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Approaches to Educating Patients and Their Families About General Anesthesia and Their Impact on Reducing Perioperative Stress

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ABSTRACT

Introduction: Preoperative anxiety associated with general anesthesia is a frequent and clinically significant problem linked to a poorer perioperative experience, increased distress, and less favorable recovery outcomes. Limited knowledge about anesthesia and the anesthesiologist's role may increase patient stress.

Aim: To examine the literature on educational strategies for patients receiving general anesthesia and, when applicable, their families, with emphasis on their effectiveness in decreasing anxiety and stress, improving knowledge, and enhancing satisfaction.

Methods: A narrative review of 28 full-text English-language articles published from 2020 to 2026 was performed using PubMed, Scopus, Web of Science, and Google Scholar. The review covered studies concerning preoperative education, family-oriented interventions, anxiety reduction, and perioperative experience in adult and pediatric populations.

Results: Educational interventions, especially multimodal, video-based, multimedia, and virtual reality methods, were linked to lower anxiety, greater preparedness, improved

understanding of anesthesia, and increased satisfaction. In pediatric settings, family-oriented strategies were particularly relevant, as parental anxiety strongly affected children's emotional responses. Verbal counseling remained essential, but combined and technology-assisted approaches seemed to be the most effective.

Conclusion: Preoperative education should be considered an integral part of perioperative care. Structured, accessible, and individualized educational strategies may decrease stress, improve cooperation, and strengthen the patient and family experience before general anesthesia.

KEY WORDS: general anesthesia; preoperative anxiety; educational interventions; perioperative stress; family-centered care

1. Introduction

General anesthesia is a fundamental component of contemporary surgical care, enabling invasive procedures to be performed under conditions of unconsciousness and controlled perioperative management. Despite its routine use in modern medicine, it is frequently perceived by patients as one of the most distressing aspects of the surgical pathway. The temporary loss of consciousness, reliance on medical personnel and technical equipment, and diminished sense of personal control may give rise to fears related to pain, complications, intraoperative awareness, and postoperative recovery [1,2]. Moreover, available evidence suggests that knowledge of anesthesia and the role of anesthesiologists remains insufficient in many patient populations, which may further exacerbate anxiety before surgery [2].

Preoperative anxiety is not merely an emotional reaction to impending surgery but a clinically significant perioperative problem associated with a range of adverse outcomes. The literature describes it as a multidimensional psychological state characterized by fear, tension, apprehension, and uncertainty in anticipation of surgery and anesthesia [3-6]. Systematic reviews and meta-analyses indicate that preoperative anxiety is highly prevalent across surgical populations, while observational studies confirm its occurrence in both adult and pediatric settings [3,7]. Importantly, elevated anxiety has been linked to impaired psychological well-being, sleep disturbance, greater pain-related distress, more challenging perioperative management in selected patient groups, and less favorable postoperative outcomes [5,6,8]. These findings underscore the clinical relevance of identifying and addressing anxiety as an integral component of perioperative care.

In pediatric populations, anxiety before anesthesia should also be considered within the broader family context. The literature indicates that parental anxiety may significantly influence

the child's emotional state in the preoperative period [9,10]. Reviews and clinical studies further suggest that interventions directed at parents, as well as combined parent-child educational strategies, may reduce anxiety and facilitate perioperative adaptation [9-13]. This highlights the importance of extending perioperative communication and educational efforts beyond the patient alone, particularly in settings involving children and dependent individuals.

The etiology of anxiety before general anesthesia is complex and multifactorial. Contributing factors may include inadequate understanding of the anesthetic procedure, uncertainty regarding perioperative events, limited awareness of the anesthesiologist's role, and concerns about safety and possible complications [1,2]. Anxiety may be further intensified when information is fragmented, overly technical, delayed, or insufficiently tailored to the patient's informational and emotional needs. Studies on preanesthetic assessment and consultation suggest that the quality of communication before surgery is highly relevant to the overall patient experience [14-18]. Accordingly, patients require clear, accessible, and clinically meaningful information regarding anesthesia, perioperative safety, and postoperative care [15-18].

