

TREATMENT

VRT MADE FUN

Virtual reality can make rehabilitation more engaging and increase compliance.

ARTICLE



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Virtual Reality for VRT

By Donielle Brasure, PT, DPT

Vestibular rehabilitation has come a long way in recent years. People have struggled to find a proper diagnosis and successful treatments for their symptoms including vertigo, dizziness, imbalance, and motion sickness. Thankfully, with the help of clinicians, patients, and support groups, we are starting to see many new treatment options. One tool to assist clinicians in the diagnosis and patients in rehabilitation is virtual reality.

Virtual reality (VR) has become very popular recently, especially for gaming, but it can also be used therapeutically for the treatment of many health issues including vestibular disorders. I personally can't get away from it as a mother of three children. Every few months, someone wants the newest gaming equipment or game to be used with their systems. For years, I have avoided their games and rides due to vestibular symptoms. I know that I will feel dizzy or nauseous while riding on The Return of the Jedi simulator at Disney World, watching my son scroll through his Minecraft world, or attempting to play a game using an Oculus VR system.

I have also spent years using various virtual reality systems to diagnose and treat patients with vestibular disorders. How can this be you ask? Not all systems are created equally. Choosing the proper hardware and software, along with proper usage, is the key to benefitting from virtual reality when you have a vestibular disorder.

WHAT IS VIRTUAL REALITY?

Virtual reality (VR) is a computer-generated simulation of an environment that can be interacted with by the person using special electronic equipment. VR systems specific to vestibular rehabilitation have been developed to achieve three primary goals:

- 1. Reduce symptoms (vertigo, dizziness, and tolerance to visual motion)
- 2. Improve gaze stabilization
- 3. Improve postural stability.

VR can provide amazing benefits for a person with a vestibular disorder. It can help a person tolerate riding in a car, promote ability to move their head without dizziness, or learn to reach for items without falling over. All these things can be performed within the safe confines of their home or healthcare provider's office. Furthermore, virtual reality can make therapy more engaging, fun, and simulate real life situations. One frequent complaint from patients is that their exercises are boring. I find it boring to sit and stare at a letter while turning my head, especially when I'm asked to perform this task for more than 20 minutes a day.

Unfortunately, VR is not a one size fits all tool. It is not meant to take the place of our healthcare providers or be the only form of treatment used during vestibular rehabilitation. Virtual reality can be beneficial when used with a healthcare provider who can assist in choosing the type of system that would best suit your needs, providing dosage of how long to perform each task, and most importantly, keep you safe while you are having fun in a new computer-generated world.

HARDWARE

The type of hardware you choose will determine how immersed you feel within the computer-generated environment. Some vestibular patients require gradual immersion into virtual reality to prevent increased symptoms or injury. There are various levels of immersion to allow patients to optimize their treatments.

Non-immersive VR uses a computer or video game console, display, and input devices like keyboards, mice, and hand controllers. It allows a user to control activities from within the software, but the environment is not directly interacting back. This allows the user to stay aware of and keep control of their physical environment. Devices such as the Nintendo Wii system, home computer programs, and smartphone applications are considered non-immersive VR hardware. Each of these examples can provide a different form of vestibular treatment. The Nintendo Wii Fit Plus system consists of a balance board to promote weight shifting and balance exercises while providing little

PRACTICAL APPLICATIONS FOR VIRTUAL REALITY

DRIVING

Help a person tolerate riding in a car.

MOVEMENT

Promote the ability to move your head without dizziness.

STABILITY

Learn to reach for items without falling over.

assistance with gaze stabilization or larger movements that would occur in the real world. Phone applications can assist with gaze stabilization, but are limited with assisting with balance.

Semi-immersive VR allows for a partial virtual environment by a person focusing on a digital image, but can easily be reconnected to their physical surroundings by looking away from the image. These environments are usually generated with 3D projectors like going to an IMAX theater or to a research facility. These systems are often costly and aren't as readily available to the public.

Fully immersive VR uses a head-mounted display (HMD). VR headsets provide highresolution content with a wide field of view. This type of VR immerses a person equipped with wearable technology into a virtual world. The person experiences a sense of being present in a simulated environment and interacts with objects within the programmed space. Oculus, HTC Vive, and Sony Playstation are just a few of the fully immersive VR sets available. What type of immersion is best for a patient with a vestibular disorder? Some people find that full immersion is too stimulating, they may feel claustrophobic in HMD, or feel unsafe due to the inability to see their real-world environment while in the virtual environment. Other people find using the non-immersive form of VR easier to use at home but feel limited in what it can treat. It is best to work with your healthcare provider to determine what level of immersion best suits your needs.

SOFTWARE

Now that you have chosen your hardware or level of immersion that best suits you, how do you determine what to do with the hardware? Software is the program and other operating information used by the computer or hardware. For example, I am using Microsoft Word software to write this article, or you may use an application software such as CandyCrush on your phone to play a game. There are many new vestibular applications available online. Some are very simple while others are rather complex.



Patient using Virtualis VR system to improve tolerance to driving through habituation.

How do you choose the best software?

- Is it intended to treat vestibular disorders or intended for gaming? Some gaming applications are used by clinicians to help vestibular disorders although they were not specifically designed for that purpose. The games were designed for healthy individuals and can sometimes make a person feel worse.
- Are the visuals simple or complex? Some patients can be over stimulated by bright colors or complex graphics. They may require muted colors and a simple design such as a ball or square that they focus on while moving their head.
- Can the application be modified in real time? Can you make the task easier or harder depending on your needs and how you are feeling?
- What type of vestibular disorders or issues does this application help with? Some applications are very specific in what they are intended to treat. Some applications only work on gaze stabilization while others only work on balance using a force plate.
- Can this software be used in the clinic and at home? Some software can be downloaded for free or low cost while other high-end software can cost thousands of dollars. The goal as technology advances is to make virtual reality accessible to more people.
- How should I feel using this software? Some software is meant to bring on the very sensations you are trying to reduce through habituation, but others just make us feel sick. Habituation is repeated gradual exposure to situations

that produce symptoms. **SUMMARY**

Virtual reality can make vestibular rehabilitation more engaging and allow for better compliance with performing exercises but it currently is not intended to be the only form of treatment for vestibular disorders. There needs to be more research to tell us that VR is treating what it says it is treating, what type of hardware to use, what type of software is best, and how to determine how much time allotted to VR versus traditional vestibular therapy. Currently, it is still best practice to be followed by a healthcare professional when using virtual reality equipment for treatment of vestibular issues.

About the Author

Donielle Brasure, PT, DPT is a vestibular physical therapist and clinical educator. She practices at FYZICAL Therapy & Balance Centers in Ocean Pines, MD and teaches through VirutalisVR, a company that creates virtual reality solutions for functional, balance, and vestibular rehabilitation.

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