Scientific Research Publishing

Open Journal of Modern Neurosurgery, 2025, 15(4), 245-255
https://www.scirp.org/journal/ojmn
ISSN Online: 2163-0585
ISSN Print: 2163-0569

Correlation between Supportive Care Needs and Symptom Distress in Postoperative Patients with Spinal Tumors

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How to cite this paper: Luo, M., Wang, X.Q., Li, Z.R. and Luo, G.Y. (2025) Correlation between Supportive Care Needs and Symptom Distress in Postoperative Patients with Spinal Tumors. *Open Journal of Modern Neurosurgery*, **15**, 245-255.
https://doi.org/10.4236/ojmn.2025.154026

Received: July 3, 2025
Accepted: August 10, 2025
Published: August 13, 2025

Abstract

Objective: To investigate the current status of supportive care needs in postoperative patients with spinal tumors and explore their correlation with symptom distress, thereby providing a theoretical basis for developing targeted interventions. **Methods:** A cross-sectional study was conducted involving 131 patients hospitalized after spinal tumor surgery between January 2024 and November 2024. Data were collected using a General Information Questionnaire for Spinal Tumor Patients, the Short-Form Supportive Care Needs Survey (SCNS-SF34), and the MD Anderson Symptom Inventory for Spine Tumors (MDASI-SP). **Results:** Postoperative spinal tumor patients reported significant unmet supportive care needs (Total SCNS-SF34 score: 87 [IQR 64-113]). The highest intensity of unmet needs was observed in the Physical and Daily Living domain (mean score 2.89 ± 0.98), while the Health System and Information domain had the highest unmet rate (83.1%). Patients universally experienced multiple symptom burdens: 93.89% reported pain (median severity: 3 points), 78.63% had motor dysfunction (arm/leg weakness), and the overall prevalence of symptom distress was 84.4%. Spearman correlation analysis further revealed a moderate positive correlation (r = 0.554) between overall symptom severity and total supportive care needs. This correlation was strongest with Physical and Daily Living needs (r = 0.592) and Psychological needs (r = 0.580). **Conclusion:** The findings indicate that postoperative spinal tumor patients have significant unmet supportive care needs, particularly in the Physical and Daily Living domain and the Health System and Information domain. They also experience a high burden of multiple symptoms. A moderate positive correlation exists between symptom severity and overall supportive care needs, with the strongest associations observed for Physical and Psychological needs. Therefore, healthcare professionals should prioritize assessing and addressing supportive care needs in these patients, especially those with high

symptom severity, by implementing targeted nursing interventions to improve postoperative recovery experiences and quality of life.

Keywords

Spinal Tumor, Symptom, Symptom Distress, Supportive Care Needs

1. Introduction

Spinal tumors are associated with a high rate of disability and complex symptoms, such as refractory bone pain and neurological dysfunction, which significantly impair patients' physical function and social participation, leading to severely compromised quality of life [1] [2]. While surgery, as the primary treatment modality, can significantly improve survival and quality of life, the traditional disease-centered treatment model often falls short in comprehensively addressing the postoperative physical and psychological rehabilitation challenges faced by these patients.

Supportive care needs refer to the diverse range of assistance, beyond medical and surgical interventions, that patients with malignant tumors and their families may require to prevent, control, or alleviate complications and adverse effects [3]. Fulfilling these supportive care needs—representing the comprehensive support required by cancer patients and families alongside conventional treatment—is a critical factor in improving outcomes. Notably, postoperative symptom distress can directly trigger specific support needs in patients, while unmet needs can further exacerbate symptom burden, thereby creating a bidirectional vicious cycle [4] [5].

Despite the growing recognition of supportive care in oncology, research specifically addressing supportive care needs and their correlation with symptom distress in the postoperative spinal tumor patient population remains notably scarce. Therefore, this study aims to analyze the current status of supportive care needs in postoperative spinal tumor patients and their correlation with symptom distress. The findings are intended to provide an empirical basis for developing symptom-oriented, precision care strategies, ultimately enhancing patient quality of life.

