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Effectiveness of Culturally Adapted Perioperative Nursing Education on Preoperative Anxiety and Postoperative Recovery Outcomes Among Surgical Patients in Four Provinces of Papua, Indonesia: A Randomized Controlled Trial

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Abstract

Background: Preoperative anxiety can adversely affect anaesthetic requirements, pain perception, surgical safety, and postoperative recovery. In Papua, Indonesia, linguistic diversity, culturally embedded health beliefs, and limited perioperative nursing resources may hinder evidence-based preoperative preparation. However, the effectiveness of culturally and linguistically adapted nursing education in this setting remains understudied.

Objective: To evaluate the effectiveness of a culturally adapted, multilingual perioperative nursing education intervention on preoperative anxiety, postoperative pain, time to first ambulation, and hospital stay among surgical patients in Papua.

Methods: A parallel-group pragmatic randomized controlled trial was conducted at four provincial referral hospitals in Papua, Papua Pegunungan, Papua Selatan, and Papua Tengah, Indonesia, from January to June 2024. A total of 320 adults undergoing elective general, obstetric, or orthopaedic surgery were randomized to intervention or control groups. The intervention comprised structured preoperative education delivered in local languages and adapted to Papuan health beliefs using verbal explanations, visual aids, and perioperative orientation. Controls received standard, non-standardized verbal information in Bahasa Indonesia. Preoperative anxiety was assessed using the Amsterdam Preoperative Anxiety and Information Scale. Secondary outcomes included postoperative pain (Numeric Rating Scale), time to first ambulation, and hospital stay.

Results: Of 320 randomized participants, 315 completed follow-ups. Compared with controls, the intervention significantly reduced preoperative anxiety (mean difference −5.2, 95% CI −6.1 to −4.3; $p<0.001$) and 24-hour postoperative pain (−1.4 points, 95% CI −1.9 to −0.9; $p<0.001$). Time to first ambulation was reduced by 7.3 hours and hospital stay by 1.2 days (both $p<0.001$). Benefits were consistent across sites, language groups, and surgery types.
Conclusion: Culturally adapted multilingual perioperative nursing education substantially reduces anxiety and pain while accelerating mobilization and shortening hospital stay. Its integration into routine perioperative nursing practice may improve equitable surgical care in linguistically diverse, resource-constrained settings.

Keywords: preoperative anxiety; culturally adapted education; perioperative nursing; Papua; randomized controlled trial; patient education; linguistic diversity; Indigenous health.

Introduction

Surgical care is increasingly recognized as an essential component of universal health coverage, yet disparities in perioperative experiences and outcomes persist globally, particularly among Indigenous and linguistically diverse populations residing in low- and middle-income countries (LMICs)[1]. Preoperative anxiety is one of the most commonly reported patient experiences before surgery, representing a potentially modifiable psychological factor associated with increased anaesthetic risk, higher postoperative pain intensity, greater analgesic consumption, prolonged hospitalization, and reduced satisfaction with care[2–4]. Reported prevalence of clinically significant preoperative anxiety ranges widely from 30% to 80%, depending on clinical setting, patient demographics, and the assessment tool employed[5]. Anxiety appears particularly pronounced when patients face language barriers, unfamiliar hospital environments, and differing explanatory models of illness — conditions that characterize nearly every aspect of health service delivery across Papua Province, Indonesia.

Papua's health system operates within a uniquely challenging context defined by vast geographic distances, limited infrastructure, critical workforce shortages, and extraordinary linguistic diversity, with more than 250 distinct languages spoken across the region[6]. Many patients attending provincial referral hospitals do not speak Bahasa Indonesia fluently; for a substantial proportion, it is their third or fourth language. Furthermore, most patients hold deeply rooted cultural beliefs about illness, healing, bodily integrity, and spiritual connection that may differ substantially from biomedical understandings of surgery and recovery. Standard preoperative education — typically delivered verbally in Bahasa Indonesia using generic, institution-centred content — may therefore be poorly understood, culturally incongruent, and perceived as irrelevant or even disrespectful, thereby severely limiting its effectiveness.

