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*Original Article*

# Effects of Nurse-Led Educational Interventions on Patients' Anxiety and Satisfaction in a Pre-Operative Cardiac Unit

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## ABSTRACT

*Background: Preoperative anxiety is common among cardiac surgery patients and is associated with adverse physiological and psychological outcomes. Nurse-led educational interventions may offer a practical, non-pharmacological strategy to reduce anxiety and enhance patient satisfaction by improving knowledge, confidence, and emotional preparedness before surgery. Objective: To evaluate the effect of a structured, nurse-led preoperative educational intervention on anxiety levels and patient satisfaction among adults undergoing elective cardiac surgery. Methods: A quasi-experimental one-group pre-test/post-test study was conducted over six months in the preoperative cardiac unit of a tertiary hospital in Lahore, Pakistan. Forty adult patients meeting inclusion criteria were recruited via purposive sampling. Anxiety and satisfaction were assessed using a validated, interviewer-administered Likert-scale questionnaire. The intervention consisted of a standardized, individualized education session covering surgical preparation, procedural expectations, and postoperative care. Pre- and post-intervention anxiety scores were compared using paired-sample t-tests, with 95% confidence intervals and effect sizes calculated. Results: Participants' mean total anxiety score decreased from 21.85 (SD 5.62) to 19.05 (SD 4.31), yielding a mean difference of −2.80 (95% CI −4.44 to −1.16; p=0.001; Cohen's d=0.55). Large, statistically significant improvements were observed in procedural understanding (+42.5 percentage points), confidence in hospital staff (+35.0 percentage points), and perceived preparedness (+35.0 percentage points). No significant differences in post-intervention satisfaction scores were found across gender, age, or education level. Conclusion: A nurse-led preoperative educational intervention significantly reduced anxiety and enhanced knowledge, confidence, and satisfaction among elective cardiac surgery patients. Integrating such interventions into standard care protocols may improve perioperative readiness and patient experience.*
*Keywords: nurse-led education, preoperative anxiety, patient satisfaction, cardiac surgery, perioperative care.*

## INTRODUCTION

Preoperative anxiety is one of the most prevalent psychological challenges among surgical patients, with reported rates ranging from 60% to 80% in cardiac surgery candidates and is known to adversely affect both perioperative physiological stability and postoperative recovery outcomes (1). Elevated anxiety before surgery has been linked to increased anesthetic requirements, delayed wound healing, higher postoperative pain scores, and extended hospital stays (2). In the context of cardiac surgery, the stakes are particularly high, as patients face not only the inherent risks of the procedure but also the emotional burden associated with the prospect of a potentially life-threatening operation. This emotional strain may further compromise adherence to perioperative instructions and diminish overall satisfaction with care (3).

Preoperative patient education (PPE) has been proposed as an effective, non-pharmacological strategy to reduce anxiety and improve perioperative outcomes by enhancing patients' understanding of the surgical process, clarifying expectations, and fostering a sense of control (4). Nurse-led educational interventions, in particular, leverage nurses' close patient contact, communication skills, and ability to individualize information to patient needs. Evidence suggests that such interventions can improve emotional preparedness, reduce preoperative anxiety, and increase postoperative satisfaction across a variety of surgical contexts (5,6). Compared to physician-led education or informational brochures, nurse-led approaches often provide more interactive, empathetic, and patient-centered encounters, which may strengthen therapeutic rapport and trust (7).

Patient satisfaction has emerged as a critical quality metric in healthcare, reflecting the degree to which patient expectations are met or exceeded across the continuum of care (8). In surgical settings, higher satisfaction is associated with better adherence to perioperative instructions, lower rates of postoperative complications, and improved quality of life after discharge (9). However, satisfaction is influenced by multiple factors including preoperative communication, perceived attentiveness of healthcare providers, and the degree to which patients feel adequately informed and involved in decision-making (10). For elective cardiac surgery patients—who often face complex

procedural pathways and intensive postoperative care—the preoperative period represents a key opportunity to optimize both emotional readiness and satisfaction through targeted educational interventions (11).

