

# Virtual reality would make attending therapy easier for stroke survivors

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Researchers have created a virtual reality clinic to make it easier for stroke survivors to attend their physical and occupational therapy sessions. Results from a proof-of-concept study suggest that the technology—and the social connection it facilitates—are effective at encouraging therapy participation.

"Physical and [occupational therapy](#) are important parts of [stroke](#) recovery, in terms of helping survivors regain dexterity and functional motor ability," says Derek Kamper, co-author of a paper on the work. "However, [stroke survivors](#) often face significant challenges in attending their [therapy sessions](#). For example, many survivors don't live near facilities that offer relevant therapy services.

"Our goal was to create an online, virtual reality platform that allows patients and therapists to interact in what is essentially real time," says Kamper, who is an associate professor in the Joint Department of Biomedical Engineering at North Carolina State University and the University of North Carolina at Chapel Hill. "Clients could also use the system to work on therapy exercises with loved ones who live far away."

The resulting system, called Virtual Environment for Rehabilitative Gaming Exercises (VERGE), is a software package that makes use of Kinect motion-sensor hardware to track the movement of patients and therapists. The system was developed by Kamper with collaborators at the Shirley Ryan AbilityLab and the University of Illinois at Chicago. VERGE currently supports three different rehabilitation activities, such as hitting a virtual ball back and forth when multiple users are present, or bouncing it off a wall when in single-user mode.

In the proof-of-concept study, researchers worked with 20 stroke survivors to evaluate the system. All participants had chronic impairment; 17 were men; and the mean age of the participants was 60.

For the study, half of the participants spent two weeks using VERGE in single-user mode, while the other half used VERGE in multi-user mode—interacting with other people remotely. The groups then switched modes for an additional two weeks.

Researchers found that study participants attended 99% of their therapy

sessions when using VERGE in multi-user mode. Compliance was also good in single-user mode, with participants making 89% of their sessions.

Participants also spent 22% more time—or an additional 7.6 minutes—in their sessions when using VERGE in multi-user mode. And that time was more active, with participants moving their hands about 415 meters per session during multi-user sessions, as compared to 327 meters during single-user sessions.

"This suggests that the social aspect of VERGE has real benefits for stroke survivors in the context of getting them engaged in therapy," Kamper says.

The researchers used the upper extremity portion of the Fugl-Meyer Assessment of Recovery after Stroke score to evaluate the efficacy of the VERGE therapy sessions, and saw a mean change of 3.2—which is comparable to what therapists would expect to see in chronically impaired patients after four weeks of therapy in a conventional clinical setting.

"The fundamental takeaway here is that VERGE has the potential to be a means of bringing clinical therapy to stroke survivors in their homes," Kamper says.

"While these results are promising, we'd like to scale up to a larger, multi-site study that can help us more fully evaluate the technology before making any decisions about how to make it available for widespread clinical use. For example, we'd like to incorporate loved ones into the next round of testing, to see if that could further increase patient engagement with therapeutic exercises.

"In the longer term, we'd like to see if this could be a means of engaging

in therapy remotely with burn survivors, or even as a means of encouraging older adults to engage in exercise and make social connections," Kamper says.

"In terms of potential harms, there are very few. It's possible that some people may experience motion sickness if they use virtual reality goggles rather than using a large screen or monitor. Otherwise, the only risk we can think of is soreness from unaccustomed activity.

"Costs are directly related to the equipment you need to make use of VERGE: a computer, a mouse, a screen or goggles for viewing, and the Kinect motion sensor equipment—plus an Ethernet or WiFi connection to support the multi-user mode. The big expense is the computer; the Kinect is generally less than a few hundred dollars."

The paper, "Home-based upper extremity stroke [therapy](#) using a multi-user virtual reality environment: a randomized trial," is published in *Archives of Physical Medicine and Rehabilitation*.

**More information:** Kelly O. Thielbar et al. Home-based upper extremity stroke therapy using a multi-user virtual reality environment: a randomized trial, *Archives of Physical Medicine and Rehabilitation* (2019). [DOI: 10.1016/j.apmr.2019.10.182](https://doi.org/10.1016/j.apmr.2019.10.182)

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