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Teleconsultations Compared to In-Person Consultations in Pre-Anesthetic Evaluation: a Systematic Review with Meta-Analysis and Trial Sequential Analysis of Randomized Clinical Trials

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A Systematic Review

ABSTRACT

Background: Telemedicine has emerged as a potential alternative to conventional in-person pre-anesthetic evaluation (PAE), but its effectiveness and acceptability remain uncertain. This systematic review with meta-analysis and trial sequential analysis (TSA) compared teleconsultations (TC) with in-person consultations (IPC) in adults undergoing PAE.

Methods: This review followed PRISMA 2020 guidelines and was prospectively registered in PROSPERO (CRD420251129363). MEDLINE, EMBASE, and Cochrane CENTRAL were searched from inception to July 2025 for randomized controlled trials comparing TC with IPC before elective surgical or diagnostic procedures. The primary outcome was patient satisfaction. Secondary outcomes included American Society of Anesthesiologists (ASA) physical status reclassification, preoperative anxiety, and surgical cancellation. Risk of bias was assessed using RoB 2 and certainty of evidence with GRADE. Random-effects meta-analyses estimated Hedges' g and risk ratios (RR). TSA assessed the robustness of cumulative evidence.

Results: Five randomized controlled trials involving 1,151 patients were included. Patient satisfaction was significantly higher with IPC (Hedges' g −0.26; 95% CI −0.43 to −0.08; p = 0.0047). No significant differences were observed for ASA physical status reclassification (RR 1.14; 95% CI 0.41–3.13), surgical cancellation (RR 0.59; 95% CI 0.23–1.48), or preoperative anxiety (Hedges' g 0.07; 95% CI −0.13 to 0.28). Heterogeneity was low across most analyses. TSA showed that accrued information reached only 9.8–45.4% of the required sample size, indicating insufficient evidence for secondary outcomes. Evidence certainty was moderate for satisfaction and ASA reclassification and low for the remaining outcomes.

Conclusions: IPC was associated with greater patient satisfaction than TC, while current evidence does not demonstrate meaningful differences in operative risk classification, preoperative anxiety, or surgical cancellation. IPC should remain the reference standard until adequately powered trials provide more definitive evidence.

Keywords: Telemedicine, Perioperative Care, Anesthesiology

RESUMO

Introdução: A telemedicina tem emergido como uma potencial alternativa à avaliação pré-anestésica (APA) presencial convencional, porém sua efetividade e aceitabilidade permanecem incertas. Esta revisão sistemática com meta-análise e análise sequencial de ensaios (Trial Sequential Analysis – TSA) comparou teleconsultas (TC) com consultas presenciais (CP) em adultos submetidos à APA.
Métodos: Esta revisão seguiu as diretrizes PRISMA 2020 e foi registrada prospectivamente no PROSPERO (CRD420251129363). As bases MEDLINE, EMBASE e Cochrane CENTRAL foram pesquisadas desde a sua criação até julho de 2025 para identificar ensaios clínicos randomizados que compararam TC com CP antes de procedimentos cirúrgicos ou diagnósticos eletivos. O desfecho primário foi a satisfação do paciente. Os desfechos secundários incluíram reclassificação do estado físico pela American Society of Anesthesiologists (ASA), ansiedade pré-operatória e cancelamento cirúrgico. O risco de viés foi avaliado pela ferramenta RoB 2 e a certeza da evidência pelo sistema GRADE. As meta-análises de efeitos aleatórios estimaram o g de Hedges e os riscos relativos (RR). A TSA avaliou a robustez da evidência acumulada.
Resultados: Foram incluídos cinco ensaios clínicos randomizados, totalizando 1.151 pacientes. A satisfação dos pacientes foi significativamente maior no grupo CP (g de Hedges −0,26; IC95% −0,43 a −0,08; p = 0,0047). Não foram observadas diferenças significativas entre as modalidades de consulta quanto à reclassificação do estado físico ASA (RR 1,14; IC95% 0,41–3,13), cancelamento cirúrgico (RR 0,59; IC95% 0,23–1,48) ou ansiedade pré-operatória (g de Hedges 0,07; IC95% −0,13 a 0,28). A heterogeneidade foi baixa na maioria das análises. A TSA demonstrou que a informação acumulada correspondeu a apenas 9,8–45,4% do tamanho amostral necessário, indicando evidência insuficiente para os desfechos secundários. A certeza da evidência foi moderada para satisfação e reclassificação ASA e baixa para os demais desfechos.
Conclusões: A consulta presencial esteve associada a maior satisfação dos pacientes em comparação à teleconsulta, enquanto as evidências atuais não demonstram diferenças clinicamente relevantes na classificação do risco operatório, ansiedade pré-operatória ou cancelamento cirúrgico. A consulta presencial deve permanecer como padrão de referência até que ensaios clínicos adequadamente dimensionados forneçam evidências mais definitivas.
Palavras-chave: Telemedicina; Cuidados Perioperatórios; Anestesiologia.