The aim of this narrative review was to analyze and synthesize the available literature on educational strategies directed at patients undergoing general anesthesia and, where relevant, their families, with particular emphasis on their effectiveness in reducing preoperative anxiety and perioperative stress, improving patient understanding of anesthesia, and increasing treatment satisfaction. The review also sought to compare different forms of preoperative education, including verbal counseling, written materials, multimedia-based education, video-assisted interventions, and virtual reality-based approaches, as well as to assess their impact on preoperative anxiety, perioperative stress, patient experience, and satisfaction with treatment. In addition, the review aimed to identify practical and clinically applicable educational solutions that may be implemented in contemporary perioperative care.

2. Materials and Methods

In view of the heterogeneity of the included studies with respect to methodology, target populations, types of interventions, and outcome measures, the analysis of the following studies was conducted as a narrative review focused on educational strategies addressed to patients undergoing general anesthesia, as well as, where appropriate, to their families and caregivers.

A total of 28 full-text articles published between 2020 and 2026 and written in English were ultimately included in the review. These studies were selected in accordance with the thematic scope of the investigation, namely preoperative anxiety, perioperative stress, patient education before anesthesia, family-centered educational interventions, and the impact of these strategies on patient experience and satisfaction.

The literature search was performed in major scientific databases, including PubMed, Scopus, Web of Science, and Google Scholar. The search strategy was developed on the basis of the main thematic domains represented in the selected literature. The following keywords and their combinations were used: "preoperative anxiety", "perioperative stress", "general anesthesia", "patient education", "family education", "preoperative education", "preanesthetic consultation", "multimedia education", "video-based education", "virtual reality", "patient satisfaction", and "perioperative experience". These terms were combined using operators such as AND and OR in order to identify studies relevant to the objective of the review.

The exclusion criteria comprised publications issued before 2020, articles written in languages other than English, studies without access to the full text, conference abstracts, commentaries, editorials, and reports with insufficient methodological clarity. Duplicate records and studies whose scope was not directly related to anesthesia, perioperative education, or anxiety reduction were also excluded. Studies focused exclusively on pharmacological management, without an educational or communication component, were not considered eligible for inclusion, as the purpose of the review was to analyze non-pharmacological educational strategies in the perioperative setting.

3. Results

3.1. Preoperative Anxiety as a Clinical Problem

The reviewed literature consistently identified preoperative anxiety as a common and clinically relevant problem in patients undergoing anesthesia and surgery. In the global meta-analysis by Abate et al., the pooled prevalence of preoperative anxiety reached 48%, whereas the LMIC-focused meta-analysis reported a pooled prevalence of 55.7%, indicating that anxiety affects approximately one half of surgical patients in many settings [3,4]. In pediatric populations, the burden may be even higher; preoperative anxiety was found in 75.44% of children assessed in the operating room [7]. Studies confirm that preoperative anxiety should be regarded as a central perioperative problem rather than a marginal emotional response.

The psychological sources of anxiety described in the reviewed studies were multifactorial. The most frequently reported major causes were fear of the outcome of surgery, fear of postoperative progress, and fear of complications [4]. Fear of complications was one of the strongest determinants of anxiety, increasing the likelihood of preoperative anxiety by approximately fourfold [3]. The 2025 review on patient knowledge about anesthesia showed that anesthesia-related fears commonly involved pain, death, brain damage, not waking up after surgery, waking up during surgery, and possible complications, while many patients also expressed uncertainty about the safety of anesthetic drugs [2]. These findings suggest that preoperative anxiety was associated with fear of adverse events and uncertainty surrounding the anesthetic experience itself [2-4].

An important mechanism intensifying perioperative stress was insufficient knowledge about anesthesia and the role of anesthesiologists. Patient knowledge regarding anesthesia is often poor, and the review showed that many respondents associated the anesthesiologist mainly with “putting the patient to sleep,” while having a limited understanding of the broader perioperative role of this specialist. The same review also showed that many patients were unaware of possible complications of anesthesia and that misconceptions regarding addiction, major neurologic harm, or anesthesia-related death remained present in some populations. The reviewed studies reported that limited patient knowledge and the presence of misconceptions about anesthesia contribute directly to the development and persistence of preoperative stress [2].

