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Predictors of pain and nursing care satisfaction following the surgery of lumbar disc herniation: A cross-sectional study

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Abstract

This study aimed to identify the determinants of postoperative pain and satisfaction with nursing care among patients undergoing lumbar disc herniation (LDH) surgery. This observational cross-sectional study included 127 patients who underwent LDH surgery in a neurosurgery ward between 15 January and 30 July 2025. Data were collected using a patient information form, the Visual Analog Scale for Pain (VAS-P), and the Newcastle Satisfaction with Nursing Care Scale (SNCS). The mean postoperative VAS-P score was 3.57 ± 1.94 , and the mean SNCS score was 81.76 ± 7.14 . Higher postoperative pain was significantly associated with longer surgery duration ($p < 0.001$), longer postoperative hospital stays ($p = 0.006$), and longer duration of preoperative LDH-related pain ($p = 0.006$). Greater satisfaction with nursing care was associated with lower pain levels ($p = 0.024$). Determinants of higher nursing care satisfaction included BMI ≥ 30 ($p = 0.020$), undergoing surgery due to pain rather than difficulty performing daily activities ($p = 0.012$), and lower postoperative pain ($p = 0.026$). Longer surgery duration, extended preoperative pain duration, and prolonged hospitalization increase postoperative pain, while higher BMI and lower pain levels positively contribute to nursing care satisfaction. These findings underscore the importance of individualized pain management and patient-centered nursing approaches to improve postoperative recovery and satisfaction.

Keywords: Lumbar vertebrae, intervertebral disc displacement, postoperative pain, nursing care, patient satisfaction

Introduction

Lumbar disc herniation (LDH) is a major cause of low-back pain worldwide, with substantial clinical and economic burden [1,2]. An estimated 403 million people, or about 5.5% of the global population, are affected by symptomatic disc degeneration [3]. This condition most commonly involves the lower lumbar spine and is particularly prevalent among adults of working age [1,3]. Despite improvements in conservative management, a significant proportion of patients eventually require surgical intervention due to persistent pain or neurological impairment [4].

LDH surgery, most commonly discectomy or endoscopic techniques, aims to decompress neural structures, alleviate radicular pain, and restore function [5]. From a surgical perspective, postoperative pain is an expected but highly variable outcome that is influenced by the extent of tissue

trauma, operative time, anesthesia and analgesia protocols, and early mobilization [6-8]. Inadequately controlled pain in the immediate postoperative period can delay mobilization, prolong hospitalization, and impair functional recovery, and is consistently associated with poorer overall surgical outcomes and reduced patient satisfaction [6,9,10]. Uncontrolled pain may also increase emotional distress and negatively affect patients' perceptions of nursing care quality, which plays a central role in postoperative recovery through continuous monitoring, pain management, mobilization support, patient education, and emotional support [11].

Within this surgical context, nursing care is central to the assessment and management of pain. Nurses monitor patients' clinical status, administer and titrate analgesia, support mobilization, provide education on positioning and activity, and offer emotional support during the vulnerable early

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postoperative period [7,8,11]. Patient satisfaction with nursing care is therefore not only an indicator of perceived care quality but is also closely intertwined with pain experiences and overall recovery following surgery.

In recent years, patient satisfaction with nursing care has become a core indicator of care quality and is considered an important metric for evaluating the effectiveness of healthcare services [12,13]. Patient experience and satisfaction are shaped by various factors, including communication with healthcare providers, emotional support, and the timeliness and consistency of care [14,15]. Evidence indicates that patients who perceive nursing care positively report better postoperative comfort, greater trust in their care process, and higher adherence to treatment recommendations [12,13,16]. However, relatively few studies have specifically examined satisfaction with nursing care among patients undergoing LDH surgery, despite the high prevalence of this procedure and the importance of postoperative nursing care on neurosurgical wards.