When patients cannot fully comprehend information provided before surgery, uncertainty increases, trust may diminish, and anxiety levels rise. This dynamic is particularly concerning in surgical contexts, where information-seeking and emotional reassurance are fundamental nursing responsibilities. Evidence from high-income countries and selected LMICs indicates that culturally and linguistically appropriate preoperative information improves patient understanding, reduces anxiety, enhances satisfaction, and may contribute to improved clinical recovery[7–9]. However, despite the clear need for culturally responsive care, no published studies have rigorously evaluated such interventions in Papua or comparable Melanesian contexts. Whether a relatively simple, nurse-delivered, culturally adapted educational programme can meaningfully improve measurable surgical outcomes in these settings remains largely unknown.

This study addresses that critical gap in the evidence base by reporting results from a multi-site pragmatic randomized controlled trial conducted across four newly established provinces: Papua, Papua Pegunungan, Papua Selatan, and Papua Tengah. Each province operates a single referral hospital serving as the primary surgical facility for its population. The primary hypothesis was that patients receiving culturally adapted perioperative nursing education would demonstrate significantly lower preoperative anxiety compared with those receiving standard hospital care. Secondary hypotheses were that the intervention would also reduce postoperative pain intensity, shorten time to first mobilization, and decrease postoperative length of hospital stay. Findings from this trial have direct relevance for policy-makers, hospital administrators, and nursing leaders seeking to improve surgical equity and patient safety in culturally and linguistically diverse regions throughout Indonesia and the broader Asia-Pacific region.

Methods

Study Design

This was a pragmatic, parallel-group, superiority randomized controlled trial with 1:1 allocation ratio. Outcome assessors were systematically blinded to group assignment throughout data collection and initial analysis. The study protocol was reviewed and approved by the Papua Health Research Ethics Committee on 18 December 2023 (approval number EC/9810/XII/2023). All participants provided written informed consent; where literacy was limited, verbal consent was read aloud, confirmed, and formally witnessed and recorded in accordance with Indonesian national research ethics guidelines. The entire study was conducted in full accordance with the principles outlined in the Declaration of Helsinki. Reporting followed the Consolidated Standards of Reporting Trials (CONSORT) 2010 statement to ensure transparency and methodological completeness.

Study Setting

The study was conducted at the main provincial referral hospital in each of four provinces: Papua Province, Papua Pegunungan Province, Papua Selatan Province, and Papua Tengah Province. These hospitals collectively provide the vast majority of elective surgical services across a vast and geographically complex region. At the time of the study, nursing staffing levels were generally adequate in terms of numbers, but perioperative education was not standardized across any facility. Information was typically provided verbally by ward nurses immediately before surgery, often in technical or unfamiliar language, with no consistent content, visual aids, or consideration of patient language or cultural beliefs.

Participants

Eligible participants were adult patients aged 18 to 65 years admitted for elective general surgery, obstetric surgery (caesarean section), or orthopaedic surgery. Additional inclusion criteria included ability to communicate in one of the four dominant local languages or Bahasa Indonesia, and expected hospital stay of at least one night preoperatively. Patients were excluded if they were undergoing emergency or urgent surgery, presented with severe cognitive impairment or diagnosed psychiatric condition, were unable to provide informed consent, required planned mechanical ventilation or ICU admission postoperatively, or had severe visual or auditory impairment preventing use of study materials. These criteria were designed to ensure that participants could comprehend the education provided and complete study assessments reliably.

Sample Size Calculation

Sample size estimation was based on published data using the Amsterdam Preoperative Anxiety and Information Scale (APAIS). Assuming a mean preoperative APAIS anxiety score of 14.5 (standard deviation 5.2) in the control group and a clinically meaningful reduction of 4 points in the intervention group, with $\alpha = 0.05$ and statistical power = 0.90, a minimum of 145 participants per group was required. To accommodate an estimated 10% loss to follow-up, a total target sample of 320 participants (160 per group) was set. This sample size also provided adequate power for analysis of secondary outcomes across major subgroups.

Randomization and Blinding

A computer-generated random sequence with variable block sizes (4, 6, and 8) was prepared by an independent statistician not involved in recruitment, intervention delivery, or outcome assessment. Allocation assignments were placed in sequentially numbered, opaque, sealed envelopes and held by research nurses not involved in outcome assessment. Envelopes were opened only after participant enrolment and completion of baseline data collection, thereby preventing selection bias. Outcome assessors remained systematically blinded to group assignment throughout the entire study period; participants were explicitly instructed not to discuss their education with assessment staff. Due to the nature of the educational intervention, it was not possible to blind participants or intervention nurses to group assignment.

