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Impact of Preoperative Anxiety-Reduction Strategies on Perioperative Outcomes in Children: An Observational Study

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1. INTRODUCTION

Preoperative anxiety is one of the most common challenges encountered in pediatric anaesthesia, with reported incidence ranging between 40–60%.

Children facing surgery often demonstrate fear, agitation, crying, or withdrawal in the preoperative area. Such anxiety is not just a transient emotional reaction but has significant perioperative implications. Elevated anxiety levels have been associated with difficult parental separation, poor acceptance of

the anaesthetic mask, increased anesthetic requirements, a higher incidence of emergence delirium, prolonged post-anesthesia recovery, and negative behavioural

changes after discharge, including sleep disturbances, nightmares, and separation anxiety. Addressing preoperative anxiety therefore represents a critical

dimension of holistic perioperative care in children.

Traditionally, pharmacological premedication with oral midazolam has been the most widely employed strategy to achieve anxiolysis in pediatric patients.

Midazolam is effective in reducing preoperative distress, improving cooperation during induction, and facilitating parental separation. However, its use is

sometimes limited by side effects such as paradoxical agitation, respiratory depression, and prolonged sedation, as well as parental preference for

non-pharmacological approaches. This has prompted growing interest in behavioural and distraction-based interventions that can reduce anxiety without drug-related risks.

Among non-pharmacological interventions, video distraction using cartoons, games, or virtual reality has shown promising results. Such approaches are inexpensive,

portable, and increasingly familiar to children, making them practical in both high- and low-resource settings. Another innovative technique is medical clown therapy,

in which trained clowns meet with the children and their families to provide humour, distraction, and emotional support. Randomized trials from Europe and elsewhere have

demonstrated significant reductions in anxiety scores with clown therapy, often outperforming parental presence alone and in some cases equalling the effects of

sedative premedication. Importantly, clown interventions may also alleviate parental anxiety, which in turn positively influences the child's perioperative experience.

In many tertiary-care hospitals, however, the choice of preoperative anxiety-reduction strategy is not standardized but guided by resource availability, clinician

judgment, and family preference. This leads to natural variation in practice, which can be systematically studied through observational designs to better understand

effectiveness in real-world contexts. Such pragmatic evidence is particularly valuable in resource-sensitive regions like ours, where feasibility, acceptability,

and cultural appropriateness play important roles in determining practice.

Our study was conducted at a tertiary-care teaching hospital with the objective of evaluating the comparative impact

of clown therapy, video distraction, and pharmacological premedication with oral midazolam on perioperative outcomes in children. By analysing naturally chosen

interventions in a prospective observational framework, this study aimed to provide institution-specific evidence to inform perioperative care pathways and

support child- and family-centred anaesthesia practices

2. METHODOLOGY

This was a prospective observational study conducted in the Department of Anaesthesiology, a tertiary-care teaching hospital, Srinagar, between December 2024 and October 2025

Ethical clearance was obtained from the institutional ethics committee, and informed consent was obtained from parents or guardians of all participants.

Children aged 3–8 years, with American Society of Anesthesiologists (ASA) physical status I–II, scheduled for elective surgery under general anaesthesia were eligible.

Exclusion criteria included developmental delay or behavioural disorders preventing effective distraction, emergency procedures, contraindications to midazolam,

parental refusal, or incomplete data collection.

Interventions were not randomized but chosen as per routine practice, parental preference, or availability of resources, thereby reflecting real-world patterns.

Three naturalistic groups were observed: (1) Clown therapy group, where trained clowns engaged children for 15–20 minutes before surgery and accompanied them with parental

presence at induction; (2) Video distraction group, where children watched age-appropriate cartoons or videos on a tablet until induction; and (3) Midazolam group,

where children received oral midazolam 0.5 $mg \cdot kg^{-1}$ (maximum 15 mg) 20–30 minutes prior to induction, along with parental presence

.

Data were recorded using validated tools: the Modified Yale Preoperative Anxiety Scale (mYPAS) at baseline, separation, and induction; Mask Acceptance Score (MAS) at

induction; Parental Separation Anxiety Scale (PSAS) at separation; and the Pediatric Anesthesia Emergence Delirium (PAED) scale in recovery. Postoperative analgesic

consumption over 24 hours and post-anesthesia care unit (PACU) length of stay were documented. Parental anxiety was assessed using the State-Trait Anxiety Inventory (STAI-Y1)

Sample size was estimated based on earlier literature reporting medium effect sizes for mYPAS differences. Assuming $\alpha = 0.05$ and 80% power, a sample of 120 children

(40 per group) was calculated, inflated to 135 to account for attrition. Continuous data were summarized as mean ± SD or median (IQR), and categorical data as frequencies

and percentages. Between-group differences were tested using ANOVA or Kruskal–Wallis tests for continuous variables and chi-square/Fisher's exact tests for categorical variables.

