discrepancies were found during the data-matching process, a third researcher re-examined the original data and made a final determination. After verification was completed, all cases were re-checked to ensure that the pre- and post-measurement indicators corresponded clearly and that the values were complete and intact.

2.6. Statistical analysis methods

Data analysis was performed using IBM SPSS Statistics 25.0 software. Continuous data were first tested for normality. If they met the conditions of normal distribution and homogeneity of variance, paired *t*-tests were used to compare differences in paired data before and after the intervention, and results were expressed as mean and standard deviation. Categorical variables were presented as frequencies and percentages, only for descriptive display, without conducting group comparisons or tests of proportional differences before and after the intervention.

To assess the relationship between changes in physiological stress indicators and mental health and quality of life, the difference (Δ value) between post-intervention and pre-intervention values was used as the object of analysis. If the Δ value data met the conditions of normal distribution and homogeneity of variance, Pearson correlation

analysis was adopted to report the correlation coefficient (*r*) and *P* value. All statistical analyses were two-sided tests, and *P* < 0.05 was considered statistically significant.

2.7. Quality control and bias control

To reduce selection bias, this study continuously included all eligible patients after defining the inclusion and exclusion criteria, without any subjective screening tendencies. To reduce information bias, two researchers independently extracted and checked the data; any inconsistencies found were immediately traced back to the original medical records for verification. All data were derived from standardized measurements and records in routine clinical processes, ensuring that the results are authentic and reliable. Throughout the research process, clear and reproducible operational steps were maintained in data extraction, matching, and statistical analysis to ensure the reproducibility and traceability of the experimental methods.

3. Results

3.1. Baseline characteristics

The baseline characteristics of the sample showed a diverse distribution in terms of sex, type, and stage of lung cancer, with no obvious central tendency. The overall case composition was predominantly non-small cell lung cancer, with a relative concentration of higher-stage patients. These baseline data established the basic population structure for the subsequent longitudinal comparison of physiological stress and mental health indicators (**Table 1**).

Table 1. Baseline clinical and demographic characteristics of included patients.

Variable	Data
Age (years)	61.54 ± 7.12
Sex, *n* (%)	Male 57 (63.33%), Female 33 (36.67%)
Type of Lung Cancer, *n* (%)	Small Cell Lung Cancer 19 (21.11%), Non-small Cell Lung Cancer 71 (78.89%)
Lung Cancer Stage, *n* (%)	Stage I 4 (4.44%), Stage II 11 (12.22%), Stage III 34 (37.78%), Stage IV 41 (45.56%)

3.2. Changes in physiological stress indicators

After the intervention, significant changes were observed in serum cortisol, heart rate variability (SDNN), and IL-6 upon statistical testing. Paired *t*-test results showed a significant decrease in serum cortisol ($t = -6.170$, $P = 0.001$), a significant increase

Table 2. Comparison of physiological stress indicators (serum cortisol, HRV, IL-6) before and after the intervention.

Indicator	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	Difference	Test Value	P Value	Cohen's *d*
Serum Cortisol (μg/dL)	18.54 ± 2.70	16.72 ± 2.30	−1.82	$t(89) = -6.170$	0.001	0.65
HRV (SDNN) (ms)	95.42 ± 13.50	101.10 ± 13.15	5.68	$t(89) = 2.978$	0.004	0.31
IL-6 (pg/mL)	14.22 ± 1.90	13.35 ± 1.85	−0.87	$t(89) = -2.066$	0.042	0.26

in SDNN ($t = 2.978$, $P = 0.004$), and a significant decrease in IL-6 ($t = -2.066$, $P = 0.042$), indicating that patients' physiological stress indicators were effectively improved following the nursing intervention (**Table 2**).

3.3. Changes in psychological health and quality of life

After the intervention, compared with baseline, patients' HADS and PSS scores significantly decreased (both *t* values > 5, *P* < 0.01), and QLQ-C30 global health, emotional, and social functioning scores significantly increased (*t* values from 2.354 to 4.254, *P* < 0.05). All results were confirmed by paired *t*-tests (**Table 3**).