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1. INTRODUCTION

Pre-anesthetic evaluation (PAE) consists of the assessment of a patient's clinical condition by the anesthesiologist prior to therapeutic or diagnostic procedures, based on medical history, interview, and physical examination. It enables the development of safe anesthetic plans, reduces the risk of perioperative complications, and allows patients or family members to ask questions about the procedure [1].

Telemedicine – the promotion of health through remote diagnosis, treatment, and prevention services – has expanded significantly in recent years, especially following the COVID-19 pandemic [2]. In anesthesiology, this advancement has driven research and the implementation of technology, primarily in PAE, with the aim of reducing costs and ensuring faster assessments across long distances [3].

However, current literature does not present a consensus on the feasibility of applying telemedicine in anesthesiology or on its differences compared to traditional PAE methods. A previous systematic review and meta-analysis by Zhang et al. [4], which included 11 observational studies and 1 randomized clinical trial (RCT), suggested that virtual PAE results in surgical cancellation rates similar to in-person consultations, greater patient satisfaction, and lower costs. However, the strength of the evidence was limited due to the predominantly non-randomized nature of the included studies.

Given the relevance of the topic, new randomized studies comparing teleconsultations (TC) with in-person consultations (IPC) in anesthesiology have been conducted and published in recent years. This study aims to analyze trials comparing these two modalities in PAE, focusing on individual preferences, factors that may compromise patient safety during surgery, surgical cancellations or postponements, and financial costs.

2. METHODS

This systematic review and meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. The review protocol was prospectively registered in the International Prospective Register of Systematic Reviews (PROSPERO) by the ID CRD420251129363.

No methodological amendments were made to the protocol after registration. Updates to the PROSPERO record were limited to administrative changes, including modification of the review status and addition of a reviewer.

2.1. Eligibility criteria

The research question was developed using the PICO framework. The population included adult patients undergoing PAE prior to elective surgical or diagnostic procedures. The intervention consisted of pre-anesthetic consultations performed via telemedicine, including video-based or telephone-based consultations conducted using computers, smartphones, or similar devices. The comparison group consisted of standard in-person pre-anesthetic consultations. The primary outcome was patient satisfaction. Secondary outcomes included operative risk assessment, preoperative anxiety, surgical cancellation or postponement and financial costs.

Only RCTs comparing TC with IPC were included. Studies involving pediatric populations, observational studies, case series, reviews, protocols, editorials, and conference abstracts without full data were excluded.

2.2. Information sources

A comprehensive literature search was performed in the MEDLINE (through PubMed), EMBASE, and Cochrane Central Register of Controlled Trials (CENTRAL) databases from inception to the most recent available date.

Additionally, the reference lists of included studies were manually screened to identify potentially eligible studies not captured in the electronic search. The final searches were carried out in July 2025.

2.3. Search strategy

The search strategy combined controlled vocabulary terms and free-text terms related to telemedicine, teleconsultation, pre-anesthetic evaluation, and preoperative assessment. Articles addressing protocols, reviews, editorials, letters, pilot studies and case reports were excluded. Only articles with full text available in English, German or Portuguese were included.

2.4. Selection process

All records identified through the search strategy were imported into the Rayyan platform (Qatar Computing Research Institute), a reference management software, in “BibText” or “RIS” format. After removing duplicates, two reviewers independently screened titles and abstracts for eligibility. Full-text articles were retrieved and independently assessed by the same reviewers to determine final inclusion. Any disagreements were resolved through discussion and consensus.

The study selection process was documented using a PRISMA flow diagram (Figure 1).