Despite the clinical relevance of postoperative pain and nursing care satisfaction, studies examining both outcomes concurrently in LDH surgery remain limited. Identifying patient-level and clinical determinants of these outcomes can inform individualized postoperative care strategies and guide nursing interventions aimed at pain reduction, nursing care satisfaction, and overall patient-centered care. Therefore, the present study aimed to investigate how sociodemographic characteristics and clinical factors (such as surgery duration, length of stay, and preoperative pain duration), together with pain levels, are associated with postoperative pain intensity and satisfaction with nursing care among patients undergoing LDH surgery.

Material and Methods

This study was conducted in accordance with the STROBE guidelines to ensure methodological rigor and strengthen reporting accuracy [17].

Study Design, Setting, and Sample

This study utilized a descriptive and correlational design to assess pain among patients admitted to the neurosurgery ward following LDH surgery and to examine their satisfaction with nursing care.

The study was conducted between 15th of January 2025 and 30th of July 2025, in the neurosurgery ward of a public hospital in western Türkiye. The study population consisted of patients who had undergone LDH surgery at the hospital. From this group, those meeting the eligibility criteria and providing informed consent were included in the sample. The required sample size was calculated using G*Power version 3.1.9.7, with parameters set at a correlation coefficient of 0.3, a significance level of 0.05, and a power of 95%, yielding a minimum of 111 participants [18]. A convenience sampling method was applied: all eligible patients who were in the discharge phase during the study period were approached on

the ward, informed about the study, and invited to participate. The final sample comprised 127 patients fulfilling the inclusion criteria. Although the minimum required sample size was 111, we continued recruitment until the end of the data collection period to increase statistical power, improve the precision of our estimates, and reduce the potential impact of incomplete or unusable questionnaires.

Inclusion and Exclusion Criteria

Patients were eligible for inclusion if they:

- Had been hospitalized for at least two nights,
- Were in the discharge phase of their treatment,
- Were 18 years of age or older,
- Were conscious and oriented,
- Provided consent to participate in the study.

Patients were excluded if they:

- Had cognitive or communication impairments preventing participation
- Were medically unstable at discharge
- Had incomplete questionnaire data
- Declined participation

Data Collection Tools

Data were collected through face-to-face interviews using the patient information form, the 'Newcastle Satisfaction with Nursing Care Scale (SNCS)', and the 'Visual Analog Scale for Pain Intensity (VAS-P)'.

Patient Information Form

In line with the literature, we developed a patient information form that included questions on sociodemographic characteristics such as age, gender, BMI, marital status and income-expenditure balance [15,19-21]. It also covered health-related information including the presence of chronic diseases, use of medications for chronic conditions, smoking, history of a previous surgery, duration of lumbar disc hernia pain, preoperative pain intensity, the reason for undergoing surgery, family history of lumbar disc hernia, type of anesthesia administered, duration of the operation, and length of hospital stay following surgery [15,19-21].

Newcastle Satisfaction with Nursing Care Scale (SNCS)

The Satisfaction with Nursing Care Scale was originally developed by Thomas et al. in 1996 to assess patients' satisfaction with nursing care from their own perspective [22]. The Turkish validity and reliability of the instrument were later established by Akin and Erdoğan in 2007 [23]. The scale consists of 19 items rated on a five-point Likert scale, focusing on various aspects of nursing care. Higher total scores indicate greater levels of satisfaction with nursing services. Reliability studies have demonstrated good internal consistency, with Cronbach's alpha values of 0.96 for both original and Turkish adapted version [22,23].

The Visual Analog Scale for Pain (VAS-P)

The Visual Analog Scale for Pain was employed to evaluate the intensity of acute postoperative pain. Recognized as one of the most sensitive and reliable instruments for pain assessment, the VAS-P consists of a 10 cm line presented either horizontally or vertically. Patients are asked to select a point on the scale ranging from 0 to 10, where '0' indicates no pain and '10' represents the worst pain imaginable (unbearable pain) [24].

