Tuesday, May 07, 2013 08:00AM - 10:00AM

Technology & Instruments: Surgical Education & Skills Assessment (II) Podium

1569: Novel augmented reality video simulation for robotic partial nephrectomy surgery training

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Abstract: 1569

Introduction and Objectives
Existing robotic virtual reality simulators have focused on basic surgical skills. Mimic Technologies and USC Urology have jointly developed a prototype training module featuring augmented reality simulation on the dV-Trainer. Users observe 3D video of robotic kidney surgery and operate augmented virtual instruments to identify anatomy, demonstrate technical skills, and learn steps of the operation. Herein, we evaluate the face, content, and construct validity of the proof-of-concept prototype.

Methods
Pre-study questionnaires were used to classify participants as â€œnoviceâ€ (no prior robotic cases as primary surgeon (n=24)) or â€œexpertâ€ (≥30 cases (n=12)). Participants were prospectively assessed on a training module featuring the bowel mobilization segment of a robotic partial nephrectomy. Performance metrics collected using Mimic software on the dV-Trainer were categorized as anatomy, technical, or steps. A post-study questionnaire assessed realism of simulation module (face validity), and utility as training tool (content validity). Wilcoxon nonparametric test compared performance data between cohorts (construct validity).

Results
Novice and expert surgeons had performed a median of 0 and 200 (30-2015) robotic cases, respectively (p=0.004). Experts rated the module as â€œvery realisticâ€ (median 8/10 (range 4-10)) and â€œvery usefulâ€ for resident training (9/10 (5-10)). Anatomy and steps exercises rated highly as training tools (8.5/10 (6-10) and 8/10 (5-10), respectively). Technical exercises in the prototype form received more modest scoring (5.5/10 (2-9)).

Experts outperformed novices on overall attempts to correct answer (p=0.004), while they took similar time to complete all exercises (p=0.1). Expert outperformed novices on steps questions (no. attempts p<0.0001; answering time p=0.004), but performed similarly on anatomy questions (no. attempts p=0.2; time p=0.09) and technical skills exercises (no. attempts p=0.06; time p=0.7).

Conclusions
This proof-of-concept prototype using augmented reality simulation has face and content validity, and construct validity in teaching steps of the operation. Anatomy identification and technical skills training exercises will undergo further refinement in development.

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