



Anesthesia Satisfaction and Associated Factors among Patients Admitted to the Cardiovascular Intensive Care Unit: A Cross-Sectional Analytical Study

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ARTICLE INFO

Article history:

Received 30 May 2025

Revised 21 June 2025

Accepted 05 July 2025

Keywords:

Anesthesia;

Care;

Perioperative;

Satisfaction;

Cardiovascular intensive care unit

ABSTRACT

Background: In perioperative care, patient satisfaction is a key quality indicator; however, very little information exists on anesthetic-specific satisfaction among cardiac surgery ICU patients. Patients admitted to the cardiac surgery intensive care unit (ICU) were evaluated in this study for their level of satisfaction.

Methods: Between 2019 and 2020, this cross-sectional analytical research included 186 consecutive adult patients undergoing open-heart surgery at Golestan Hospital, Ahvaz, Iran. The verified Evaluation du Vécu de l'Anesthésie Générale (EVAN-G) scale (score range: 0-100) measured anesthesia satisfaction 48 hours post-extubation. Multivariable linear regression identified predictors of satisfaction.

Results: The mean satisfaction score was 73.8 ± 14.2 . High satisfaction (≥ 80) was reported by 52.7% (n=98). Significant predictors included: Preoperative anxiety therapy ($\beta=8.6$, $p=0.003$), Effective pain control (VAS <4) ($\beta=12.1$, $p<0.001$), Clinician communication quality ($\beta=9.3$, $p<0.001$) and, Absence of PONV ($\beta=7.2$, $p=0.011$). The regression model accounted for 63% of satisfaction variation ($R^2=0.63$, $p<0.001$).

Conclusion: Modified variables linked with anesthesia satisfaction in patients in a cardiac ICU are active communication, pain management, and preoperative counseling.

Introduction

Cardiac surgery is among the most complex medical interventions of modern times, offering significant survival benefits despite imposing significant physiological stress [1]. During this high-risk surgery, anesthesia care plays a pivotal role, extending beyond the induction of anesthesia, serving as a vital safeguard for hemodynamic stability, neuroprotection, and intraoperative pain management [2]. Considering that the number of cardiac surgeries worldwide exceeds

1.5 million annually, the clinical focus has shifted beyond mortality criteria to include patient-centered recovery outcomes [3]. Patient satisfaction is a critical indicator of healthcare quality and reflects the alignment between patient expectations and perceived care experiences [4]. In anesthesia management, satisfaction encompasses multidimensional areas including: preoperative communication, intraoperative awareness management, postoperative pain control, and physician responsiveness [5]. The reasons support its clinical importance: dissatisfied patients show higher postoperative pain

The authors declare no conflicts of interest.

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DOI: [10.18502/aacc.v12i3.21308](https://doi.org/10.18502/aacc.v12i3.21308)

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scores ($\beta=0.34$, $p<0.01$), longer opioid use ($OR=2.1$), and reduced adherence to rehabilitation protocols [6-7].

Unique satisfaction challenges occur in the cardiac surgical intensive care unit (CVICU). Due to altered drug pharmacokinetics from cardiopulmonary bypass, between 38 and 56% of patients in cardiac surgery intensive care units (CSICUs) report "near-death experiences" during bypass, ventilator dependence that restricts self-expression, and the simultaneous management of inotropes, mechanical ventilation, and bleeding diatheses, all of which pose unique satisfaction challenges [8-9]. However, despite these difficulties, satisfaction through anesthesia remains underexplored among CVICU patients. It is necessary to have a study that includes these groups since current research has significant shortcomings, such as time mismatch, heterogeneous measurement, insufficient sample size, and neglect of CVICU-specific stressors like delirium-inducing sedatives. The majority of studies on patient satisfaction with anesthesia are focused on outpatient surgeries. This study aims to assess the level of satisfaction with anesthesia in patients admitted to the cardiac surgery intensive care unit of Golestan Hospital, Ahvaz, Iran, since patients in the CVICU stay for a long time, and satisfaction with anesthesia affects the length of stay.

Methods

Study Design

Cross-sectional analytical study (STROBE guidelines followed).

Setting & Participants

Center: CVICU of Golestan Hospital, Ahvaz, Iran (November 2019-May 2020).

Inclusion criteria included: Adults (≥ 18 years), Elective CABG/valve surgery, Extubated ≤ 24 h post-op and, Glasgow Coma Scale=15 at assessment.

Exclusion criteria included: Emergent surgery, cognitive impairment, language barriers.

Sample size: 186 (all eligible patients during the study period).

Variables that were examined including, Anesthesia satisfaction under going to EVAN-G scale (21 items (0-100) (High satisfaction ≥ 80 , Moderate 60-79, and Low <60) [10], Pain intensity (VAS) [11], Communication quality (Communication Assessment Tool) [12] and Preoperative anxiety (Amsterdam Preoperative Anxiety Scale) [13].

