

Virtual Reality as an Adjunct to Anesthesia in the Operating Room

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Introduction: Advancements in virtual reality (VR) technology have resulted in the expansion of the technology from the personal entertainment industry into the medical field. Preliminary studies have found VR to be a safe and effective adjunct to standard sedative and analgesic protocols for reducing pain and anxiety for patients undergoing upper gastrointestinal endoscopy, dental procedures, dressing changes for burns and joint arthroplasty¹⁻⁴. Given these findings, it is possible that VR technology has the potential to serve as a useful adjunct to standard anesthesia practice in surgeries where patients’ intraoperative anxiety is the primary concern for the anesthesiologist because regional anesthesia has prevented majority of the surgical stimulation.

Objective: To investigate the potential for VR to reduce intraoperative sedative requirements during surgical procedures of the hand and wrist, as compared to usual care.

Methods: In this randomized controlled trial, 40 adult patients undergoing hand and/or wrist surgery at a single academic institution will be randomly assigned to either intraoperative VR immersion or usual care (Figure 1). All patients receive a peripheral nerve block prior to surgery. The intervention, VR immersion, is designed to provide patients with a relaxing virtual environment to alleviate intraoperative anxiety. The software to be used in this trial was created in collaboration with VRHealth. Patients in the intervention group will select a playlist of videos and immersive environments to create a customized intraoperative experience. A VR headset paired with sound canceling headphones will be used to reduce the effect of potentially disturbing operating room stimuli. The patient interface is designed to enable the user to change videos or environments using just their eyes, to prevent impacting the operative environment through patient movement. The tablet interface was designed to allow the anesthesiologist to communicate with the patient via text without requiring the patient to remove their headphones, thus maintaining the immersive experience. Since virtual reality is a 360-degree environment, a feature is integrated into the tablet to reposition the visual content into the line of sight if a patient changes position. Patients in the intervention group can receive propofol and sedatives if needed during the procedure at the discretion of the anesthesiologist. Patients in the control arm will receive usual care, consisting of a propofol infusion with supplemental analgesia at provider discretion. The primary outcome is total propofol dose administered intraoperatively and will be assessed between study groups. Additionally, perioperative opioid requirements, intraoperative airway interventions, postoperative pain scores and patient satisfaction will be assessed.

Discussion: VR immersion can potentially allow for a reduction in the dose of anesthesia needed for patient relaxation and comfort, and may be a promising option for patients undergoing hand or wrist surgery. A positive result from this study could lead to a change in anesthesia practice through the introduction of a technology based, non-pharmacologic, patient-led intervention which can potentially reduce the burden of over-sedation while providing a satisfactory perioperative experience.

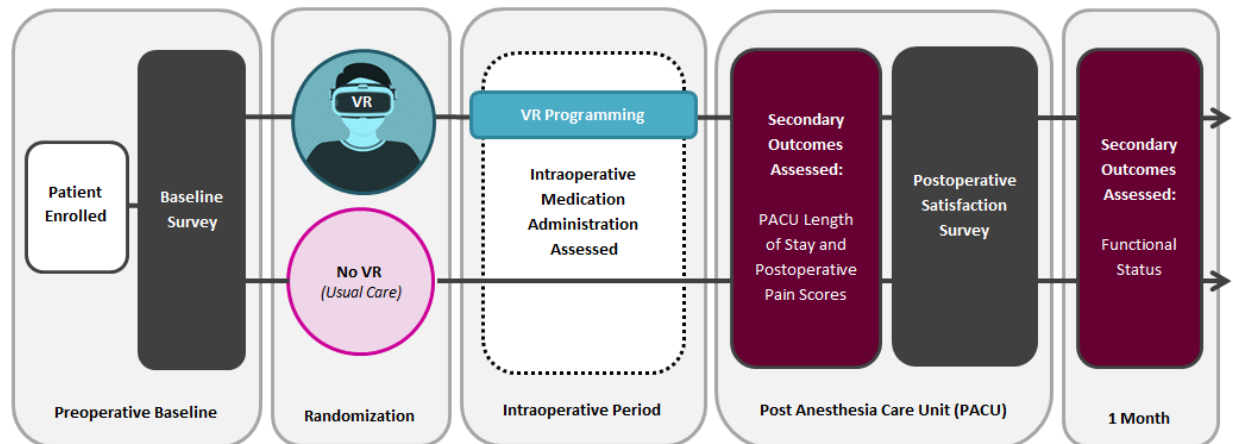


Figure 1. Study Schema

References

1. Chan, P. Y., & Scharf, S. (2017). Virtual Reality as an Adjunctive Nonpharmacological Sedative during Orthopedic Surgery under Regional Anesthesia: A Pilot and Feasibility Study. *Anesthesia and Analgesia*, *125*(4), 1200–1202. <https://doi.org/10.1213/ANE.0000000000002169>
2. Furman, E., Roma Jasinewicius, T., Bissada, N. F., Victoroff, K. Z., Skillicorn, R., & Buchner, M. (2009). Virtual reality distraction for pain control during periodontal scaling and root planing procedures. *Journal of the American Dental Association*, *140*(12), 1508–1516. <https://doi.org/10.14219/jada.archive.2009.0102>
3. Morris, L. D., Louw, Q. A., & Grimmer-Somers, K. (2009). The effectiveness of virtual reality on reducing pain and anxiety in burn injury patients: A systematic review. *Clinical Journal of Pain*, *25*(9), 815–826. <https://doi.org/10.1097/AJP.0b013e3181aaa909>
4. Vázquez, J., Wiederhold, B., Miller, I., & Wiederhold, M. (2017). Virtual Reality Assisted Anaesthesia During Upper Gastrointestinal Endoscopy: Report of 115 Cases. *Pdfs.Semanticscholar.Org*, (January), 75–82.