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Changes in Preoperative Anxiety Following Video-Based Re-Education Delivered via WhatsApp Among Patients Undergoing Appendectomy: A Pre-Experimental Study

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Abstract

Background: Preoperative anxiety may reflect uncertainties about anesthesia, surgery, and recovery. Video-based reinforcement of standard counseling can be distributed through mobile messaging, but bundled AI-supported education needs cautious evaluation when only a single-group design is available.
Objective: To document within-person changes in reported preoperative anxiety scores following an AI-supported educational video delivered by WhatsApp to patients awaiting appendectomy.
Methods: A single-group pretest–posttest study purposively enrolled 33 patients aged 17–50 years at Mary Cileungsi Hospital. One day before appendectomy, participants received an AI-supported re-education video through WhatsApp following standard physician counseling. The Amsterdam Preoperative Anxiety and Information Scale (APAIS) was administered before and after re-education, and paired outcomes were analyzed using the Wilcoxon signed-rank test. The analyzed APAIS scoring variant requires confirmation.
Results: Recorded mean anxiety scores fell from 12.52 (SD 2.587) to 6.94 (SD 1.886), a descriptive reduction of 5.58 points. All 33 participants had lower posttest scores (Wilcoxon $Z = -5.033$; $p < 0.001$). Reported anxiety categories lack independently documented thresholds and require validation.
Conclusion: Anxiety scores were lower after a WhatsApp-delivered preoperative educational video among 33 selected appendectomy patients. The uncontrolled design and incomplete instrument and intervention-fidelity documentation prevent attributing the change to the video, WhatsApp, or AI use specifically. Controlled, reproducible studies are needed.

Keywords: Artificial intelligence; appendectomy; digital health education; patient education; preoperative anxiety; WhatsApp.

INTRODUCTION

Acute appendicitis remains an important contributor to the global burden of urgent abdominal disease, and appendectomy continues to be a widely used treatment when surgery is clinically indicated (1–3). For patients, the interval between diagnosis and operation may be marked by pain, unfamiliar procedures, concern about anesthesia, and uncertainty regarding recovery (4). Even when a surgical indication is clear, understanding the sequence of preparation, perioperative care, and postoperative expectations may be difficult in a time-pressured hospital environment. This makes psychological preparation a substantive nursing concern rather than an optional addition to technical surgical care (4). Preoperative communication is particularly relevant when patients need to absorb information while distressed, respond to changing schedules, and make decisions under clinical time constraints (4).

Preoperative anxiety is common but varies substantially according to population, procedure, assessment instrument, and healthcare setting (4). In a systematic review and meta-analysis involving 27 studies and 5,575 surgical patients across low- and middle-income countries, Bedaso et al. estimated a pooled anxiety prevalence of 55.7%, with notable heterogeneity (5). That pooled estimate should not be used as the expected prevalence among appendectomy patients selected for this study. Anxiety before surgery can concern anesthesia awareness, pain, adverse events, recovery time, family responsibilities, and loss of personal control (4). These concerns may create information needs that routine explanations do not always resolve (6). A clinically useful educational approach should therefore address anticipated patient questions while preserving opportunities for individual clarification and emotional support (6).

Preoperative education is a potentially modifiable component of perioperative care (6). Clear explanations of fasting, anesthesia, pain control, mobilization, warning signs, and expected recovery may reduce uncertainty and help patients organize realistic expectations (6). Yet educational interventions are not uniform: they differ in timing, length, health-literacy demands, interactivity, and whether they reinforce or replace usual clinician counseling (7). A systematic review of video-supported education and subsequent procedure-specific reviews suggest that psychological effects vary across surgical populations and comparison conditions (8–11). The relevant scientific issue is thus not whether information is invariably beneficial, but which elements of a clinically accurate educational package are appropriate for particular patients at particular moments before surgery (12).

