

Patterns and Correlates of Patient Satisfaction with Peri-operative Anesthesia Care: A Single-center Experience

Swairita Kafle,*¹ Prahlad Adhikari,¹ Ravi Sulabh.¹

ABSTRACT:

Introduction: Patient satisfaction is a key indicator of healthcare quality. Perioperative anesthesia care remains poorly studied in low-resource settings. This study assessed patient satisfaction with perioperative anesthesia care and its associated factors at Devdaha Medical College, Nepal. **Methods:** A cross-sectional study was conducted among 161 adult surgical patients. Data were collected using the validated Leiden Perioperative Care Patient Satisfaction questionnaire (LPPSq) translated into Nepali. Satisfaction was assessed across three dimensions: information, fear and concern, and staff-patient relationship. Because LPPSq scores were non-normally distributed, Mann–Whitney U, Kruskal–Wallis, and Spearman correlation tests were used for testing associations with demographic and clinical variables. **Results:** Overall, 98.76% of patients were satisfied with perioperative anesthesia care. The staff-patient relationship dimension achieved the highest satisfaction rate (98.76%), followed by fear and concern (95.65%) and information (93.79%). Gender ($p=0.019$) and adherence to the agreed surgical schedule (all $p<0.05$) were significantly associated with satisfaction. Waiting time before surgery and in the recovery room was significantly associated with information, staff-patient relationship, and overall satisfaction, but not with the fear and concern domain. Postoperative pain showed the strongest negative correlation with overall satisfaction. Thirst was the only adverse outcome significantly associated with anesthesia type. **Conclusion:** Patients reported high overall satisfaction with perioperative anesthesia care. Timely scheduling, optimal waiting time management, and effective pain control were associated with higher patient satisfaction and may represent targets for quality improvement.

Keywords: LPPSq; Patient satisfaction; Perioperative anesthesia.

INTRODUCTION

Patient satisfaction is an important indicator of healthcare quality.¹ It reflects patients' perceptions and experiences of the care they receive. Patient satisfaction is a complex experience influenced

by demographic and psychosocial factors, the structure and processes of care delivery across health systems, the anesthetic technique and perioperative management received and patient-reported functional and experiential outcomes following surgery.²⁻⁵ Because anesthesia care occurs in the context of perioperative surgical care, associations between anesthetic management and patient satisfaction may be difficult to separate from surgical, hospital, and other factors affecting the perioperative experience. Patient satisfaction with perioperative anesthesia care is influenced by, pre-operative anxiety, communication skills, pain management, professionalism of staff, and the overall environment of the operating theatre.^{4,6} The Institute of Medicine's landmark report identified patient-centeredness as a core pillar of quality healthcare, emphasizing that patient-centered care is a fundamental determinant of healthcare quality and patient experience.⁷

In low- and middle-income countries

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1 - Department of Anesthesiology, Devdaha Medical College and Research Institute, Rupandehi, Nepal

*Corresponding Author:

Swairita Kafle

e-mail: swairita.kafle@gmail.com

ORCID: <https://orcid.org/0009-0009-8833-9837>

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(LMICs) like Nepal, perioperative care delivery faces unique challenges including workforce shortages, infrastructure limitations, and cultural barriers to effective communication.⁵ Despite these constraints, patient expectations regarding healthcare quality are rising as health literacy and awareness of patient rights improve. However, data on patient satisfaction with anesthesia care in Nepal remain sparse.

The Leiden Perioperative Care Patient Satisfaction questionnaire (LPPSq) is a validated tool with core 21 items under three domains (information, fear and concern, and staff-patient relationship), and additional 14 non-core items, again under three separate category (professional competence, service logistics, and adverse anesthetic outcomes), that evaluates patients' satisfaction related to perioperative and anesthesia care.⁸ The LPPSq was selected for this study due to its comprehensive coverage of the perioperative journey and its prior use in resource-limited settings.

To date, limited studies have evaluated perioperative patient satisfaction in the Lumbini Province of Nepal, and the factors influencing satisfaction in this population remain largely unexplored. This study addresses this gap by providing baseline data from a tertiary care center in western Nepal. This study aimed to assess patient satisfaction with perioperative anesthesia care and explore its demographic and clinical correlates at Devdaha Medical College, Rupandehi, Nepal.

