



Analysis and Monitoring of a Robotics Curriculum: Are SimNow Modules Valuable?

J. Applegarth, MD, I. Baida, MD, A. Iacco, MD, N. Nguyen, PhD NM Novotny, MD
Corewell Health East William Beaumont University Hospital, Royal Oak, Michigan

Introduction:

- Rapid increase in robotic surgery application, but Insufficient robotic simulated practice identified as a barrier to operative experience (1)
- Surgeons are more likely to allow residents to operate if given objective data demonstrating practice and skill (1)
- To address barrier, a formal institutional robotics curriculum (consisting of simulated and non-simulated components) instituted July 2021
- Simulated component consists of 14 modules (7 basic and 7 advanced) on DaVinci SimNow Simulator
- **Aim:** To perform post-implementation analysis to evaluate each module’s ability to simulate a valid, realistic operative experience and to train and capture a resident’s robotic surgery skill
- **Hypothesis:** If SimNow modules effectively capture robotic operative skill, then senior residents should perform significantly better compared to junior residents

Methods:

- General surgery residents completed 14 SimNow modules (Figure 1)
- Analyzed average # of attempts to pass, score, and duration
 - Pass = score 90 or greater on 2 consecutive attempts
- Wilcoxon Rank Sum test was used to compare juniors (PGY1-2) vs senior (PGY3-5) residents.
- Cohen's d effect sizes were calculated to quantify the magnitude of differences between groups.

Table 1: Comparison of SimNow modules by group

Modules	PGY 1-2	PGY 3-6	p-value
Camera 0	n = 14	n = 16	
Average Attempts to Pass	4.64	2.50	0.072
Average Score	87	96	0.036
Average duration	155	144	0.236
Wrist Articulation	n = 15	n = 14	
Average Attempts to Pass	4.53	3.50	0.098
Average Score	84	91	0.049
Average duration	123	109	0.023
Combo Exercises	n = 13	n = 14	
Average Attempts to Pass	4.46	4.43	0.980
Average Score	83	87	0.286
Average duration	443	390	0.025
ATW Needle	n = 13	n = 13	
Average Attempts to Pass	11.7	6.9	0.022
Average Score	62	73	0.050
Average duration	163	144	0.091

