

## VIRTUAL REALITY FOR THE UPPER EXTREMITY Information for Patients and Families

### What is virtual reality?

**Virtual Reality** is a rehabilitation technique 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). Virtual reality 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).



## Why use virtual reality after a stroke?

It is estimated that 55-to-75% of individuals who suffer a stroke experience have persistent impairment of the affected upper limb. Virtual reality is a technique used to retrain motor function of the upper limb. It can be easily modified according to the needs of the individual, it is fun and motivating for patients, and it allows researchers to include elements that have been shown to maximize learning such as feedback.

## 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 you are inside the environment.



- **Non-immersive, or partially immersive VR** is when you view the scene on a computer screen and it appears as if you are watching TV.

## **Does virtual reality work for stroke?**

Research suggests that immersive VR may have an advantage over no therapy in the rehabilitation of the upper limb in patients with stroke.

In addition, there is evidence to suggest that while immersive VR may be beneficial, non-immersive VR has not yet shown potential benefits. There remain large gaps in the literature regarding the effectiveness of VR compared to conventional therapy, and current results are vague due to the lack of control groups and small sample sizes.

Research has shown that virtual reality is useful in retraining the brain for individuals who have had a stroke. However, current evidence on the effectiveness of VR in the rehabilitation of the upper limb in patients with stroke is limited. Nonetheless, it is sufficiently encouraging to justify further research efforts in this area.

## **Are there any side effects or 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 are able to be controlled by the individual receiving the treatment.

## **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 will I need?

Information on the required amount and intensity of VR training 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 equipment. While this was certainly true when the technology was created, the cost of virtual reality hardware and software has decreased in recent years, and should soon be reasonably affordable for clinical use.

## Is virtual reality for me?

Although some studies have shown that VR is effective, there is no strong scientific evidence at this time to confirm that VR works to improve grip strength, manual dexterity, and overall control of the upper limb.

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