Simulation-Based Education

In a systematic review of randomized clinical trials Mawyin-Muñoz et al. from the University of Granada,; Teodoro Maldonado Carbo Hospital, Guayaquil; Espíritu Santo University, Samborondon; Catholic University of Santiago of Guayaquil. published in the BMC Medical Education to evaluate the effectiveness and relevance of simulation-based medical education, particularly in neurological and neurosurgical training. Simulation-based education significantly enhances learning, skill acquisition, feedback, and stress management across various specialties, including neurosurgery. However, despite improvements in performance metrics, no studies showed reduced operative complications or mortality. Emerging technologies such as AI and robotics remain investigational with undefined clinical impact [1].

Critical Review

While the authors present a comprehensive PRISMA-guided systematic review, the methodology is shallowly described, lacking detailed inclusion/exclusion criteria and specific metrics for skill assessment. The selection of 26 RCTs is commendable, yet the synthesis of results is oversimplified, with limited discussion on study heterogeneity, bias, or statistical significance beyond vague affirmations.

The absence of measurable outcomes related to surgical safety or patient survival undermines the claim of simulation being “essential.” Moreover, no direct neurosurgical procedures are evaluated in depth, raising concerns about the extrapolation of findings to neurosurgery. The review is enthusiastic but not sufficiently critical, and lacks a nuanced understanding of the limitations and contextual demands of real-world neurosurgical education.

Final Verdict: Ambitious but superficial. The article promotes simulation as a panacea without rigorously confronting its limitations or gaps in evidence.

Takeaway for the Practicing Neurosurgeon: Simulation training is beneficial for skill development and stress reduction but remains unproven in improving clinical outcomes or operative safety in neurosurgery.

Bottom Line: Simulation-based education shows promise but needs more robust, specialty-specific evidence before being deemed essential in neurosurgical training.

Rating: 5/10

Title: Simulation-Based Education **Citation:** Mawyin-Muñoz CE, Salmerón-Escobar FJ, Hidalgo-Acosta JA, Calderon-León MF. *Medical simulation: an essential tool for training, diagnosis, and treatment in the 21st century*. BMC Med Educ. 2025 Jul 7;25(1):1019. doi: 10.1186/s12909-025-07610-z. PMID: 40624635. **Corresponding Author Email:** aquileschonero@hotmail.com

Blog Categories: Education, Simulation, Evidence-Based Practice **Tags:** simulation training, medical education, neurosurgical simulation, PRISMA, skill acquisition, stress reduction, clinical outcomes, artificial intelligence, mixed reality

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