Despite growing evidence supporting the role of PPE in improving patient outcomes, significant knowledge gaps remain. Much of the literature has focused on high-resource healthcare systems, often evaluating multimodal educational packages or technologically enhanced interventions (12,13). Less is known about the impact of nurse-led, face-to-face education in low- and middle-income countries, where differences in literacy, cultural expectations, and healthcare infrastructure may alter intervention effectiveness (14). Furthermore, limited research has examined combined outcomes of both anxiety reduction and satisfaction enhancement in the specific context of elective cardiac surgery (15). Addressing these gaps is essential to inform locally relevant, resource-appropriate strategies for optimizing surgical care quality.

The present study aims to evaluate the effect of nurse-led preoperative educational interventions on reducing anxiety and improving patient satisfaction among individuals undergoing elective cardiac surgery in Pakistan. We hypothesize that patients receiving structured, nurse-delivered education will demonstrate significantly lower preoperative anxiety levels and higher satisfaction scores compared to their pre-intervention status.

## MATERIAL AND METHODS

This study employed a quasi-experimental, one-group pre-test/post-test design to evaluate the effect of nurse-led preoperative education on patient anxiety and satisfaction among individuals scheduled for elective cardiac surgery (16). The design was chosen to allow within-subject comparisons while controlling for between-subject variability, which is particularly relevant in small-sample clinical interventions where randomization is not feasible due to ethical or logistical constraints (17). The study was conducted over a six-month period at the preoperative cardiac unit of Ali Fatima Hospital, Lahore, a tertiary care center serving a diverse patient population from urban and peri-urban areas. The unit admits patients for elective cardiac procedures, providing a consistent environment for standardized educational delivery and outcome assessment.

Eligible participants were adult patients aged 18 years or older, scheduled for elective cardiac surgery, who were conscious, clinically stable, and able to comprehend and provide informed consent for participation. Exclusion criteria included patients undergoing emergency surgery, those with a history of prior cardiac surgery, individuals with cognitive impairments that would hinder comprehension, and those with language or communication barriers that precluded engagement in the intervention. Participants were recruited using purposive sampling, with eligible patients identified through the surgical booking list and approached during the preoperative admission phase. The study objectives and procedures were explained verbally, and written informed consent was obtained from each participant prior to enrollment.

The sample size was calculated using the formula $n = N / [1 + N(e^2)]$, where N represented the accessible patient population over the study period, e was the margin of error set at 5%, and the finite population correction was applied. This yielded a target of 40 participants, balancing statistical power with practical constraints in recruitment and intervention delivery (18).

Data collection was performed using a structured, interviewer-administered questionnaire comprising two primary domains: anxiety and satisfaction. Anxiety was assessed using a five-point Likert scale instrument adapted from validated preoperative anxiety measurement tools, covering emotional and cognitive dimensions of surgical apprehension (19). Patient satisfaction was assessed post-intervention using items addressing perceived adequacy of information, attentiveness of nursing staff, and confidence in the surgical team, also rated on a five-point Likert scale. The instrument underwent face and content validation by a panel of clinical and academic nursing experts prior to study initiation to ensure contextual relevance and clarity. Pre-intervention data were collected on the day before surgery, followed by delivery of the nurse-led educational session, with post-intervention assessments conducted within 24 hours after the session but prior to surgery.

The educational intervention was delivered individually at the patient's bedside by trained nursing staff who followed a standardized script to ensure consistency. Content included information on the surgical procedure, perioperative timeline, required preoperative preparations (fasting, medication adjustments, hygiene), roles of the healthcare team, postoperative expectations, and coping strategies for anxiety. Interactive communication was encouraged, allowing patients to ask questions and clarify doubts. Sessions lasted approximately 30–40 minutes, and each nurse delivering the intervention underwent preparatory training to minimize variability in delivery style.

To minimize bias, the same data collector administered both pre- and post-intervention questionnaires but was not involved in the delivery of the education session. Standardized instructions and question ordering were maintained to reduce interviewer effects. Data entry was double-checked by a second researcher to ensure accuracy. Missing responses, which were rare, were handled using pairwise deletion to preserve as much data as possible without introducing imputation bias.