2. Participants and Methods

2.1. Study Design and Participants

A convenience sampling method was employed. Participants were recruited from the Department of Bone and Soft Tissue at a tertiary Grade A cancer hospital in Guangzhou, China, between January 2024 and November 2024. Eligible patients were those diagnosed with a spinal tumor and scheduled for surgical intervention. **Inclusion Criteria:** 1) Pathologically confirmed diagnosis of primary spinal tumor or spinal metastasis, meeting the diagnostic criteria for spinal tumors accord-

ing to the WHO Classification of Tumours of Bone (2020 Edition). 2) Planned to undergo open spinal surgery. 3) Cognitively intact, possessing adequate literacy and comprehension skills to independently complete study questionnaires or complete them with researcher assistance if needed. 4) Provided informed consent and voluntarily agreed to participate in the study. **Exclusion Criteria:** 1) Presence of severe dysfunction in major organ systems. 2) History of diagnosed psychiatric disorders. 3) Incomplete medical records. This study has been approved by the Hospital Ethics Committee (approval number: B2023-700-01).

Sample Size Calculation

The target sample size was determined through empirical methods accounting for scale dimensionality. As the primary assessment tool (SCNS-SF34) contains 5 core domains, a minimum sample of 50 - 100 participants was required (10 - 20 times the number of key variables). Accounting for an estimated 15% rate of invalid responses or attrition, the final target enrollment range was calculated as 58 to 115 participants. Our study successfully recruited 131 patients, exceeding the upper threshold of this calculated range while ensuring robust analytical capacity.

2.2. Research Methods

2.2.1. General Information Questionnaire for Spinal Tumor Surgery Patients

A self-designed questionnaire collected demographic and clinical characteristics, including gender, age, tumor type, tumor stage, educational level, disease duration, and surgical type.

2.2.2. Short-Form Supportive Care Needs Survey (SCNS-SF34)

The SCNS-SF34, developed by Boyes *et al.* [6], assesses supportive care needs across five domains: Physical and Daily Living (5 items), Psychological (10 items), Sexual (3 items), Patient Care and Support (5 items), and Health System and Information (11 items). It comprises 34 items rated on a 5-point Likert scale, ranging from 1 ("No need") to 5 ("High need"). A score of 3 - 5 indicates that the patient has unmet needs. Total scores range from 34 to 170, with higher scores indicating greater unmet needs. The Chinese version, validated by Yang Pu *et al.* [7] in a cancer patient population, demonstrated high reliability with Cronbach's α coefficients ranging from 0.850 to 0.964 for its domains. In this study, the Cronbach's α coefficients of the five dimensions of the scale are 0.806, 0.947, 0.850, 0.941 and 0.964 respectively, and the Cronbach's α coefficient of the scale as a whole is 0.969.

2.2.3. Chinese Version of the MD Anderson Symptom Inventory for Spine Tumors (MDASI-SP)

The MDASI-SP is a multi-symptom assessment tool originally developed by Cleeland *et al.* [8] at The University of Texas MD Anderson Cancer Center in 2000. The Chinese version evaluates symptoms experienced within the past 24 hours. It consists of two modules: 1) a Symptom Severity module (18 items) assessing the severity of common symptoms, and 2) a Symptom Interference module (6 items)

assessing the impact of symptoms on daily life. All items are rated on a 0 ("Not present/No interference") to 10 ("As bad as you can imagine/Complete interference") scale. Higher scores indicate greater symptom severity or interference. Xu *et al.* [9] reported high reliability for the Chinese version, with Cronbach's α coefficients of 0.91 for the Symptom Severity module and 0.92 for the Symptom Interference module. In this study, the Cronbach's α coefficient of the symptom severity module of the scale is 0.915.

2.3. Data Collection Procedure

To minimize potential bias, data collection was conducted exclusively by trained members of the research team. Data were collected during the patients' postoperative hospital stay (approximately one week after surgery). Using a standardized script, researchers explained the study's purpose, procedures, significance, and questionnaire completion requirements to participants. Written informed consent was obtained prior to participation. Researchers provided standardized responses to any participant's questions during questionnaire completion. Out of 151 questionnaires distributed, 131 were fully completed and valid for analysis, yielding an effective response rate of 86.75%.