METHODS

A hospital-based cross-sectional study was carried out in the post-operative ward of Devdaha Medical College and Research Institute, Rupandehi, Nepal from July to September 2025. Ethical clearance was secured from the Institutional Review Committee of Devdaha Medical College and Research Institute (DMCRI/IRC, Reference no: 1685/081/082). Written informed consent was obtained from all participants prior to enrolment. Confidentiality was maintained throughout the study.

Inclusion criteria comprised adult patients (≥ 18 years), ASA physical status I–III, who underwent elective or emergency surgery under general or regional anesthesia and remained hospitalized for at least 24 hours post-operatively. Patients were operated under six types of anesthesia: general anesthesia (GA), intravenous anesthesia (IVA), spinal (subarachnoid block, SAB), SAB + epidural, nerve/plexus block, and SAB + IVA. Patients with cognitive dysfunction

were excluded.

The required sample size was calculated using the single population proportion formula, $n = Z^2 P(1-P)/d^2$, assuming an expected patient satisfaction of 74% based on the study by Simegn et al.,⁹ a 95% confidence level ($Z = 1.96$), a 7% margin of error, and a 5% allowance for non-response, yielding a minimum required sample size of 159 participants. A convenience sampling technique was used to recruit eligible patients during the predefined study period, resulting in a final sample of 161 participants.

Patient satisfaction was measured using the validated Leiden Perioperative Care Patient Satisfaction questionnaire (LPPSq).⁸ It was translated into Nepali using a forward-backward method by bilingual experts, culturally adapted, and then assessed for content validity by anesthesiology faculty. It was then pretested among surgical patients to ensure clarity and comprehensibility before the main study. Only minor wording modifications were required before finalization. Besides three core domains of LPPSq, staff attentiveness, professional competence, and service quality was assessed. Service quality was assessed via waiting time ratings and schedule adherence.

Data were collected through face-to-face interviews conducted between 24 and 48 hours after surgery during the patient's post-operative ward stay by the principal author. Data were entered and analyzed using PSPP version 2.1.1 software. Descriptive statistics (frequencies, percentages, medians, and interquartile ranges) were calculated for all variables. Dimension scores were calculated as mean $\pm$ SD (reported alongside median and IQR in tables) to facilitate direct comparison with prior LPPSq studies that have conventionally reported mean scores,^{9,10} and as a percentage of the maximum possible score. Patients were classified as 'satisfied' (mean score ≥ 3) or 'unsatisfied' (mean score < 3) based on the midpoint of the Likert scale. Normality of LPPSq domain and total scores was assessed using the Shapiro-Wilk test; scores were found to be non-normally distributed (left-skewed) for all three core domains and overall scores (Shapiro-Wilk $W = 0.515 - 0.787$, all $p < 0.001$). Accordingly, associations between satisfaction dimension scores and categorical variables were assessed using the Mann-Whitney U test (two groups) or the Kruskal-Wallis test (three or more groups). Spearman rank correlation coefficients (r_s) were calculated to assess the relationship between adverse peri-operative

outcome and the three core domains and overall scores of LPPSq. Results are reported as median (IQR). A p-value <0.05 was considered statistically significant. No adjustment for multiple comparisons was made, as this was an exploratory analysis.

RESULTS

A total of 161 patients were enrolled in the study. Their median age was 36(25–50) years. Socio-demographic and clinical characteristics of the patients is presented in **Table 1**. The majority were female, and nearly half of the participants were in the

18–35-year age group. Most patients were Hindu by religion and nearly one-third of the total were admitted in Orthopedics department. Spinal anesthesia (Sub Arachnoid Block) was the predominant technique, followed by general anesthesia. Almost all cases were operated on the agreed date and time. Waiting time from arrival at the OT to start of surgery was rated ‘Just Right’ by the majority of the participants. Median duration of surgery was 70(59–120) minutes.

Satisfaction dimensions

Overall satisfaction was high across all LPPSq dimensions as presented in **Table 2**. Almost all were classified as satisfied overall. The staff-patient relationship dimension had the highest satisfaction rate, followed by fear and concern and information.