Data Collection Process

On the day of discharge, patients received the questionnaires prior to leaving the neurosurgery ward, and were given adequate time to complete them. The researcher explained the study verbally and in writing, after which written informed consent was obtained from each participant. Questionnaires were completed either in the patient rooms or in designated areas of the neurosurgery unit, with the process taking approximately 15-20 minutes.

Statistical Analysis

Data were analyzed using IBM SPSS Statistics version 28.0 (IBM Corp., Armonk, NY, USA). The normality of continuous variables was assessed through skewness-kurtosis values and visual inspection of histograms. As pain and nursing care satisfaction scores demonstrated an approximately normal distribution, parametric tests were used. Descriptive statistics including mean, standard deviation, frequency, and percentage were calculated to summarize participants' sociodemographic and clinical characteristics.

To address the first study aim, comparisons of postoperative pain and nursing care satisfaction scores across categorical sociodemographic and clinical variables were performed using independent samples t-tests. Associations between continuous clinical variables (e.g., age, surgery duration, length of hospital stay, and duration of preoperative pain) and VAS-P and SNCS scores were examined using Pearson correlation analysis.

To address the second study aim, the determinants of postoperative pain and satisfaction with nursing care were identified using multiple linear regression analyses. Separate regression models were constructed for VAS-P and SNCS as dependent variables. Variables showing statistical significance in univariate analyses and those had $p < 0.01$ were entered into the regression models. Model assumptions, including normality of residuals, linearity, multicollinearity and others were evaluated and met. Statistical significance was set at $p < 0.05$ for all tests.

Ethical Considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. Ethical approval was granted by the Usak University Non-Interventional Clinical Research Ethics Committee (No: 526-526-04, Date: 09 January 2025),

and institutional authorization was obtained from the hospital administration (18 December 2024; Approval No: E-45786011-799-262854155). Prior to data collection, all participants were informed about the study and provided written informed consent.

Results

A total of 127 patients who underwent LDH surgery were included in the study. The mean age of participants was 57.09 ± 12.88 years, and 50.4% were female. The mean postoperative VAS-P score was 3.57 ± 1.94 , and the mean SNCS score was 81.76 ± 7.14 . No statistically significant differences in postoperative pain scores were observed across gender, educational status, marital status, smoking status, comorbidities, medication use for chronic conditions, or history of previous surgery ($p > 0.05$). However, pain scores were significantly higher in patients with a family history of LDH ($p = 0.014$) and among those who received spinal anesthesia ($p = 0.011$) (Table 1).

In terms of nursing care satisfaction, patients with a BMI ≥ 30 had significantly higher SNCS scores compared to those with a BMI < 30 ($p = 0.003$). Additionally, patients whose primary reason for undergoing surgery was difficulty performing daily activities had significantly lower satisfaction scores than those undergoing surgery primarily due to pain ($p = 0.045$).

Postoperative pain scores were moderately and positively correlated with surgery duration ($r = 0.405$, $p < 0.001$) and length of hospital stay ($r = 0.266$, $p = 0.002$), as well as the duration of LDH-related pain ($r = 0.286$, $p < 0.001$). A weak but significant negative correlation was found between VAS-P and SNCS scores ($r = -0.209$, $p = 0.019$), indicating that higher pain levels were associated with lower nursing care satisfaction. No significant correlations were observed between SNCS scores and age, duration of surgery or length of hospital stay ($p > 0.05$) (Table 2).

Multiple linear regression analysis for VAS-P has shown that surgery duration ($\beta = 0.79$, $p < 0.001$), length of postoperative hospital stay ($\beta = 0.22$, $p = 0.006$), and duration of preoperative pain due to LDH ($\beta = 0.01$, $p = 0.006$) were independent determinants of postoperative pain levels. In addition, higher satisfaction with nursing care was associated with lower postoperative pain ($\beta = -0.05$, $p = 0.024$). The model was statistically significant ($F(8,118) = 8.197$, $p < 0.001$). The model explained 35.7% of the variance in pain scores ($R^2 = 0.357$) (Table 3).