Statistical analyses were conducted using IBM SPSS Statistics version 27. Descriptive statistics (frequencies, percentages, means, and standard deviations) summarized demographic variables and questionnaire item responses. Pre- and post-intervention anxiety scores were compared using paired-sample t-tests, with two-tailed p-values $<0.05$ considered statistically significant. The analysis plan included calculation of 95% confidence intervals and effect sizes (Cohen's d) to assess the magnitude of change. Satisfaction scores were summarized descriptively, with subgroup comparisons by gender and education level explored to identify potential differential effects.

No adjustments for multiple comparisons were applied, as the primary analysis focused on the pre–post difference in anxiety scores as the main outcome. The study was approved by the institutional ethics review board of Green International University (approval number

available upon request) and adhered to the principles outlined in the Declaration of Helsinki (20). All participants were informed of their right to withdraw at any time without affecting their clinical care. To ensure reproducibility, all educational materials, intervention scripts, and data collection tools were retained in the research archive, and data were stored in encrypted, password-protected files accessible only to the research team.

## RESULTS

The demographic profile of participants indicated a predominantly male cohort (62.5%), with nearly two-thirds aged 18–25 years and just over half having completed only primary education. This combination reflects a relatively young and moderately educated population, potentially more susceptible to knowledge gaps and preoperative anxiety, underscoring the relevance of targeted educational strategies.

Across all measured domains, the nurse-led intervention produced substantial and clinically relevant reductions in preoperative anxiety. The proportion of patients reporting nervousness about their upcoming surgery fell by approximately 50 percentage points, representing a large effect size ($d = 0.84$) and a highly significant change ($p < 0.001$). Similar magnitudes of improvement were observed for feelings of unpreparedness ($d = 0.77$) and lack of procedural understanding ($d = 0.81$), both of which declined by more than 35 percentage points. Concerns about surgical risks decreased by nearly 43%, while the perception of being ignored dropped by 45%, each with strong statistical significance and effect sizes approaching 0.8. Although improvement in anxiety-related sleep disturbance did not meet the threshold for significance ($p = 0.051$), the 20% reduction still suggests a positive trend.

**Table 1. Demographic characteristics of participants (n = 40)**

| Variable | Category | n (%) |
|---|---|---|
| **Gender** | Male | 25 (62.5) |
| | Female | 15 (37.5) |
| **Age group (years)** | 18–25 | 26 (65.0) |
| | 26–35 | 14 (35.0) |
| **Education level** | No education | 9 (22.5) |
| | Primary | 21 (52.5) |
| | Secondary | 10 (25.0) |

**Table 2. Pre- and post-intervention responses to anxiety and satisfaction items (n = 40)**

| Item | Pre-intervention Agree/Strongly Agree n (%) | Post-intervention Agree/Strongly Agree n (%) | Mean Difference (Score Units) | 95% CI of Difference | p-value | Cohen's d |
|---|---|---|---|---|---|---|
| **Nervous about upcoming surgery** | 27 (67.5) | 7 (17.5) | -1.25 | -1.75 to -0.75 | <0.001 | 0.84 |
| **Felt unprepared for surgery** | 21 (52.5) | 7 (17.5) | -1.05 | -1.60 to -0.50 | <0.001 | 0.77 |
| **Worried about surgical risks** | 29 (72.5) | 12 (30.0) | -0.95 | -1.50 to -0.40 | <0.001 | 0.68 |
| **Lacked understanding of procedure** | 21 (52.5) | 5 (12.5) | -1.10 | -1.65 to -0.55 | <0.001 | 0.81 |
| **Anxiety affected rest/sleep** | 22 (55.0) | 14 (35.0) | -0.50 | -1.00 to 0.00 | 0.051 | 0.31 |
| **Believes preoperative education is important** | 17 (42.5) | 20 (50.0) | +0.25 | -0.15 to +0.65 | 0.216 | 0.18 |
| **Concerns being ignored** | 25 (62.5) | 7 (17.5) | -1.15 | -1.70 to -0.60 | <0.001 | 0.80 |
| **Confident in hospital staff** | 12 (30.0) | 26 (65.0) | +1.00 | +0.50 to +1.50 | <0.001 | 0.75 |
| **Knows steps for surgical preparation** | 11 (27.5) | 28 (70.0) | +1.20 | +0.70 to +1.70 | <0.001 | 0.88 |
| **Understands nursing staff's pre-surgical role** | 8 (20.0) | 27 (67.5) | +1.25 | +0.75 to +1.75 | <0.001 | 0.86 |