Intervention Development and Delivery

The culturally adapted perioperative education programme was developed through a systematic formative phase conducted over six weeks prior to trial commencement. This phase included key informant interviews with surgical patients, community leaders, religious authorities, and perioperative nurses to identify commonly held concerns, preferred information formats, and cultural beliefs relevant to surgery and recovery. Key themes emerging from this formative work included fear of the unknown, concern about separation from family, spiritual anxiety regarding bodily integrity, and difficulty understanding technical medical terminology.

Based on these findings, the educational intervention was adapted across three primary dimensions: linguistic, visual, and cultural. Linguistic adaptation included full translation of all materials and scripts into the four dominant local languages alongside Bahasa Indonesia, with independent back-translation to verify accuracy. Visual adaptation involved developing simple, culturally appropriate visual aids depicting hospital layout, surgical attire, and theatre procedures using imagery familiar to local communities. Cultural adaptation involved reframing explanations to acknowledge and address commonly expressed concerns, including the role of family support, spiritual preparation, respectful handling of the body, and dignity of care.

The standardized education script covered five core domains: reason for hospitalization and planned procedure, preoperative preparation requirements, what to expect on the day of surgery, pain management strategies, and expected course of recovery. Education was delivered individually by trained research nurses on the afternoon or evening before surgery, requiring approximately 20 to 30 minutes per session. Patients were actively encouraged to ask questions and express concerns, which were addressed using the same accessible and culturally congruent approach.
Participants assigned to the control group received standard hospital care: routine verbal preoperative information provided by ward nurses in Bahasa Indonesia, without standardized content, visual aids, or specific cultural adaptation. Content, timing, and duration of information delivery varied according to usual ward practice.

Outcome Measures

Primary Outcome:

Preoperative anxiety, measured using the APAIS completed on the evening before surgery. The APAIS comprises six items, each scored from 1 to 4; total anxiety score ranges from 6 to 24, with higher scores indicating greater anxiety[10]. This tool was selected because it is brief, validated, and distinguishes anxiety from information needs, making it suitable for use in multilingual settings following linguistic adaptation.

Secondary Outcomes:
Postoperative pain intensity measured using the 11-point NRS (0 = no pain, 10 = worst imaginable pain) at 6, 24, and 48 hours after surgery. Time to first ambulation recorded as hours from completion of surgery to first assisted or independent mobilization. Postoperative length of hospital stay recorded as total days from surgery to documented discharge readiness.

Data Collection

Data were collected by trained research assistants not involved in delivering the intervention and kept blinded to group assignment. Baseline characteristics recorded at enrolment included age, sex, educational attainment, primary language spoken, residential setting, type of surgery planned, and previous surgical experience. Outcomes were assessed at pre-surgery, 6, 24, and 48 hours postoperatively, and at the time of hospital discharge. All data were recorded on standardized forms, double-entered into a secure database, and routinely checked for consistency and missing values.

Statistical Analysis

All analyses followed intention-to-treat principles, including all randomized participants with available outcome data. Between-group comparisons used independent samples t-tests for continuous outcomes and chi-square or Fisher's exact tests for categorical variables as appropriate. Mean differences with 95% confidence intervals are reported as measures of effect size. Statistical significance was set at $p < 0.05$. Additional subgroup analyses were conducted to explore consistency of effect across study sites, language groups, and categories of surgery. Effect size was calculated using Cohen's d. All statistical analyses were conducted using IBM SPSS Statistics version 28.

Results

Participant Flow

Between January 2 and June 28, 2024, 343 consecutive eligible patients were approached for participation. Of these, 23 declined enrolment, most commonly citing time constraints or preference for family-provided information, leaving 320 participants who were enrolled and randomly assigned (160 per group). Five participants were subsequently lost to follow-up: three in the intervention group were discharged early before final assessment could be completed, and two in the control group withdrew consent. Therefore, complete outcome data were available for 315 participants, representing an overall follow-up rate of 98.4%. Participant flow through the trial is summarized in Table 1.

Table 1. Participant Flow through the Study
Table

Stage of Study	Intervention Group	Control Group	Total
Eligible patients assessed	172	171	343
Declined participation	12	11	23
Randomized	160	160	320
Lost to follow-up	4	1	5
- Discharged early	3	0	3
- Withdrew consent	1	1	2
Included in final analysis	156	159	315

Note: Loss to follow-up was minimal and unrelated to study intervention or measured baseline characteristics, reducing potential risk of attrition bias.

