Hernia Tutor: Evaluating the Use of an Open Inguinal Hernia Repair Training System

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Introduction: The Hernia Tutor is a mastery-based proctor-less training platform developed to facilitate acquisition of technical skills in open inguinal hernia repair with mesh. The platform will use a combination of machine learning and instructional aides to assess technical skills and provide feedback to its users. This study aimed to gather validity evidence for the Hernia Tutor platform for the "scoring inference" in the Kane's validity framework.

Methods: We recruited 6 expert surgeons and 10 novices (medical students) for the study. Each participant was recorded performing simulated open inguinal hernia repair on a phantom. Participants were either provided the Hernia Tutor system or were not. We recorded how many steps of the procedure that were completed, the time spent on each step, and whether the procedure was completed within a 55-minute time frame. To set performance benchmarks for procedural skills, we used the total procedure time and the time to complete each step averaged across the 6 experienced surgeons. We then compared the time taken and completion rate of the novice participants given the system and not given the system to one another and our benchmark.

Results: On average, each step took 48% longer for those performing the procedure without the Hernia Tutor than those provided the system. While both groups took most of the 55-minute time frame, those that were with the system finished the procedure at a 50% higher rate than those who were not provided the Hernia Tutor system. Neither group performed near the expert participants.

Conclusions: We found that the instructional material and aids provided to the novices were helpful as a form of feedback for the novices. Those provided the system performed significantly better than their counter parts without.
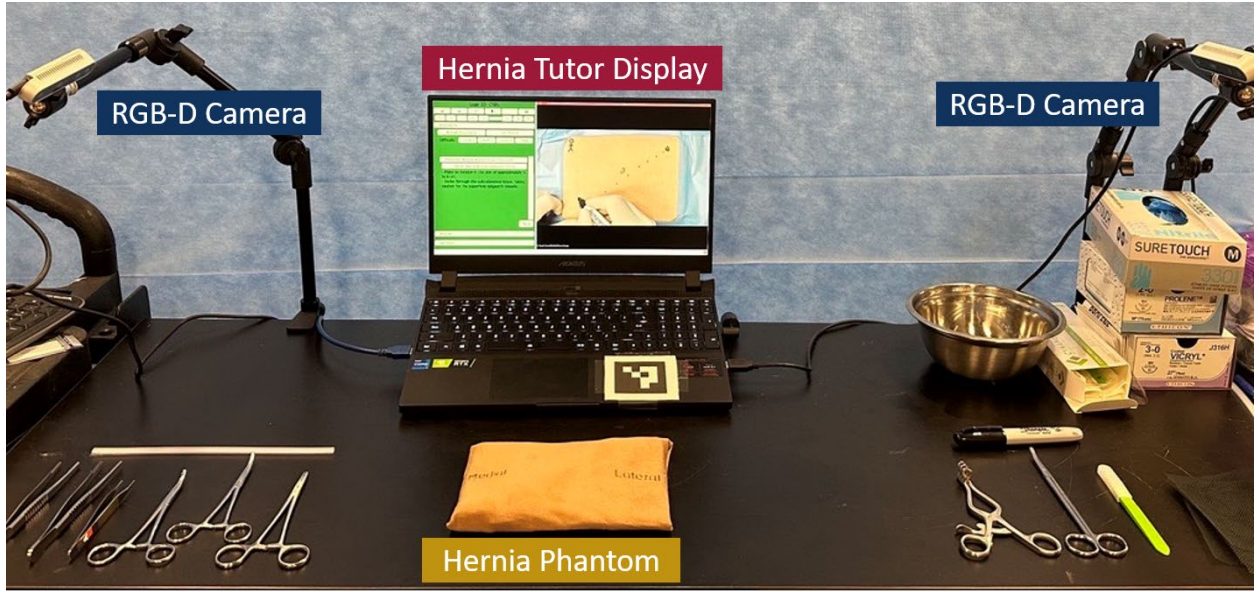
RGB-D Camera

Hernia Tutor Display

RGB-D Camera

Hernia Phantom