Figure 1

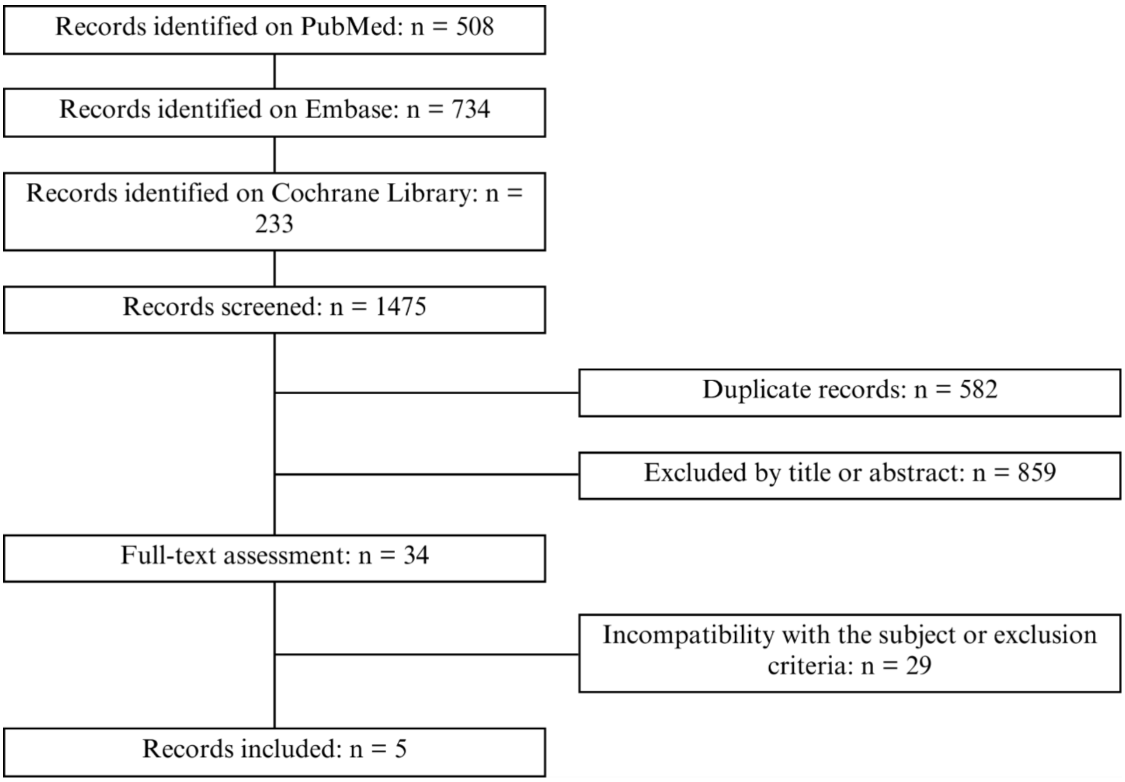

Figure 1. PRISMA flow diagram of study screening and selection.

2.5. Data collection process

Data extraction was performed independently by two reviewers using a standardized data extraction form. The following information was collected from each included study: authorship, year of publication, country, study design, sample size, patient characteristics, details of the intervention and comparison groups, outcomes assessed, and main results. Discrepancies in data extraction were resolved by consensus between the reviewers.

2.6. Study risk of bias assessment

The methodological quality and risk of bias of the included RCTs were assessed independently by two reviewers using the RoB 2 tool (version August 22, 2019). Disagreements were resolved by consensus between the reviewers. Publication risk was not addressed given the small number of included studies, making Egger's test and funnel plot analysis inappropriate for this review.

Two authors used the GRADE protocol to classify the quality of evidence in this meta-analysis as high, moderate, low, or very low, with disagreements being resolved by consensus.

2.7. Statistical analysis

Statistical analyses were performed using the R software version 4.4.3 with the Rstudio integrated development environment and “meta” package. The DerSimonian-Laird method was chosen for estimating the τ^2 statistic, and the Mantel-Haenszel method for calculating Q and τ^2, similarly to RevMan 5.

Continuous outcomes were summarized using standardized mean differences (SMD) through Hedges' g with corresponding 95% confidence intervals, while dichotomous outcomes were summarized using risk ratios (RR) with 95% confidence intervals. Statistical significance was defined as a two-sided p value < 0.05.

Statistical heterogeneity was assessed using the I^2 and τ^2 statistics, and Cochran’s Q test. An I^2 statistic $\geq 50\%$ was considered substantial. A random-effects model was applied to account for potential clinical and methodological heterogeneity among studies. Sensitivity analyses were then conducted to evaluate the robustness of findings.

To assess the strength of cumulative evidence, a trial sequential analysis was performed using the TSA software (Copenhagen Trial Unit). A two-sided type I error of 5% and a type II error of 20% (80% power) were applied using O’Brien-Fleming boundaries. The required information size was estimated assuming a clinically meaningful RR reduction of 20% for dichotomous outcomes and an SMD of 0.2 for continuous outcomes, according to conventional interpretations of standardized effects.

