ACS 2022 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

Promoting Technology and Collaboration

Quantifying, Standardizing and Tracking Surgical Performance on an Open Simulator

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Background: For nearly two decades, various stakeholders have been calling for major revisions to the current training model. Since the establishment of the Surgical Council on Resident Education (SCORE) in 2006, important steps have been taken to make surgical training and evaluation more efficient. Restrictions on resident duty-hours, greater specialization, and subjective systems of assessment have elucidated an urgent need for better evaluation techniques.

Technology Overview: This technology is a proposed training tool for open vascular surgery that incorporates multiple procedures of progressive difficulty into a perfused benchtop device. A novel method for manufacturing durable synthetic vasculature accurately replicates the physical properties and complex anatomical geometries of human vessels. Soft capacitive sensors collect data on surgical performance and provide quantitative feedback to residents in real time, allowing for user-specific skill tracking, as well as skill benchmarking across an online database. Procedures will range from basic anastomosis practice to complex procedures such as re-attempted Abdominal Aortic Aneurysm repair after failed EVAR.

Potential Application in Surgical Simulation and Education: The proposed technology has potential to allow for the standardization of simulation training as well as simulation-based objective assessment. Attendings will be able to assess their residents' level of technical competency before allowing them to participate in procedures. The proposed technology will remove bias and subjectivity from surgical evaluation, while also eliminating the need for attendings to be physically present to assess their residents' performance.

Potential Opportunities to Collaborate: Areas of collaboration include published research studies evaluating the effectiveness and impact of this technology, co-development for procedures outside of vascular surgery, and co-development of an online learning management system to track and store data collected from users.