Based on multiple linear regression analysis for SNCS, higher BMI (≥ 30) ($\beta = 3.19$, $p = 0.020$), undergoing surgery due to difficulty in performing daily activities rather than having pain ($\beta = -3.87$, $p = 0.012$), and lower postoperative pain levels ($\beta = -0.70$, $p = 0.026$) were determinants of greater satisfaction with nursing care. The regression model was statistically significant ($F(3,123) = 5.706$, $p < 0.001$), and accounted for 12.2% of the variance in SNCS scores ($R^2 = 0.122$) (Table 4).

Table 1. Baseline comparison of patient characteristics by VAS-P and SNCS scores (n=127)

Variable	n (%)	VAS-P Mean $\pm$ SD	SNCS Mean $\pm$ SD
Gender			
Female	64 (50.4)	3.81 $\pm$ 2.23	81.39 $\pm$ 7.31
Male	63 (49.6)	3.31 $\pm$ 1.57	82.13 $\pm$ 7.00
p		0.075	0.282
Education status			
Less than high school	85 (66.9)	3.51 $\pm$ 1.91	81.56 $\pm$ 7.37
High school and above	42 (33.1)	3.69 $\pm$ 2.02	82.14 $\pm$ 6.70
p		0.308	0.335
Marital status			
Partnered	102 (80.3)	3.59 $\pm$ 1.95	81.78 $\pm$ 6.76
Single	25 (19.7)	3.48 $\pm$ 1.96	81.64 $\pm$ 8.66
p		0.402	0.464
BMI			
< 30	92 (72.4)	3.67 $\pm$ 2.12	80.89 $\pm$ 7.70
$\geq$ 30	35 (27.6)	3.29 $\pm$ 1.36	84.03 $\pm$ 4.77
p		0.158	0.003
Level of income			
Less than expenses	25 (19.7)	4.28 $\pm$ 2.54	80.76 $\pm$ 7.32
Equal or greater than expenses	102 (80.3)	3.39 $\pm$ 1.74	82.00 $\pm$ 7.11
p		0.054	0.219
Presence of comorbidities			
Yes	65 (51.2)	3.68 $\pm$ 1.81	82.19 $\pm$ 6.86
No	62 (48.8)	3.45 $\pm$ 2.08	81.31 $\pm$ 7.44
p		0.258	0.245
Regular use of medication for chronic condition			
Yes	58 (45.7)	3.45 $\pm$ 1.69	82.09 $\pm$ 6.86
No	69 (54.3)	3.67 $\pm$ 2.14	81.48 $\pm$ 7.40
p		0.261	0.317
Smoking			
Yes	38 (29.9)	3.47 $\pm$ 1.93	82.53 $\pm$ 6.85
No	89 (70.1)	3.61 $\pm$ 1.96	81.43 $\pm$ 7.27
p		0.363	0.214
History of previous surgery			
Yes	76 (59.8)	3.46 $\pm$ 2.04	81.62 $\pm$ 7.00
No	51 (40.2)	3.73 $\pm$ 1.80	81.96 $\pm$ 7.40
p		0.227	0.396
Preoperative pain intensity			
Severe	112 (88.2)	3.60 $\pm$ 1.98	81.98 $\pm$ 7.12
Mild/moderate	15 (11.8)	3.33 $\pm$ 1.68	80.07 $\pm$ 7.30
p		0.311	0.165
Primary reason for undergoing LDH surgery			
To suffer from pain	102 (80.3)	3.57 $\pm$ 1.99	82.45 $\pm$ 6.26
Difficulty in performing daily activities	25 (19.7)	3.56 $\pm$ 1.76	78.92 $\pm$ 9.59
p		0.492	0.045
Family history of LDH			
Yes	57 (44.9)	3.98 $\pm$ 2.07	80.88 $\pm$ 7.79
No	70 (55.1)	3.23 $\pm$ 1.78	82.47 $\pm$ 6.52
p		0.014	0.106
Type of anaesthesia			
General	102 (80.3)	3.37 $\pm$ 1.86	81.93 $\pm$ 6.37
Spinal	25 (19.7)	4.36 $\pm$ 2.12	81.04 $\pm$ 9.80
p		0.011	0.334