2.8. Assessment of agreement in ASA physical status classification system

In the included RCTs, all patients underwent a final in-person PAE immediately before surgery, which was considered the reference standard. Since the trials did not report standardized clinical risk scores or postoperative complications with compatible follow-up, discrepancies in the ASA physical status classification between the initial PAE and subsequent preoperative assessment performed on the day of surgery were used as a pragmatic indicator of consistency in perioperative risk categorization. This approach enabled comparison of the two diagnostic pathways using a common reference parameter.

One included trial reported ASA classifications grouped as I-II and III-IV, whereas the remaining trials reported changes across individual ASA classes. To ensure comparability across studies, ASA categories were harmonized into two strata: I-II (lower operative risk) and III-IV (higher operative risk). Although this grouping reduces the granularity of the original scale, it enables consistent comparison of clinically relevant differences across trials. Disagreement rates between groups were then calculated using RR.

3. RESULTS

3.1. Study selection

Based on the established criteria, a total of 1,475 records were identified – 508 from MEDLINE, 233 from Cochrane Library (CENTRAL), and 734 from EMBASE. After removal of duplicates, 893 records remained for title and abstract screening. Of these, 34 studies were selected for full-text assessment. Twenty-nine studies were excluded for the following reasons: non-randomized design, inclusion of pediatric populations, absence of a comparison between teleconsultation and in-person consultation, or insufficient outcome data. Five RCTs met the eligibility criteria and were included in the final analysis.

3.2. Study characteristics

The 5 included RCTs comprised a total of 1,151 patients undergoing pre-anesthetic evaluation. The studies were conducted in the following countries: Austria, India, the Netherlands, and France. Teleconsultations were performed using video-based or telephone-based platforms, while control groups received standard face-to-face pre-anesthetic consultations. The primary and secondary outcomes assessed varied among studies but included patient satisfaction, ASA physical status classification, preoperative anxiety, and surgical cancellation or postponement rates (Table 1).

Table 1 - Summary of included studies.

Study	**Place and period**	**Sample TC/IPC**	**Patient satisfaction**	**Preoperative anxiety**	**Cancellation of surgeries and appointments**	**Change in ASA classification between PAE and preoperative assessment***
Gibas *et al.*	Vienna - Austria. June 2019 to October 2019.	n (ITT) = 271 patients n (PP) = 130 patients. n TC (ITT) = 134 patients. n IPC (ITT) = 137 patients. n TC (PP) = 72 patients. n IPC (PP): n = 58 patients.	—	Before PAE[1] TC: 34.2 ± 10.3 IPC: 33.6 ± 8.7 After PAE[1] TC: 36.3 ± 9.7 IPC: 36 ± 9.9	—	—
Maurya *et al.*	New Delhi - India. August 2020 to August 2021.	n (ITT) = 100 patients. n (PP) = 100 patients. n TC (ITT) = 50 patients. n IPC (ITT) = 50 patients. n TC (PP) = 50 patients. n IPC (PP) = 50 patients.	[2] TC: 6.94 ± 1.34 IPC: 7.26 ± 1.42 (p = 0.2514)	—	—	—
van Hoorn *et al.*	Netherlands. March 2021 to August 2021.	n (ITT) = 400 patients. n (PP) = 241 patients.. n TC (ITT) = 201 patients. n IPC (ITT) = 199	[2] TC: 7.8 ± 1.5 IPC: 8.1 ± 1.1 (p = 0.12)	After PAE[1] TC: 38 ± 10 IPC: 37 ± 11 (p = 0.084)	PAE cancellation TC: n = 15 patients. IPC: n = 18 patients. (p = 0.47)	TC: n = 5 patients. IPC: n = 5 patients.

		patients. n TC (PP) = 124 patients n IPC (PP): = 117 patients.			Surgical cancellation TC: n = 6 patients. IPC: n = 9 patients. (p = 0.35)	
Roche *et al.*	Nancy - France. June 2018 to September 2021.	n (ITT) = 208 patients. n (PP) = 196 patients. n TC (ITT) = 96 patients.. n IPC (ITT) = 112 patients. n TC (PP) = 84 patients. n IPC (PP) = 112 patients.	[3] Not directly reported.	—	—	TC: n = 0 patients. IPC: n = 4 patients.
Morau *et al.*	Nîmes - France. May 2021 to January 2022.	n (ITT) = 172 patients. n (PP) = 149 patients. n TC (ITT) = 85 patients. n IPC (ITT) = 87 patients. nTC (PP) = 79 patients. n IPC (PP) = 70 patients.	[2] TC: 8.96 ± 1.68 n = 71 IPC: 9.48 ± 1.45 n = 70 (p = 0.0006)	—	Surgical cancellation TC: n = 1 patient. IPC: n = 2 patients. (p = 0.60)	TC: n = 6 patients. IPC: n = 2 patients.