2.4. Statistical Analysis

Data were double-entered into Microsoft Excel for accuracy. Statistical analyses were performed using SPSS software (version 26.0). Demographic and clinical characteristics of participants were described using frequencies and percentages (%) for categorical variables. Continuous variables meeting the assumption of normality were described using mean ± standard deviation (SD). The correlation between supportive care needs (SCNS-SF34 total score) and symptom distress (MDASI-SP Symptom Severity module) was analyzed using Spearman's rank correlation coefficient (r). A p-value < 0.05 was considered statistically significant. Spearman's rank correlation was employed because Shapiro-Wilk tests confirmed non-normal distributions for variables. This violation of normality invalidates the parametric assumptions required for Pearson correlation. The magnitude of the correlation coefficient (r) was interpreted as follows [10]: weak (<0.30), moderate (0.30 - 0.50), or strong (>0.50).

3. Results

3.1. Demographic and Clinical Characteristics of Postoperative Spinal Tumor Patients

The age of participants ranged from 18 to 82 years, with a mean age of 49 years. The majority were male (65.6%) and had secondary spinal tumors (69.2%). A significant proportion of tumors were located in the thoracic spine (45.4%) or lumbar spine (30.5%). Further details of the patient characteristics are presented in **Table 1**.

Table 1. Demographic and clinical characteristics of postoperative spinal tumor patients (N = 131).

Variable	Category	n	%
Age (years)	<45	50	38.2
	45 - 59	44	33.6
	≥60	37	28.2
Sex	Male	86	65.6
	Female	45	34.4
Education Level	Primary school or below	19	14.5
	Junior high school	53	40.5
	Senior high school/Tech. school	27	20.6
	College (Associate degree)	14	10.7
	Bachelor's degree or higher	18	13.7
Clinical Stage	I/II	41	31.3
	III/IV	90	68.7
Surgical Level	Cervical	11	8.4
	Thoracic	59	45.4
	Lumbar	40	30.5
	Sacral	15	11.5
	Thoracolumbar junction	3	2.3
	Lumbosacral junction	3	2.3
Tumor Type	Primary spinal tumor	40	30.5
	Secondary spinal tumor (Rapid progression)	18	13.7
	Secondary spinal tumor (Moderate progression)	50	38.2
	Secondary spinal tumor (Slow progression)	23	17.6
Disease Duration	≤1 month	21	16.0
	2 - 3 months	27	20.6
	>3 months	83	63.4

3.2. Supportive Care Needs of Postoperative Spinal Tumor Patients

The total score on the SCNS-SF34 for the 131 postoperative spinal tumor patients was 87 [IQR 64 - 113], with a mean item score of 2.56 [IQR 1.88 - 3.32]. Among the domains, the Physical and Daily Living domain had the highest mean domain score (2.89 ± 0.98). The prevalence of unmet needs was highest in the Health System and Information domain (83.1%), followed by Patient Care and Support (63.8%), Physical and Daily Living (47.7%), Psychological (33.1%), and Sexual domains (24.6%). Detailed scores are presented in Table 2.

Table 2. Supportive care needs scores of postoperative spinal tumor patients (N = 131).

Domain	No. of Items	Domain Total Score	Mean Domain Score
Physical and Daily Living	5	14.45 ± 4.89	2.89 ± 0.98
Psychological	10	25 [16, 35]	2.50 [1.60, 3.50]
Sexual	3	5 [3, 8]	1.67 [1.00, 2.67]
Patient Care and Support	5	11 [7, 15]	2.20 [1.40, 3.00]
Health System and Information	11	29 [18, 39]	2.64 [1.64, 3.55]
Total Needs	34	87 [64, 113]	2.56 [1.88, 3.32]

3.3. Symptom Occurrence and Distress in Spinal Tumor Patients 5 - 7 Days Post-Surgery

The results revealed that pain was the most prevalent symptom 5 - 7 days after surgery (93.89%), while disturbed sleep had the highest median severity score (Median = 4). Detailed symptom prevalence and severity are presented in Table 3. Regarding symptom interference, the prevalence rates were highest for interference with general activity (95.4%), work (92.4%), enjoyment of life (92.4%), walking ability (90.1%), mood (90.1%), and relations with others (76.3%). The median interference scores for these aspects were 7, 8, 5, 7, 4, and 3, respectively.

Table 3. Symptom occurrence, severity, and interference in postoperative spinal tumor patients (5 - 7 Days Post-Surgery; N = 131).

