Virtual reality tele-rehab improves hand function: Playing games for real recovery

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Remotely monitored in-home virtual reality videogames improved hand function and forearm bone health in teens with hemiplegic cerebral palsy. Credit: Indiana University School of Medicine

Remotely monitored in-home virtual reality videogames improved hand function and forearm bone health in teens with hemiplegic cerebral palsy, helping them perform activities of daily living such as eating, dressing, cooking, and other tasks for which two hands are needed.

"While these initial encouraging results were in teens with limited hand and arm function due to perinatal brain injury, we suspect using these games could similarly benefit individuals with other illness that affect movement, such as multiple sclerosis, stroke, arthritis and even those with orthopedic injuries affecting the arm or hand," said Meredith R.

Golomb, M.D, M.Sc., Indiana University School of Medicine associate professor of neurology. A pediatric neurologist at Riley Hospital for Children, she is the first author of a pilot study which reported on the rehabilitative benefits of these custom videogames.

This project was done in collaboration with the Rutgers University Tele-Rehabilitation Institute, headed by Grigore Burdea, Ph.D., professor of electrical and computer engineering. The study appears in the January 2010 issue of *Archives of Physical Medicine and Rehabilitation*.

The researchers also reported that improved hand function appears to be reflected in brain activity changes as seen on functional magnetic resonance imaging (fMRI) scans.

The three study participants were asked to exercise the affected hand about 30 minutes a day, five days a week using a specially fitted sensor glove linked to a remotely monitored videogame console installed in their home. Games, such as one making images appear ("sliders") were custom developed at Rutgers, calibrated to the individual teen's hand functionality, included a screen avatar of the hand, and focused on improvement of whole hand function.

"Popular off-the-shelf games are targeted to people with normal hand and arm function and coordination. These games don't work for or benefit those with moderate-severe hemiplegic cerebral palsy and many other disorders that affect movement. They just aren't made to be used by or improve hands that can't pinch or grasp" said Dr. Golomb.

In the future, physical therapists could remotely monitor patients' progress and make adjustments to the intensity of game play to allow progressive work on affected muscles. In addition to meeting an unfulfilled need, this could potentially also save healthcare dollars and time.

Typically, insurance or government program coverage for rehabilitation therapy for cerebral palsy does not cover teens. Long term physical rehabilitation is costly. And even if cost is not an issue, taking an adolescent out of school and transporting him or her to the hospital or rehab center puts stress on both the patient and their parents. These specially developed games motivated rehabilitation exercises in the home at a time convenient for the teens, broadening access to rehabilitation

Provided by Indiana University School of Medicine