CP: In-person consultation.

TC: Teleconsultation.

PAE: Pre-anesthetic evaluation.

PP: Per protocol.

ITT: Intention to treat.

[1]Measured with a score ranging from 20 to 80 points.

[2]Measurement on a scale of 1 to 10 points

[3]Measurement on a scale of 0 to 10 points

*Scores were divided into 2 groups: ASA I-II and ASA III-IV. Changes within the same group were not considered.

3.3. Statistical analysis

A statistically significant difference was found favoring IPC over TC in terms of overall patient satisfaction (Hedges' g -0.26; 95% CI -0.43 to -0.08; $p = 0.0047$; $I^2 = 0\%$; 3 RCTs; 490 patients), as illustrated in Figure 2. The study by Roche *et al*. was not included because it did not directly report this value.

Regarding secondary outcomes, no statistically significant difference was observed for preoperative anxiety (Hedges' g 0.07; 95% CI -0.13 to 0.28; $p = 0.4795$; $I^2 = 0\%$; 2 RCTs; 378 patients), disagreement in ASA grouping scores between PAE and preoperative consultations (RR = 1.14; 95% CI 0.41 to 3.13; $p = 0.8067$; $I^2 = 39.2\%$; 3 RCTs; 599 patients) or surgical cancellations (RR = 0.59; 95% CI 0.23 to 1.48; $p = 0.2548$; $I^2 = 0\%$; 2 RCTs; 390 patients). None of the included trials reported no-show rates for PAE.

Trial sequential analysis, however, indicated that z-curves for surgery cancellation, ASA disagreement and preoperative anxiety did not cross the trial sequential monitoring boundaries (Figure 3). The accrued sample corresponded to 21.7%, 9.8% and 45.39% of the required information sizes, respectively, indicating that the current evidence is insufficient to confirm or exclude the specified effects.

Statistical heterogeneity was low for most outcomes ($I^2 = 0$, $\tau^2 = 0$), while ASA classification disagreement showed low to moderate between-study variability ($I^2 = 39.2\%$, $\tau^2 = 0.12$). In view of the limited heterogeneity, the small number of studies included per outcome and the absence of stratified clinical data, formal subgroup analyses or meta-regression were not deemed appropriate.

3.4. Sensitivity analysis

To determine the influence of individual studies over the obtained results, a sensitivity analysis was performed using the leave-one-out method. Excluding any of the studies in the satisfaction assessment resulted in the persistence of significant combined effects (ranging from p = 0.0099; 95% CI to p = 0.0317; 95% CI), reinforcing patients' preference for IPC.

Conversely, excluding any of the studies with discrepancies in the ASA score did not result in statistically significant findings (ranging from p = 0.4292; 95% CI to p = 0.8537; 95% CI). Therefore, there was no consistent basis to determine whether TC provides different operative risk classifications than CP for the same patient.

Given that excluding studies would result in the synthesis of a single study, a sensitivity analysis was not performed for the objectives of surgical cancellation and preoperative anxiety.

3.5. Quality analysis

A moderate risk of bias was assigned to the 3 studies for assessment of patient satisfaction and the 2 studies for assessment of preoperative anxiety (Table 2). These studies raised doubts regarding deviations from intended interventions and outcome assessments, due to the impossibility of blinding and the possible influence of personal expectations on the type of consultation. The 3 studies that assessed discrepancies in ASA classification between pre-anesthetic and preoperative evaluations were evaluated as having low risk of bias for this outcome.

