

# Reduction of Preoperative Anxiety Using Virtual Reality vs. Midazolam: A Randomized Controlled Trial

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DOI: <https://doi.org/10.30953/thmt.v9.533>

Keywords: analgesia, anxiety, delayed recovery, pediatrics, postoperative pain, preoperative stress

Received: October 1, 2024; Accepted: October 15, 2024; Published: October 31, 2024

More than 50% of pediatric patients experience significant stress and anxiety prior to surgery.<sup>1</sup> High anxiety can result in increased postoperative pain, analgesic consumption, and delayed recovery.<sup>2</sup> To reduce this preoperative anxiety, multiple therapeutic modalities have been developed, including the use of distraction, such as playing video games, watching movies, and listening to music. In severe cases of anxiety, anxiolytic and sedative medications like midazolam are used. However, given the acknowledged drawbacks of medications, including the risk of paradoxical reactions to the drug, alternatives to medication for reducing preoperative anxiety in patients may be useful. We aim to compare the use of virtual reality (VR) to midazolam in reducing preoperative anxiety in surgical patients and assess differences in induction compliance, emergence delirium, pain scores, and opioid use in VR vs. midazolam-treated patients.

## Methods

This study was approved by the Phoenix Children's Hospital Institutional Review Board. First-time surgical patients ( $N = 36$ ) between the ages of 5 and 11 years undergoing tonsillectomy or tonsillectomy/adenoidectomy procedures were randomly assigned to either receive midazolam (0.5 mg/kg up to 25 mg) or play an interactive underwater-themed game using VR. The Modified Yale Preoperative Anxiety Scale (mYPAS) was administered by a single child life specialist preoperatively, and only patients who reached a threshold of  $> 40$  on mYPAS scoring were enrolled (scale range: 23–100).

Additional anxiety measurement was tested using the adult and child State-Trait Anxiety Inventory (STAI). Midazolam or VR was administered prior to transport to

the OR, and mYPAS was scored again at the time of separation from the family. The Induction Compliance Checklist (ICC) was utilized for assessment at the time of anesthesia induction. The VR-treated patients continued use of the VR headset through mask induction. A standardized anesthesia induction protocol was used for all patients. The Pediatric Anesthesia Emergence Delirium (PAED) scale was administered at emergence, postoperatively. Postoperative nurses scored pain and administered IV pain medication as needed. Group means and standard deviations were reported and compared with two-sided *t* tests.

## Results

Interim results show the mYPAS anxiety scores dropped  $20.1 \pm 11.7$  points following midazolam treatment ( $p < 0.001$ ) and dropped  $28.3 \pm 7.3$  points following VR treatment ( $p < 0.001$ ). There was a significant difference in mYPAS scores between groups following treatment (midazolam =  $32.0 \pm 4.9$ ; VR =  $25.4 \pm 4.7$ ;  $p = 0.04$ ). There were no significant differences between midazolam- and VR-treated groups in the ICC, PAED scale, peak postoperative pain scores, and medication use for pain control postoperatively. This study is currently ongoing.

## Conclusion

Virtual reality appears to reduce preoperative anxiety similar to midazolam in anxious first-time surgical pediatric patients. Limitations include patient population. Further studies should be conducted for greater generalizability.

## References

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