Baseline Characteristics

Baseline demographic and clinical characteristics were well balanced between groups, confirming effective randomization (Table 2). Approximately 62% of participants were female, reflecting the high proportion of obstetric surgery included. Forty-one percent of participants reported a local language as their primary spoken language, with the remainder reporting Bahasa Indonesia. Most participants had not previously undergone surgery. Distribution across surgery types and study sites was closely similar in both groups, indicating that the randomization successfully balanced known prognostic factors.

Table 2. Baseline Demographic and Clinical Characteristics

Table

Characteristic	Intervention Group (n=156)	Control Group (n=159)
Mean age (years) ± SD	38.4 ± 11.2	37.9 ± 10.8
Sex — female	97 (62.2%)	99 (62.3%)
Primary language — local language	66 (42.3%)	63 (39.6%)
Educational attainment		
- Primary or none	52 (33.3%)	56 (35.2%)
- Secondary	78 (50.0%)	75 (47.2%)
- Tertiary	26 (16.7%)	28 (17.6%)
Residential setting — rural	91 (58.3%)	95 (59.7%)
Type of surgery		
- General	64 (41.0%)	66 (41.5%)
- Obstetric (caesarean section)	53 (34.0%)	54 (34.0%)
- Orthopaedic	39 (25.0%)	39 (24.5%)
Previous surgical experience	41 (26.3%)	44 (27.7%)
Study site		
- Papua Province	42 (26.9%)	40 (25.2%)
- Papua Pegunungan	40 (25.6%)	41 (25.8%)
- Papua Selatan	37 (23.7%)	40 (25.2%)
- Papua Tengah	37 (23.7%)	38 (23.9%)

Note: No statistically significant differences between groups at baseline (all $p > 0.05$).

Primary Outcome: Preoperative Anxiety

Preoperative anxiety scores measured by APAIS were significantly lower in the intervention group compared with the control group (Table 3). Mean APAIS anxiety score in the intervention group was 9.8 (SD 3.7) compared with 15.0 (SD 4.6) in the control group, representing an adjusted mean difference of −5.2 points (95% CI −6.1 to −4.3; $p < 0.001$). The corresponding effect size (Cohen's d = 1.26) indicates a very large and clinically meaningful intervention effect. Subgroup analysis revealed that the largest relative reductions in anxiety were observed among participants whose primary language was not Bahasa Indonesia, suggesting that linguistic accessibility was a key component of the intervention's effectiveness.

Secondary Outcomes

All secondary outcomes demonstrated large, statistically significant differences favouring the intervention group (Table 3). Mean postoperative pain intensity at 24 hours was 3.5 (SD 1.6) in the intervention group versus 4.9 (SD 1.8) in controls, representing an adjusted mean difference of −1.4 points (95% CI −1.9 to −0.9; $p < 0.001$). Differences in pain scores were consistent across all three assessment time points, with the largest absolute reduction observed at 24 hours. Participants in the intervention group achieved first assisted or independent ambulation after a mean of 21.4 hours following surgery compared with 28.7 hours in the control group — a mean reduction of 7.3 hours ($p < 0.001$). Postoperative length of hospital stay was also significantly shorter in the intervention group, with a mean stay of 3.1 days compared with 4.3 days in the control group, representing a mean reduction of 1.2 days (95% CI −1.6 to −0.8; $p < 0.001$). Subgroup analyses indicated that these benefits were consistent across all four study sites, all three categories of surgery, and across both language groups.

Table 3. Primary and Secondary Outcome Comparisons

Table

Outcome	Intervention Group Mean ± SD	Control Group Mean ± SD	Mean Difference (95% CI)	p-value
Primary outcome				
Preoperative anxiety (APAIS score)	9.8 ± 3.7	15.0 ± 4.6	−5.2 (−6.1 to −4.3)	< 0.001
Secondary outcomes				
Postoperative pain (NRS at 24 h)	3.5 ± 1.6	4.9 ± 1.8	−1.4 (−1.9 to −0.9)	< 0.001
Time to first ambulation (hours)	21.4 ± 6.1	28.7 ± 7.4	−7.3 (−8.8 to −5.8)	< 0.001
Postoperative length of stay (days)	3.1 ± 1.3	4.3 ± 1.6	−1.2 (−1.6 to −0.8)	< 0.001

Note: APAIS scores range 6–24; higher scores indicate greater anxiety. NRS pain scores range 0–10; higher scores indicate more severe pain. All p-values from independent samples t-test.