Symptom	Severity Median [IQR]	n [%]
Pain	3 [2, 5]	123 (93.89)
Fatigue	3 [2, 5]	120 (91.60)
Nausea	1 [0, 3]	75 (57.25)
Disturbed Sleep	4 [2, 6]	113 (86.26)
Distress	3 [1, 5]	110 (83.97)
Shortness of Breath	1 [0, 3]	82 (62.60)
Forgetfulness	1 [0, 3]	69 (52.67)
Poor Appetite	2 [1, 5]	108 (82.44)
Drowsiness	2 [0, 4]	95 (72.52)
Dry Mouth	2 [1, 4]	111 (84.73)
Sadness	2 [0, 5]	95 (72.52)
Vomiting	0 [0, 1]	44 (33.59)
Numbness	2 [1, 5]	104 (79.39)
Radiating Spinal Pain	2 [1, 5]	111 (84.73)
Arm/Leg Weakness	3 [1, 7]	103 (78.63)
Bowel/Bladder incontinence	0 [0, 4]	61 (46.56)
Diarrhea/Constipation	3 [0, 6]	97 (74.05)
Sexual Dysfunction	0 [0, 5]	64 (48.85)

3.4. Correlation between Postoperative Symptoms, Symptom Distress, and Supportive Care Needs

Spearman's rank correlation analysis was performed to examine the relationships between symptom severity/symptom interference and supportive care needs (total and domain scores). The results are presented in Table 4.

Table 4. Spearman correlation (r) between symptom severity/symptom interference and supportive care needs in postoperative spinal tumor patients.

Supportive Care Needs Domain	Symptom Severity		Symptom Interference	
	r	P	r	P
Physical and Daily Living	0.592	<0.001	0.340	0.000
Psychological	0.580	<0.001	0.406	0.000
Sexual	0.439	<0.001	0.295	0.001
Patient Care and Support	0.479	<0.001	0.285	0.001
Health System and Information	0.315	<0.001	0.176	0.044
Total Needs	0.554	<0.001	0.358	0.000

Abbreviation: r, Spearman's rank correlation coefficient. P-values < 0.001 are denoted as <0.001. Interpretation of r magnitude: weak (<0.30), moderate (0.30 - 0.50), strong (>0.50).

4. Discussion

4.1. Demographic and Clinical Characteristics of the Study Sample

Among the 131 patients included in this study, 68.7% had stage III/IV advanced cancer, and 69.2% had secondary spinal tumors (38.2% of which exhibited moderate progression). Tumors were predominantly located in the thoracic spine (45.4%), consistent with the clinical pattern of higher metastatic incidence in this region [11]. This distribution indicates a sample primarily composed of patients with advanced disease and high tumor burden. Notably, patients aged ≥ 60 years constituted 28.2% of the cohort. Advanced age is often associated with physiological decline and weakened social support networks (e.g., living alone, lack of familial care), potentially exacerbating postoperative recovery challenges [12]. Furthermore, 63.4% of patients had a disease duration exceeding three months, reflecting prolonged symptom suffering prior to surgery. Previous research suggests that long-term illness, coupled with disease progression and functional decline, significantly heightens supportive care needs [13].

4.2. Symptom Experience in Postoperative Spinal Tumor Patients

Patients undergoing rehabilitation after spinal tumor surgery continue to face multiple symptom burdens. In this study, over 93% of patients experienced pain of moderate severity (Median = 3), 91.6% reported fatigue, and 86.26% suffered from disturbed sleep with notably high severity (Median = 4). Motor and neuro-

logical dysfunctions were particularly prominent: nearly 80% reported arm or leg weakness, approximately 79% experienced numbness, and nearly half encountered bowel or bladder incontinence, highlighting the specific neural damage caused by spinal tumors. The overall prevalence of symptom distress reached 84.4%. Although often mild in intensity, its multidimensional impact was significant: Physically: Radiating pain and motor dysfunction directly restricted activities of daily living. Emotionally: Approximately 67% of patients reported significant distress, anxiety, and other negative emotions. This emotional burden is closely linked to fears of physical impairment arising from functional loss, chronic pain, and sleep deprivation, establishing a vicious cycle between symptoms and emotional distress. Furthermore, spinal stabilization surgery can induce compensatory radiating pain in adjacent segments, while neural decompression often leads to sensory abnormalities and autonomic dysfunction, constituting unique surgery-related symptoms [14] [15]. Consequently, clinical management must extend beyond disease cure, integrating neurological dysfunction management and psychological support as core rehabilitation objectives.