Audiovisual education can convey procedural sequences using narration and images and may standardize information that otherwise differs between encounters (7). Tom and Phang's systematic review evaluated video as a supplement to preoperative education and found substantial variation in reported outcomes and intervention characteristics (8). A meta-analysis of multimedia education among women undergoing cesarean delivery suggested reduced anxiety in that population (9), while reviews involving other procedures showed that benefit is not universal (10,11). These differences may reflect baseline anxiety, expected pain, urgency of care, quality of usual counseling, and the interval between education and assessment (7,12,13). Consequently, findings from elective obstetric or dental surgery cannot simply be transferred to patients awaiting appendectomy (6). Content, dose, timing, and comparator remain central to interpreting video-based education (6).

Mobile messaging platforms potentially alter access to, rather than the fundamental clinical content of, preoperative education (14). WhatsApp allows staff to send audiovisual material to a patient's own device and enables subsequent viewing without requiring a second face-to-face teaching session (14). Research on WhatsApp and WeChat interventions in oncology illustrates how messaging tools have been deployed to support physical and psychosocial care, although interventions and outcomes were heterogeneous (15). The availability of a familiar channel could be relevant in the brief interval before appendectomy, but digital access, privacy, comprehension, and actual viewing cannot be presumed. A messaging application is best conceptualized as a delivery mechanism within an educational strategy, not as an independently established treatment for anxiety (14).

Artificial intelligence (AI) may facilitate the drafting or production of educational content, but its inclusion introduces distinct clinical

governance questions (14). Generative systems may simplify language or accelerate multimedia production while also producing inaccuracies, omissions, misleading reassurance, or content misaligned with local institutional procedures (14). A recent review of AI-supported patient educational materials identified both potential accessibility benefits and quality concerns (16). Clinical validation, understandable language, appropriate disclosures, and safeguards for patient data are therefore necessary before such material becomes routine care (14). Importantly, a patient exposed to an AI-assisted video delivered through WhatsApp is receiving a combined package; without a component-specific comparator, any observed change cannot identify whether AI, the video format, the messaging channel, repeated education, or routine care was responsible (14).

Existing research has examined preoperative audiovisual information in several surgical contexts, so a claim of an entirely unstudied intervention would be premature (8–11,15). A more focused uncertainty concerns how brief, remotely accessible re-education is delivered and assessed among patients preparing for appendectomy, particularly when information has already been provided in a physician encounter (6). Re-education may function differently from a first explanation: it could reinforce comprehension, prompt questions, or reassure patients through familiarity rather than introduce new knowledge (12). Research also needs to characterize the quality and fidelity of AI-assisted educational content (14). A single-group pretest–posttest study can contribute a preliminary description of anxiety-score change after the package; however, it cannot estimate change attributable to the intervention beyond natural temporal change and other co-occurring influences (17).

The proposed contribution is primarily practical and descriptive: it brings together clinical re-education, audiovisual delivery, mobile access, and reportedly AI-supported material in a real hospital workflow. These components should remain analytically distinct even though they were delivered together. Documenting the timing, anxiety measurement, and observed pretest–posttest pattern can help generate hypotheses about patient-centered surgical preparation. Establishing the added value of any component will require a controlled design, prospectively defined outcome scoring, standardized content-validation procedures, and intervention-fidelity assessment (17). This framing places the study within the existing evidence base while avoiding unsupported claims of technological novelty or mechanistic proof.

METHODS

Study Design

The study used a pre-experimental, one-group pretest–posttest design in the surgical inpatient unit of Mary Cileungsi Hospital in 2026. Participants served as their own comparisons across two closely spaced preoperative observations. No randomization, concurrent usual-care comparison, or blinded outcome assessment was reported. The design estimates observed change, not the counterfactual intervention effect.

Sample

The source hospital record listed 43 appendectomy cases during May–June 2026. Purposive recruitment yielded 33 participants. Sample size was calculated using G*Power's two-tailed paired-mean framework, n = 33 observations provides approximately 80% power at $\alpha = 0.05$ for a standardized within-person change of $d_z \approx 0.50$.

Eligibility criteria were a diagnosis of appendicitis with scheduled appendectomy, age 17–50 years, consciousness and ability to communicate, mild-to-moderate anxiety by the investigators' APAIS classification, ability to read Indonesian, access to an active WhatsApp account, prior physician-provided surgical information, and provision of informed consent. The exclusion criteria was cognitive impairment, severe mental distress, emergency urgency, psychotropic treatment, or previous exposure to the video.