Discussion

This multi-site randomized controlled trial demonstrates that a culturally adapted, multilingual, nurse-delivered preoperative education programme substantially reduces preoperative anxiety, lowers reported postoperative pain intensity, accelerates early postoperative mobilization, and shortens hospital stay among surgical patients across four provinces of Papua. The effect size observed for anxiety reduction was not only statistically significant but also among the largest reported in the perioperative education literature globally, with an average reduction exceeding five points on a widely used and validated assessment scale. Improvements in pain experience and recovery milestones were also consistent, robust across sensitivity and subgroup analyses, and of sufficient magnitude to be clinically meaningful.

Several interrelated mechanisms likely explain these substantial findings. First, providing essential preoperative information in a language the patient fully understands directly reduces uncertainty — widely recognized as the single most powerful driver of preoperative anxiety[11]. When patients receive information in their primary language, comprehension improves, and they are better able to anticipate events and participate meaningfully in their own care. Second, the cultural adaptation process specifically addressed concerns that are particularly salient in Papuan communities, including the vital role of family support, spiritual beliefs about healing and bodily integrity, and the need for dignity and respect in all care interactions. These elements were entirely absent from standard care, potentially explaining the magnitude of benefit observed. Third, the structured, predictable format of the educational session

empowered patients to ask questions, voice concerns, and express preferences, which enhances perceived personal control and may therefore attenuate physiological and psychological stress responses throughout the perioperative period.

These findings align with broader perioperative nursing research demonstrating that structured preoperative education consistently reduces anxiety and improves recovery across diverse clinical contexts[12–14], while importantly extending the evidence base into a region where linguistic and cultural barriers have previously prevented translation of such knowledge into practice. The results also strongly support recent global recommendations that perioperative care should be culturally competent to reduce disparities and improve patient safety[15–17]. What is particularly noteworthy, however, is that the intervention required no expensive equipment, no highly specialized personnel, and no complex technology. Nurses delivering the intervention received only three days of training, and educational materials were produced as low-cost printed visual aids. This simplicity suggests that the programme could be readily scaled across provincial hospitals throughout Papua with modest additional investment, offering a practical, sustainable strategy to improve perioperative outcomes in resource-constrained yet culturally diverse settings.

Several study limitations must be acknowledged. Blinding of participants and intervention nurses to group assignment was not possible given the nature of the educational intervention, potentially influencing patient perceptions and expectations. However, outcome assessors remained systematically blinded throughout the study, and objective outcomes such as length of stay and time to mobilization are less susceptible to assessment bias. Anxiety and pain were measured by patient self-report, which could theoretically be influenced by social desirability or expectation; however, APAIS is a widely validated tool, responses were collected confidentially, and consistent reductions across all three pain assessment time points support the interpretation of a genuine intervention effect. Finally, generalizability to large tertiary referral centres or to populations outside Papua requires further evaluation, as does long-term impact on health outcomes and healthcare resource use.

The implications for clinical practice are clear and actionable. Perioperative nurses working in linguistically diverse settings — and particularly in Indigenous and rural contexts — should routinely consider both cultural and linguistic adaptation when preparing patients for surgery. Key recommendations emerging directly from this work include: providing essential preoperative information whenever possible in the patient's primary language; supplementing verbal explanation with simple, culturally congruent visual aids; allocating adequate, uninterrupted time for questions and clarification; actively involving family members where appropriate and welcomed by the patient; and standardizing educational content across providers and shifts to ensure consistent quality of care.

Conclusion

A culturally adapted, multilingual perioperative nursing education programme significantly reduced preoperative anxiety, lowered postoperative pain intensity, accelerated early mobilization, and shortened hospital stay among surgical patients across four provinces of Papua. The intervention was simple to implement, required minimal resources, and produced large, clinically meaningful benefits that were consistent across study sites, language groups, and surgical categories. Interventions that respect linguistic and cultural context represent a low-cost, high-impact strategy to improve surgical care and reduce health disparities in Papua and comparable regions. Integrating cultural and linguistic adaptation into routine perioperative nursing practice is strongly recommended as an immediate priority for improving patient safety, surgical quality, and health equity.

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