Table 3. Comparison of psychological health and quality of life scale (HADS, PSS, QLQ-C30) scores before and after the intervention.

| Scale/Dimension	Pre-Intervention (Mean ± SD)	Post-Intervention (Mean ± SD)	Difference	Test Value	*P* Value	Cohen's *d*
HADS (Total Score, 0–42)	21.37 ± 3.12	17.29 ± 3.11	−4.08	$t(89) = -8.320$	<0.001	0.88
PSS (Total Score, 0–40)	26.46 ± 2.93	23.57 ± 2.89	−2.89	$t(89) = -5.100$	0.001	0.54
QLQ-C30 (Global Health, 0–100)	55.77 ± 8.14	61.38 ± 8.17	5.61	$t(89) = 4.254$	0.002	0.45
QLQ-C30 (Emotional Function, 0–100)	62.07 ± 9.24	66.59 ± 9.27	4.52	$t(89) = 2.860$	0.005	0.33
QLQ-C30 (Social Function, 0–100)	58.53 ± 7.83	61.97 ± 7.68	3.44	$t(89) = 2.354$	0.021	0.27

3.4. Nursing intervention compliance

The results of the comprehensive nursing intervention indicated that the completion rates for psychological support, pain management, and breathing training and rehabilitation guidance were all relatively high (**Table 4**), indicating overall good compliance. These findings suggest that patients cooperated well with the prescribed nursing plan, facilitating the smooth implementation of the intervention and providing references for optimizing nursing strategies.

Table 4. Patient compliance data for comprehensive nursing intervention measures.

Intervention Component	Actual Total Executions	Planned Total Executions	Completion Rate (%)
Psychological Support	835	900	92.78
Pain Management Program	661	720	91.81
Breathing Training and Rehabilitation Guidance	1095	1170	93.85

3.5. Correlation analysis between changes in physiological stress indicators and psychological health, quality of life

Post-intervention HRV changes were moderately negatively correlated with changes in HADS and PSS scores (*r* = −0.35 and *r* = −0.42, *P* < 0.01) and moderately positively correlated with changes in QLQ-C30 scores (*r* = 0.30, *P* < 0.01), indicating a statistically significant association between the degree of physiological stress relief and the reduction of psychological symptoms as well as improvement in quality of life (**Figure 1**).
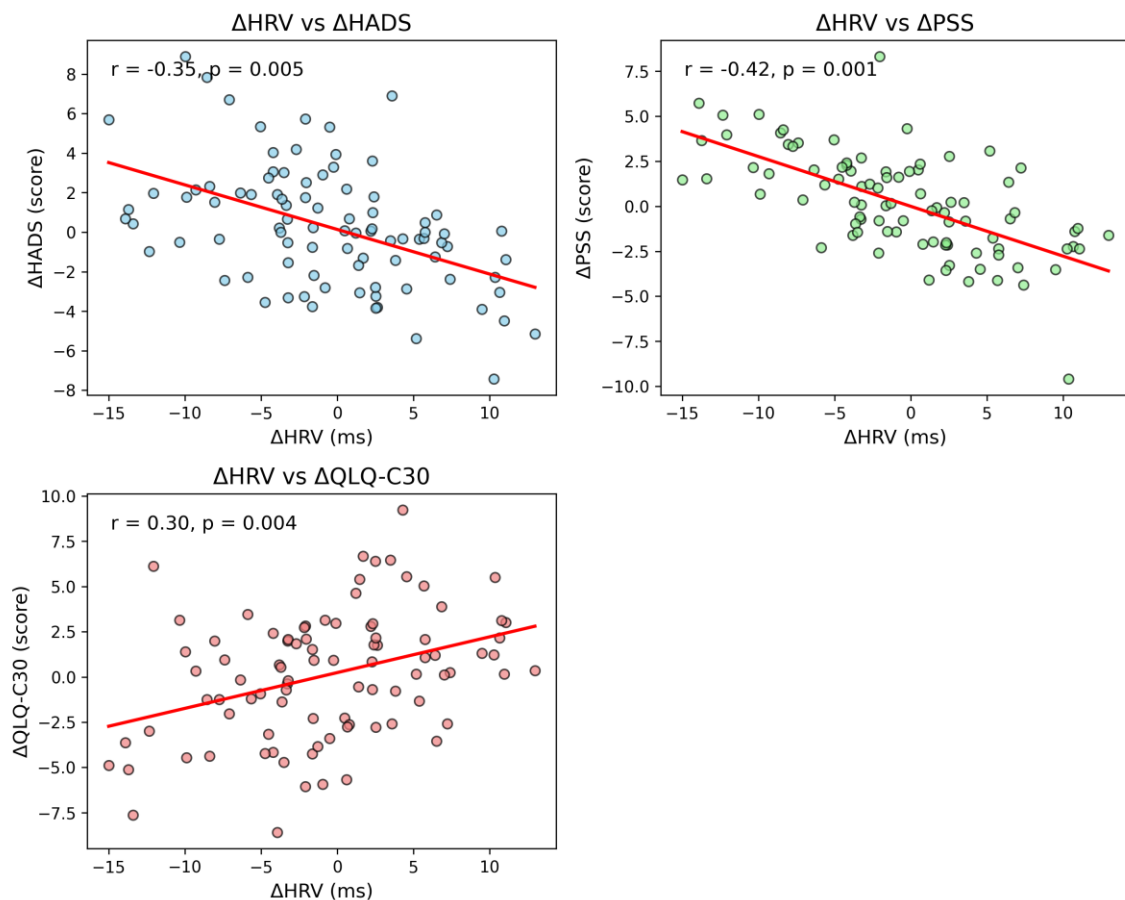
Figure 1. Scatter plots of the correlation between ΔHRV and ΔHADS, ΔPSS, and ΔQLQ-C30 scores, tested by Pearson correlation analysis. The corresponding correlation coefficients (*r*) and *P* values are shown. *P* < 0.05 is considered statistically significant.

