

What is virtual reality?



Virtual Reality is an environment that is simulated by a computer. Most virtual reality environments are primarily visual experiences, displayed either on a computer screen or through special stereoscopic displays (see picture 1), and may also include auditory stimulation through speakers or headphones. Users can interact with the virtual environment through the use of devices such as a keyboard, a mouse, or a wired glove (see picture 2).



Are there different kinds of virtual reality?

Generally, there are two types of virtual reality: full immersion, and non-immersion.

Full immersive VR is when the environment is viewed through a device such as a head-mounted display to create the illusion that one is inside the environment.



Non-immersive, or partially immersive VR, is when the user views the scene on a computer screen and it appears as if he was watching TV.

Why use virtual reality after a stroke?

Loss of leg function, movement, and strength are common after a stroke, and can result in the impairment of walking and standing.

Virtual reality is becoming an increasingly popular intervention used to improve the use of one's leg after a stroke. It can be easily modified according to the needs of the individual, is perceived as being fun and motivating for patients, and allows researchers to include elements such as feedback that have been shown to maximize learning.

Does it work for stroke?

Researchers have studied how different VR-based treatments designed for the recovery of walking ability and legs function can help patients with stroke:

In individuals with CHRONIC stroke (more than 6 months after stroke), studies found that:

- **IREX (Immersive Rehabilitation Exercise) system training** is MORE helpful than comparison treatment(s) in improving balance, walking ability, and walking speed.
- **VR ankle training** is MORE helpful than comparison treatment(s) in improving walking ability and spasticity.
- **VR + Robotics RARS (Rutgers Ankle Rehabilitation System) training** is MORE helpful than comparison treatment(s) in improving walking ability. It is AS helpful as comparison treatment(s) in improving walking endurance and walking speed.
- **VR postural control training** is AS helpful as comparison treatment(s) in improving balance, walking ability, and walking speed.
- **VR stepping exercise** is MORE helpful than comparison treatment(s) in improving balance and walking speed.
- **VR treadmill gait training** is MORE helpful than comparison treatment(s) in improving balance, walking ability, and walking speed.

It is AS helpful as comparison treatment(s) in improving balance confidence, and ability to circumvent obstacles.

In individuals with stroke (acute, subacute and/or chronic), studies found that:

- **VR balance training** is AS helpful than a comparison treatment in improving balance, walking ability and speed and pelvis control.

Side effects/risks?

Use of devices such as a head-mounted display can cause nausea and vertigo.

No real risks have been reported because of the absence of external manipulation. All activities are self-paced and under individual control and perception of movement.

Who provides the treatment?

VR treatments are usually provided by a Physical Therapist or Occupational Therapist. Presently most rehabilitation centers and private clinics are not equipped with this technology other than for research purposes. But, given the promising early evidence for the value of using VR, this treatment is likely to be integrated as part of post-stroke therapy in the future.

How many treatments?

Information on the amount and intensity of VR training needed is still not available. High quality studies need to be conducted before advice can be given regarding specific programs and content of treatment sessions.

How much does it cost?

There is concern that the use of VR in the clinic is not possible due to the cost of the required equipment. While certainly true when this technology was created, the cost of virtual reality hardware and software has decreased and should soon be reasonably affordable for clinical use.

Is virtual reality for me?

There is clear evidence that there are benefits to using virtual reality in comparison to regular therapy or no therapy. These benefits include walking strength, how fast you can walk, length of step, stamina, the community living skill “crossing the street”, and remapping of the brain. However, in terms of obstacle clearance, VR was not shown to be more effective than conventional therapy. More studies are needed to determine if VR is an effective intervention for stair-climbing and the community living skill “taking the train”. So, overall, VR is an effective treatment you may want to consider after a stroke. If you are interested in learning more about VR, speak to your rehabilitation provider about the possibility of using this treatment.

Information on this web site is provided for informational purposes only and is not a substitute for professional medical advice. If you have or suspect you have a medical problem, promptly contact your professional healthcare provider.