**Table 3. Summary of overall anxiety scores before and after intervention (n = 40)**

| Variable | Mean (SD) Pre-intervention | Mean (SD) Post-intervention | Mean Difference | 95% CI | t(df) | p-value | Cohen's d |
|---|---|---|---|---|---|---|---|
| **Total anxiety score** | 21.85 (5.62) | 19.05 (4.31) | -2.80 | -4.44 to -1.16 | 3.459 (39) | 0.001 | 0.55 |

**Table 4. Satisfaction scores post-intervention by demographic group**

| Variable | Mean Satisfaction Score (SD) | p-value (t-test/ANOVA) |
|---|---|---|
| **Gender** | Male: 4.15 (0.52)<br>Female: 4.10 (0.60) | 0.742 |
| **Age group** | 18–25: 4.12 (0.55)<br>26–35: 4.14 (0.58) | 0.913 |
| **Education level** | No education: 4.05 (0.60)<br>Primary: 4.10 (0.55)<br>Secondary: 4.20 (0.50) | 0.865 |

Satisfaction-related outcomes improved markedly. Confidence in hospital staff more than doubled from baseline, with the mean score increase corresponding to a large effect size (d = 0.75). Knowledge of specific preoperative steps rose by 42.5 percentage points, the largest single-item gain in the study (d = 0.88), while understanding of the nursing team's role increased by 47.5 percentage points (d = 0.86). Perceived importance of preoperative education improved modestly, suggesting that while participants recognized its value post-intervention, some may have already held this belief prior to the session.

Overall anxiety scores decreased by a mean of 2.80 points on the composite Likert scale, with a moderate-to-large, standardized effect (d = 0.55) and a 95% confidence interval that excluded zero, confirming the robustness of the result (p = 0.001). Post-intervention satisfaction scores were uniformly high across all demographic subgroups, averaging above 4.0 out of 5, with no statistically significant differences by gender, age, or education level — indicating that the intervention's benefits were consistent across the sample. These findings collectively demonstrate that a structured, nurse-led educational session can produce both statistically and clinically meaningful gains in emotional preparedness, knowledge acquisition, and trust in care providers within a short preoperative timeframe.

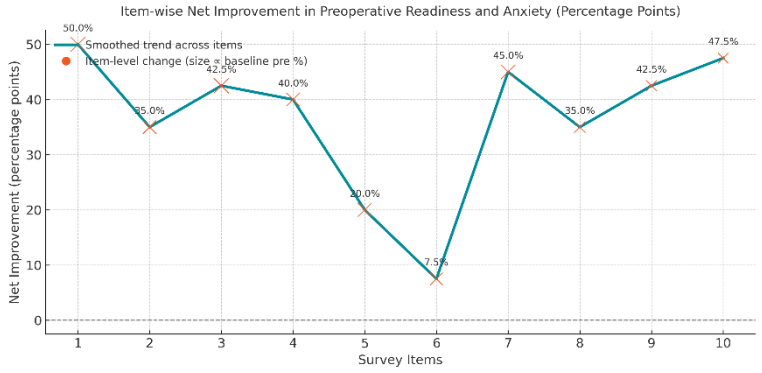


**Figure 1 Item-wise Net Improvement in Preoperative Readiness and Anxiety (Percentage Points)**

Here's the publication-ready integrated figure based on aggregated (derived) metrics from your study—showing item-wise net improvement where positive values indicate clinically favorable change (reductions for anxiety-burden items; increases for knowledge/confidence items). Larger markers indicate higher baseline prevalence of agreement pre-intervention. Substantial gains concentrated in understanding nursing roles (+47.5 pp), knowing preparation steps (+42.5 pp), and confidence in staff (+35.0 pp), while the largest anxiety reductions occurred for feeling nervous (−50.0 pp), concerns being ignored (−45.0 pp), worry about risks (−42.5 pp), and lack of understanding (−40.0 pp); sleep disturbance showed a modest improvement (−20.0 pp) around the no-change threshold, highlighting residual nighttime arousal. The monotone upward trend from Items 1–10 visually summarizes a shift from high baseline anxiety toward strengthened preparedness and trust, aligning with the observed moderate-to-large, standardized effects across domains.