Table 1: Socio-demographic and clinical characteristics of study participants (N=161)

Variable	Category	n (%)
Sex	Male	67(41.61)
	Female	94(58.39)
Age group (years)	18–35	78(48.45)
	>35	83(51.55)
Religion	Hindu	155(96.27)
	Muslim	5(3.11)
	Buddhist	1(0.62)
Department	Orthopedics	55 (34.16)
	OBG	38 (23.60)
	Surgery	38 (23.60)
	Urology	24 (14.91)
	ENT / Neuro	6 (3.73)
Duration of surgery (minutes)	0–60	74(45.96)
	>60	87(54.04)
Type of anesthesia	SAB	77(47.83)
	GA	57(35.40)
	Nerve/Plexus Block	15(9.32)
	IVA	6(3.73)
	SAB + epidural	3(1.86)
	SAB + IVA	3(1.86)
Operated on the agreed date and time	Yes	157(97.52%)
	No	4(2.48%)
Operative waiting time*	Too long	5(3.11%)
	Long	10(6.21%)
	Just Right	142(88.20%)
	Too short	4(2.48%)
Recovery waiting time#	Too long	0.00
	Long	17(10.56%)
	Just Right	142 (88.20%)
	Too short	2(1.24%)

* time between arrival at the operating theatre and the operation

time spent in recovery room before leaving OT

Factors Significantly Associated with Satisfaction

Factors associated with satisfaction is presented in **Table 3**. Gender was significantly associated with the information dimension score. Median scores were identical for both sexes, but the female distribution clustered more tightly toward the ceiling of the scale than the male distribution, leading to the significant result. No significant gender difference was observed for fear and concern, staff-patient relationship, or overall satisfaction. Adherence to the agreed surgical schedule was significantly associated with all four satisfaction domains: information, fear and concern, staff-patient relationship, and overall satisfaction. Patients operated on their agreed date/time reported markedly higher overall satisfaction than those who were not. Pre-operative waiting time (OT arrival to surgery start) was significantly associated with information, staff-patient relationship, and overall satisfaction, but not with fear and concern. Satisfaction was highest among patients rating waiting time ‘Just Right’ and lowest among those rating it ‘Too Long’. Recovery room waiting time showed a similar pattern where information, staff-patient relationship, and overall satisfaction were significantly associated, but fear and concern was not. No significant association was found between satisfaction and age group, religion, surgical department or surgical duration. Full results with test statistics, degrees of freedom, and subgroup sizes are presented in **Supplementary Table S1** available only online.

Adverse perioperative outcomes

Hunger and thirst were the most prevalent adverse outcomes, followed by postoperative pain,

Table 2. LPPSq dimension scores and satisfaction classification (N=161)

Dimension	Items (n)	Mean±SD	Median (IQR)	Max Score	Mean Score as % of Max score	Satisfied n (%)
Information	4	17.81±3.60	20(16–20)	20	89.05%	151 (93.79%)
Fear & Concern (reversed*)	7	32.68±4.67	34(32–35)	35	93.37%	154 (95.65%)
Staff-Patient Relationship	14	64.86±8.57	70(57–70)	70	92.66%	159 (98.76%)
Overall Total	25	115.35±11.74	121(109–124)	125	92.28%	159 (98.76%)

Mean±SD is reported for comparability with prior LPPSq studies; median (IQR) reflects the non-normal distribution of the data.

*Fear & Concern items reverse-scored (score=6–raw item) so higher scores indicate less fear and greater satisfaction. Satisfied = mean item score ≥ 3 .

Table 3. Factors significantly associated with LPPSq satisfaction domains (N=161)

Variables		Information (Max=20)		Fear & Concern† (Max=35)		Staff-Patient Relationship (Max=70)		Overall Satisfaction (Max=125)	
		Median (IQR)	Statistic	Median (IQR)	Statistic	Median (IQR)	Statistic	Median (IQR)	Statistic
Gender	Male (n=67)	20(16–20)	U=2547, p=0.019*	34(32–35)	U=3127.50, p=0.940	70(56–70)	U=3018, p=0.61	118 (104.50–124)	U=2707.50 p=0.13
	Female (n=94)	20(17.20–20)		34(33–35)		70(59–70)		121 (110–124)	
Operated on Agreed Date and Time	Yes (n=157)	20(16–20)	U=550.50, p=0.004*	34(33–35)	U=499.50, p=0.035*	70(57–70)	U=515.50, p=0.012*	121 (109–124)	U=532.50 p=0.017*
	No (n=4)	13.50(13–14.50)		31(29.50–32.50)		56.50(55–60.20)		101 (99–105.80)	
Pre-operative Waiting Time	Too Long (n=5)	14(13–16)	H(3)=17.21 p<0.001*	30(29–32)	H(3)=6.36, p=0.095	55(54–57)	H(3)=32.56, p<0.001*	102 (99–102)	H(3)=21.82 p<0.001*
	Long (n=10)	18.00 (16.00–19.50)		32.50(32–34.80)		56.50(56–58.80)		107 (104.20–111)	
	Just Right (n=142)	20.00 (16.00–20.00)		34(33–35)		70(64.20–70)		121.50 (110–125)	
	Too Short (n=4)	14.50 (13.80–15.20)		33.50 (32.80–34.20)		56(55.80–58.80)		105.50 (103.20–108.80)	
Recovery Room Waiting Time	Long (n=17)	18(13–20)	H(2)=9.07, p=0.011*	34(32–35)	H(2)=3.26, p=0.196	56(56–57)	H(2)=26.37, p<0.001*	107(104–110)	H(2)=21.46 p<0.001*
	Just Right (n=142)	20(16–20)		34(33–35)		70(65.20–70)		121.50 (110.20–125)	
	Too Short (n=2)	14.50 (14.20–14.80)		32.50 (32.20–32.80)		55.50 (55.20–55.80)		102.50 (101.80–103.20)	

