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Research Abstracts

Assessing the Impact of Hands-on Anatomical Model Construction on Medical Students' Procedural Skills: A Randomized Controlled Trial

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Introduction: Our group developed a low-cost, proctorless system that leverages computer vision to assess open surgical skills - the Open Surgery Tutor (OST) (Fig.1). This system can be sustainable by having learners construct phantoms. This study investigates whether participation in phantom construction is associated with superior open surgical skills in a simulated environment.

Methods: We conducted a prospective randomized controlled trial with 2nd year medical students at Queen's University. Study participants were asked to perform an open IH repair on a phantom using the OST following randomization into three educational interventions: (1) Control Group: no teaching, (2) Lecture Group: 45-min lecture, and (3) Phantom-Building Group: 45-min lecture and 1-hr to build an IH phantom. The primary outcome was open surgical skills - assessed using the OCHRA (number of errors committed). Secondary outcomes included proportion of IH procedural steps completed, and perceived value of each educational intervention.

Results: We had 30 participants: control group (n=7), lecture group (n=11), and phantom-building group (n=12). Control group participants committed greatest number of errors during an open IH repair (mean (SD) 13.5(10.5)) vs lecture group (11.7(10.3)) vs phantom-building group (9.5(10.3)); p=0.87. Participants assigned to the control group completed a greater proportion of the steps of IH repair (95(7)%) vs lecture (80(18)%) vs phantom-building group (87(18)%); p=0.02. Participants rated the phantom-building activity as moderately effective for learning inguinal canal anatomy (3.5/5), and the utility in understanding open IH repair as moderate (3.1/5).

Conclusions: Participants who built IH phantoms committed fewest errors during a simulated IH repair, while still completing over 85% of the procedure. This suggests that medical students who build their own phantoms, in addition to attending a lecture, are more cautious and intentional in their open surgical skills. Thus, building anatomical models is a promising learning intervention to improve the technical skills of students.