ACS 2023 Surgeons and Engineers: A Dialogue on Surgical Simulation Meeting

Research Abstracts

Establishing Expert Benchmarks for Simulation Training on New Robotic Platforms: The Medtronic Hugo RAS Experience

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Introduction: All new robot-assisted surgery platforms being developed will be required to have proficiency-based simulation training available either as an embedded feature or as a stand-alone product. Previous benchmarks for virtual reality simulation metrics for commercial products have been based on expert surgeon data supplemented with engineering benchmarks which evolved organically over several years as new data was gathered. This paper reviews a methodical and efficient process utilized to establish expert surgeon benchmarks for virtual reality simulation metrics for the new Hugo™ RAS Simulator from Medtronic prior to commercial launch.

Methods: Nine surgeons from multiple specialties who are superusers of the da Vinci® surgical system were recruited for this study. After a familiarization process, surgeons were asked to perform five sessions for each of the 49 simulation exercises (basic and advanced skills) available on the Medtronic Hugo™ RAS Simulator. A number of performance metrics for each exercise (e.g., Time to Complete, Economy of Motion, Instrument Collisions, etc.) from the simulator were exported for analysis. A standard box and whisker plot was used for each metric to identify outliers. The passing benchmark was set at 1 standard deviation above the mean value calculated from the remaining data points after excluding the outliers.

Results: A total of 1915 valid sessions (~ 58 hours of simulation time) were obtained from nine surgeons and were used to establish the passing benchmarks for each exercise. This process took just under three months.

Conclusions: This study presents an efficient method of establishing simulation benchmarks using surgeon superusers from an established robot-assisted surgery platform. Validation of these benchmarks will occur as they are utilized by academic training centers to train surgeons on the Hugo™ RAS System.