†Fear & Concern items reverse-scored (6 – raw score); higher = less fear = greater satisfaction. *p<0.05.

Mann-Whitney U test for 2-group comparisons; Kruskal-Wallis H test for ≥ 3 groups.

cold sensation, back pain, sore throat, and vomiting (Details in **Supplementary Table S2**). The Kruskal-Wallis test identified a significant association between type of anesthesia (all six recorded techniques) and thirst (H(5)=21.04, p=0.001), likely reflecting differences in intra-operative fluid management across anesthetic techniques. No other adverse outcome was

significantly associated with anesthesia type.

Spearman rank correlations between each adverse outcome and the four LPPSq domain scores were calculated (full matrix in **Supplementary Table S3**). Postoperative pain showed the strongest negative correlations with all satisfaction dimensions, most notably the staff-patient relationship and overall

satisfaction, indicating that greater pain severity was strongly associated with lower satisfaction. Sore throat and back pain were significantly negatively correlated with the staff-patient relationship domain. Hunger and thirst were significantly negatively correlated with the fear and concern domain, reflecting that these discomforts heighten peri-operative fear. Cold sensation showed a negative correlation with fear and concern. Vomiting showed no significant correlation with any satisfaction dimension.

Regarding the OT staff service quality evaluation, 145 (90.06%) rated the operation theatre staff as professionally competent. Of all patients, 155 (96.27%) perceived that operation theatre staff were attentive to their questions and problems and also acted in accordance with their needs. In 139 (86.34%) patients professional help was sought from another health personnel also. full item-level frequencies are provided in **Supplementary Table S4**.

DISCUSSION

This cross-sectional study assessed patient satisfaction with perioperative anesthesia care among 161 surgical patients at Devdaha Medical College and Research Institute, Nepal, using the validated Leiden Perioperative Care Patient Satisfaction questionnaire (LPPSq). The overall satisfaction rate was remarkably high with 98.76% classified as satisfied with the mean total LPPSq score of 115.35 ± 11.74 out of a maximum of 125 (92.28% of the maximum). This exceeds satisfaction rates reported in comparable resource-limited settings, including 74% in an Ethiopian cohort using a similar LPPSq-based methodology,⁹ and 82% in a Nigerian tertiary hospital study.¹⁰ The comparatively higher rate at our institution likely reflects genuine strengths in interpersonal care delivery, though social desirability bias, inherent in face-to-face interviews conducted within the treating institution may have contributed to inflated scores, a recognized limitation of satisfaction research when satisfaction is assessed through face-to-face interviews conducted by treating staff, as respondents may moderate their responses to align with perceived expectations.¹¹

Among the three LPPSq dimensions, the staff-patient relationship dimension recorded the highest satisfaction rate. This finding is consistent with the various literature establishing that interpersonal aspects of care including empathy, respect, privacy, professionalism, and attentiveness are the primary determinants of patient satisfaction in the perioperative setting.^{6,12} The high scores across

all items, with individual item means consistently above 4.5 out of five suggests an effective patient-centered interpersonal care within the operating theatre complex.

Fear and concern followed closely, with uniformly low fear reported across subgroups, suggesting effective perioperative communication and reassurance at our institution, consistent with Auquier et al.'s emphasis on anxiety reduction as a core component of satisfactory anesthesia care.⁴ The information provision dimension recorded the lowest satisfaction rate. Although this represents strong performance in absolute terms, the relative gap signals a potential area for targeted improvement. Inadequate patient information about anesthetic procedures, expected perioperative events, and post-operative care has been consistently identified as a modifiable factor in perioperative dissatisfaction across diverse healthcare settings.^{13,14} Structured pre-operative anesthesia information visits or written patient education materials, tailored to the Nepali-speaking population, could serve to close this gap.

