Colonoscopy simulator training and transfer of skills to clinical practice
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Background:
Traditionally, general surgery residents have learned flexible endoscopy techniques “on-the-job” by practicing on patients in hospital settings under strict guidance of experienced surgeons. Simulation training is often used as a method of “pre-training” residents on flexible endoscopy skills before practicing on actual patients. Comparison between endoscopic virtual reality and physical-model simulators and their role in transferring skills to the real world needs to be addressed.

Methods
General surgery interns in the 2012-2013 class (n=24) served as participants in this study. At the beginning of their skills development rotation, each intern performed one baseline colonoscopy on a real patient under the guidance of experienced faculty (as is the current standard learning practice). Their performance was scored using the Global Assessment of Gastrointestinal Endoscopic Skills (GAGES), which was developed and validated by the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES). Subsequently, interns completed a three-week flexible endoscopy curriculum developed at our institution. One-third of the residents were assigned to the GI Mentor (virtual-reality) platform exclusively, one-third of the residents were assigned to the Kyoto (physical model) simulator and, one-third of the residents trained using both simulators. At the end of their skills development rotation, interns performed one posttest colonoscopy on a different real patient, again under the guidance of experienced faculty and scored using GAGES. A post-testing survey was administered after completion of study participation to evaluate self-reported levels of anxiety, colonoscopy performance and simulator preference.

Results:
A statistically significant improvement in the GAGES total score from pre to post-test (p=.001) was observed in all the groups combined. When subgroup analysis was done, trainees using the GI mentor and both simulators obtained significant better post-test GAGES total scores (p=.045 and p=.024 respectively). Interestingly, no single training condition was a better training modality when compared to each other in terms of total GAGES score or in any of its subcomponents.

Other variables such as total colonoscopy time or time to reach the cecum were not significantly different between groups. Trainees who trained on both simulators had statistically significant higher percentage of clear visualization of the lumen (p=.006). This could potentially have clinical implication by allowing trainees to identify a higher number of lesions that might be otherwise missed.

Survey analysis reported that trainees in the GI mentor and Kyoto group had a statistically significant decrease of anxiety (p=.034, p=.038 respectively) and improvement in their performance (p=.11, p=.008 respectively) in the post-testing phase. However, these differences were not significant for trainees assigned to both simulators despite showing statistical significant improvement in their post-testing GAGES total score (p=.024)

Conclusion:
Colonoscopy simulator training with the GI mentor platform exclusively or in combination with a physical model simulator (Kyoto) improves skill performance in real colonoscopy cases when measured with the GAGES tool.