The clinical significance of anxiety was also evident in studies assessing perioperative outcomes. Patients with preoperative anxiety undergoing laparoscopic gynecological surgery had worse perioperative sleep quality, more severe postoperative pain, greater analgesic requirements, and a higher incidence of nausea, vomiting, and dizziness than patients without

preoperative anxiety [8]. In pediatric studies, anxiety was linked to problems extending beyond the immediate preoperative period, including poorer adaptation to anesthesia and the risk of emergence delirium [12,13]. Studies agree that preoperative anxiety has both psychological and clinical consequences, affecting comfort, cooperation, and selected postoperative outcomes [8,12,13].

3.2. Educational Needs of Patients and Their Families Before General Anesthesia

The analyzed literature showed that one of the main educational deficits before anesthesia concerns basic understanding of what anesthesia is, how it is induced, who is responsible for perioperative safety, and what risks and postoperative experiences may be expected. Skowrońska et al. demonstrated that patient knowledge about anesthesia remains heterogeneous and frequently inadequate, with many patients not fully understanding induction methods, the anesthesiologist's role, or the possible complications of anesthesia [2]. The same review suggested that information needs extend beyond the moment of induction itself and include concerns about safety, pain, postoperative recovery, and the overall perioperative process [2].

The included studies also suggest that educational needs are not uniform across populations. Younger age and parental anxiety were independent predictors of higher preoperative anxiety in children, indicating that educational preparation in pediatric settings must be developmentally adapted and family-inclusive [7]. Similarly, pediatric intervention studies were all designed around age-appropriate audiovisual or interactive content, which implies that children benefit most when the information is understandable, engaging, and matched to their emotional and cognitive level [11-13]. In adults, technological barriers may affect older or less digitally experienced patients, showing that educational strategies should also be adapted to digital literacy and the patient's practical ability to use the chosen format [19].

The results further indicate that patients and families need information not only about the anesthetic procedure itself, but also about the expected perioperative pathway. Studies on multimedia education platforms and preoperative assessment repeatedly addressed treatment plans, recovery processes, and perioperative expectations rather than isolated technical facts [14,16]. Multimedia education improved satisfaction with information related to treatment, recovery, and supportive services, suggesting that patient education should be broad, practical, and recovery-oriented rather than limited to procedural consent alone [20]. In pediatric settings, preparation focusing on the perioperative sequence and the child's upcoming experience could improve induction quality and reduce distress [12,13].

3.3. Forms of Patient and Family Education

The reviewed studies covered a broad spectrum of educational approaches, although the literature was dominated by verbal consultation, multimedia/video-based education, virtual assessment tools, and VR-based interventions. Evidence for stand-alone printed materials was relatively limited in the literature included in this review. Written materials were more often discussed as part of standard counseling or broader perioperative pathways than as the main

intervention under study [16,20]. At the same time, several authors emphasized that written information can be limited by readability and comprehension barriers, particularly in stressed patients or in groups with lower health literacy [20,21].

Traditional verbal education and pre-anesthetic consultation remained an important reference standard across the literature. Kristoffersen et al. found that pre-anesthetic assessment clinics were associated with reductions in length of hospital stay and cancellation of surgery for medical reasons, although anxiety outcomes were mixed [15]. Virtual preoperative assessment achieved similar cancellation rates to in-person assessment, high patient satisfaction, and reduced costs, indicating that structured communication can be effective even when delivered remotely [14]. In the PATCH pilot trial, patient self-assessment supported by digital tools produced consultation times and overall satisfaction comparable to standard nurse-led assessment, suggesting that digital support can complement the work of anesthesia nurses without reducing patient experience [18].

Among modern strategies, video-based education was the most frequently studied and generally yielded favorable results. Stand-alone preoperative video education improved short-term knowledge retention compared with face-to-face education by an anesthesiologist, while the combination of video plus face-to-face education produced the best knowledge retention; importantly, anxiety and satisfaction did not differ between groups [19]. A preanesthetic educational video reduced interview time by about 24 seconds without worsening anxiety, patient satisfaction, anesthesiologist satisfaction, or intraoperative vital signs [22]. Preoperative videos were found easy to understand by 95% of patients, 96% were satisfied overall, and most anesthesiologists perceived improved understanding and reduced consultation time, with average time savings of 3.9 minutes per patient and no reported increase in workload [23]. Several studies also showed direct anxiety-reducing effects of video and multimedia education. Preoperative educational video interventions reduced Amsterdam Preoperative Anxiety and Information Scale (APAIS) anxiety and information scores, improved patient knowledge, and were associated with higher satisfaction and favorable recovery-related outcomes [21]. The video group demonstrated lower APAIS scores for anesthesia, surgery, total anxiety, and information needs. In addition, lower State-Trait Anxiety Inventory (STAI-state) anxiety and greater willingness to undergo the procedure again were observed [24]. In head and neck surgery, multimedia education significantly increased postoperative satisfaction and improved the perceived quality of information about treatment and recovery [20]. Several studies reported reduced anxiety and improved knowledge following multimedia education when it is clear, standardized, replayable, and combined with an opportunity to ask questions [20, 21, 24].

