Commentary

Can Robots Accelerate the Learning Curve for Surgical Training? An Analysis of Residents and Medical Students

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Abstract

Surgical traineeship has traditionally been based on a master apprentice model where learning takes place in the operating theatre. This approach has changed over the past few years with greater emphasis on surgical training taking place within the surgical skills laboratory. We developed a high fidelity simulator, the Image-guided Robotic Assisted Surgical simulator (IRAS) with an incorporated robotic guidance feature. The robot system is developed to mimic the process of an experienced surgeon physically holding a trainee's hands to demonstrate manoeuvring of the laparoscopic instruments. We aimed to assess the efficacy of incorporating robotic guidance into this high fidelity surgical simulator. Forty-two participants (13 surgical residents and 29 medical students) were recruited. Participants had one practice run for familiarisation and subsequently performed the virtual laparoscopic cholecystectomy (LC) once. Among the medical students, they were randomised to either a control or intervention group. They were tasked to perform a second- and third-timed LC assessment. Participants were asked to rate the simulator using a 5-point Likert scale questionnaire. IRAS rated favourably in hand-eye coordination and training bimanual dexterity (mean score: 4.1 and 4.0 among students, 3.4 and 3.4 among residents) though it faired suboptimally in realism. At baseline, residents were statistically faster compared to students (overall time: 418.9 vs 586.8 seconds, $P = 0.001$). Participants randomised to the intervention group consistently scored better. However, their overall time were not statistically significant from the control group. The robotic guidance capability of the IRAS is a key advantage of this simulator platform over the conventional platform.

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