

## Active Virtual Reality Improves Vascular Access Compliance in Anxious Children

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**Introduction:** The fear of needles is commonly encountered by healthcare professionals when providing vascular access for pediatric patients. Virtual reality (VR) has been used in the healthcare setting for nearly two decades [1, 2], and it has recently demonstrated utility in vascular access settings [3]. The goal of this prospective, randomized study was to evaluate the efficacy of actively playing a VR game during vascular access compared to standard of care. Our primary outcome was compliance. Secondary outcomes were child self-reported fear, pain, and anxiety ratings.

**Methods:** 49 pediatric patients undergoing vascular access at the Lucile Packard Children's Hospital Stanford were enrolled. Vascular access included blood draw, IV placement, or port access. Participants were randomized to an active VR game (n = 24, mean age = 14.02, SD = 2.56) or control (n = 25, mean age = 13.44, SD = 3.55). For VR patients, the proprietary game Spaceburgers™ was played on a customized Samsung Gear VR headset and S8 smartphone during vascular access. For control patients, standard of care was provided. The primary outcome was measured by a modified Induction Compliance Checklist (mICC). The ICC is traditionally used to measure pediatric compliance during induction of anesthesia, but underwent minor modification of wording to apply it as a measure of compliance of vascular access. mICC scores of 0 indicate perfect access, while scores > 6 indicate poor compliance. Secondary outcomes were assessed via the Children's Fear Scale (CSF), pain scale, and Childhood Anxiety Meter (CAM).

**Results:** Percentage of perfect access were similar at 91.67% for the VR group and 88% for the control group (p = 0.68), demonstrating demographic homogeneity. For the population of interest, those in need of extra support during vascular access, there was a significant difference demonstrated between average mICC scores (p = 0.032). Patients in the control group who did not have perfect access exhibited a higher mICC average score of 3.67, indicating lower compliance. Patients in the VR group who did not have perfect access exhibited a lower mICC average score of 1.5, indicating higher compliance. For secondary outcomes, statistical significance was not found. The VR group had a smaller rise in fear (p = 0.060), larger rise in pain (0.91), and decrease in anxiety (p = 0.56) relative to the control group.

**Conclusion:** There was no statistical difference between groups in mICC scores for perfect vascular access. However, for those patients who did not have perfect access, the VR group performed at a lower mICC score with better compliance. The VR group also shows promise in

mitigating fear and anxiety, but not pain, amongst pediatric patients. Future studies should include larger sample sizes for greater power to examine covariates of interest.

**References:**

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