Virtual reality constituted another important contemporary educational strategy. A VR-based intervention with preoperative education reduced preoperative anxiety and stress, increased preparedness, and significantly improved satisfaction with preoperative services, although it did not significantly change pain or postoperative length of stay [25]. These findings were reinforced by the 2025 systematic review and meta-analysis, which included 35 randomized controlled trials and found a significant overall benefit of VR-based interventions in reducing preoperative anxiety compared with usual care [26].

3.4. The Role of Family in the Preoperative Education Process

The literature reviewed in this study clearly showed that family education is particularly important in pediatric perioperative care. Santapuram et al. emphasized that parental anxiety has meaningful negative effects on children's anxiety and emotional response, and reviewed evidence supporting preoperative education, play-based interventions, music therapy, parental presence at induction, and integrative preparation programs as strategies for reducing parental anxiety [9]. This makes family-centered education clinically relevant not only for parental well-being, but also for the child's perioperative adaptation [9]. This relationship was also demonstrated empirically, as parental anxiety was identified as an independent predictor of children's preoperative anxiety [7]. In their cohort, children with anxious parents had significantly greater odds of being anxious in the operating room. The authors concluded that the preoperative visit should address both pediatric patients and their families, which supports the concept of emotional transfer within the family context [7].

Interventional studies confirmed that family-inclusive educational strategies may improve perioperative outcomes. Interactive multimedia-based home-initiated education reduced preoperative anxiety in children and their parents, improved the quality of anesthesia induction, and shortened the duration of induction, indicating that preoperative preparation delivered before hospital admission may benefit both the child and the family [12]. Video animation combined with verbal communication showed a trend toward lower pediatric anxiety and enhanced parental satisfaction compared with verbal communication alone, although the difference in anxiety did not reach statistical significance [11]. Individualized cartoon-based preparation reduced perioperative anxiety and emergence delirium in children, while the 2024 meta-analysis by Oktaviani et al. found that audiovisual interventions significantly lowered m-YPAS scores in children undergoing general anesthesia [10,13]. In younger children, additional nonpharmacological approaches may also be useful, as video game-based preparation reduced preoperative anxiety in children aged 3 to 6 years undergoing elective surgery [27]. The reviewed studies emphasize the necessity of involving parents and caregivers in preoperative education, particularly in the case of younger children and when preparation can be initiated prior to the day of surgery [9–13, 27].

3.5. Impact of Education on Clinical Outcomes, Stress Reduction, and Treatment Satisfaction

Table 1 summarizes the principal non-pharmacological methods of preoperative patient education, including their advantages, limitations, and reported effects on patient anxiety and satisfaction. Across the reviewed studies, multimodal and combined interventions were most frequently associated with favorable outcomes, whereas single-component strategies, such as verbal or printed education alone, were typically described as supportive components of broader perioperative preparation pathways.

Table 1. *Comparison of educational methods used before general anesthesia*

Method	**Advantages**	**Limitations**	**Impact on anxiety**	**Practical application**	**Reference numbers**
Verbal education and pre-anesthetic consultation	Individualized, allows questions, builds trust, adaptable to patient needs	Depends on communication skills, time-consuming, variable between staff members	Beneficial, though not always sufficient alone	Best used as a core element of all perioperative preparation	4, 5, 15, 16
Printed educational materials	Easy to distribute, low cost, can reinforce verbal information	Limited evidence as stand-alone method in the reviewed studies, may be difficult for highly anxious or low-literacy patients	Likely supportive rather than strongly independent	Useful as supplementary material	5, 6, 16
Video-based education	Standardized, repeatable, improves knowledge, may reduce interview time, easy to scale	May require technical access and patient attention, not fully individualized	Frequently beneficial; reduced anxiety in several studies	Highly practical for routine adult perioperative care	10, 16, 19, 20, 21, 22, 23, 24
Multimedia/interactive digital education	Can combine text, image, animation, and perioperative pathway explanation; suitable for home preparation	Requires design quality, digital access, and usability	Beneficial in several adult and pediatric studies	Useful for structured preparation before admission	10, 11, 16