VAS-P, visual analogue scale for pain; SNCS, Newcastle satisfaction with nursing care scale; LDH, lumbar disk hernia

Table 2. Correlation of patient characteristics by VAS-P and SNCS scores (n=127)

Variable	Mean ± SD	Pearson correlation (PC) VAS-P	Pearson correlation (PC) SNCS
Age	57.09 ± 12.88	-0.052 (PC)	0.030 (PC)
P		0.559	0.740
Surgery duration (hours)	2.76 ± 0.87	0.405 (PC)	0.052 (PC)
P		<0.001	0.563
Length of hospital stay after surgery (days)	4.39 ± 1.88	0.266 (PC)	-0.011 (PC)
P		0.002	0.900
Duration of pain due to LDH (months)	22.73 ± 49.79	0.286 (PC)	-0.137 (PC)
P		<0.001	0.124
VAS-P	3.57 ± 1.94	1	-0.209 (PC)
P		-	0.019
SNCS	81.76 ± 7.14	-0.209 (PC)	1
P		0.019	-

VAS-P: visual analogue scale for pain, SNCS: Newcastle satisfaction with nursing care scale, LDH: lumbar disk hernia

Table 3. Factors associated with VAS-P following LDH surgery based on multiple regression analysis (n=127)

Independent variable	B (95%, CI)	SE	p
Intercept	4.99 (1.12, 8.86)	1.96	0.012
Surgery duration (hours)	0.79 (0.45, 1.12)	0.17	<0.001
Length of hospital stay after surgery (days)	0.22 (0.07, 0.38)	0.08	0.006
SNCS score	-0.05 (-0.09, -0.01)	0.02	0.024
Duration of pain due to LDH (months)	0.01 (0.00, 0.01)	0.00	0.006
Type of anaesthesia (spinal)	0.53 (-0.20, 1.27)	0.37	0.154
Gender (male)	-0.39 (-0.96, 0.19)	0.29	0.187
Family history of LDH (no)	-0.29 (-0.88, 0.30)	0.30	0.329
Level of income (Equal or greater than expenses)	-0.30 (-1.04, 0.45)	0.37	0.431

R= 0.598. R²=0.357. Adjusted R²= 0.314. B: regression coefficient, SE: standard error, CI: confidence interval, VAS-P: visual analogue scale for pain, LDH: lumbar disk hernia, SNCS: Newcastle satisfaction with nursing care scale

Table 4. Factors associated with SNCS following LDH surgery based on multiple regression analysis (n=127)

Independent variable	B (95%, CI)	SE	p
Intercept	84.83 (79.37, 90.29)	2.76	<0.001
BMI (≥ 30)	3.19 (0.50, 5.87)	1.36	0.020
Primary reason for undergoing LDH surgery (Difficulty in performing daily activities)	-3.87 (-6.88, -0.87)	1.52	0.012
VAS-P score	-0.70 (-1.32, -0.09)	0.31	0.026

R= 0.598. R²=0.357. Adjusted R²= 0.314. B: regression coefficient, SE: standard error, CI: confidence interval, VAS-P: visual analogue scale for pain, LDH: lumbar disk hernia, SNCS: Newcastle satisfaction with nursing care scale

Discussion

This study examined postoperative pain and satisfaction with nursing care following LDH surgery and identified key clinical and patient-level determinants of these outcomes. Recent evidence highlights that postoperative recovery in spine surgery is strongly influenced not only by surgical factors but also by nursing care quality, pain management effectiveness, and patient expectations, underscoring the clinical relevance of the present findings [6,8]. Based on our findings, the determinants of higher

pain were longer surgery duration, longer postoperative length of stay, and longer preoperative pain duration. However greater satisfaction with nursing care was associated with lower pain levels. The determinants of satisfaction with nursing care were having higher BMI, difficulty in performing daily tasks as a primary reason for undergoing surgery and post operative VAS pain scores.

