ACS 2026 Surgeons and Engineers: A Dialogue on Surgical Simulation

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Challenges in Surgical Education

Mi SafeSAM: Early Evaluation and Durability Test of a Novel Infant Spinal Anesthesia Task Trainer

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Background: In children<2 years, pediatric spinal anesthesia (SA) has resurged. Although task-trainers exist to teach neonatal lumbar puncture, no such simulator exists for SA. We created the MiSafeSAM, a novel simulator designed to support training of the full pediatric SA procedure workflow, from patient positioning/landmark identification to needle insertion and anesthetic administration. METHODS: We created a durable infant-sized body form, with anatomical landmarks and a silicon body with replaceable insert. Spring of 2025, 15 pediatric anesthesiologists evaluated the simulator's physical attributes, realism of experience, ability, value, and relevance with a 41-item survey using 4-point rating scales (4.0=highest). The senior author tested the insert's durability by counting pokes to; a) leak from injection site, b) visible injection site needle damage, c) decreased intrathecal "pop," and d) decreased CSF flow. The means, SD, 95% CI, comments, and poke counts were reported. RESULTS: Participants reported M=9.6±4.8 years' experience and 2.3±2.8 SA monthly cases. Means aligned with adequate realism and comments suggested improvement to the model's head (e.g. "Head is heavy" and "...more flexibility in neck"). Ability scores aligned with "Somewhat easy to perform," and value ratings,M=3.93,SD=0.26, aligned with "Great deal of value..." The poke test indicated 50 pokes until detectible needle damage, minimal leaking at injection site, and decreased intrathecal "pop," with no decrease in CSF flow at 100 pokes. **CONCLUSIONS**: MiSafeSAM holds promise for pediatric SA training. Following modifications, we will test the generalizability of findings and develop a comprehensive curriculum and competency assessment program.

Current Challenges: In spite of resurgence of awake spinal anesthesia, existing commercially-available models do not adequately support SA training.

Need of Innovation: SA is a coordinated effort between the practitioner and patient positioner. With a focus on procedural skills, existing simulators fail to support learning of all awake spinal anesthesia skills-procedural, communication, and positioning of infant.

Mean scores for targeted domains, 4= highest score		
Domain	**Mean Score (*SD*)**	**95% CI**
Physical Attributes	3.44 (0.33)	3.11 - 3.77
Realism of Experience	3.20 (0.96)	2.24 - 4.16
Value as testing tool	3.67 (0.62)	3.05 - 4.28
Value as training tool	3.93 (0.26)	3.68 - 4.19
Relevance to practice	3.00 (0.00)	3.00 - 3.00
Global Rating	2.64 (0.63)	2.01 - 3.28