Virtual preoperative assessment	Convenient, reduces travel and costs, maintains patient experience	May be less suitable for some patients with low digital competence	Indirect benefit through improved preparedness and access	Valuable in elective and ambulatory pathways	14, 15, 17, 18
Virtual reality-based education	Immersive, engaging, strong potential for reducing stress and increasing preparedness	Requires equipment, workflow integration, and patient acceptance	Promising and supported by recent evidence	Suitable for selected settings and high-anxiety patients	25, 26
Combined interventions (e.g., video plus consultation, home multimedia plus family support)	Integrates standardization with personalization, addresses multiple learning needs	Requires planning and coordination	Often the most comprehensive approach	Likely the most clinically useful model	5, 6, 10, 16
Family-centered pediatric education	Addresses emotional transfer, prepares both child and caregivers	Population-specific, requires age-adapted content	Strong potential benefit in children	Essential in pediatric anesthesia	7, 9, 10, 11, 12, 13, 27

Across the reviewed literature, educational interventions were associated with measurable improvements in anxiety outcomes assessed using validated psychometric tools. APAIS was used in several adult studies and consistently showed benefit for video-based interventions, including the trials by Rajput et al. and Karalar et al. [21,24]. In pediatric settings, anxiety was frequently measured using the modified Yale Preoperative Anxiety Scale, and the available

studies showed favorable effects of audiovisual strategies such as video games, cartoons, or animations [10-13,27]. The pediatric meta-analysis reported a significant pooled reduction in m-YPAS scores in favor of audiovisual interventions, with a mean difference of -10.75 [10]. The effect of education extended beyond psychometric scores. Multimedia video information was associated with lower preoperative anxiety, improved knowledge retention, and greater patient satisfaction [21]. Improved quality of anesthesia induction in children receiving home-initiated multimedia preparation was reported [12]. Reduction not only in perioperative anxiety but also in emergence delirium was demonstrated [13]. Studies reported that educational interventions may influence clinically relevant perioperative processes, especially where anxiety directly interferes with induction or early recovery [12,13,21].

The reviewed evidence also indicates that education can improve patient experience and satisfaction even when anxiety reduction is not always statistically significant. Markedly higher satisfaction with preoperative services was found in the VR group, despite no significant differences in pain or length of stay [25]. A clear increase in postoperative satisfaction after access to a multimedia platform was demonstrated [20]. Very high patient-rated clarity and satisfaction with explanatory videos were found, together with perceived workload reduction among anesthesiologists [23]. In parallel, high positive patient experience with virtual preoperative assessment was shown, and better knowledge retention could be achieved without increasing anxiety [20,23,25].

Finally, broader systematic reviews suggest that the effects of preoperative education may extend to recovery-related outcomes, although the evidence remains heterogeneous. Brodersen et al. reported that most included studies in abdominal surgery found reduced length of hospital stay and, in some cases, fewer postoperative complications and adverse events in patients who received preoperative education, while also noting lower psychological stress and anxiety [16]. Fewer medical cancellations and shorter hospital stay were similarly found in patients assessed in pre-anesthetic clinics [15]. However, both reviews stressed methodological heterogeneity and the need for higher-quality studies before making strong implementation recommendations [15,16]. Current literature supports that educational interventions are consistently beneficial for patient understanding, perioperative experience, and anxiety reduction, while their effects on hard clinical endpoints, although promising, are less uniformly established [15, 16, 19-26].