Figure 2

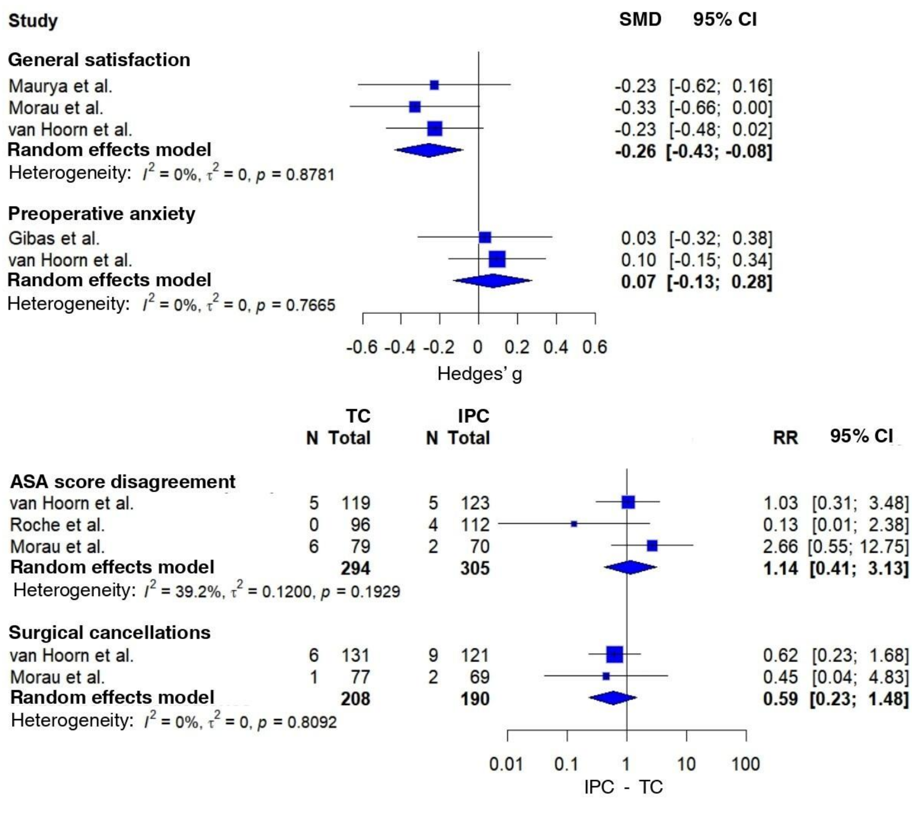

Figure 2. Forest plot of findings. Patients favored IPC over TC in terms of satisfaction, but there were no significant differences regarding other outcomes.

Figure 3

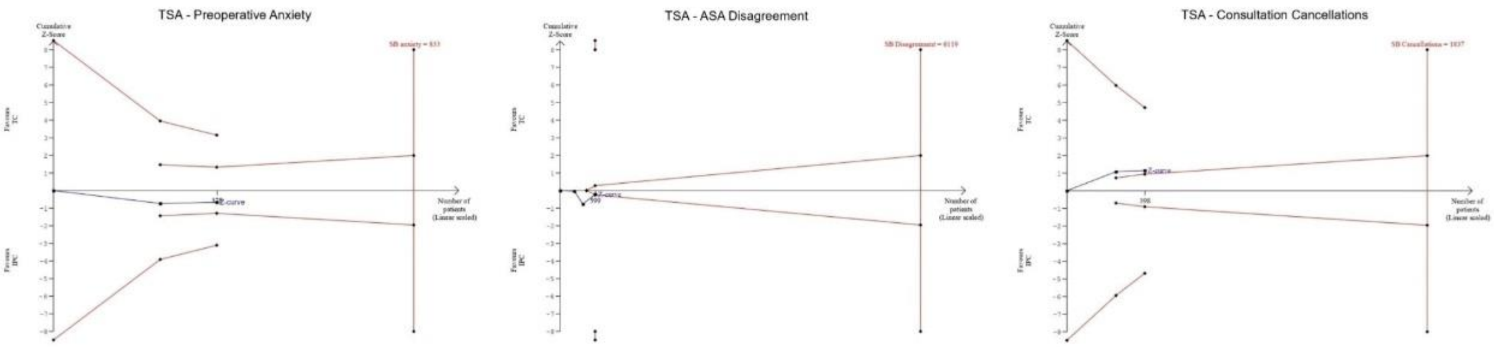

Figure 3. Trial sequential analysis for secondary outcomes. The z-curves did not cross the trial sequential monitoring boundaries.

Using the GRADE model, the level of evidence for the findings on overall satisfaction and discrepancies in the ASA classification was classified as moderate, and the other outcomes as low. One point was subtracted from satisfaction and anxiety outcomes due to the impossibility of blinding and possible interference from individual expectations in the evaluation of consultations, in addition to one point for anxiety due to imprecision. For surgical cancellation, one point was subtracted for the risk of bias resulting from deviations in the intended interventions and one point for imprecision. For discrepancies in the ASA score, one point was subtracted for imprecision.