Consistent with previous studies, patients in our sample reported moderate pain levels following LDH surgery, with the mean

VAS score falling within the expected postoperative range (3.57 ± 1.94). A comparison of these results with those of other studies with different patient groups showed that the severity of the pain experienced was higher than that reported in a study [25] and lower than another [19]. The difference in the mean pain scores in the early postoperative period can be attributed to characteristics of the population in which the studies were conducted.

Longer surgical duration was independently associated with higher postoperative pain levels, likely reflecting increased tissue manipulation and inflammatory response [26]. Recent spine surgery studies similarly report operative time as a predictor of acute postoperative pain and delayed recovery, even in minimally invasive procedures [26,27]. These findings emphasize the importance of efficient surgical techniques and postoperative pain management.

Our analysis showed that the length of hospital stay was a significant determinant of higher postoperative pain, and there was a positive relationship based on the findings of a multiple linear regression model ($\beta=0.22$, $p=0.006$). Postoperative pain was also associated with longer hospital stay, supporting literature that there is a bidirectional association between pain and length of stay [28,29]. Inadequate pain control can delay mobilization and discharge readiness, while prolonged hospitalization may increase pain sensitivity and analgesic exposure [28]. Systematic reviews and meta-analyses of Enhanced Recovery After Surgery (ERAS) pathways in spine surgery similarly demonstrate that optimized multimodal pain management can reduce length of stay and improve clinical outcomes [10,29]. These findings underscore the need for effective, multimodal pain management strategies not only to improve patient outcomes but also to optimize hospital resource utilization.

An important finding of our study is the positive association between the longer duration of preoperative pain due to LDH and increased post-operative pain score ($\beta=0.01$, $p=0.006$). The association between longer duration of preoperative pain and increased postoperative pain is consistent with evidence linking chronic pain exposure to central sensitization mechanisms [30-32]. Prolonged nociceptive input may lower pain thresholds and amplify postoperative pain responses, even after surgical correction. Recent studies in lumbar spine surgery populations confirm that longer symptom duration predicts poorer pain outcomes and slower recovery [30-32]. This finding suggests that patients with a long history of preoperative pain warrant identification as a high-risk group and should be targeted for multidisciplinary pain management protocols in the perioperative period.

Based on the multivariate analyses, our study provides evidence for a bidirectional relationship between nursing care satisfaction and postoperative pain. Specifically, higher SNCS scores were associated with lower VAS-P scores ($\beta=-0.05$, $p=0.024$) and vice versa ($\beta=-0.70$, $p=0.026$). When nurses provide high-quality

care, characterized by empathy, timely responses, effective communication, and thorough patient education, the patient feels supported and secure [33,34]. This positive emotional state may reduce anxiety and improve the patient's overall pain tolerance and satisfaction with the hospital experience. On the other hand, patients who achieve satisfactory pain relief, regardless of the quality of other aspects of care, are inherently more satisfied with their overall surgical and hospital outcome [35]. Since pain management is a core component of nursing care, effective pain control is automatically perceived as high-quality nursing practice, leading to better SNCS scores. Our findings are consistent with broader evidence showing that patient satisfaction with nursing care is a long-standing and well-established construct in the literature. In particular, a recent systematic review and meta-analysis confirmed that higher quality nursing care is associated with better patient-reported satisfaction across diverse hospital settings, further supporting the relevance of nursing care satisfaction as a key outcome in surgical populations [16].

