ACS 2025 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

P-D-09

Research Abstracts

Investigating the Impact of Extended Reality on the Robot-Assisted Surgery Training

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Introduction: Robot Assisted Surgeries (RAS) have a steep learning curve compared to other surgeries. Because of this, methods to practice RAS outside the operating room have been developed, including the incorporation of extended reality simulators into surgical training programs. In this Systematic review, we seek to determine if extended reality simulators can improve the performance of novice surgeons and how the performance compares to the conventional training method.

Methods: Using the PRISMA 2020 guidelines, a systematic review and meta-analysis was performed searching PubMed, Embase, Web of Science, and Cochrane library for studies that compared novice surgeons that were not trained, trained with extended reality, or trained with inanimate physical simulators. We included articles that compared novice surgeons' performance with either GEARS or Time to complete measures. A meta-analysis was performed on SPSS to compare the post training scores of novice surgeons.

Results: Surgeons trained using extended reality completed their surgical tasks faster than those who did not receive training (Cohen's d=-0.95, p=0.02), and moderately slower than those conventionally trained (Cohen's d=0.65, p=0.14). However, this difference was not statistically significant. Surgeons trained on extended reality demonstrated a statistically significant improvement in GEARS scores over those who did not train (Cohen's d=0.964, p<0.001). While surgeons trained conventionally had a non-statistically significant improvement in GEARS scores over surgeons trained in Extended reality (Cohen's d=0.65, p=0.14).

Conclusions: This meta-analysis demonstrates that extended reality simulators translated complex skills to surgeons in a low cost and low risk environment. Highlighting the value of incorporating innovative training regimens into surgical practice. This study in particular is the first to highlight the positive impact extended reality can have on preparing surgeons for robotic assisted surgery compared to traditional training.

Summary of meta-analysis results			
Comparison	Cohen's D	Confidence Intervals	P value
Extended reality vs. No training Time to complete	-0.95	-1.73, -0.16	0.02
Extended reality vs. No training GEARS Score	0.75	-0.48, 2.05	0.2
Extended reality vs. Dry lab Time to complete	0.65	-0.22, 1.52	0.14
Extended reality vs. Dry lab GEARS Score	-1.09	-3.17, 0.98	0.30