patients who underwent morcellation, which may differ from the LMS characteristics reported in this series. Further, the SEER database did not have information regarding other risk factors for LMS including tamoxifen use, prior radiation, and hereditary diseases. Our study found factors related to LMS included older age, black race, large tumor size, and extrauterine disease. ■

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Impact of a robotic simulation program on resident surgical performance

OBJECTIVE: Minimally invasive technology has changed gynecologic surgery with the number of robotic hysterectomies increasing from 0.8-8.2% from 2008 through 2010.[1] Increasing emphasis on patient safety and resident work-hour restrictions require new methodologies for resident training.[2] This study's primary objective was to evaluate the da Vinci Skills Simulator (Intuitive Inc, Sunnyvale, CA) as an effective component of resident robotic training by correlating simulator utilization with surgical skill development during robotic-assisted vaginal cuff closure.[3]

STUDY DESIGN: This study is a prospective, institutional review board–exempt analysis of third-year gynecology residents. Residents were required to complete the Intuitive Inc online training modules and practice virtual reality modules using the da Vinci simulator that mimicked the skills required to complete robotic vaginal cuff closure. Total time practicing was tracked. Resident performance was videotaped during each robotic-assisted vaginal cuff closure and reviewed by 2 expert laparoscopic surgeons (K.N.W. and V.W.W.). Each surgeon was blinded to the resident performing the surgery and the duration of that resident's simulation training. Objective Structured Assessment of Technical Skills (OSATS) scores were assigned.[4,5]

RESULTS: Eight third-year residents who had performed a median number of 1 (range 0-15) robotic vaginal cuff closure prior to starting this study were enrolled. Throughout the rotation, residents utilized the simulator for an average of 179 (range 63-553) minutes and performed a median of 6 (range 4-7) robotic vaginal cuff closures. The OSATS scores for each resident were plotted over time and there was consistency between the scores assigned by the 2 raters. This consistency was verified by creating a separate scatter plot for each resident and superimposing least square regression lines for each rater on each plot. These lines were reasonably parallel, supporting consistency of raters.

To evaluate improvement in operating room performance, a regression line was superimposed on each resident's data set and the calculated slope of each line was used to calculate the rate of change in OSATS score. A significant positive correlation was found between the rate of change in operative performance, as noted by change in OSATS scores, and the total amount of simulation (Pearson correlation, 0.802; $P = .02$; estimated slope calculated using: $-0.007 + .0043 *$ total simulation time). Resident 3 had a much longer simulation time and resident 1 had a significantly higher rate of improvement in her OSATS scores. To account for the outliers, the data were reanalyzed after excluding each of these residents independently. A significant positive correlation between total simulation and change in OSATS score remained (Figure).

CONCLUSION: The rise in number and complexity of minimally invasive procedures coinciding with limitations in opportunities for practice demands the creation of modern curricula that trains future gynecologic surgeons to operate safely, effectively, and efficiently.

The strengths of this study are its prospective nature and its design. Limitations include being a single-institution study with a small number of participants. This pilot study confirms the feasibility of a structured simulation program and validates it as an effective method to train residents. Given that robotic simulation correlates with objective measurements of operating room performance, we recommend that robotic simulation training performance be part of Accreditation Council for Graduate Medical Education milestones with mandatory evaluation prior to surgery on live patients. ■

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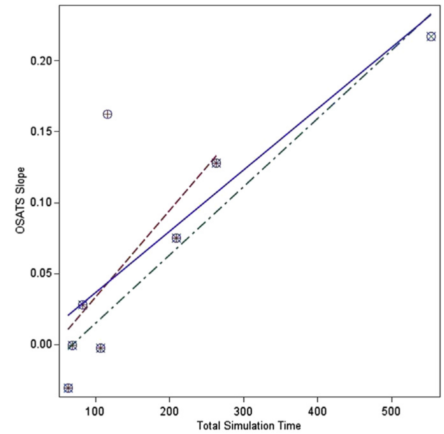
FIGURE

Least square regression: total simulation time vs change in OSATS



Association between OSATS slope (ie, estimated rate of OSATS change per day from resident level linear regression analysis) shown on Y-vertical axis and total simulation time shown on horizontal X-axis. Solid blue line (Pearson correlation, 0.802; $P = .02$; estimated slope calculated using: $-0.007 + .0043$ * total simulation time) shows fitted least square linear regression line using data from all 8 residents. Pearson correlation was 0.645, $P = .01$ when resident 3 (red dashed line) was removed from data set. Removal of resident 1 (green dot-dashed line), resulted in Pearson correlation of 0.966, $P = .01$.)

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