4. Discussion

This study indicates that after receiving comprehensive nursing interventions, lung cancer patients experienced a significant decrease in serum cortisol and IL-6 levels and a significant increase in HRV (SDNN) levels. These changes reflect, from a physiological perspective, the alleviation of patients' stress states and the improvement of their self-regulation abilities. Serum cortisol is a key biomarker of the hypothalamic-pituitary-adrenal (HPA) axis, and elevated levels are typically associated with excessive stress load, anxiety, and depressive states [7,8]. IL-6, as a pro-inflammatory cytokine, not only indicates inflammation activation but may also exacerbate systemic immune dysfunction and tumor progression in patients. Through the intervention, the significant reduction in cortisol and IL-6 levels suggests that the overactivation of the stress axis and inflammatory pathways has been suppressed, creating conditions for the restoration of internal homeostasis in patients. The increase in HRV levels reflects enhanced dynamic balance capabilities of the autonomic nervous system, particularly the regulation between the sympathetic and parasympathetic nerves [9]. In emergency department lung cancer patients, reduced HRV is often closely related to an increased risk of cardiovascular events and the worsening of anxiety and depressive states [10,11]. Improvement in HRV implies

enhanced adaptability of patients to external stimuli and more flexible physiological responses. This not only helps reduce the incidence of acute stress-related cardiovascular events but also, to some extent, alleviates the damage caused by chronic stress to the neuroendocrine-immune network, thereby laying a good foundation for the implementation of subsequent treatment plans [12]. These results collectively suggest that comprehensive nursing interventions can improve patients' physiological homeostasis and stress resistance by reducing physiological stress burden and enhancing autonomic regulation function. This process not only optimizes patients' short-term prognosis but may also have a positive impact on long-term recovery, emphasizing the importance of focusing on physiological stress indicators in tumor care.

The decrease in patients' anxiety, depression, and perceived stress levels after the intervention is not only a change in numbers and scores but also a validation of the clinical nursing intervention approach. The significant reduction in HADS and PSS scores indicates that patients transitioned from a state of tension and helplessness to a calmer and more controllable psychological state within a short period [13,14]. This is not merely a process of psychological consolation but rather an actual effect generated under a rigorous nursing program. Through appropriate information explanation and emotional support, patients began to understand their own condition and no longer viewed the treatment situation as an insurmountable obstacle [15]. On this psychological foundation, the improvement in quality of life is not limited to increased survival time and the alleviation of clinical symptoms but is reflected in all aspects of daily life [16]. The QLQ-C30 assessment showed significant improvements in patients' overall health status, emotional, and social functioning. These indicators are extremely valuable in the treatment process of lung cancer patients in the emergency department because treatment requires not only time, technology, and medication but also the patients' psychological reserves to cope with medical challenges. When patients are able to face pain and adjustments to treatment plans with a more positive attitude, the implementation of nursing interventions proceeds more smoothly, and the allocation of medical resources can be more effectively utilized [17]. Higher quality of life is manifested by the formation of more positive interactions between patients, family members, and the nursing team, with smoother communication and more rational decision-making. Patients are no longer passively receiving treatment instructions but can participate in treatment decisions, and this consensus enhances the effectiveness of the intervention measures [18]. In the long term, the improvement in psychological health and quality of life lays the foundation for reducing recurrence rates, delaying disease progression, and improving long-term compliance. When patients' psychological stress responses are effectively alleviated, negative emotions such as fear and helplessness no longer dominate daily life, and subsequent treatment methods and rehabilitation strategies are expected to achieve higher compliance [19]. Patients have stronger psychological support when facing subsequent complex treatment choices and drug side effects, and they are less likely to withdraw excessively due to minor discomfort. Instead, they are more willing to continue engaging in ongoing care and rehabilitation processes. The establishment of this positive cycle allows disease management to go beyond the narrow scope of physiological indicator improvement and achieve breakthroughs on a broader

psychosocial level. In this process, patients are not blindly optimistic but begin to learn to allocate their energy and resources rationally, actively seeking help and strategic support when facing medical challenges, and gradually finding feasible and sustainable directions in the complex and ever-changing journey of the disease.

