Virtual reality technology transforming cardiovascular medicine

June 25 2018

Rapid advancements in the field of virtual reality are leading to new developments in cardiovascular treatment and improved outcomes for patients, according to a review paper published today in *JACC: Basic to Translational Science*. Extended reality applications in cardiac care include education and training, pre-procedural planning, visualization during a procedure and rehabilitation in post-stroke patients.

"For years, virtual reality technology promised the ability for physicians to move beyond 2-D screens in order to understand organ anatomy noninvasively," said Jennifer N.A. Silva, MD, FHRS, assistant professor of pediatrics and cardiology at the Washington University School of Medicine in St. Louis and lead author of the paper. "However, bulky equipment and low-quality virtual images hindered these developments. Led by the mobile device industry, recent hardware and software developments—such as head mounted displays and advances in display systems—have enabled new classes of 3-D platforms that are transforming clinical cardiology."

Virtual reality provides complete control over the wearer's visual and auditory experience as they interact within a completely synthetic environment, while augmented reality allows the wearer to see their native environment while placing 2-D or 3-D images within it. Merged reality and mixed reality allow for interaction with digital objects while preserving a sense of presence within the true physical environment. These technologies make up the full spectrum of extended reality, which is transforming the practice of cardiovascular medicine.

Advances in this technology allow patients and family members to better understand their cardiac conditions, helping them to make more informed decisions surrounding their medical care. Medical students and trainees can better visualize cardiac abnormalities with virtual reality, which allows trainees to simulate operating environments and multiple physicians to interact while viewing the same educational material in a natural environment. Additionally, 3-D workstations may assist physicians in assessing the heart in surgical situations where it may be difficult to see.

However, the authors point out that there are still challenges and limitations.

"These technologies are still constrained due to cost, size, weight and power to achieve the highest visual quality, mobility, processing speed and interactivity," Silva said. "Every design decision to mitigate these challenges affects applicability for use in each procedural environment."

Still, according to the research, early data show that improved visualization due to this technology will allow physicians to learn more quickly, interpret images more accurately and accomplish interventions in less time. These improvements will most likely translate into lower cost procedures and better outcomes for patients.

More information: *JACC: Basic to Translational Science*, DOI: 10.1016/j.jacbts.2017.11.009

Provided by American College of Cardiology