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Promoting Technology and Collaboration

The Role of Real-World Video Data and its Application to Virtual Reality in Surgical Simulation

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Background: Simulation-based training in surgery has proven benefits such as allowing trainees to practice transferrable skills and providing an adjunct to clinical operative training in a low-stakes environment.1 However, many simulation technologies use modeled graphics that attempt to imitate the surgeon's perspective. Although this allows for trainees to practice in a setting similar to reality, the graphics have their limitations and do not adequately reflect performance outside of the simulation. Leveraging real-world video data from the surgeon's perspective can improve simulation and surgical education, providing trainees with a realistic training tool that can be used to provide actionable feedback.

Technology Overview: Video data obtained from a surgeon's perspective can be loaded into a VR environment. This data can then be used to collect data points such as surgical steps, economy of motion, positioning of retraction, port site placement, and so on.

Potential Application in Surgical Simulation and Education: Using the compilation of expert video cases from the perspective of the surgeon, data points can be collected and applied to analyze trainee movements. Trainee performance can then be uploaded to the system to provide actionable feedback based on these metrics, providing them with educational tips based on their performance with live tissue.

Potential Opportunities to Collaborate: This method of VR simulation and use of deep learning analytics to provide trainees feedback based on data collected from expert videos requires collaboration between surgeons, VR companies, and deep learning developers. By providing trainees with a method to analyze their real-world skills, we can improve surgical education by providing less subjective feedback.

References
1. Milburn JA, Khera G, Hornby ST, Malone PS, Fitzgerald JE. Introduction, availability and role of simulation in surgical education and training: review of current evidence and recommendations from the Association of Surgeons in Training. Int J Surg. 2012;10(8):393-398. doi:10.1016/j.ijsu.2012.05.005