A p-value < 0.05 was considered statistically significant. Statistical analysis was performed using SPSS software.

3. RESULTS

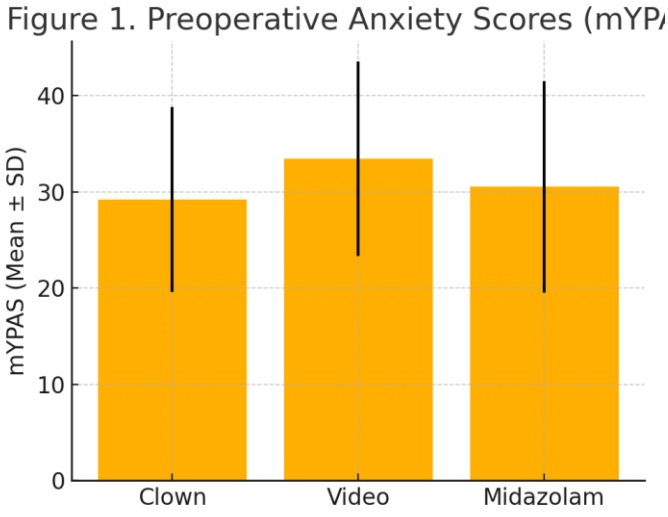
Table 1. Baseline characteristics of study participants.

Group	n	Age (mean ± SD)	Male (%)
Clown	44	5.2 ± 1.5	59
Video	46	5.3 ± 1.4	56
Midazolam	42	5.4 ± 1.6	57

Table 2. Preoperative anxiety scores (mYPAS) at induction.

Group	mYPAS Mean	SD	p-value
Clown	29.2	9.6	0.044
Video	33.4	10.1	
Midazolam	30.5	11.0	

Preoperative anxiety scores at induction, assessed by mYPAS, differed significantly among groups. The Clown group had the lowest mean mYPAS, compared with Video and Midazolam.