4. Discussion

4.1. Summary and appraisal of the main findings

The findings of this narrative review indicate that preoperative anxiety remains a highly prevalent and clinically meaningful problem in patients undergoing anesthesia and surgery. The reviewed literature consistently showed that anxiety before anesthesia is not limited to a transient emotional reaction, but represents a multidimensional state associated with fear of complications, fear of not waking up, fear of pain, uncertainty regarding the anesthetic procedure, and insufficient understanding of the role of the anesthesiologist. In both adult and pediatric populations, anxiety was linked with poorer perioperative experience and, in several studies, with less favorable perioperative or postoperative outcomes. The available evidence

therefore supports the view that preoperative anxiety should be considered an important target of perioperative care rather than an unavoidable aspect of surgery.

A central observation emerging from the reviewed studies is that lack of knowledge about anesthesia appears to be one of the most modifiable causes of perioperative stress. The literature repeatedly showed that many patients have an incomplete understanding of general anesthesia, its safety profile, the perioperative responsibilities of anesthesiologists, and the expected course of induction and recovery. These informational gaps create space for misconceptions and may amplify preexisting emotional distress. From this perspective, educational interventions are important not only because they provide factual information, but also because they reduce uncertainty, improve predictability, and support the patient's sense of control over the perioperative situation. This interpretation is further supported by recent evidence indicating that patient education regarding anesthesia options may reduce anxiety and improve satisfaction, while structured pre-anesthetic interviews can improve communication and psychological outcomes, including fear of anesthesia [28].

Another major finding of the review is that educational interventions before anesthesia can be delivered in multiple forms and that their effectiveness depends not only on the content, but also on the method of presentation. Traditional verbal consultation remains a fundamental component of perioperative preparation, particularly because it allows individualized explanation, clarification of doubts, and direct interaction with healthcare professionals. However, the reviewed literature suggests that verbal education alone may not always be sufficient, especially when the amount of information is high, the patient is highly anxious, or the available consultation time is limited. In such contexts, structured educational materials and digital tools appear to offer substantial added value.

Among the different strategies examined in the reviewed studies, multimedia and video-based education were the most consistently supported by empirical evidence. These interventions were shown to improve knowledge retention, reduce anxiety scores in some clinical settings, improve patient understanding, and increase satisfaction with perioperative communication. Video-based tools also offered organizational advantages, including standardization of content and reduction of consultation time without deterioration of patient experience. This suggests that multimedia education may function as a particularly useful bridge between efficiency and patient-centeredness in contemporary perioperative care.

Virtual reality-based interventions emerged as another promising approach. The reviewed randomized and meta-analytic evidence indicates that VR may reduce preoperative anxiety and increase preparedness for surgery, especially in elective settings. At the same time, the findings do not support the assumption that all modern technologies necessarily improve every clinical outcome. In the available studies, VR did not consistently influence pain intensity or length of hospital stay, which suggests that its strongest effects may be concentrated in the psychological and experiential dimensions of perioperative care rather than in all postoperative endpoints. This distinction is important because it helps position VR as a targeted tool for anxiety reduction and patient engagement, rather than as a universal solution for all perioperative problems. Similar conclusions were presented in a review in which virtual reality was described as a potentially useful adjunctive method for reducing pain and anxiety in pediatric patients, including perioperative anxiety. However, the authors also noted practical limitations, such as equipment costs, the need for trained staff, and possible adverse effects including dizziness or motion sickness [29].

The reviewed evidence also highlights the importance of family-centered education, especially in pediatric anesthesia. Studies involving children and their parents consistently

demonstrated that parental anxiety may influence the emotional condition of the child and that interventions directed toward both the child and caregivers may improve perioperative adaptation. This finding is highly relevant, because it broadens the educational target from the patient alone to the patient-family unit. In pediatric settings, preoperative education appears to be most effective when it is interactive, age-appropriate, visually engaging, and understandable to caregivers as well as to the child. The literature therefore supports the inclusion of family members in perioperative education not merely as observers, but as active participants in anxiety reduction and emotional preparation.

The available evidence indicates that preoperative anxiety related to anesthesia is both common and clinically meaningful, with its intensity often linked to patients' limited understanding of the anesthetic process. Within this context, educational interventions emerge as a valuable non-pharmacological approach, particularly when they are structured and tailored to the patient's level of knowledge and concerns. The literature consistently suggests that the most effective strategies are those that go beyond simple information delivery, incorporating elements of accessibility, emotional reassurance, and adaptation to specific patient populations. Taken together, these findings support the view that well-designed educational components should be considered an integral part of routine perioperative care, not only to improve patient experience but also to potentially optimize clinical outcomes.