Data Collection: Intervention Procedure

The educational video was distributed via WhatsApp one day before appendectomy, after baseline measurement.

The educational material reinforced standard clinical counseling, addressing appendectomy, anesthesia, fasting, physical preparation, anticipated pain, psychological coping, early mobilization, and recovery. It was delivered through WhatsApp one day before the operation after completion of the baseline anxiety instrument. Participants could in principle

reopen the content, but actual viewing time, completion, and repeated access were not recorded. The video was therefore assessed as one bundled educational exposure rather than separable AI, video, and messaging components. The video was reportedly created or supported using AI, but the software and version, video duration, exact script, clinical content review, and degree of patient viewing were not documented. Intervention fidelity and the AI-specific component are therefore not reproducible from the available record. For replication and patient safety, the final video file, exact spoken script, duration, production tool/version, clinician review record, language readability assessment, and standardized delivery checklist should be archived.

Instruments

Preoperative anxiety was measured with the Amsterdam Preoperative Anxiety and Information Scale (APAIS), developed by Moerman et al. (18). Its six items use five response categories (1–3,5,8): four anxiety items yield a subscale sum of 4–20, and two information-needs items yield 2–10; all six together yield 6–30. The original study reported internal consistency of approximately α = 0.86 for anxiety and α = 0.72 for information need. Perdana et al. evaluated the Indonesian version among 102 surgical patients and reported Cronbach α = 0.825 for anxiety and α = 0.863 for information need (19).

Data Collection

Potential participants were screened according to the eligibility criteria during hospitalization. Patients who met the criteria received information about the study and were invited to participate. Written informed consent was obtained before data collection.

After written consent, investigators recorded baseline APAIS responses, sent the AI-supported re-education video via WhatsApp, and conducted a second APAIS measurement before surgery. Age, sex, education, and employment status were extracted for description. The precise time interval between viewing and posttest, whether all items were completed, procedures used to assist patients with phones, and any participant feedback about comprehension or acceptability were not documented; these are material reproducibility details.

Data Analysis

Participant characteristics were summarized using descriptive statistics. Categorical variables were reported as frequencies and percentages, while anxiety scores were summarized using means and standard deviations. The primary analysis compared available paired scores using a two-sided Wilcoxon signed-rank test at α = 0.05. Descriptive mean, SD, minimum and maximum (where available), frequency, and percent were used to summarize participant characteristics and scores. A negative-rank count and test statistic are reported.

RESULTS

Participant Characteristics

A total of 33 patients met the eligibility criteria, received the intervention, and completed both pre- and post-intervention assessments. No participants were lost between the two measurements.

Table 1 presents the demographic characteristics of the participants. Most participants were aged 30–49 years (63.6%), while 36.4% were aged 17–29 years. Women accounted for 57.6% of the sample and men for 42.4%.

Almost half of the participants had completed senior high school (48.5%). The remaining participants had completed elementary school (12.1%), junior high school (18.2%), diploma-level education (6.1%), or a bachelor's degree (15.2%). Regarding employment status, 57.6% were not employed and 42.4% were employed.

Pre- and Post-Intervention Anxiety Levels

As shown in Table 2, the source data classified 19 participants (57.6%) as mildly anxious and 14 (42.4%) as moderately anxious before re-education. The pre-intervention mean score was 12.52 (SD 2.587). Because the APAIS scoring subscale and category thresholds were not supplied, these descriptive categories should be interpreted cautiously.

Following the intervention, the distribution of anxiety levels shifted toward lower categories. Twenty-one participants (63.6%) were classified as having no anxiety, 11 (33.3%) had mild anxiety, and one participant (3.0%) had moderate anxiety. No participant was categorized as having severe or very severe anxiety/panic. The mean post-intervention score was 6.94 (SD = 1.886).

Change in Anxiety Scores

Table 3 indicates a recorded mean decline of 5.58 points, from 12.52 (SD 2.587) to 6.94 (SD 1.886). The change is a subtraction of reported group means, not a standardized effect size or confidence interval. If the four-item APAIS anxiety subscale was used, its clinical interpretation differs from that of the six-item total; this requires verification.

