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LETTER TO THE EDITOR

Virtual Reality in Orthopaedic Residency Training: A Survey of Resident Perspectives and Utilization Patterns

Dear Editor

Virtual reality (VR) surgical simulation has emerged as a promising tool in orthopaedic residency training, offering a safe and immersive environment for skill development that does not involve actual patients. The primary advantage of VR in surgical education is its ability to allow trainees to independently learn, rehearse, and review surgical steps in a relatively risk-free environment supported by built-in instructional guides and real-time feedback.[1,2] Recent studies indicate that VR training is particularly beneficial for junior residents, with a lesser impact observed among senior residents.[3-5] Despite the demonstrated benefits, such as skill acquisition and improved operative performance, most studies have not explored end-user perceptions nor established best practices for integrating VR into existing orthopaedic education.[6] To address this gap, we conducted a survey study to assess the usage patterns, perceptions, and barriers to the adoption of VR among junior residents.

Our institution piloted the VR system (OSSO VR, Palo Alto, 2016) for approximately two months to Postgraduate Year 1 (PGY-1) and Postgraduate Year 2 (PGY-2) junior orthopaedic residents [Figure 1]. Residents were assigned VR modules covering trauma and arthroplasty procedures, with instructions to complete each module in teaching mode, achieve target times, and subsequently complete them in test mode. Following this pilot period, an anonymous survey was administered via Google Forms, which included questions regarding resident utilization patterns, perceived effectiveness of the VR training, barriers encountered, and suggested improvements. A total of twelve residents responded (6 PGY-1 and 6 PGY-2; mean age 29 years [25-36]; 83% male), representing a 100% response rate. This study was determined to be a Quality Improvement/Quality Assessment project by the Institutional Review Board. Thus, formal approval was not required.

The results of our study are notable [Table 1]. Residents reported modest weekly usage of VR: 50% practiced for 1-2 hours, 33% for less than one hour, and 17% for three to five hours. The most commonly used modules were fracture fixation (67%) and joint replacement (33%). The perceived effectiveness of VR training averaged 3.1 on a 1-5 Likert scale, with 33% rating it as a 4 or 5. The main barriers to VR adoption included a lack of protected training time (92%), technical difficulties (33%), and device complexity (25%). Suggested improvements included better tactile feedback (67%), a wider variety of cases (50%), and the integration of real patient data (33%). Of note, 59% of respondents recommended VR to other residency programs.

The incorporation of VR in orthopaedic training may offer several advantages for junior orthopaedic surgery residents, including risk-free learning, performance analytics, and unlimited practice opportunities. Our preliminary findings underscore the value of VR as a supplementary educational tool for junior trainees. However, persistent challenges identified in our study may limit widespread adoption. Addressing these barriers by optimizing curriculum integration, improving system performance and reliability, minimizing user interface complexity, and diversifying procedural content may improve utilization and effectiveness. Further multicenter studies and systematic reviews are necessary to evaluate the broader effectiveness of VR and to facilitate the development of a standardized curriculum.

Figure 1. Artificial intelligence-generated illustration of an orthopaedic resident using a virtual reality headset to engage in procedural simulation training. Created using DALL·E (Open AI, 2025) for conceptual and illustrative purposes only.

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Table 1. Resident Utilization and Perceptions During a Virtual Reality Pilot Study	
Total Count, n (%)	12 (100)
Demographics	
Age (years), mean (range)	28.7 (25–36)
Sex, n (%)	
Male	10 (83)
Female	2 (17)
Training level, n (%)	
PGY-1	6 (50)
PGY-2	6 (50)
Weekly VR exposure, n (%)	
< 1 h	4 (33)
1–2 h	6 (50)
3–5 h	2 (17)
Most-practiced modules, n (%)	
Fracture fixation	8 (67)
Joint replacement	4 (33)
Perceived effectiveness (Likert 1–5), mean (SD)	3.1 (1.2)
Ease of use, n (%)	
Easy	7 (58)
Neutral	3 (25)
Difficult	2 (17)
Physical discomfort, n (%) ‡	
Never	2 (17)
Rarely	3 (25)
Occasionally	5 (42)
Frequently	2 (17)
Primary barriers cited, n (%)	
Lack of protected time	11 (92)
Technical issues	4 (33)
Device complexity	3 (25)
Desired improvements, n (%)	
Enhanced haptic feedback	8 (67)
More case variety	6 (50)
Real-patient data integration	4 (33)
Higher-resolution graphics	3 (25)
Likelihood to recommend VR, n (%)	
Very likely	5 (42)
Likely	2 (17)
Neutral	1 (8)
Unlikely	3 (25)
Very unlikely	1 (8)

‡ Eye strain and dizziness were the most reported physical discomforts cited during or after VR use.
Abbreviations: SD, standard deviation; VR, virtual reality

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