VR HEALTH CARE

BROUGHT TO YOU BY AI MED IN PARTNERSHIP WITH HP

BEST PRACTICES FOR CLINICAL IMPLEMENTATION

Diane Gromala, PhD, Howard Rose, M.Ed, Frances Ayalasomayajula, MPH, PMP

Virtual reality (VR) technology has improved significantly over the last few years. With these advancements, the use of VR in the clinical setting is rapidly increasing. Currently, there is a void of reliable guidance on the appropriate application and adoption of VR technology for clinical use.; this For clinical VR to achieve its full potential, such guidance needs to be made available.

This work is the collaboration of Diane Gromala, PhD, Canada Research Chair in Computational Technologies for Transforming Pain, and the Founding Director of the Chronic Pain Research Institute and the Pain Studies Lab at Simon Fraser University; Howard Rose, M.Ed, CEO and co-founder of Firsthand Technology; and Frances Ayalasomayajula, MPH, PMP, Worldwide Lead for Population Health and Patient Engagement at HP. The team came together to produce a series of recommended best practices for the Clinical Implementation of VR. Starting from the principles of "First do no harm", they laid out a framework for those who are considering the adoption of VR in their clinical practice, or creating VR therapy applications or technology.

"First, we offer a simple, useful definition of VR: a computer-generated experience that fools the senses into perceiving the experience is real." As an example of fooling your senses in VR, imagine a virtual world where you see a virtual table, bend down to look under that table, and then put your real hand out to steady yourself on that virtual table top as you stand up. Research by the authors and others has demonstrated that this type of VR experience can be very powerful for therapeutic uses for pain relief, physical therapy, rehabilitation, and mental health.

Our recommendations are based on decades of practice and rigorous evidence-based research in the VR health field. We emphasize that the suggestions here focus on patient-centered therapeutic uses of VR, involvingthe patient, as opposed to uses of VR solely by a doctor for training or medical practice. The application of VR therapy is diverse and fast growing. Much has already been proven, but there is still a need for further research on the long-term exposure to VR and development of new therapies. We hope this effort will lead to a greater understanding of the potential for VR to enhance health care, and elicit a broader conversation about how to best bring VR technology into wide clinical use.

DO NO HARM

In keeping with the primary rule of all medicine – to First do no harm – VR therapy must aspire to cause little or no negative side effects in the patient. Generally speaking, negative effects such headache, nausea, or fatigue often result from incompatibilities between the VR system and the human sensory or cognitive systems.

Some effects are obvious and immediate, such as motion sickness from riding a virtual roller coaster, while effects such as eye strain and disruption of balance can result in a more undifferentiated feeling of being physically or mentally "off". It is therefore the obligation of VR software and hardware developers to take all measures to reduce potential harm to patients, and vigilantly test for any negative effects from VR therapy.

USE THE BEST VR SYSTEM YOU CAN

Using the best possible VR hardware system is essential to ensure the best experience with the minimal risk of harm. But this begs the question: What defines a good VR system? We can answer this without getting into preferences for specific VR hardware products in the current market. A useful definition for a good VR system is one that matches the human sensory and cognitive systems as closely as possible. The closer the match among human, machine, and VR content, the better the VR experience feels, the fewer side effects arise, and the better the clinical outcomes.

Matching the complex and finely tuned human sensory system is no small task for VR hardware or software. Good VR systems deliver a high quality graphical and interactive experience with high image quality, brightness, and low latency. The ease of use and physical ergonomics of the equipment can also have a major effect on the quality of experience and efficacy of clinical outcomes. For example, the VR controller that is used can have a major impact on the quality of immersion, usability, and the physical stress of using VR. An easy to use system is essential: it means that one cannot assume that all patients know how to use video game controllers or conventions, and do not have the responses of young adults. Select a system that has simple control features. We refer to the collection of the positive qualities listed above as professional VR. We highly recommend using professional VR systems for all clinical use. Using a professional VR system becomes even more crucial for extended or multiple clinical sessions, because high grade systems maximize comfort, deliver the highest efficacy, and reduce harmful side effects.

For VR headsets, we recommend those designed to comply with safety and EMC standards applicable to Information Technology Equipment. Select a VR headset that has successfully been tested and is certified as free from causing electromagnetic interference. Look for hardware that is IEC/EN-60601-1 and -2 series approved, not just tested.

CLINICAL PROTOCOLS

The clinical implementation of VR is in some respects very similar to any other piece of clinical equipment. For instance, it must be sterilized for use between patients. Most off-the-shelf VR headsets are not easily sterilized, and have too many recessed areas and bacteria-friendly materials to adequately clean at all. To maintain standard levels of clinical infection control, choose equipment that can withstand repeated use of germicidal wipes, has no open-cell foam, and has a replicable or sanitizable face cushion. Many hospitals have successfully reduced infection risks using barriers such as hospital bonnets or even wrapping parts of the VR headset in sterile materials.

PATIENT PREPARATION

Along with our industry collaegues, we have gathered extensive evidence that VR can be used successfully with patients ranging from small children to senior citizens. Patients don't need to be self-identified "gamers" for VR to be clinically successful. One of the keys to success, particularly with vulnerable populations, is to adequately prepare the patient. Clinicians should make sure patients understand the risks and potential benefits of VR. It is a good practice to inquire about any pre-existing physical conditions or a history of becoming easily seasick or carsick. Before patients put the VR headset on, make sure they know how long the VR therapy session will last, and what they should do when it ends. Provide the patient with a way to signal you if they encounter problems.

Take the time to ensure that the VR headset fits the patient and is not too tight or heavy. Be familiar with the adjustments that the hardware and software are capable of. The most crucial component of visual comfort is the ability to adjust the interpupillary distance (IPD).

A patient requires a safe place. Because the VR headset "occludes" or covers a patient's view of the physical world, the space where they use VR should be clear of potential obstructions that patients may easily trip over, bump into, or hit their head on, and should be free of cables, people, small children, and pets. A stable chair (not one on wheels) is especially important.

CLINICIAN PREPARATION

One of the most important factors affecting clinical success with VR is the health care provider's familiarity with and comfort in using the system. When the clinician feels at ease presenting and operating the equipment, the patient will feel more at ease and derive the greatest benefit. We strongly encourage clinicians to spend some time using the VR system themselves. Before using VR with patients, become comfortable with the system setup and use of the equipment. We also suggest providers familiarize themselves with the history and science behind the VR therapy in use; so that, they can share that knowledge with patients.

Prepare and rehearse a clear set of instructions. Where possible, prior to putting the VR headset on patients, show them what the virtual environment looks like, and describe the experience and how they will interact with it. Demonstrate the use of the VR controllers. Allow patients to try the controllers before they put the VR headset on and can no longer see or attend to what's going on around them in the room.

The duration of a VR therapy session will depend on the type of therapy, the clinical conditions, and the specifics of the patient. As a rule of thumb, we recommend testing the patient's success and tolerance to VR in an initial session lasting no longer than 15 minutes. For subsequent sessions, we suggest adjusting to the needs of the patient and the clinical requirements of treatment. For prolonged repeated use, a maximum session time of 60 minutes is an advisable upper limit. Breaks between sessions are recommended for at least 10–15 minutes.

SHIFTING CARE FROM CLINIC TO HOME

Perhaps the biggest potential benefit of VR is to shift the focus of therapy and wellness from the clinical context to help patients at home. Watch for future coverage of this topic in future articles.