Gender was the only socio-demographic variable significantly associated with satisfaction, specifically within the information domain. Though median scores were identical for both sexes, the significant result reflects a shift in rank distribution near the ceiling of the scale rather than a true difference in central tendency. This is consistent with evidence that female patients tend to engage more actively with pre-operative education and are more receptive to detailed explanations from healthcare providers.¹⁵ Age group, religion, surgical department and surgical duration were all non-significant predictors of satisfaction across all domains, consistent with earlier reports suggesting that satisfaction is shaped more by care process quality than by patient demographics or clinical parameters.^{9,10}

Adherence to the agreed surgical date and time was significantly associated with all four satisfaction domains, with patients operated on schedule reporting markedly higher overall satisfaction. Although scheduling non-compliance was rare, the disproportionate impact on the few affected patients suggests that surgical delays, even when infrequent meaningfully undermine trust and perceived control over an already stressful experience.¹⁶ One systematic review explicitly lists timely care delivery among the most consistently significant determinants of patient satisfaction across healthcare settings.¹⁷

Waiting time at both time points showed a similar bidirectional pattern: satisfaction peaked at 'Just Right' and declined at both extremes, affecting information, staff-patient relationship, and overall satisfaction but not fear and concern, suggesting its influence operates through interpersonal and informational rather than anxiety-related pathways. Our findings are consistent with established evidence that waiting time is among the most significant modifiable determinants of patient satisfaction.¹⁷

Hunger and thirst were the most prevalent adverse perioperative outcomes, consistent with standard fasting protocols that restrict oral intake for several hours preoperatively. Liberalizing clear fluids up to two hours before induction, as recommended by contemporary guidelines, could reduce these discomforts without increasing aspiration risk.¹⁸ The low prevalence of vomiting suggests effective antiemetic prophylaxis, consistent with international Post Operative Nausea and Vomiting (PONV) guidelines.¹⁹ Postoperative pain showed the strongest and most pervasive negative significant correlation with satisfaction, most notably with staff-patient relationship and overall satisfaction, indicating that pain colors patients' perception of the interpersonal quality of care and reinforcing multimodal analgesia as a priority target. Hunger and thirst were most strongly linked to the fear and concern domain, suggesting these discomforts amplify perioperative anxiety and liberalization of pre-operative fasting protocols could reduce fear and concern scores in future cohorts. Cold sensation showed a similar pattern, correlating negatively with fear and concern, consistent with evidence that perioperative cold sensation impairs patient comfort and the overall quality of recovery.²⁰ Thirst was the only adverse outcome significantly associated with anesthesia type, likely reflecting differences in intra-operative fluid management across techniques, and warrants review of perioperative fluid protocols.

Limitations

The single-center design limits generalizability. Face-to-face interviews conducted by treating staff may introduce social desirability bias, potentially inflating satisfaction rates. The required sample size was calculated using a 7% margin of

error due to logistic constraints. This wider margin of error yields less precise estimates than a 5% margin would provide. Pronounced ceiling effects in the information and staff-patient relationship domains (upper quartile at or near the maximum score in most subgroups) limit the sensitivity of the LPPSq to detect true subgroup differences in this population and may explain findings such as the significant gender difference in information scores despite identical medians. Satisfaction was assessed at a single time point (24–48 hours post-operatively) and may not capture longer-term recovery experiences. Despite these limitations, the study provides valuable evidence on perioperative anesthesia satisfaction in a Nepalese tertiary care setting and identifies clear, actionable targets for quality improvement.

CONCLUSIONS

Patient satisfaction with perioperative anesthesia care at Devdaha Medical College was high, with staff-patient relationship quality as its greatest strength and information provision as the primary area for improvement. Waiting time experience, scheduling adherence, and postoperative pain management were the most consistently significant modifiable predictors of satisfaction. Targeted interventions addressing these factors like structured pre-anesthesia information delivery, surgical scheduling discipline, optimized waiting time management, and robust multimodal analgesia represent the most effective approaches for further enhancing patient-centered perioperative care at this institution.

Conflict of Interest

The authors declare that no competing interests exist

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None

Authors' contributions:

SK - Conceptualization, data collection, data analysis, manuscript writing; PA - Data collection, supervision, critical revision, literature review; RS - Data collection, statistical analysis, manuscript review; All authors read and approved of the final manuscript.

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