4.2. Limitations of the reviewed literature

Despite the generally positive results, the reviewed body of literature has important limitations that should be acknowledged. The first and most evident limitation is the marked heterogeneity of the included studies. The reviewed publications differed substantially in study design, patient population, type of surgery, age group, perioperative setting, educational content, timing of intervention, and measured outcomes. Some studies focused on adults undergoing elective surgery, others on pediatric patients, and others on specific surgical populations such as abdominal, gynecological, urological, or head and neck surgery. This diversity increases the breadth of the evidence, but at the same time makes direct comparison difficult and reduces the possibility of drawing highly standardized conclusions.

A second major limitation concerns the variability of outcome measures. Anxiety was assessed using different psychometric tools across studies, including APAIS, STAI, and m-YPAS, while patient experience and satisfaction were measured with nonuniform questionnaires or study-specific instruments. As a result, even when the overall direction of findings was similar, the magnitude of benefit could not always be compared across studies in a precise way. The use of different scales reflects the multidimensional nature of anxiety and patient satisfaction, but it also complicates synthesis and makes it more difficult to identify which interventions are superior under specific conditions.

The third limitation relates to differences in intervention content and delivery. The category of "education" was not uniform across the literature. In some studies it meant standard verbal explanation, in others a structured pre-anesthetic clinic, a video, multimedia platform, interactive home preparation, computerized self-assessment, or immersive VR-based exposure. Even within video-based interventions, the duration, complexity, visual style, target audience, and accompanying verbal explanation varied substantially. Therefore, the term "educational intervention" does not refer to a single comparable modality, but rather to a broad spectrum of

approaches with different theoretical mechanisms and practical objectives.

Another important limitation is the diversity of patient characteristics. Some studies included relatively homogeneous elective surgical populations, whereas others focused on children, older adults, or patients exposed to highly specific clinical contexts. Such differences are important because anxiety is influenced by age, previous surgical experience, baseline emotional status, parental anxiety, digital literacy, and the perceived seriousness of the operation. Consequently, an educational method that performs well in one population may not produce the same effect in another. This problem is particularly relevant when interpreting results from pediatric studies in relation to adult practice, or when generalizing findings from technologically supported interventions to populations with limited digital familiarity.

The literature also suggests practical barriers to implementation. Although modern tools such as video-based education, computerized assessment, and virtual reality appear promising, they require organizational readiness, appropriate equipment, suitable content, and staff acceptance. The reviewed studies indicate that technology-based interventions may improve efficiency, but they also imply that implementation depends on workflow integration and usability. In older patients or in those with limited digital competence, stand-alone technological solutions may be less effective unless supplemented by human explanation. Likewise, although video tools may reduce consultation time, they should not replace the opportunity to ask questions or to receive individualized clarification from trained personnel. These findings suggest that implementation challenges are not limited to infrastructure, but also include adaptation to patient capabilities and maintenance of interpersonal communication.

A further limitation of the reviewed literature is the lack of standardization of educational materials. The studies differed in both message content and educational purpose. Some interventions emphasized procedural explanation, others focused on recovery, others on familiarization with the hospital environment, and others on emotional reassurance. This lack of standardization makes it difficult to define a single optimal educational package for general anesthesia. It also means that positive outcomes may depend not only on the format of delivery, but on the quality, clarity, and relevance of the content itself.

Finally, although many studies demonstrated improvement in anxiety, knowledge, satisfaction, or perioperative experience, evidence for hard clinical endpoints remained less consistent. Some studies reported improved induction quality, reduced hospital stay, or fewer perioperative disruptions, whereas others found no effect on pain or length of stay. Therefore, the literature more consistently supports the psychological and experiential value of education than its universal effect on all postoperative outcomes. This does not reduce its importance, but it does suggest that the strongest current argument for preoperative education lies in its benefits for communication, emotional readiness, and patient-centered care.

4.3. Practical implications for clinical practice

The reviewed evidence allows several practical conclusions relevant to perioperative care. Quality preoperative education before general anesthesia should be structured, understandable, and delivered early enough to allow the patient or family to process the information and ask questions. Education appears to be most valuable when it addresses the aspects that patients fear most: loss of consciousness, intraoperative safety, pain, postoperative recovery, and possible complications. Educational content should therefore go beyond administrative preparation or formal consent and should clearly explain the anesthetic process in language that is clinically accurate but easy to understand.