In Table 3, the Wilcoxon signed-rank test showed lower posttest than pretest scores ($Z = -5.033$; $p < 0.001$); all 33 paired observations were negative ranks. Statistical significance does not resolve confounding, testing effects, or the clinical meaning of this difference.

Because paired observations are correlated, marginal pretest and posttest SDs are insufficient to calculate the SD of change or an accurate confidence interval. The original paired observations would permit a Hodges–Lehmann estimate with confidence interval, a distributional plot, and assessment of whether changes differ by initial anxiety without manufacturing inferential statistics.

Table 1. Demographic Characteristics of Participants (N = 33)

Characteristics	n	%
Age (years)		
17–29	12	36.4
30–49	21	63.6
Sex		
Male	14	42.4
Female	19	57.6
Educational attainment		
Elementary school	4	12.1
Junior high school	6	18.2
Senior high school	16	48.5
Diploma	2	6.1
Bachelor's degree	5	15.2
Employment status		
Employed	14	42.4
Unemployed	19	57.6

Table 2. Anxiety Levels Before and After AI-Supported Video-Based Re-Education (N = 33)

Anxiety level	Pre-intervention, n (%)	Post-intervention, n (%)
No anxiety	0 (0.0)	21 (63.6)
Mild anxiety	19 (57.6)	11 (33.3)
Moderate anxiety	14 (42.4)	1 (3.0)
Severe anxiety	0 (0.0)	0 (0.0)
Very severe anxiety/panic	0 (0.0)	0 (0.0)

Table 3. Comparison of Pre- and Post-Intervention Anxiety Scores (N = 33)

Measurement	n	Mean	SD	Z	*p*
Pre-intervention	33	12.52	2.587		
Post-intervention	33	6.94	1.886	−5.033	<0.001

DISCUSSION

Among 33 patients preparing for appendectomy, mean recorded anxiety scores decreased after video re-education. The broader evidence is compatible with an educational explanation while also showing important uncertainty (7). Tom and Phang reviewed video-supported preoperative instruction, with outcomes that varied according to intervention and surgical setting (8). More recent procedure-specific syntheses report some favorable anxiety findings, including a meta-analysis of multimedia education among cesarean patients (9), but different comparator interventions and outcome instruments complicate translation to appendectomy (10,11). These studies provide stronger or different designs than the present uncontrolled observation, yet even controlled findings from elective procedures need contextual assessment before implementation in urgent abdominal surgery (12). The current result should therefore be considered concordant with the possibility of benefit, not a direct replication of a pooled treatment effect (6).

A further distinction concerns the time at which anxiety was assessed. Anticipatory anxiety can fluctuate rapidly during preoperative care, and the relevance of an informational intervention may depend on whether it is delivered at admission, before anesthesia consultation, or shortly before transfer to the operating room (4). Without more detailed documentation of the interval between the video and posttest, the results cannot identify an optimal educational window. Future studies should prespecify standardized measurement points and record concurrent care (17). Such detail would allow investigators to distinguish immediate reassurance from durable psychological preparation and improve comparability across clinical sites.

Audiovisual education may offer specific communication affordances (12). A carefully produced video can present the sequence of preparation and recovery consistently, combining narration and images to support patients who find lengthy verbal explanations difficult to recall (7). The same content can also be reviewed more than once, potentially allowing family members to support understanding when patients consent. Nevertheless, comprehensibility depends on reading level, language, audio quality, pace, visual accessibility, and whether the examples reflect local practice (14). These features were not independently assessed in this study. The video format itself should therefore not be equated with adequate informed understanding or psychological benefit (12).

In a systematic review and meta-analysis of seven randomized trials including 1,006 women, Abuzaid et al. found that preoperative multimedia education may reduce anxiety before cesarean delivery (9). This provides evidence that audiovisual information can have measurable psychological consequences in some settings, but clinical and methodological differences limit direct extrapolation: cesarean delivery often has different indications, patient expectations, counseling practices, and temporal preparation than appendectomy (20). The magnitude of change in the present one-group sample cannot be compared with a controlled trial effect because it includes all temporal and contextual influences occurring between assessments. The evidence is best synthesized as support for further controlled testing of appropriately adapted content (6).