Data Collection

Trained interviewers administered instruments 48h post-extubation. Clinical data extracted from medical records. Statistical Analysis: Descriptive statistics (mean \pm SD, frequencies), Bivariate analyses (t-tests, ANOVA, Pearson correlations), Multivariable linear regression (entry criteria: $p<0.2$ in bivariate). SPSS v27.0 ($\alpha=0.05$). This study approved by the Ethical Committees of Ahvaz Jundishapur University of Medical Sciences (IR.AJUMS.HGOLESTAN.REC.1398.013). Written informed consent was obtained from all patients.

Results

A total of 215 patients were assessed for eligibility. Of these 29 excluded from study Emergent surgery ($n=11$), Cognitive impairment ($n=8$), Language barriers ($n=6$) and, Death/transfer ($n=4$). Finally, 186 patients were studied. The mean age of patients was 63.2 ± 9.8 years. The 34.4% of them was female. The mean EuroSCORE II [14], median [IQR] of patients was 1.8 [1.2-2.9]. The mean CPB time (min), was 112.4 ± 31.6 . 47 and, (25.3%) of patients had Delayed extubation (>6 h) (Table 1).

The satisfaction score based on Global EVAN-G Scores was as follows: Global satisfaction: 73.8 ± 14.2 High satisfaction: 98 patients (52.7%), Moderate: 67 (36.0%) and, Low: 21 (11.3%). Subscale scores: Information provision: 68.4 ± 21.3 , Pain management: 71.9 ± 18.7 and, Respectfulness: 85.2 ± 12.1 (Table 2).

Table 1- Demographic and Clinical Profile

Characteristic	Total (n=186)	CABG (n=104)	Valve (n=82)	P value
Age (years), mean \pm SD	63.2 \pm 9.8	65.1 \pm 8.7	60.9 \pm 10.4	0.003*
Female, n (%)	64 (34.4%)	28 (26.9%)	36 (43.9%)	0.018*
EuroSCORE II, median [IQR]	1.8 [1.2-2.9]	2.1 [1.5-3.2]	1.5 [1.0-2.4]	<0.001*
CPB time (min), mean \pm SD	112.4 \pm 31.6	98.7 \pm 24.3	129.6 \pm 31.2	<0.001*
Delayed extubation (>6 h), n (%)	47 (25.3%)	21 (20.2%)	26 (31.7%)	0.078

*Statistically significant ($p<0.05$)

Table 2- EVAN-G Subscale Ratings of Anesthesia Experience

EVAN-G Domain	Mean \pm SD	% Max Score	Correlation with Global Score (r)
Information provision	68.4 \pm 21.3	68.4%	0.59*
Pain management	71.9 \pm 18.7	71.9%	0.78*
Respectfulness	85.2 \pm 12.1	85.2%	0.42*

Attention to needs	69.7±19.5	69.7%	0.67*
Emotional support	63.1±24.8	63.1%	0.51*

All correlation coefficients (r) are statistically significant at $p < 0.001$.

Factors affecting satisfaction: Clinical Reasons

Patients with VAS < 4 at 24h: 79.2±11.4 vs. VAS ≥ 4 : 63.1±15.9 ($p < 0.001$, $d = 1.18$), No PONV: 76.9±12.7 vs. PONV: 64.3±16.2 ($p = 0.002$, $d = 0.89$), Delayed extubation: 65.4±17.8 vs. timely: 76.1±12.1 ($p = 0.011$, $d = 0.71$)

Procedure Causes

Pre-op anxiety therapy: 80.1±10.3 vs. none: 69.2±14.7 ($p = 0.003$, $d = 0.86$), Communication quality (CAT score): $r = 0.62$, $p < 0.001$.

Surgical Type

CABG patients: 76.9±13.1 vs. Valve: 70.1±14.8 ($p = 0.002$, $d = 0.49$).

As shown in (Table 3), based on multivariable linear regression, the following points are evident: Multivariate linear regression analysis showing the relationship between various clinical and perioperative variables and anesthesia satisfaction scores. Results are reported as unstandardized beta coefficients with 95% confidence intervals (β [95% CI]), standardized beta (β), corresponding P values, and variance inflation factors (VIF). Positive β values indicate a positive association with satisfaction. So that Pain control effect stronger in valve patients ($\beta = 14.2$ vs. CABG $\beta = 10.1$) and Communication more impactful in CABG ($\beta = 10.8$ vs. valve $\beta = 7.3$).