Table 2 - Risk of bias analysis of the included studies according to RoB 2 protocol**.**

Study	Outcome	Domain 1	Domain 2	Domain 3	Domain 4	Domain 5	Overall
Maurya *et al.*.	Satisfaction	⊕	⊖	⊕	⊖	⊕	⊖
Morau *et al.*	Satisfaction	⊕	⊖	⊕	⊖	⊕	⊖
van Hoorn *et al.*	Satisfaction	⊕	⊖	⊕	⊖	⊕	⊖
Gibas et *al.*	Preoperative anxiety	⊕	⊖	⊕	⊖	⊕	⊖
van Hoorn *et al.*	Preoperative anxiety	⊕	⊖	⊕	⊖	⊕	⊖
van Hoorn *et al.*	ASA group disagreement	⊕	⊕	⊕	⊕	⊕	⊕
Roche *et al.*.	ASA group disagreement	⊕	⊕	⊕	⊕	⊕	⊕
Maurya *et al.*.	ASA group disagreement	⊕	⊕	⊕	⊕	⊕	⊕
van Hoorn *et al.*.	Surgical cancellation	⊕	⊕	⊕	⊕	⊕	⊕
Maurya *et al.*.	Surgical cancellation	⊕	⊗	⊕	⊕	⊕	⊗

Judgement: ⊕low risk; ⊖some questions; ⊗high risk.

Domain 1: Risk of bias in the randomization process.

Domain 2: Risk of bias due to deviation from intended interventions.

Domain 3: Risk of bias due to incomplete data.

Domain 4: Risk of bias in measuring results.
Domain 5: Risk of bias in the selection of the reported outcome.

4. DISCUSSION

Telemedicine, as a strategy, aims to expand access to healthcare, improve continuity of care, and expand access to care for the population as a whole [10]. As noted in an umbrella review on its use in different specialties [11], this modality has shown multiple non-inferior and superior results in the diagnosis, prevention, and prognosis of diseases when compared to traditional practices. Thus, it becomes pertinent to discuss the application and benefits of this technology in anesthesiology.

This review incorporated 5 RCTs, all of which used cell phones and computers for communication between patients, anesthesiologists, and associated professionals. The main differences among the included studies were related to their methodologies and analyzed objectives.

Patient satisfaction, despite being subjective, has been consistently linked to clinically relevant outcomes, such as patient safety, clinical effectiveness and lower readmission rates [12, 13]. In our review, studies that explicitly recorded patient satisfaction with the type of consultation [14,15] reported a greater preference for IPC, in contrast to findings from previous observational studies that favored TC. Although this phenomenon may be linked to generational differences, available evidence has not demonstrated a clear association between preference for consultation modality and patient age [16]. It is possible that this preference was influenced by technical difficulties during the process, particularly audio problems, connection issues, and the need for equipment changes, as described by Morau *et al*. [9], Roch*e et al*. [8] and other observational studies [17,18].

Morau et al. [9] also reported that patient verbatim feedback highlighted preference for IPC due to human relationships and perceived professionalism. The authors further note that studies conducted during the COVID-19 period may be subjected to contextual bias [9]. Maurya et al. and van Hoorn et al. [6,7] did not discuss technical difficulties, interpersonal factors or contextual differences as drivers of reduced patient satisfaction. Taken together, these findings suggest that the observed preference for IPC could be influenced more by experiential and contextual factors, such as technical reliability and perceived interpersonal interaction, than by measurable differences in clinical adequacy. However, the available evidence provides limited insight on this outcome.

The ASA classification was the most commonly used parameter to predict operative complications. Owing to its simplicity and standardized structure, the score remains a pragmatic tool for perioperative risk assessment [19]. Nevertheless, the possibility of interobserver disagreement should be considered [20,21]. Also, agreement in ASA classification reflects similarity in assigned risk categories, but does not represent a complete measure of perioperative risk assessment.

This review analyzed discrepancies in ASA classification between initial PAE and in-person preoperative reassessment using grouped categories (I-II and III-IV) to reflect lower and higher operative risk, respectively [22,23]. In this context, no significant difference in ASA reclassification rates was observed between TC and IPC pathways. This finding may indicate that the initial evaluation modality did not meaningfully influence the ASA category assigned at the time of surgery, although the estimates were limited due to the low number of events.

In the analysis of this outcome, the trial by Roche et. al [8] generated the largest deviation from the pooled estimate, with events occurring only in the IPC arm. This study also enrolled a narrowly defined ambulatory orthopedic and hand surgery population, differing from the broader surgical case-mix of the other trials. Across all included studies, only 17 ASA disagreements were observed among 599 participants, indicating sparse outcome data. For this setting, small absolute differences in event counts can substantially influence relative risk estimates and widen confidence intervals. The observed divergence therefore reflects contextual variation and sparse-event variability rather than a clinically meaningful difference in operative risk assessment between consultation modalities.