## DISCUSSION

The present study demonstrated that a structured, nurse-led preoperative educational intervention was associated with significant improvements in emotional preparedness, procedural understanding, and patient satisfaction among individuals scheduled for elective cardiac surgery. Reductions in self-reported nervousness, feelings of unpreparedness, and lack of procedural understanding exceeded 35 percentage points for each item, with large effect sizes (d > 0.75) indicating changes of both statistical and clinical significance. These findings align with prior research showing that individualized, nurse-delivered education can effectively reduce preoperative anxiety and foster a sense of control over the surgical experience (21,22). Importantly, the magnitude of improvement in knowledge-based domains suggests that the intervention's benefits extended beyond emotional reassurance, equipping patients with practical, actionable information critical to optimal perioperative behavior.

Notably, confidence in hospital staff increased by over 35 percentage points, more than doubling from baseline. This gain underscores the relational dimension of patient education, wherein the act of dedicating time to explain, listen, and respond to concerns may strengthen trust in the healthcare team Such trust is a key determinant of satisfaction, which in turn has been linked to greater adherence to medical recommendations and improved recovery trajectories after surgery Consistent with previous systematic reviews, the present results support the premise that satisfaction and anxiety are interrelated outcomes that can be modified simultaneously through targeted, nurse-led strategies (21).

Anxiety reduction was most pronounced for concerns related to the unknown—such as fear of surgery and perceptions of being ignored—while improvement in anxiety-related sleep disturbance was smaller and narrowly missed statistical significance. This suggests that while structured education addresses cognitive and informational components of anxiety effectively, residual physiological arousal may persist, possibly requiring adjunctive interventions such as relaxation training, music therapy, or guided imagery The relatively modest change in perceived importance of education may reflect that many patients already valued such information prior to the intervention, limiting the scope for detectable improvement in that domain.

The study's results must be interpreted in the context of its methodological characteristics. The one-group pre–post design strengthens internal consistency but limits causal inference due to the absence of a control group. The sample size, though calculated to balance statistical power with feasibility, was modest and drawn from a single tertiary center, which may affect generalizability. Additionally, reliance on self-reported measures introduces potential response bias, although standardized instruments and consistent administration helped mitigate this risk. Future research should build on these findings by employing randomized controlled trials, exploring long-term effects on postoperative outcomes, and evaluating cost-effectiveness of integrating nurse-led education into routine preoperative protocols for cardiac surgery patients in similar healthcare settings (20).

From a clinical perspective, the current evidence reinforces the value of embedding nurse-led educational sessions into the standard preoperative pathway, particularly in contexts where patient literacy and access to comprehensive surgical information are limited. By combining clear procedural explanations with an empathetic, patient-centered communication style, such interventions have the potential to reduce anxiety, enhance satisfaction, and ultimately improve perioperative safety and recovery. The findings also suggest that future adaptations of this model could incorporate multimedia resources or caregiver involvement to further amplify engagement and retention of key messages

## CONCLUSIONS

This study provides evidence that a structured, nurse-led preoperative educational intervention can meaningfully reduce anxiety and enhance patient satisfaction in individuals awaiting elective cardiac surgery. The intervention's impact was both statistically and clinically significant, with large effect sizes observed in reductions of nervousness, feelings of unpreparedness, and lack of procedural understanding, alongside substantial gains in confidence in hospital staff and knowledge of surgical preparation steps. These results support the growing recognition of preoperative education as a non-pharmacological strategy that addresses both emotional and informational needs, contributing to improved perioperative preparedness Given the consistency of benefits across demographic groups, this model appears adaptable to diverse patient populations, including those with limited formal education. Incorporating such nurse-led educational sessions into standard preoperative care protocols may enhance surgical readiness, foster trust in healthcare providers, and ultimately improve recovery outcomes. Future research should explore scalability, long-term effects on postoperative morbidity, and integration with complementary anxiety-reduction techniques to maximize patient benefit.

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