Our results indicated that patients whose primary reason for surgery was difficulty in performing daily tasks reported significantly lower satisfaction with nursing care compared to those whose primary reason was pain ($\beta=-3.87$, $p=0.012$). Patients undergoing surgery primarily due to functional limitations reported lower nursing care satisfaction, which may reflect unmet expectations regarding early functional recovery. Expectation-outcome mismatch has been identified as a major determinant of dissatisfaction after spine surgery, particularly when functional improvements occur more gradually than pain relief [36,37]. These findings highlight the importance of expectation management and the necessity for nurses to implement individualized care plans focusing on improvements in patients' physical function that bridge the gap between initial pain relief and long-term functional recovery for this specific patient cohort [20].

The finding that patients with a Higher Body Mass Index (BMI), specifically those classified as obese, reported higher satisfaction with nursing care compared to non-obese patients ($\beta=3.19$, $p=0.020$) is intriguing and warrants discussion. Obese patients require more physical assistance with basic activities of daily living, such as repositioning, hygiene, and ambulation. When nurses deliver diligent, essential and demanding physical care, patients often recognize this effort as highly valuable and attribute it directly to high-quality nursing practice. Studies show that patients' perceptions of nursing care quality are strongly influenced by the nurses' responsiveness to their physical comfort and needs [38,39]. Furthermore, individuals with obesity who frequently experience stigmatization within healthcare settings may feel an especially strong sense of relief and appreciation when they receive truly non-judgmental, attentive and comprehensive nursing care [40]. This positive care environment can lead to higher levels of patient satisfaction among this population.

Limitations

This study has some limitations that should be considered when interpreting the findings. Its observational cross-sectional design does not permit causal inferences regarding the relationships identified between postoperative pain, nursing care satisfaction, and clinical factors. In addition, the study was conducted in a single public hospital which may limit the generalizability of the results to different healthcare settings, surgical practices, or patient populations. All data on patient characteristics and satisfaction were obtained through self-reported measures which may be subject to recall bias and social desirability bias. In addition, postoperative pain was assessed at a single time point on the day of discharge; therefore, the study does not capture fluctuations in pain scores during the early or later postoperative recovery period. Furthermore, although several key clinical and sociodemographic variables were included in the regression models, other potentially important factors such as psychological distress, patient expectations, and analgesic regimens were not assessed and may have influenced pain perception and satisfaction outcomes.

The use of a single-institution sample and a non-probability convenience sampling method also raises the possibility of selection bias, as patients who agreed to participate may differ systematically from those who declined participation. The explained variance of the regression models indicates that additional unmeasured variables likely contribute to postoperative pain and nursing care satisfaction. Future multicenter studies with longitudinal designs, larger samples, and more comprehensive clinical and psychosocial assessments are warranted to confirm these findings and to better elucidate the complex determinants of postoperative recovery following LDH surgery.

Conclusion

This study identified key clinical and patient level factors associated with postoperative pain and satisfaction with nursing care among patients undergoing lumbar disc herniation surgery. Longer surgery duration, longer preoperative pain duration, and prolonged postoperative hospitalization were significant independent determinants of higher pain levels in the regression model. Conversely, greater satisfaction with nursing care was associated with lower postoperative pain, higher BMI (≥ 30), and undergoing surgery primarily due to pain rather than functional limitation. Together, these findings indicate that both clinical factors (such as operative time and length of stay) and patient experiences of pain are quantitatively and meaningfully linked to perceptions of nursing care.

These findings emphasize the multifactorial nature of patients' postoperative experiences and highlight the importance of individualized, high-quality nursing care. Tailored pain management strategies, early identification of patients at risk for heightened postoperative pain (e.g., those with longer symptom duration or longer expected operative time), and patient-centered nursing interventions may enhance both recovery and

patient satisfaction. Integrating these approaches into routine postoperative care could improve surgical outcomes and support a more patient-centered care model in neurosurgical settings.

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Ethical Approval

Approved by the Usak University Non-Interventional Clinical Research Ethics Committee (No: 526-526-04, Date: 09 January 2025).

Patient Consent

Prior to data collection, all participants were informed about the study and provided written informed consent.

Conflict of Interest

The authors declare no conflict of interest.

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