A NOVEL BENCH-TOP MODEL FOR ROBOTIC SKILLS ACQUISITION IN SURGICAL TRAINING

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INTRODUCTION

There is no universally adopted robotic surgery training program and assessment. Most programs use virtual reality (VR) simulators for training and case numbers to determine robotic proficiency. In this study, we evaluated trainee comfort, satisfaction, and speed with a robotic bench-top model and VR simulation (SimNow, Intuitive Surgical, Sunnyvale, CA).

METHODS AND PROCEDURES

Robotic trainees at multiple institutions were studied. Robotic bench-top models were designed to mimic common surgical techniques and were also designed in line with the skills on the Da Vinci SimNow program. Skills included suturing, puzzle piece cutting (Figure2A), railroad hand-to-hand transfer (Figure2B), and knot-tying (Figure2C). Participants completed pre-study questionnaires indicating the number of robotic cases performed, hours of training/simulation completed, and resident comfort with robotic skills using a Likert scale from 1-5. Trainees were randomized based on level of training into bench-top model or VR training groups (Figure1). Each underwent benchmark assessment, practice with either SimNow or bench-top model, and final assessment followed immediately by the post-study questionnaire (Figure2). Baseline and final assessment times were recorded in seconds.

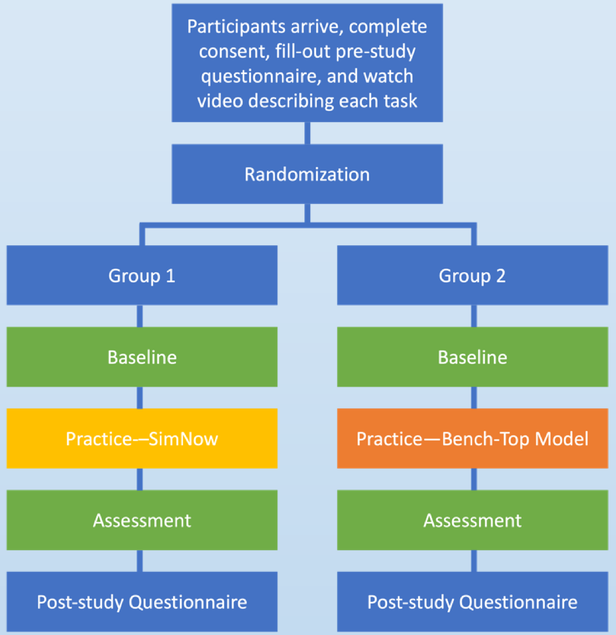
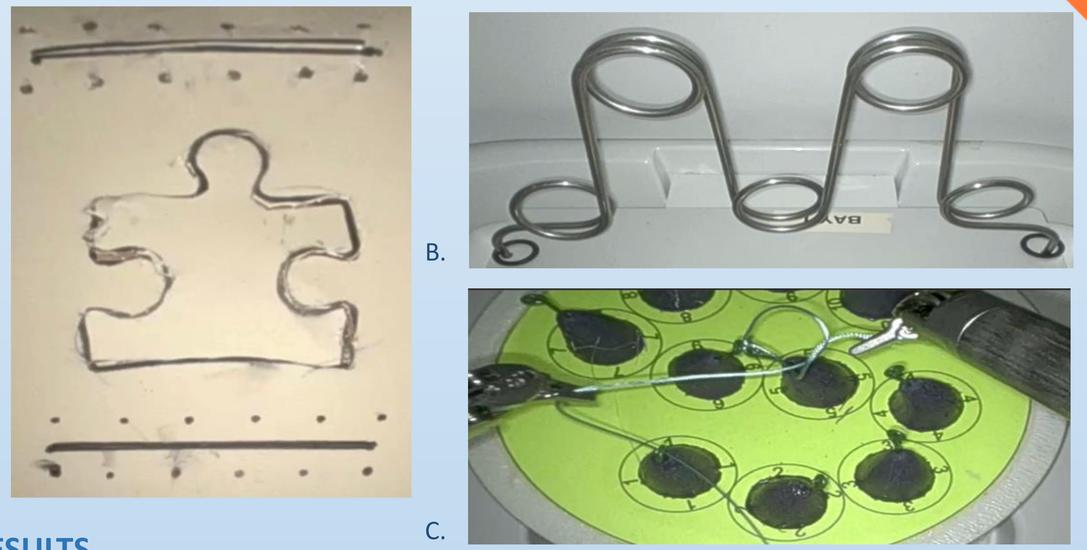


Figure 1. Methods for randomization, training, and assessment.

	Comfort Level		
Robotic Skill	*Baseline*	*Assessment*	
Camera Motion	3.2	4.3	*p<0.01
Hand-to-hand Transfer	3.0	4.1	*p<0.01
Knot-tying	2.4	3.1	*p=0.02
Forehand Suturing	2.8	3.2	p=0.1
Backhand Suturing	2.4	3.1	*p=0.02
Cutting	2.8	3.8	*p=0.01
Dissection	2.6	3.5	*p<0.01

Table 1. Comfort level before and after training on a Likert scale 1-5.

Figure 2. A—Suturing and puzzle piece, B-Ring roller coaster, C—Knot-tying.



RESULTS

Of 24 participants, 13 practiced on the bench-top model and 11 on the simulator. There were no significant differences in baseline comfort with robotic skills. All trainees reported significantly more comfort with most robotic skills after training (Table1). Regardless of training group, completion times for each task before and after training improved and there were no significant differences in improvement times between bench-top and simulator training groups.

CONCLUSIONS

Robotic training curricula lead to increased confidence and speed but are still underdeveloped in most residency programs. This pilot demonstrated improvement of trainee's task completion times in a limited subset of operators, further research will be aimed at integration of such model in our system-wide robotic training curriculum and its impact on clinical skills. More studies are necessary to determine the optimal breakdown between bench-top and VR training.

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