4.3. Analysis of Supportive Care Needs in Postoperative Spinal Tumor Patients

The SCNS-SF34 total score of 87 [64 - 113] confirms substantial unmet supportive care needs. Key findings across domains include: Physical and Daily Living Needs: This domain exhibited the highest intensity (mean score 2.89 ± 0.98), primarily stemming from motor dysfunction caused by the disease and surgery, leading to activity limitations. Consequently, needs for assistive devices and home environment modifications were particularly pronounced. Health System and Information Needs: The prevalence of unmet needs in this domain (83.1%) was second only to Physical/Daily Living. This high demand pattern aligns with findings in other cancer populations [16], reflecting a universal desire among cancer patients for prognostic information and rehabilitation guidance. Specifically for spinal tumor patients, the most urgent need focused on postoperative neurorehabilitation protocols, especially personalized exercise guidance for the nearly 80% experiencing limb weakness. Sexual Needs: While this domain had the lowest scores, 48.85% of patients reported sexual dysfunction. The relatively low expressed *need* may result from avoidance due to postoperative physical decline or patient reluctance stemming from cultural taboos or embarrassment [17].

4.4. Correlation between Postoperative Symptoms, Symptom Distress, and Supportive Care Needs

Spearman correlation analysis revealed a significant positive correlation between postoperative symptom severity and total supportive care needs (r = 0.554). The correlations were strongest with Physical needs (r = 0.592) and Psychological needs (r = 0.580). Regarding symptom *interference*, Psychological needs showed the strongest association (r = 0.406), underscoring the amplifying effect of emotional distress on support requirements. Conversely, the correlation between Sex-

ual needs and symptom interference was relatively weak (r = 0.295), suggesting patients may prioritize survival-related core needs. These results illustrate the bi-directional symptom-need cycle [4]: Postoperative physical symptoms (e.g., pain, motor deficits) directly trigger specific demands for professional care (e.g., pain management, rehabilitation). Simultaneously, unmet support needs can exacerbate symptom perception through psychological mechanisms like anxiety; for instance, emotional stress can heighten pain sensitivity. Therefore, clinical interventions must target symptom management as an entry point, integrating physical and psychological support strategies to disrupt this detrimental cycle.

4.5. Limitations

This study has several limitations that warrant consideration. First, the use of a convenience sample from a single tertiary cancer center may limit the generalizability of findings to populations with differing healthcare resources or cultural contexts. Second, data collection at a single postoperative time point (5 - 7 days) may not capture symptom evolution across the recovery trajectory. Future research should incorporate multiple assessments to map symptom-need trajectories. Third, self-reported measures (SCNS-SF34, MDASI-SP) are susceptible to recall and social desirability biases, particularly for sensitive domains like sexual dysfunction. Objective biomarkers and caregiver-reported data could complement future assessments. Despite these limitations, our findings provide foundational evidence for targeted interventions in this understudied population.

5. Summary and Implications

Postoperative spinal tumor patients exhibit a high prevalence of unmet supportive care needs, concentrated in the physical and informational domains, which show significant positive correlations with symptom severity. Clinical practice urgently requires: 1) Integrated Symptom-Need Monitoring: Establish mechanisms linking symptom monitoring (e.g., using the MDASI-SP) with supportive care needs assessment to rapidly identify and prioritize intervention for high-symptom-burden patients. 2) Specialized Postoperative Support Pathway: Develop a dedicated pathway for spinal tumor patients, featuring stepwise rehabilitation protocols specifically addressing motor dysfunction, integrated with pain management and personalized information support. 3) Psychosocial Integrated Care: Implement models incorporating fear of progression interventions and strengthening social support networks to disrupt the "symptom-unmet need" vicious cycle.

Future research should focus on validating predictive models for supportive care needs in larger samples and developing symptom-oriented, evidence-based supportive care intervention systems tailored to this population.

Conflicts of Interest

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

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