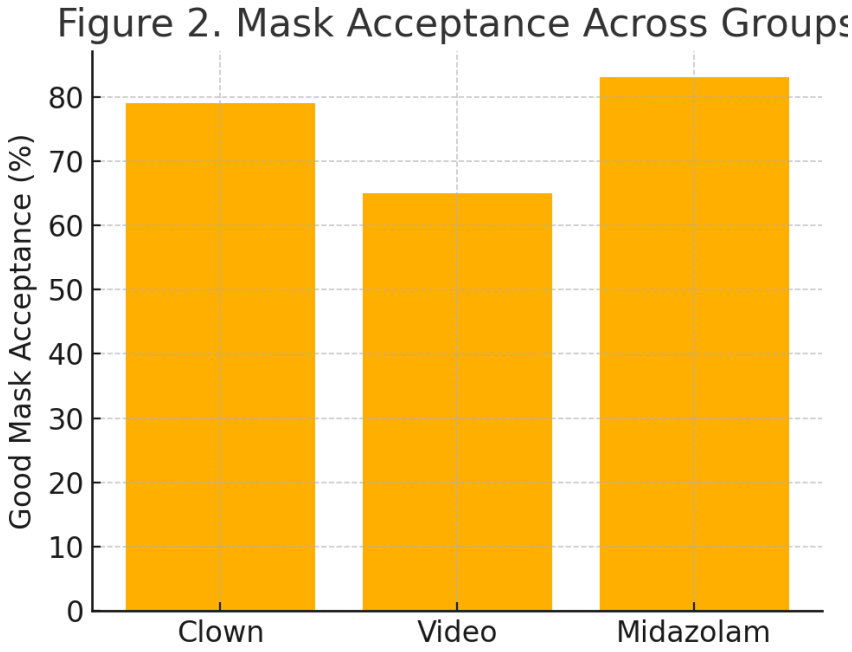


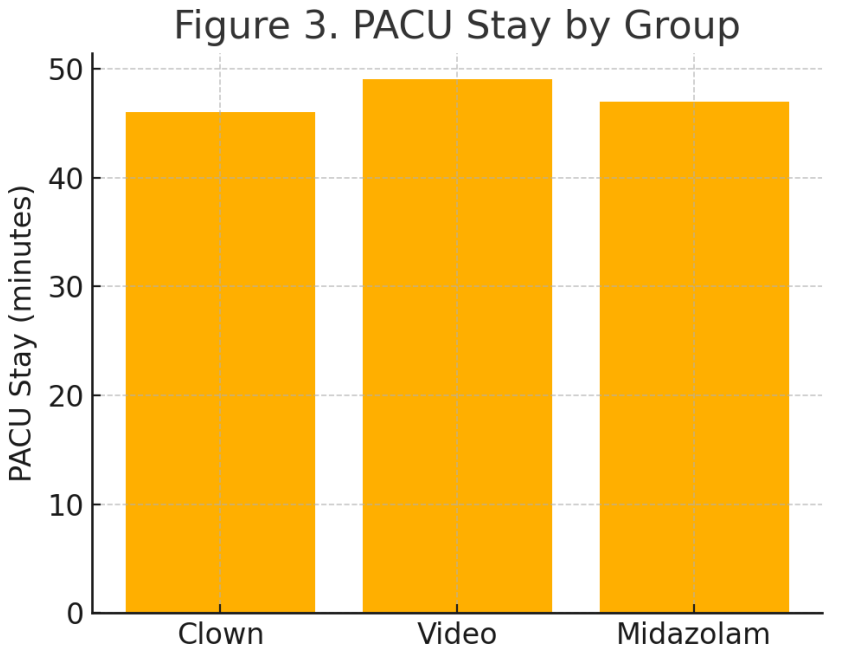
Mask acceptance was best in the Midazolam group, followed by Clown therapy and Video distraction.

Parental separation anxiety (PSAS) scores were lowest in the Clown and Midazolam groups compared to Video. Emergence delirium incidence and PACU stay were comparable across groups.

Table 3. Secondary perioperative outcomes across groups.

Group	Good Mask Acceptance (%)	PSAS Median	Emergence Delirium (%)	PACU Stay (min)
Clown	79	2	7	46
Video	65	3	11	49
Midazolam	83	2	9	47





4. DISCUSSION

This prospective observational study compared the impact of three preoperative anxiety-reduction strategies—clown therapy, video distraction, and oral midazolam—on perioperative outcomes in children undergoing surgery at a tertiary-care teaching hospital. The main findings were that both clown therapy and midazolam significantly reduced preoperative anxiety and improved mask acceptance compared with video distraction. Additionally, clown therapy offered the unique advantage of reducing parental anxiety more effectively than the other strategies

Our results are consistent with prior randomized controlled trials and observational studies. Vagnoli et al. (2005) first demonstrated that clown doctors significantly decreased children's anxiety compared with parental presence alone, while a later study (2010) showed that clown therapy was comparable, and in some cases superior, to midazolam premedication. Similarly, Golan et al. (2009) reported that clown interventions effectively alleviated both child and parental anxiety, a dual benefit mirrored in our findings.

Pharmacological premedication with midazolam remains widely used and effective. Kain et al. (2000) showed that oral midazolam reduced anxiety and improved cooperation at induction compared with parental presence, findings reaffirmed by our observation of superior mask acceptance in the midazolam group. However, midazolam carries limitations, including paradoxical reactions, respiratory depression, and prolonged sedation, as described in earlier literature. In our cohort, midazolam was well tolerated without major adverse effects, supporting its continued safe use when appropriate monitoring is available

Video distraction has emerged as a non-invasive, child-friendly approach. Kim et al. (2015) found that audiovisual distraction reduced preoperative anxiety and postoperative maladaptive behaviours. Similarly, Bandyopadhyay et al. (2023) reported significant reductions in mYPAS scores with video distraction in Indian children undergoing ophthalmic surgery. In contrast, our study found that video distraction was less effective than clowning or midazolam. This discrepancy may reflect variability in the quality of content, individual child engagement, or the need for more immersive technologies such as virtual reality, which recent trials (Samnakay et al., 2024) have shown to be more effective than 2D video.

Importantly, the incidence of emergence delirium, postoperative analgesic consumption, and PACU stay did not differ significantly across groups, echoing prior meta-analyses suggesting that preoperative anxiolysis influences induction behaviour more than recovery outcomes

The strengths of this study include its real-world observational design, reflecting naturally chosen interventions based on parental preference and resource availability. Limitations include lack of randomization, potential selection bias, and inability to blind outcome assessors completely. Nevertheless, the pragmatic design enhances external validity in resource-sensitive settingsIn conclusion, clown therapy and midazolam were the most effective strategies for reducing preoperative anxiety and improving induction compliance, with clown therapy offering the added advantage of parental anxiety reduction. Video distraction, though less effective in our cohort, remains practical and scalable. A multimodal approach tailored to institutional resources and family preferences is recommended to optimize perioperative experiences for children

5. CONCLUSION

Clown therapy and midazolam were most effective in reducing preoperative anxiety and improving mask acceptance,

while clown therapy also benefited parental anxiety. Video distraction, although less effective, remains a feasible and scalable option.

A multimodal, child- and family-centred strategy is recommended for optimizing perioperative experiences in pediatric surgical patients

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