Simple, Annotated, Video-Based Instruction Augments General Surgery Residents' Robotic Surgical Skills and Satisfaction Compared to Traditional Rote Practice

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Introduction

Teaching residents to operate safely with the robot presents unique challenges due in part to the physical distance between the trainee and the surgeon. While consistent practice on the console facilitates skill, the availability of expert surgeons to coach residents can be a limited resource. We set out to assess whether the addition of an enhanced instructional video with narration and instructional arrows may increase the effectiveness of individual practice of robotic surgical skills.

Methods

Twenty-two general surgery residents (PGY 1-5) were randomly assigned to either watch an enhanced annotated instructional video on knot-tying or a sham video. They performed the task twice before and twice after watching the video and their performances were scored with the Global Evaluative Assessment of Robotic Skills (GEARS) scale. The two scores before and after the intervention were averaged for comparison. Surveys were also conducted before and after the intervention.

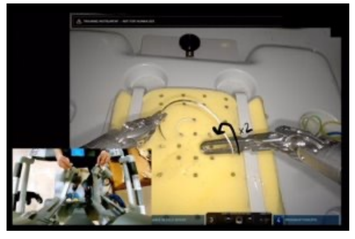


Figure 1. Enhanced instructional video with annotations specifying the direction of movement and voice-over narration of each step.

Depth Perception				
1	2	3	4	5
Consistently exceeds the target, large movements, fixes slowly.		Some failures in making the goal, but corrected quickly.		Directs the instruments in the correct plane to the target.
Bimanual skill				
1	2	3	4	5
Use only one hand, ignores the non-dominant hand, poor coordination between the two.		Use both hands, but the interaction between them is not optimal.		Use both hands in a complementary manner for optimal exposure.
Efficiency				
1	2	3	4	5
Many tentative movements, frequent changes in the thing to do, not progress.		Slow movements, but organized and reasonable.		Confident, efficient, remains focused on the goal.
Force control				
1	2	3	4	5
Jerking, tearing the tissue, damage to structures. Frequent breaking of the suture.		Reasonable handling of tissues, less damage occurs. Occasional rupture of the suture.		Proper handling of tissues, proper traction thereof. Without breaking the suture.
Autonomy				
1	2	3	4	5
Unable to complete the procedure.		The individual is able to complete the task safely, with some guidance tutor.		Able to complete the task alone, without a guide.
Robot Control				
1	2	3	4	5
No optimizes the position of the hands on the console, frequent collision. The vision is not optimal.		Occasional collision of hand. Vision is sometimes not optimum.		Adequate control of the camera. Optimal hand position without collision.

Figure 2. GEARS Assessment Sánchez R, Rodríguez O, Rosciano J, et al. GEARS scale (Global Evaluative Assessment of Robotic Skills).

Results

	Sham Mean (SD)	Intervention Mean (SD)	P-value
Post Graduate Year	2.17 (1.4)	2.36 (1.5)	0.34
Bedside Cases	7.2 (8.0)	12.2 (16.5)	0.12
Console Cases	4.5 (10.5)	6.4 (13.3)	0.32
Total Hours on Robot	9.4 (14)	22.3 (36.2	0.08
Comfort	1.61 (.08)	2.2 (1.1)	0.04

Table 1. Average post graduate year, number of bedside and console cases, hours on robot, and comfort rating on the robot (scale of 1-5) in control and intervention groups.

	Sham Mean (SD)	Intervention Mean (SD)	P-value
Score Change	2.47 (3.7)	3.08 (4.3)	0.3
Time Change	-20.6 (94.1)	-27.2 (70.4)	0.4
Helpfulness	3 (.08)	3.7 (1.3)	0.02

Table 2. Average score and time change post video, in addition to helpfulness rating (scale of 1-5) in control and intervention groups.

	Sham Mean (SD)	Intervention Mean (SD)	P-value
Score Change	2.46 (4.0)	2.71 (4.1)	0.44
Time Change	-5.6 (93)	-31.3 (80)	0.22

Table 3. Average score and time change post video in subjects at PGY-1 level through PGY-3 level.

Conclusions

- The addition of an annotated instructional video to a standardized robotic surgery training curriculum improves performance of a task beyond practicing alone.
- General surgery residents report a higher level of satisfaction when receiving coaching, even when being delivered passively through an enhanced instructional video with narration of the steps of the task at hand.
- The results and future directions of this pilot study are intended to inform the best ways to construct a robotic surgery curriculum at the graduate medical education level, as a standardized curriculum has not yet been developed.

References

1.Larkins K, Mansour K, Costello D, et al. Recommendations for the design of video-based educational interventions as instructional tools in robotic surgical training. *J Robot Surg*. 2023;17(3):779-784. doi:10.1007/s11701-022-01513-7

2.Anacleto S, Mota P, Fernandes V, et al. Can narration and guidance in video-enhanced learning improve performance on E-BLUS exercises? *Cent European J Urol*. 2021;74(1):131-138. doi:10.5173/ceju.2021.0005

3.Sánchez R, Rodríguez O, Rosciano J, et al. Robotic surgery training: construct validity of Global Evaluative Assessment of Robotic Skills (GEARS). *J Robot Surg*. 2016;10(3):227-231. doi:10.1007/s11701-016-0572-1

4.Tom CM, Maciel JD, Korn A, et al. A survey of robotic surgery training curricula in general surgery residency programs: How close are we to a standardized curriculum? *Am J Surg*. 2019;217(2):256-260. doi:10.1016/j.amjsurg.2018.11.006