

Virtual ACS 2021 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

Research In-Progress

Establishing Performance Metrics on Pinning Pediatric Elbow Fractures: From Simulation to the Operating Room

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Introduction: Supracondylar humerus fractures are one of the most common pediatric fractures. A standard treatment approach is to fix the fracture by pinning it with three surgical wires spread across the fracture line under fluoroscopic guidance. We developed a novel simulator to train orthopaedic residents on this critical and difficult wire navigation skill. The goal of this work was to establish the validity of the new simulator by demonstrating performance differences between expert and novice orthopaedic surgeons working with the simulator and in the operating room (OR).

Methods: Simulator performance was assessed with 4 novice and 4 attending orthopaedic surgeons. Performance was measured by: (a) the spread of the wires at the fracture line, (b) the number of fluoroscopic images used while placing the wires, (c) and the duration of time spent. OR performance on pinning pediatric supracondylar humerus fractures was assessed on any relevant case from January to October of 2019, in which all fluoroscopic images acquired during surgery were saved. This allowed for a post-operative analysis of the performance using the same metrics as were used for the simulator.

Preliminary Results: On the simulator, experts demonstrated greater pin spread at the fracture line and used fewer images than novice surgeons. The OR data revealed almost no correlation between the number of images used and the pin spread of the surgeon, suggesting these metrics are independent of one another and can be combined to form a composite score.

Next Steps: We will take new residents through a curriculum on the simulator before they enter the OR. Then we will measure their performance using the newly validated metrics and compare their skill level with previous data on residents that hadn't practiced on the simulator. This will demonstrate if training on the simulator can improve performance in the OR.