Figure 1: SimNow Modules

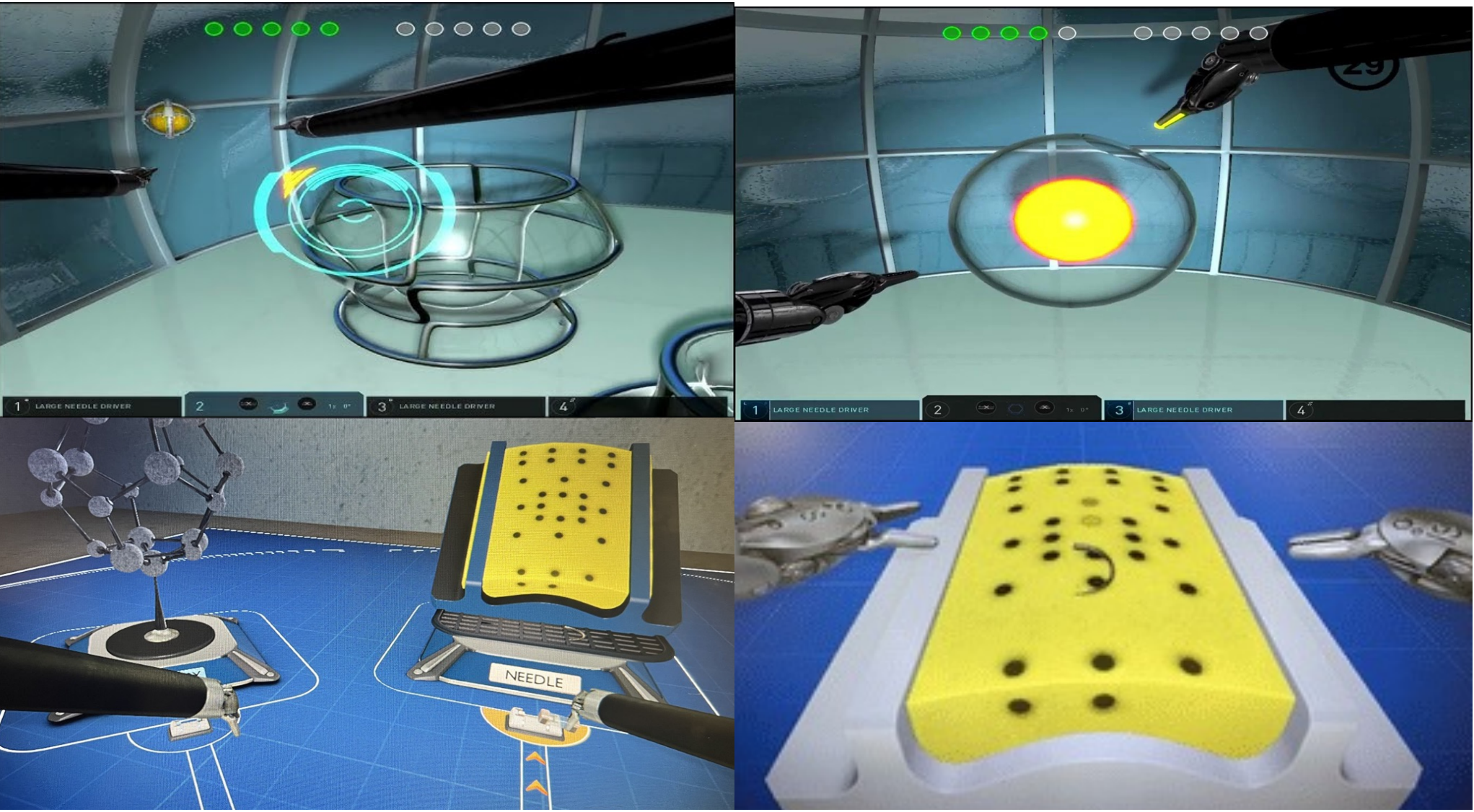
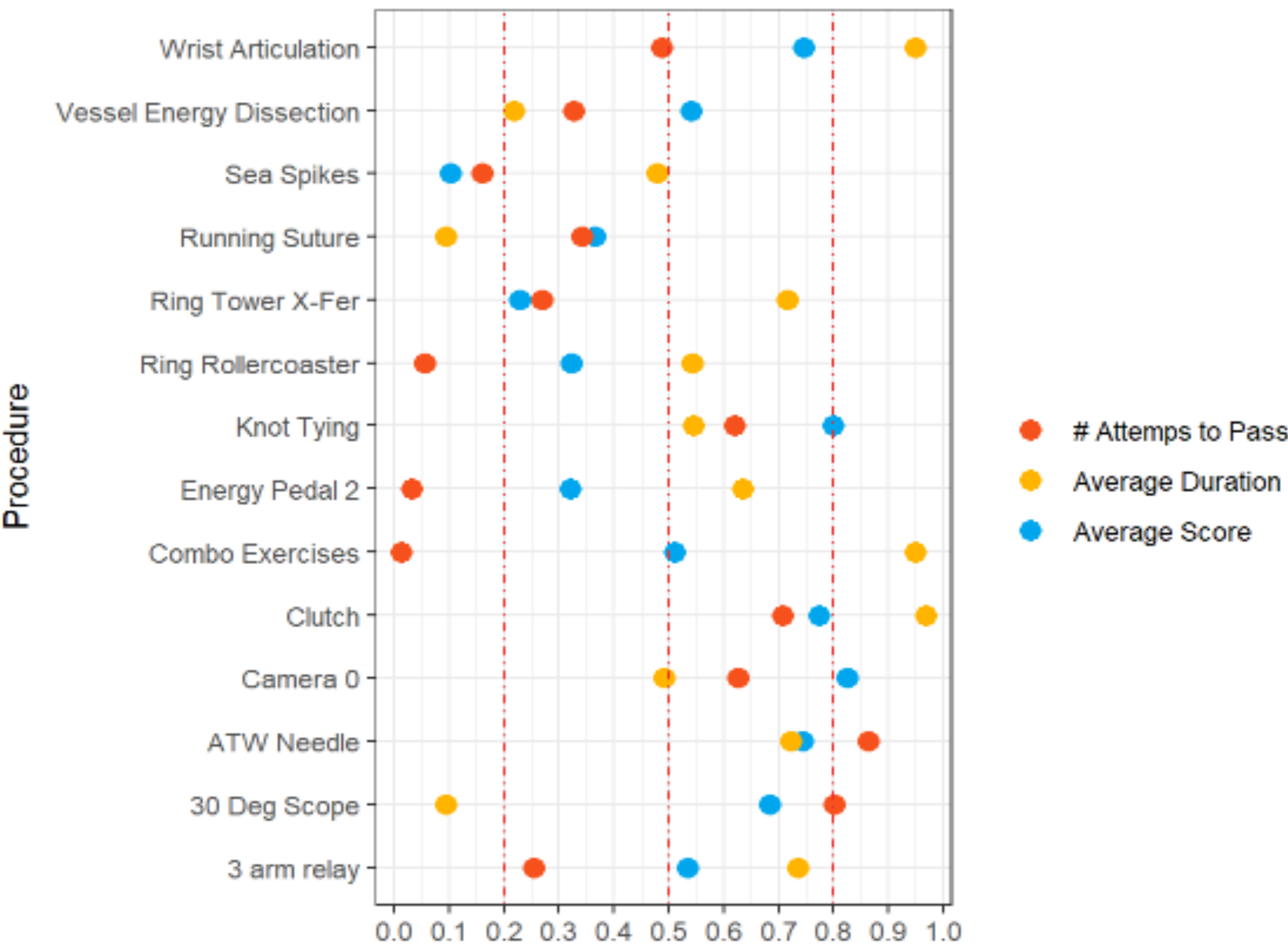


Figure 2: Effect size by Cohen's d test



Results:

- 2,425 attempts and 490 completed modules were performed by 35 residents
- Compared to junior residents, senior residents performed better in most performance categories
- Significant differences were observed in one category on 4/14 modules (28.5%) (Table 1)
- At least a medium effect size ($d \geq 0.5$) of increased PGY level on performance for 12/14 modules (85.7%) (Figure 2)

Conclusion:

- We present one method for continued surveillance of a robotics curriculum using SimNow modules
- While senior residents performed better than junior residents in most performance categories, a significant difference was seen in only 4/14 (28.5%) modules

Future Works:

- 1) Increasing sample size to generalize the results
- 2) Analyzing expert reviews to validate modules
- 3) Investigating impact of curricula on operative experience for residents

References:

1. Perry B, Howard K, Novotny NM, Iacco A, Ivascu F, Nguyen N. Identifying barriers to resident robotic console time in a general surgery residency through a targeted needs assessment. J Robot Surg. 2023 Dec;17(6):2783-2789. doi: 10.1007/s11701-023-01711-x. Epub 2023 Sep 17. PMID: 37717231.