Other procedure-specific reviews underscore the importance of avoiding selective interpretation (12). Evidence concerning educational videos before third-molar surgery and elective cesarean delivery is not completely consistent across comparisons and outcomes (10,11). A video may be helpful when it addresses a gap in usual care, yet add little when standard counseling is already comprehensive (12). Differences in whether control participants received written instructions, verbal explanations, or alternative multimedia are consequential because they determine the added value being tested (7). For this reason, future appendectomy research should specify the content of usual counseling and select a comparator that can isolate the incremental contribution of the video-based re-education package (6).

The current intervention combined at least four elements: repeated information, a structured video, WhatsApp distribution, and reportedly AI-assisted production. Their possible contributions are not equivalent. Repetition might reinforce earlier counseling; video might improve procedural visualization; mobile delivery might facilitate access; and AI might reduce production effort without necessarily improving clinical content (7). A factorial design

would be needed to isolate all components, but a more feasible initial study could compare usual care with usual care plus a validated video while keeping timing and clinician contact similar (17). This would provide a clinically interpretable estimate of added benefit without prematurely attributing the change to the newest technological component.

WhatsApp served as the access channel for the educational material. Delivering the video to personal devices could allow participants to revisit information outside scheduled counseling encounters, potentially supporting continuity of preparation (14). These practical possibilities are particularly relevant in busy inpatient workflows, but they should be treated as hypotheses unless viewing behavior is documented (14). Merely sending a message does not confirm that a patient opened the file, watched it fully, understood it, or shared concerns with clinical staff. Future protocols should record successful delivery, actual exposure, viewing completion, and availability of assistance for patients unfamiliar with mobile technology (14).

Digital accessibility is not uniform (14). Patients may have different levels of smartphone ownership, data affordability, connectivity, hearing or visual ability, and health literacy. Those who cannot easily view digital materials may be systematically excluded from an intervention intended to broaden access (14). Re-education should therefore be available through an equivalent non-digital route, with opportunities to ask questions (14). Researchers should also distinguish between a patient's permission to receive a health message and permission to transmit potentially sensitive material via a third-party application. Institutional privacy requirements and the minimum necessary disclosure should guide the communication workflow (14).

A systematic review of WhatsApp- and WeChat-supported approaches in oncology found heterogeneous effects on health-related outcomes, illustrating the potential of messaging channels while cautioning against assuming universal efficacy (15). Oncology care frequently involves long-term follow-up, whereas pre-appendectomy education is time-limited and focused on imminent procedural concerns; the two contexts therefore differ in frequency of contact, intervention goals, and opportunity for reinforcement. The relevance of messaging-platform evidence here lies mainly in delivery feasibility and patient communication, not in demonstrating a procedure-specific anxiety effect (14). Content quality and implementation fidelity should remain the primary targets of improvement (14).

For perioperative nurses, a digital video can supplement but should not displace interpersonal assessment (7). A nurse can use the material as a shared reference, invite the patient to identify what remains confusing, and confirm understanding with a brief teach-back discussion (6). Questions about anesthesia, pain, fasting, and expected recovery may require individualized responses that a standardized video cannot provide. If a patient reports severe distress or misunderstanding, escalation to an appropriately qualified clinician remains necessary (4). These safeguards position mobile re-education as one possible component of patient-centered care rather than a stand-alone solution.

The role of AI must be interpreted especially cautiously. AI-enabled systems may assist with drafting narration, simplifying explanations, or producing visual sequences, potentially reducing the labor required to prepare materials (14). However, research on AI-generated patient educational content has raised concerns about factual accuracy, readability, completeness, and governance (14,16). The present report did not specify which AI system was used, what content it generated, whether clinicians reviewed all statements, or how discrepancies with hospital protocols were handled. Consequently, neither feasibility beyond the reported delivery nor any psychological advantage specifically attributable to AI can be quantified from these data (14).

