Evaluating Obstetrics and Gynecology Residents Surgical Skill Using Baseline Endoscopic Simulation

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Introduction

- Simulation improves various technical skills such as dexterity, efficiency, and psychomotor skills which are vital for endoscopic surgery. (1)
  - Physicians participating in virtual reality (VR) training performed faster and more efficient surgeries than by those who had not completed this program. (2)
- Simulation provides efficient and realistic practice in a secure, relaxed, safe, and affordable environment. (1)
- A program was implemented at LVHN in 2016, where OB/GYN residents completed annual testing on surgical simulation equipment.
  - Now in it's third year, the study has shown an improvement between surgical residency year and simulation testing performance.

Purpose: Evaluate the performance and progress of residents using various endoscopic module in a simulation setting

Methods

- Testing was conducted in a multi-disciplinary Surgical Education Enter (SEC) at LVHN.
- OB/GYN Residents (PGY1-PGY4 + outgoing chief residents) were tested in various areas of surgical skill – emulating clinical practice – over a three year period.

Simbionix

30° Camera Manipulation

Score= Total time (seconds) + number of correct hits + total path length + number of camera shots + accuracy rate

Box Trainers

Bead Speed, Peg Transfer, Shoelace, Hysteroscopy

Score = Total time (10 second mistake penalty)

Mimic Robot

Tubes, Matchboard, & Energy Switching

Score = Total time (seconds) + economy of motion + instrument collisions + excessive instrument force + instruments out of view + master workspace range + number of mistakes

Figure 1: Simbionix Lap Mentor

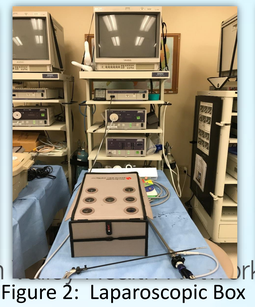


Figure 2: Laparoscopic Box Trainer

Figure 3: Mimic Robot

Results

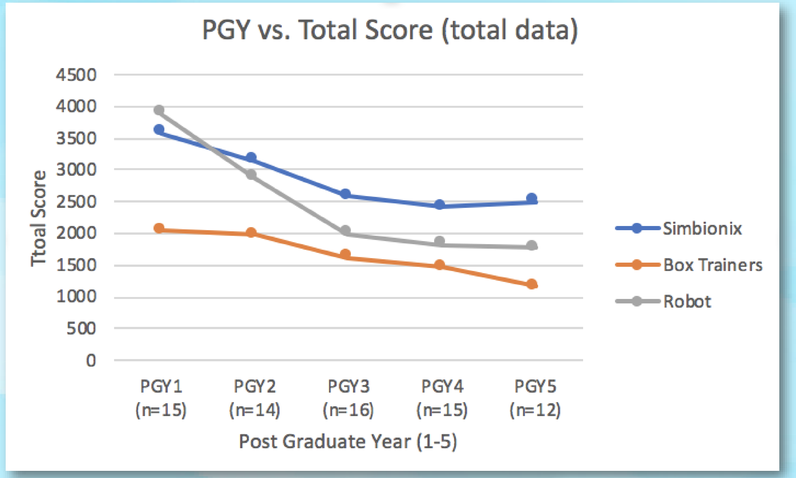


Chart 1: OB/GYN Resident PGY pool data vs. total score pool data from entire study.

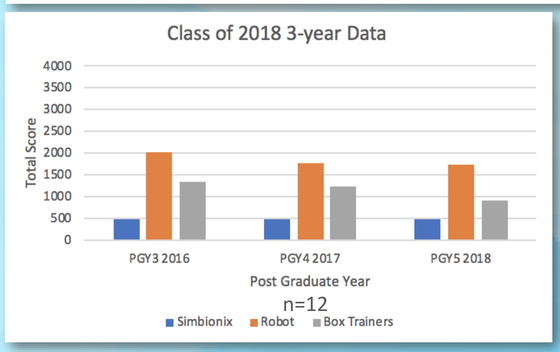
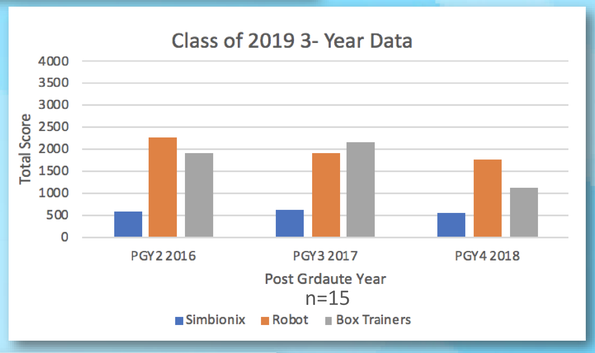


Chart 2: OB/GYN Resident Class of 2018 3-Year study data.

Chart 3: OB/GYN Resident Class of 2019 3-year study data.



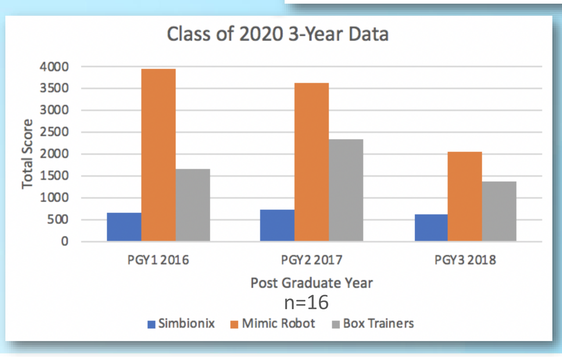


Chart 4: OB/GYN Resident Class of 2020 3-year study data.

Discussion

- Generally, the residents improve scores each year although this improvement plateaus later in training.
  - More experience = Improvement on exercise
  - More practice = Improved speed, dexterity, efficiency
- Correlation Coefficients further confirms study findings.
  - Simbionix Lap mentor vs PGY= -0.912
  - Endoscopic Box Trainers vs PGY= -0.983
  - Mimic Robot vs PGY = -0.918
- **Box trainers show strongest improvement and are the cheapest and most efficient way to simulation surgical skills.**

Conclusion

- Simulation performance is effective in discriminating between level of training and experiential level.
- Box trainers are simple, effective, affordable training option for surgical programs.
- Shows residents areas of needed improvement and motivates residents to practice technical skills
- Limitations/Bias/Challenges:
  - Fatigued residents, distractions in testing environment, equipment failure, motivation of resident
- Future Research:
  - Establish Curriculum/Goals/ Minimum criteria for performance based on level of training
  - Evaluate correlation between simulated performance and patient outcomes in the clinical setting

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(1): Agha, Riaz A., and Alexander J. Fowler. "The Role and Validity of Surgical Simulation." *International Surgery* 100.2 (2015): 350–357. *PMC*. Web. 29 July 2018.
(2): Gallagher, Anthony G. et al. "Virtual Reality Simulation for the Operating Room: Proficiency-Based Training as a Paradigm Shift in Surgical Skills Training." *Annals of Surgery* 241.2 (2005): 364–372. *PMC*. Web. 26 July 2018.

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