Preoperative anxiety is associated with an increased need for anesthetic drugs, a higher occurrence of postoperative complications, and delays in the healing process [24,25]. Various digital interventions have been investigated to mitigate this phenomenon, including educational videos, tele-nursing counseling and telemedicine-based therapy programs delivered prior to surgery [26-28]. In this regard, a potential advantage of TC over IPC would be the absence of exposure to stressful factors in the hospital environment, such as odors, lack of privacy, and concerns about viral and bacterial contamination [29,30]. However, current literature does not provide significant evidence of practical differences in anxiety reduction through TC alone, a finding reflected in the results of this review.

Surgical cancellation, addressed by two studies, showed similar results between the two consultation modalities, although these findings were not statistically significant. This is consistent with observational studies in both surgery and anesthesiology [31-33]. However, the disproportionate occurrence of events external to the intervention in one of the included studies [9] – namely, cancellations due to defective surgical equipment – compromises the strength of the evidence and limits an unbiased interpretation of this outcome.

Economic and logistical factors were inconsistently reported across the included trials. Morau et al. quantified reductions in travel time and distance through the use of TC. Van Hoorn et al. demonstrated a 26% labour cost reduction with TC, mainly due to no nurse being required to collect and provide information to patients. The remaining studies discussed potential reductions in travel burden but did not directly measure this outcome. Despite this, multiple reviews of studies in clinical and surgical settings [34-39] suggest that telehealth has the potential to reduce costs for both patients and healthcare services, mainly by avoiding travel and optimizing human and logistical resources.

Postoperative complications were not meta-analyzed because the included trials reported this outcome using different follow-up periods. Morau et al. [9] reported no perioperative complications in either groups within the first perioperative day, whereas van Hoorn et al. [7] evaluated complications up to 30 days and observed similarly low and non-significant rates (5% IPC versus 3.8% for TC).

The results of this review suggest that IPC remains the preferred modality for PAE from the patient satisfaction perspective. Meanwhile, current evidence is insufficient to demonstrate significant differences between consultation modalities regarding operative risk assessment, preoperative anxiety or surgical cancellation rates. These findings support maintaining IPC as the reference standard in PAE until more robust evidence becomes available. Widespread replacement of IPC with TC should therefore be undertaken with caution. Further adequately powered RCTs with standardized outcomes are needed to better define the effectiveness and safety of TC.

This systematic review with meta-analysis has several limitations. First, only five RCTs met the eligibility criteria, and pooled analyses included only two or three studies. Consequently, pooled estimates were more susceptible to the influence of individual studies and small variations in event counts, particularly for outcomes with sparse data, reducing the robustness of the available evidence.

Formal assessment of publication bias was also not feasible, since methods such as Egger's regression test are considered unreliable in meta-analyses with few studies. The certainty of the findings was further constrained by the low accrued information sizes in the performed trial sequential analyses.

Although I^2 and τ^2 values were low for most outcomes, differences in the objectives assessed and in the measures used to quantify effects may still compromise the interpretation of the pooled results [40].

Some included trials were conducted during or shortly after the COVID-19 pandemic, when restrictions and concerns about infection may have influenced patient perceptions of consultation modalities. Rather than methodological bias, this factor represents contextual circumstances and therefore was not assessed by the RoB2 domains.

Several clinically relevant perioperative outcomes were not consistently reported across the included trials. The average duration of PAE was only directly evaluated by Maurya et al. [6] and favored IPC compared to TC, which was possibly attributable to the technological interface employed. None of the studies reported anesthesia preparation time or unplanned ICU admissions, therefore those outcomes could not be evaluated in this meta-analysis.

A formal subgroup analysis was also not performed due to the absence of data stratified by age group, differentiation of effects by sex, gender and type of procedure performed. Additionally, no-show rates were not reported in the included trials, precluding assessment of potential differences in consultation adherence between modalities. Collectively, these factors limit the generalizability of the current evidence

5. CONCLUSION

This systematic review and meta-analysis suggested a higher degree of patient satisfaction with in-person consultation compared with teleconsultation during pre-anesthetic evaluation. Although no statistically significant differences were detected between the two modalities in the categorization of operative risk, preoperative anxiety or surgical cancellation rates, the small number of trials and low event counts resulted in wide confidence intervals and limited precision.

Despite the increasing number of recently published RCTs contributing to strengthening the evidence related to the evaluated outcomes, this progress has not been accompanied by uniformity in study objectives. Therefore, additional reports with similar objectives and larger sample sizes are required to enhance the strength of the evidence and to optimize the application of telemedicine in anesthesiology.

Conflict of interest

The authors have no conflict of interest to declare.

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