Education should not rely on a single method of communication. The most useful approach, according to the reviewed literature, is multimodal. Verbal counseling remains indispensable because it creates trust and enables individualized clarification, but its effects can be strengthened by supplementary tools such as brochures, standardized written instructions, educational videos, or digital platforms. Modern technologies appear especially useful when they standardize core information, improve consistency of communication, and reduce the burden on staff while preserving patient comprehension. For many institutions, the most practical model may therefore be a layered one in which the patient first receives standardized educational material and then discusses remaining concerns with the anesthesiologist or anesthesia nurse.

The timing of education matters. Interventions delivered only moments before surgery may be less effective than those introduced during the broader preoperative pathway. The reviewed literature suggests that education can be integrated into the pre-anesthetic consultation, preoperative clinic workflow, remote assessment, or home-based preparation before admission. Earlier educational contact may improve preparedness and reduce last-minute stress, especially in patients with high baseline anxiety or in families preparing children for surgery. In elective surgical pathways, perioperative education may also be integrated with broader prehabilitation advice when clinically appropriate. Evidence summarized in a review indicates that physical activity can alleviate anxiety symptoms in adults and may therefore complement, but not replace, anesthesia-specific education in patients awaiting surgery [30].

Perioperative education should be tailored to the characteristics of the patient. Children require age-appropriate, visual, and emotionally accessible content. In pediatric settings, educational interventions should routinely include parents or caregivers, because parental anxiety has a measurable influence on child anxiety. Older adults and patients with limited health literacy or limited digital familiarity may benefit more from simple language, repetition, direct explanation, and combined traditional-plus-digital formats than from stand-alone technology. Highly anxious patients may require more individualized counseling and the opportunity for repeated clarification rather than a single brief information session.

The findings of this review underscore the central role of the anesthesiologist and anesthesia nurse in the educational process. These professionals are not only providers of technical perioperative care, but also key communicators who translate complex procedural information into understandable and reassuring guidance. The educational function of pre-anesthetic contact should therefore be recognized as a meaningful clinical activity rather than as an optional administrative step. Technology may enhance this process, but it should complement rather than replace professional interaction.

Finally, the reviewed literature supports the idea that the choice of educational tools should be pragmatic. Video-based education appears highly suitable for routine implementation because it is repeatable, scalable, understandable, and supported by several studies showing benefits in knowledge, anxiety, satisfaction, or workflow efficiency. VR-based interventions are promising, particularly for anxiety reduction and patient engagement, but they may currently be better suited for selected settings or patient groups rather than universal implementation. Family-centered and home-based interventions are especially valuable in pediatric anesthesia. Overall, the most clinically applicable educational strategy appears to be one that combines standardization with personalization: standardized core information, personalized explanation, and adaptation to age, emotional state, and communication capacity.

5. Conclusions

The findings of this review indicate that patient and family education should be considered an integral component of perioperative care in the setting of general anesthesia. Preoperative anxiety is consistently identified as a common and clinically relevant problem, driven by fear of complications, pain, loss of control, inadequate understanding of anesthesia, and uncertainty regarding the perioperative course. The reviewed evidence shows that educational interventions can reduce preoperative anxiety and perioperative stress, improve patient knowledge and preparedness, and enhance the overall perioperative experience. The greatest benefits appear to be associated with individualized, multimodal approaches that combine direct communication with the anesthesiologist or anesthesia nurse with complementary tools such as written materials, educational videos, multimedia resources, digital assessment platforms, and, in selected settings, virtual reality-based interventions. In pediatric care, family involvement is of particular importance, as parental anxiety may directly influence the child's emotional response and adaptation to anesthesia. In practical terms, the quality of perioperative preparation may be improved through structured pre-anesthetic counseling, standardized educational materials, family-centered preparation in pediatric settings, and communication tailored to the patient's age, emotional condition, and health literacy. Taken together, the available evidence supports the view that education before general anesthesia is not merely an adjunct to care, but a clinically meaningful intervention with the potential to reduce stress, improve cooperation, and increase satisfaction with treatment.

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