The correlation between changes in HRV and changes in HADS, PSS, and QLQ-C30 after the intervention reflects the interactive mechanism between physiological and psychological dimensions in clinical nursing. Under the overall regulation of the neuro-endocrine-immune (NIE) axis, HRV can dynamically reflect the subtle regulatory capacity of the sympathetic and parasympathetic nerves over the body. Existing literature indicates that when sympathetic nerve excitability remains elevated for a prolonged period, the HPA axis is activated to release more stress hormones, and the levels of inflammatory mediators such as IL-6 also increase, ultimately exacerbating negative emotions and physical discomfort. An increase in HRV signifies that the autonomic nervous system has returned to a relatively balanced state, thereby inhibiting inflammation and excessive stress responses, resulting in favorable outcomes in terms of mood, social functioning, and overall quality of life [20]. This series of interconnected changes reveals that physiological and psychological processes are not isolated from each other but rather interact through neural, endocrine, and immune circuits, providing deeper mechanistic support for clinical nursing interventions. This is not merely a statistical result but rather an integrated pathway signal from biological stress responses to psychological perception and then to the improvement of quality of life [21]. In practice, nursing interventions often focus on controlling symptoms and indicators. However, through such comprehensive assessments and correlation analyses, it becomes clear that improvements in physiological status may indirectly affect mental health and promote emotional recovery and social functioning through autonomic nervous system regulation. Therefore, clinical nursing should not be limited to reducing a specific inflammatory factor or alleviating a particular physiological symptom but should incorporate psychological scales into the overall assessment framework. With the advancement of technology and management methods, nursing staff can early identify physiological relief signals brought about by changes in HRV and accordingly predict trends in patients' psychological stress levels, allowing for more flexible allocation of psychological support and educational measures in nursing plans. This comprehensive evaluation approach not only aids in timely intervention and prevention of emotional distress but also provides a new foothold for improving patients' quality of life. Through such analyses, clinical teams can consciously include psychological factors when developing nursing strategies, making the patient's treatment journey not solely centered around the disease itself but focused on enhancing the individual's coping abilities and adaptability levels. The impact on clinical practice is not confined to a single department or time period but permeates all aspects of the patient's medical experience through a holistic approach. Nursing staff often feel pressured when dealing with clinical complexities, but with clear correlation signals and data support, they can confidently adjust the timing and methods of psychological interventions, making the patient's recovery path smoother [22]. In practice, this approach can also promote interdisciplinary collaboration, where doctors, nurses, psychotherapists, nutritionists, and rehabilitation specialists can conduct integrated interventions based

on these correlated data, avoiding fragmented management and resource wastage. Overall, this dual-index comprehensive assessment method provides a more complete decision-making foundation for the field of clinical nursing. It helps fundamentally improve patient experiences, increase the flexibility of treatment plans, and ensure that patients receive not only physiological relief but also support and enhancement in psychological and social functioning.

The higher compliance rate with nursing interventions observed in the study results is not a coincidental phenomenon. Patients maintaining good participation and adherence in the multidimensional nursing processes indicate that the design and implementation of the intervention programs aligned with the patients' actual needs and circumstances. Whether it is individualized psychological support, pain management strategies tailored to the pain experience, or precise breathing training and rehabilitation guidance programs, patients did not passively receive these interventions. Instead, through these orderly, feasible, and repeatable measures, they gained a sense of self-control. When patients realize that their involvement can lead to tangible physiological and psychological benefits, completing nursing instructions becomes not just a mechanical act of following medical advice but a voluntary choice to enhance their own quality of life. The clinical team plays a pivotal role in this process, acting as a bridge that not only meets standardized technical requirements but also provides patients with trust and understanding through humanistic care. Based on this, the optimization space for clinical practice becomes clearer. Faced with a diverse and complex patient population, nursing intervention strategies are not fixed templates but need continuous adjustment and refinement in practice. Human-centered considerations in resource allocation, precise determination of nursing staff training directions, and flexible optimization of internal department management models are all inspired by the high compliance rate indicator. When real-world data show that patients are willing and able to actively participate, the nursing team no longer needs to speculate whether patients will accept new attempts but can make more breakthrough improvements based on the existing foundation. This positive cycle allows the formulation of nursing strategies to no longer rely on a single data dimension but to have clear clinical feedback as the basis for judgment. Practitioners can use this as a foothold to confidently explore new integrated pathways, merging physiological indicator control, psychological counseling, and behavioral interventions to strive to build a dynamic and adjustable nursing ecosystem. In this ecosystem, patients are no longer passive subjects adapting to medical processes but are collaborators who can influence the direction of their treatment through their own involvement. This transformation not only improves current efficacy but also broadens the perspectives for future tumor care and rehabilitation work, providing opportunities to further explore the collaborative potential of multidisciplinary teams and personalized service models.

