

Mount Sinai HELPS Center Study Finds Virtual Reality ACLS Simulation Training Effective for Assessing ACLS Competency

The 2018 American Heart Association (AHA) Scientific Statement, “[Resuscitation Education Strategies to Improve Outcomes from Cardiac Arrest](#),” stated that “when providers take resuscitation courses, whether online or in-person, their skills decay over time,” leading to poor survival outcomes. It also introduced concepts that can improve how well they learn and retain these skills: mastery learning and deliberate practice, spaced learning, contextual learning, feedback and debriefing, assessment, innovative educational strategies, faculty development, and knowledge translation and implementation.

These new concepts, along with the updated skills decay information, served as a catalyst for Health Scholars’ decision to create a head mounted display VR application for Advanced Cardiac Life Support (ACLS) training that allows hospitals to easily scale experiential ACLS education and enable deliberate practice with standardized refresher training.



“Staying ahead of skills decay requires high-yield, deliberate, and frequent practice. In caring for patients with cardiopulmonary arrest, there is no room for error or delayed decision making because survival depends on clinicians’ ability to deliver precise and correct care without hesitation. Our communities entrust hospital staff with their lives; we must live up to this trust by committing to and assuring clinical readiness. Virtual reality is the ideal modality for enabling real-to-life training at the scale and frequency requisite to ensuring readiness for such critically ill individuals.”

-Brian Gillett, MD, Health Scholars President & Chief Medical Officer

The Study

To understand the potential impacts of VR-based simulation compared to high-fidelity simulation for ACLS training, Dr. Daniel Katz, MD, Vice Chair of Education for the Mount Sinai Department of Anesthesiology and Director of Operations for the Mount Sinai HELPS Center, conducted a research study utilizing Health Scholars’ ACLS virtual reality application.

The single centered non-inferiority cross-over study compared the performance of mannequin-based high-fidelity simulation for assessing ACLS competencies to that of a VR application with a cohort of 25 anesthesiology residents who:

- Were of the same post-graduate year (CA-1)
- Took the same ACLS course one year prior
- Had the same preparation
- Had similar educational experiences

Beginning in July 2019 the residents were randomized to either of the two assessment modalities. Two weeks later, the groups switched and underwent assessment with the alternative modality. The in-person skills examiners were also blinded as to whether or not the residents had been exposed to ACLS VR.



Photo courtesy of Mount Sinai HELPS Center

The Results

The study found that **VR simulation was predictive of clinicians' overall performance in high-fidelity mannequin-based simulation and was 83% more cost effective.** There was no statistically significant difference in assessing clinicians' decision-making capabilities between VR and high-fidelity mannequin-based simulation. Additionally, the rank order of the clinicians' performance in VR correlated with their rank-order in high-fidelity simulation, indicating that VR can predict how clinicians will perform in real-life scenarios. This is because high-fidelity mannequin-based simulation has previously proven to be an effective surrogate for real life encounters in the resuscitation domain.

The study also demonstrated that Health Scholars' ACLS VR application performed similarly to high-fidelity mannequin-based simulation for assessing communication competencies. Effective team-based communication is critical to successfully resuscitating patients.

Enjoyability and perceived educational value is essential to achieving clinicians' acceptance of training and assessment modalities. **The study demonstrated that there was no statistically significant difference in the reported enjoyability of VR, the value of VR, or the desire to use VR as an ACLS certification pathway as compared to high-fidelity mannequin-based simulation.** Of note, the feedback received during high-fidelity mannequin-based simulation was reported as being more useful than that in VR. **The study also demonstrated that the majority of clinicians in this cohort would voluntarily use VR every six months on their own accord for refresher training.**



Tying It All Together

Virtual reality offers a 100% objective, standardized, cost-effective, and highly repeatable modality for assessing Advanced Cardiopulmonary Life Support competencies. The study showed that VR can deliver true-to-life scenarios for assessing readiness and predicting clinical performance. High-fidelity mannequin-based simulation continues to be a vital training modality, particularly for team-based training and point-of-care assessments. However, this study suggests that VR may be an effective alternative for individualized deliberate practice and competency assessment.

Important Points to Note

The study showed that VR is highly cost-effective in terms of staff involvement, time, and cost:

Required Staff

High-Fidelity Mannequin-based Simulation: 20 physician training proctors
VR: 5 (not required to be a physician resource)

Average Time

High-Fidelity Mannequin-based Simulation: 45 minutes
VR: 25 minutes

Cost per Learner

High-Fidelity Mannequin-based Simulation: \$193
VR: \$89

The Mount Sinai study also demonstrated that VR is significantly less taxing on facilitators. Using the [NASA TASLI](#) mental demand model, Dr. Katz found that VR required far less mental, physical, and temporal demand on proctors. It also required less effort and resulted in less frustration. This is important because the operational workflows must be tenable in order to sustainably implement training or competency validation pathways in healthcare.

“Organizing the ACLS training for our department is extremely resource intensive. It’s a process that requires maintaining multiple schedules, and often one of the most challenging is making sure we have enough simulation instructors/operators to keep up with the demand. Moving to a virtual platform to refresh ACLS skills would allow us to meet our educational goals, while minimizing the demand and burnout of our simulation team.”

- Daniel Katz, MD, Mount Sinai Vice Chair of Education for the Department of Anesthesiology & Director of Operations for the Mount Sinai HELPS Center

In Summary

With results indicating VR’s effectiveness – and cost savings up to 83% – VR is on its way to becoming a viable alternative to train and assess competencies at scale and a legitimate solution to preventing ACLS skills decay that contribute to poor survival outcomes.

For more information about Health Scholars ACLS VR Simulation Training, visit <https://healthscholars.com/acls/>.

Full study results will be released as part of abstract publications Fall/Winter 2019.