

29. **ORTHOPAEDIC SURGERY IN THE METAVERSE: CURRENT DATA ON VIRTUAL-REALITY BASED TRAINING**

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<https://www.youtube.com/watch?v=vlsNiqV1-28&t=11833s>

**BACKGROUND:** Immersive, realistic, and low-risk training has long been ideal for skill-based disciplines such as surgery. Recent advances in virtual reality technology have led to development of surgical training software with the goal to provide experience without risk. The aim of this review is to summarize the current data for virtual reality-based orthopaedic surgery training to evaluate how beneficial the technology may become in educational circumstances. **METHODS:** A literature review was completed analyzing eight randomized controlled trials completed between 2019 to 2022 to evaluate the effect of virtual reality on orthopaedic surgery education for medical students and residents. Each trial included groups of learners that were trained on a specific procedure with standard methods ("control") or virtual reality software ("VR group"). Subjects were then evaluated on completion of procedures with real-life models. Procedures included total hip arthroplasty (n=2), tibial intramedullary nail (n=2), slipped capital femoral epiphysis pinning (n=2), and unicompartmental knee arthroplasty (n=2). The primary metrics assessed were time to complete procedure and objective assessment scores. Secondly survey results were evaluated regarding subjects' perceived utility of virtual reality in orthopaedic surgery training. **RESULTS:** 168 subjects (medical students n=68, residents n=100) were included across the 8 different trials. All trials included at least one objective assessment and it was found that overall, the VR group performed 19.9% better than control group on average ( $19.875 \pm 18.324$ , 95% CI). Seven of the trials reported time to complete procedure, in which it was found that overall VR group completed the procedures 12% faster than control group on average ( $12 \pm 10.988$ , 95% CI). Subjective measures showed that over 70% of subjects found the VR learning to be at least "helpful" or "useful". **CONCLUSION:** Early studies of the emerging field of virtual reality in surgical training are promising. When looking at objective measures and time to complete procedures, VR trained learners perform as well, if not better, than standard method learners. Inclusion of virtual reality-based practice in medical school curricula and residency training may lead to less surgical errors, increased knowledge of procedures, and more efficient learning in real-life scenarios. This potential impact extends beyond well-resourced institutions, as VR technology can provide a cost-effective and accessible alternative for surgical training in low-income and low-resource areas of the world, democratizing access to high-quality medical education. Continued research on translation into clinical practice is warranted, with the potential to bridge educational disparities and improve surgical outcomes on a global scale.

**Key words:** Virtual Reality; Orthopaedics; Medical Education; Arthroplasty; Global Health (Source: MeSH-NLM).