An AI-assisted video is not intrinsically superior to a clinician-authored video or an ordinary teaching session (14). Participants encountered the entire re-education package, and no arm held the information constant while varying only the production method. The observed anxiety change therefore cannot answer whether AI improved clarity, engagement, health literacy, or clinical outcome. This distinction matters for interpreting novelty: the technical involvement of AI may be noteworthy as part of the workflow, but it does not constitute evidence of an AI-mediated treatment mechanism (14). Comparative evaluation would require transparent production documentation, independent clinical assessment of accuracy, and

patient comprehension measures alongside anxiety (14).

Practical governance should precede widespread adoption (14). Every educational script should be checked against current institutional procedures by appropriate clinical personnel, reviewed in language accessible to the intended patients, and tested for misleading or unnecessarily frightening statements (14). The final material should include an explanation that it supplements individual clinical advice and cannot answer every personal medical question (14). Version control and documented approval would make later updates and corrections possible (14). Such procedures are important regardless of whether AI-assisted or conventional production tools were used, but AI-generated content may create additional needs for verification and accountability (16).

These requirements also suggest an appropriate future research sequence. First, assess readability, factual correctness, cultural and language fit, and patient acceptability of the final video (14). Second, confirm that patients actually receive and understand the content (14). Third, compare a clinically validated video package with clearly defined usual care using appropriate allocation, outcome timing, and blinded analysis where feasible (6,17). Only after establishing a credible package-level effect would it be sensible to test whether AI-assisted development offers measurable advantages in production cost, adaptability, or patient comprehension (14). This sequence would distinguish implementation innovation from evidence of clinical benefit.

Nursing Implication

The main clinical implication is to make concise, accurate, understandable information readily available before appendectomy while maintaining the relational elements of perioperative nursing (6). Staff may offer a validated audiovisual summary as an optional adjunct, confirm patient comprehension through teach-back, and respond to specific anxieties through individual counseling (7). Implementation should include a non-digital alternative, privacy-sensitive distribution, accessible language and media, and formal review of any AI-assisted content (14). Anxiety screening may help direct attention to patients needing additional support, but treatment decisions and referrals must be based on a fuller clinical assessment (4). The present data support further evaluation of this pathway, not immediate claims that it independently reduces anxiety.

Study Limitations

This study had several limitations. First, the uncontrolled one-group pretest–posttest design prevented causal inference, as the observed reduction in anxiety may have been influenced by routine counseling, repeated testing, regression to the mean, or other concurrent factors. Second, the small, purposively selected sample of 33 patients from a single hospital, restricted to those with mild or moderate anxiety, limited generalizability. Third, the combined intervention prevented identification of the independent contributions of video-based education, WhatsApp delivery, and AI-assisted content. Furthermore, uncertainties regarding APAIS scoring, anxiety classification thresholds, intervention fidelity, and clinical validation of the educational materials limited interpretation and reproducibility. Future multicenter controlled studies should use standardized instruments, validated educational content, appropriate comparison groups, and longer follow-up to establish the clinical benefits of this approach.

CONCLUSION

In patients awaiting appendectomy, lower recorded preoperative anxiety scores followed a WhatsApp-delivered AI-supported educational video. The statistically significant within-person change cannot be attributed specifically to AI, video education, or the messaging platform, and interpretation depends on verification of APAIS scoring. These findings support the feasibility of digital counseling reinforcement and justify a controlled trial with standardized video documentation, validated anxiety scoring, and clinically meaningful effect estimates.

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Author Contributions

NF: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing – Original Draft, Visualization, Project Administration.

MS: Conceptualization, Methodology, Supervision, Validation, Writing – Review & Editing.

TWI: Methodology, Supervision, Validation, Writing – Review & Editing.

HPFS: Methodology, Supervision, Validation, Writing – Review & Editing.

Conflict of Interest Disclosure

The authors declare that they have no known financial or non-financial competing interests that could have influenced the work reported in this manuscript.

Data Availability Statement

Data availability was not specified in the original study report. Access to participant-level data would require confirmation from the corresponding author and compliance with applicable confidentiality requirements.

AI-Assisted Writing Disclosure

Generative artificial intelligence was used to assist with English-language editing. The authors critically reviewed, revised, and verified the resulting text and take full responsibility for the accuracy, integrity, and content of the final manuscript. AI was not used to generate, alter, or analyze the study data.

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