This study's results also provide new perspectives for the expandability of nursing intervention strategies and the potential improvement of patients' long-term outcomes. On the one hand, the effectiveness of the intervention has been verified not only in the short term; in the future, follow-up monitoring could be considered to continuously observe changes in patients' functional recovery, incidence of complications, and long-term quality of life so as to evaluate long-term benefits. On

the other hand, HRV monitoring methods in clinical practice possess non-invasive and real-time advantages. If HRV data can be collected periodically during the emergency department or hospitalization process and combined with psychological scale assessment results, psychological intervention and resource input intensity can be dynamically adjusted accordingly, thus achieving a precise and staged approach targeting patients with different stress levels. In this way, not only can excessive intervention for patients under low stress be avoided, but timely strengthened support can also be provided to patients under high stress, helping to maximize intervention effects under limited nursing resources. With the further development of biosensing technology, utilizing HRV parameters for real-time analysis of autonomic nervous system status will become more feasible and will lay a foundation for the development of clinical nursing toward intelligence and personalization. This study adopted a single-center retrospective design, which is indeed similar to certain existing literature in methodology. However, conducting a systematic dual-index comprehensive assessment of lung cancer patients in the emergency department remains exploratory. Existing research mostly focuses on conventional inpatient or outpatient patients, whereas this study integrates the urgent condition and high stress load unique to the emergency department, using HRV and other indicators capable of rapidly and dynamically reflecting autonomic nervous function as the entry point. For the first time, it verified its correlation with the QLQ-C30 overall health status and functional dimensions in this special setting. This has practical value in filling the gap in simultaneously managing physiology and psychology in the emergency nursing field, lays a foundation for subsequent multicenter or prospective research, and further expands the idea of using HRV for individualized nursing intervention decision-making.

This study is a single-center, retrospective design in which it is difficult to completely avoid selection bias and information bias during case screening and data collection, and the extrapolation of the results is limited. Although all eligible lung cancer patients in the emergency department were continuously enrolled, representativeness may still be insufficient due to factors such as the characteristics of the local healthcare-seeking population or the hospital admission structure. In addition, this study mainly included late-stage (III/IV) patients, which is not sufficient to fully reflect the intervention effect on early- or mid-stage patients, and clinical generalizability should be cautiously evaluated. In the future, multicenter or prospective randomized controlled trials can be considered to improve sample diversity and the generalizability of the results. Given the current sample size of 90 cases, this study was unable to conduct more detailed stratified discussions in baseline data balance analysis, especially regarding differences in intervention effects among patients with different lung cancer stages, which require further verification. Subsequently, provided there is a sufficient sample size, subgroup analysis of patients in each stage or those with comorbid chronic diseases can be performed to more accurately evaluate how the intervention functions in patients at different disease stages. By strengthening prospective follow-up and dynamic monitoring, the long-term prognostic impact of nursing intervention can also be better evaluated.

5. Conclusion

The results of this study indicate that comprehensive nursing interventions for lung cancer patients in the emergency department can effectively alleviate physiological stress responses, reduce cortisol and IL-6 levels, and improve HRV indicators. There were significant improvements in scores related to psychological health and quality of life, with HADS and PSS scores significantly decreasing and overall QLQ-C30 scores increasing, demonstrating a trend of synergistic improvement in physiological and psychological states. The significant correlations between changes in HRV and changes in HADS, PSS, and QLQ-C30 provide a basis for the clinical development of more targeted and holistic nursing strategies. The high compliance rate indicates patient acceptance of the intervention measures, laying the foundation for further promotion and optimization of resource allocation.

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Ethical approval: The study was approved by Ethics Committee of Ganzhou People's Hospital, approval number is PJB2024-010-01. The date of approval is 19 December 2024.

Informed consent statement: Informed consent was obtained from all subjects involved in the study.

Conflict of interest: The authors declare no conflict of interest.

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