Expert Assessment Does Not Correlate with Case Volume in Evaluating Robotic Proficiency

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Background

- Robotic case volume is used as a surrogate for proficiency in the literature and clinical practice
- The Global Evaluative Assessment of Robotic Skills (GEARS) scoring system is a validated tool for evaluating robotic surgeon performance
- The aim of this study is to determine if surgeon case volume correlates with GEARS score when evaluated by expert surgeons

Methods

Modified GEARS Assessment

	1	2	3	4	5
Depth perception	Constantly overshoots target, wide swings, slow to correct		Some overshooting or missing of target, but quick to correct		Accurately directs instruments in the correct plane to target
Bimanual dexterity	Uses only one hand, ignores nondominant hand, poor coordination		Uses both hands, but does not optimize interaction between hands		Expertly uses both hands in a complementary way to provide best exposure
Efficiency	Inefficient efforts; many uncertain movements; constantly changing focus or persisting without progress		Slow, but planned movements are reasonably organized		Confident, efficient and safe conduct, maintains focus on task, fluid progression
Force sensitivity	Rough moves, tears tissue, injures nearby structures, poor control, frequent suture breakage		Handles tissues reasonably well, minor trauma to adjacent tissue, rare suture breakage		Applies appropriate tension, negligible injury to adjacent structures, no suture breakage
Robotic control	Consistently does not optimize view, hand position, or repeated collisions even with guidance		View is sometimes not optimal. Occasionally needs to relocate arms. Occasional collisions and obstruction of assistant.		Controls camera and hand position optimally and independently. Minimal collisions or obstruction of assistant

Methods

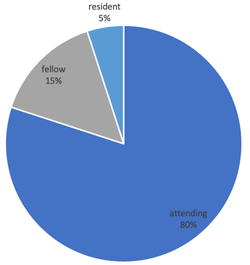
- 20 video recordings of simulated bovine intracorporeal bowel anastomosis (ICA) performed using the intuitive Xi robotic platform by attending, resident and fellow surgeons of varying experience levels were independently evaluated and scored by three expert colorectal surgeons (having performed > 400 robotic colon cases) using modified GEARS assessment
- Surgeons were self reported independent console case volume were reported (1-20, 21-50, 51-100, or >100), novice surgeons were defined as <100 cases and expert surgeons were defined by >100 cases
- Statistical analysis was performed using SPSS Version 29. Median scores were compared using Fisher test as non-parametric test. Inter-rater reliability was assessed using Cronbach's analysis. Correlation was calculated using Pearson coefficient for continues variables and Spearman's coefficient for discrete variables. Statistical significance was defined as $p<0.05$.

Results

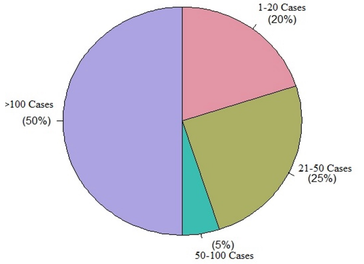
Table 1. Correlation between Surgeon's characteristics and performance GEARS evaluation

GEARS evaluation	Depth perception	Bimanual Dexterity	Efficiency	Force sensitivity	Robotic Control	Total scores	Opinion (Expert/ Novice)
Experience in years (after training)	0.97	0.27	0.95	0.47	0.05	0.94	0.76
Experience in robotic surgery (years)	1	0.64	0.43	0.25	0.61	0.21	0.66
Number of cases	0.58	0.62	0.14	0.85	0.57	0.09	0.83

Participant Surgeon Demographics



Surgeon's Prior Case Volume



Author Disclosures: *Intuitive, Surgery United, SurgeOn, Stryker, Medtronic, Applied Medical, Connmed, Human Extensions, LivsMed, J&J, Astellas Pharmaceuticals, Distal Motion, Endo Quest, Noah*

Results

- 10 (50%) surgeons were defined as experts (>100 cases)
- The was no significant difference in median scores between self-assessed novice and experts in terms of: Depth perception (p=0.66),Bimanual Dexterity (p=1), Efficiency (p=0.58), Force sensitivity (p=1), Robotic Control (p=1) and Total Scores (p=0.18)
- Cronbach's analysis yielded an alpha of 0.71, suggesting acceptable interrater reliability of expert reviewers

Discussions

- Surgeons' own assessment regarding robotic skills may be inaccurate when being assessed objectively by expert reviewers
- Case volume does not appear to correlate with robotic proficiency when objectively using the modified GEARS assessment

Conclusions

- Future consideration and research is warranted to determine what defines robotic proficiency, particularly when performing colorectal surgery

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