Table 3- Predictors of Anesthesia Satisfaction

Variable	β (95% CI)	Standardized β	P value	VIF
Pain control (VAS < 4)	12.1 (8.3-15.9)	0.41	< 0.001	1.8
Communication quality	9.3 (6.7-11.9)	0.38	< 0.001	2.1
Pre-op counseling	8.6 (3.1-14.1)	0.22	0.003	1.5
Valve surgery	-5.9 (-9.2--2.6)	-0.19	0.001	1.7
PONV absence	7.2 (1.6-12.8)	0.17	0.011	1.4
Delayed extubation	-4.8 (-8.9--0.7)	-0.15	0.022	1.9
Age (per 10 years)	-1.2 (-3.1-0.7)	-0.08	0.210	1.3
Female sex	1.8 (-1.9-5.5)	0.06	0.340	1.2

Multivariate linear regression analysis showing the relationship between various clinical and perioperative variables and anesthesia satisfaction scores. Results are reported as unstandardized beta coefficients with 95% confidence intervals (β [95% CI]), standardized beta (β), corresponding P values, and variance inflation factors (VIF). Positive β values indicate a positive association with satisfaction.

Discussion

This cross-sectional study of 186 cardiac surgical intensive care unit (CSICU) patients identified three principal modifiable determinants of anesthesia satisfaction: how well their pain was managed, how clearly their clinicians communicated, and whether they received proper pre-op counseling to reduce anxiety. The most powerful predictor was pain management; Patients whose pain was kept under control (a VAS score below 4) were considerably more satisfied, over 12 points higher on the EVAN-G scale. That's not just statistically significant; it's also clinically relevant, beating the 7-point minimal clinically important difference (MCID) often cited in the literature [15]. Interestingly, those

undergoing valve surgery had even more noticeable effects. This aligns with the most current EACTA guidelines, which emphasize the importance of proactive multimodal pain techniques in reducing physiological stress in cardiac patients [16]. So, it's clear: controlling pain isn't just about comfort—it's a cornerstone of the recovery experience. The second biggest factor was communication quality. For every notch higher patients rated their clinician's communication, their satisfaction scores jumped by 9.3 points. That's a big deal. Neuroscience may help explain this: general evidence suggests that the amygdala plays a central role in processing fear and emotional stress, particularly in contexts involving uncertainty or perceived threats [17]. Emotional arousal, including fear triggered by unclear communication, is known to increase amygdala activity, which can influence heart rate and autonomic responses [18]. It's not just about "bedside manner"—effective communication can literally change the way patients process their hospital experience. This supports newer ERACS (Enhanced Recovery After Cardiac Surgery) recommendations calling for consistent, scripted communication protocols [19]. The third key factor was preoperative anxiety reduction. Patients who received

structured counseling before surgery reported satisfaction scores nearly 9 points (8.6) higher than those who didn't. Why? Because unmanaged anxiety before surgery has been linked to a 3-fold increase in cortisol, the body's main stress hormone [18]. High cortisol levels, in turn, have been independently linked to dissatisfaction after surgery [20]. This means we're not just soothing nerves—we're biologically improving outcomes. Interestingly, these three factors—pain, communication, and anxiety—together explained 63% of the variation in satisfaction scores. That's more than we usually see in general surgical patients, where similar models only explain about 41–52% of satisfaction variance.

This makes sense: cardiac surgery is uniquely invasive and emotionally intense. Patients are more vulnerable and more reliant on their care team, so every interaction carries more weight.

One of the more unanticipated findings was that valve surgery patients reported lower satisfaction than those who had bypass surgery—by nearly 7 points. That contradicts some previous research, but it may be due to a few factors: Higher rates of delirium in valve patients, which can cloud their memory of care [21] and, longer cardiopulmonary bypass times, which may lead to more inflammation and a sense of malaise [22].

Another interesting finding was the strong impact of avoiding nausea and vomiting (PONV). Patients who didn't experience PONV reported 7.2 points higher satisfaction, much higher than what we typically see in other surgical groups (3–4.5 points) [23]. One reason might be that cardiac patients are more likely to be on opioids or have unstable blood pressure, both of which can make nausea feel worse [23].

When it comes to patient satisfaction after cardiac surgery, it is not enough to just observe the technical aspects of anesthesia; good communication, effective preventive pain control, and careful preoperative counseling can be very effective in creating greater satisfaction and an overall better experience.

Limitations

Single-center design, Recall bias risk, unmeasured confounders (such as; socioeconomic factors).

Conclusion

Modified variables clearly linked with anesthesia satisfaction in patients in the CV ICU are active communication, pain management, and preoperative counseling. Future studies must address valve patients' unique susceptibilities through delirium-prevention strategies and procedure-specific counseling.

Acknowledgment

This article is a result of the thesis work with Project number U-98206 from the Pain Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran. We sincerely thank the patients who cooperated with us in this project and supported the research team. Special thanks to Ahvaz, Glestan Hospital Clinical Research Development Unit, Ahvaz, Iran, for their cooperation.

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