

# Arm Rehab Boosts Function in Chronic Stroke

## VITALS

**Major Finding:** Two different, upper-extremity rehabilitation programs for chronic stroke patients showed modest but significant gains in motor function and ability to perform daily activities, compared with usual care.

**Data Source:** Controlled, multicenter study with 127 chronic stroke patients randomized to robot-assisted arm movement, conventional intensive arm movement, and usual care.

**Disclosures:** Dr. Lo and most of his collaborators had no disclosures. One collaborator, Hermano I. Krebs, Ph.D., coined the study's robot-assisted movement devices, a technology patented by the Massachusetts Institute of Technology. He also has an equity position in Interactive Motion Technologies, which produces and markets the robots under license from MIT.



Robot-assisted therapy (above, the InMotion 3.0 Wrist robot) guides patients through a series of over 1,000 movements per session.

BY MITCHEL L. ZOLER

SAN ANTONIO — Regular sessions of arm and hand movement rehabilitation exercises helped chronic stroke patients significantly improve their motor capacity, motor skills, and ability to perform daily activities in a randomized study with 127 Veterans Affairs patients.

“High-intensity, repetitive movement can help individuals with stroke-related impairment despite high severity, chronicity, and multiple strokes,” Dr. Albert C. Lo said at the International Stroke Conference.

The exercises “result in modest improvement. The findings are small but consistent, and significant because little is [currently] available for chronic stroke patients,” said Dr. Lo, a neurologist at the VA Medical Center and at Brown University in Providence, R.I. “Compared with what’s out there, I think this is better.”

Especially notable about the movement and activity gains achieved with both robot-assisted therapy and intensive conventional physical therapy was that the patients were enrolled an average of 5 years post stroke, with a range of 0.5-24 years since their initial stroke.

“These are exciting findings. Intensive treatment can give patients hope for continued improvement months or even years later, when many thought they could no longer improve,” commented Dr. Philip B. Gorelick, professor of neurology and rehabilitation and director of the Center for Stroke Research at the University of Illinois in Chicago.

The study enrolled 127 patients (96% men) at four VA centers with an average age of 65 years (range, 28-95 years). Overall, 78% were white and 19% African American; 85% had ischemic strokes, and a third had multiple strokes.

Dr. Lo and his associates randomized the patients into three study groups:

► Forty-nine patients underwent robot-assisted, upper-extremity physical therapy three times a week for 12 weeks. The robots guided each patient through a series of movements of the fingers, hands, wrists, and elbows, with more than 1,000 movements per session.

► Fifty patients participated in an “intensive comparison therapy” (ICT) that also involved three sessions per week for 12 weeks. Patients did arm and hand exercises using conventional physical therapy equipment, such as hand ergometers.

► Twenty-eight patients entered a “usual care” control group that did not undergo structured upper-extremity exercise.

The study’s primary end point was change in the patients’ mean score on the

Fugl-Meyer Assessment, which measures motor capacity, at the end of 12 weeks. At entry, the average score was 18.9 out of a possible 66.

After 12 weeks, the average score rose by slightly more than 1 point in the robot-assisted group and fell by slightly more than 1 point in the usual care group, a difference that just missed statistical significance. The robot and ICT groups had similar score changes after treatment.

Dr. Lo and his associates also presented preliminary economic data. The average cost per patient over 12 weeks was \$9,977 for robot-assisted, \$8,269 for ICT, and \$0 for usual care. The higher cost for robot therapy largely derived from an amortized portion of the robot’s cost, about \$200,000 per machine, with several different machines used in the physical therapy sessions, Dr. Lo said at the conference, which was sponsored by the American Heart Association. ■

## Stage Set for More Targeted Rehab

WE often think of stroke patients as reaching maximum recovery after a certain period of time. Some stroke patients receive very little physical therapy and rehabilitation in the chronic phase. For any rehabilitation program to show improvements in stroke patients this late after the index event is a very important finding.

The take-home message is that intensive rehabilitation, be it by people or by robots, can be effective late after stroke. That’s very intriguing. And the overall cost of robot-based treatment was similar to more conventional, intensive physical therapy.

This study should be followed by trying similar rehabilitation earlier

after stroke, in larger numbers of patients, and in patient groups that are more representative than a VA population. There have not been enough randomized, controlled trials to assess methods to improve patient outcomes late after their strokes. We need to develop more approaches for improving poststroke recovery.



RALPH L. SACCO, M.D., is professor and chairman of neurology at the University of Miami. He had no disclosures relevant to this topic.

# Increase Seen in Percentage of Stroke Patients Under Age 45

BY KERRI WACHTER

SAN ANTONIO — Not only is the average age of stroke patients getting significantly younger, but the proportion of young stroke patients—those younger than 45 years—is going up significantly, according to a population-based study of more than 1 million people over a 12-year period.

The average age at the time of stroke dropped from 71.3 years in 1993-1994 to 70.9 years in 1999 to 68.4 years in 2005, Dr. Brett Kissela reported at the annual International Stroke Conference. Over the same period, the percentage of stroke patients younger than 45 years went up, from 4.5% in 1993-1994 to 5.5% in 1999 and to 7.3% in 2005.

In the oldest age groups, “there were statistically significant declines in incidence rates,” said Dr. Kissela, professor of neurology at the University of Cincinnati.

Dr. Kissela and his coinvestigators examined data from the Greater Cincinnati/Northern Kentucky stroke study, which includes 1.3 million people in a five-county region. The region is representative of the United

States in terms of age, median income, educational level, and percentage of blacks in the population.

The researchers identified patients retrospectively by using ICD-9 discharge diagnosis codes and symptom-based screening of admission logs. Potential stroke cases were identified in local hospitals, hospital-based clinics, or coroner’s offices, and by a sampling of nursing homes and physician offices. The medical record abstract for each potential case was reviewed by a study physician.

The same clinical case definition was used for comparisons across study periods. Stroke was defined as a focal neurologic deficit referable to a vascular territory and lasting longer than 24 hours. For the incidence rates, the numerator was the number of incident cases and the denominator was the at-risk population, using U.S. Census population data.

There were 1,907 strokes in 1993-1994, 1,955 in 1999, and 1,888 in 2005. In each period, more than half (55%-58%) of the individuals who had a stroke were women. Blacks accounted for 18%-20% of the population, Dr. Kissela reported at the conference, which was sponsored by the American Heart Association.

One possible explanation for increasing strokes among younger age groups might be an increase in hemorrhagic strokes. However, when the researchers looked at this, they found that ischemic strokes outnumbered hemorrhagic strokes (intracranial and subarachnoid hemorrhage) in those aged younger than 45 years in all three time periods, and even seemed to increase in 2005.

Regarding risk factors, both diabetes and coronary heart disease significantly increased between 1995 and 2005 in those aged 20-44. The prevalence of diabetes increased from 0% to 5% and CHD increased from 0.4% to 7%. There were similar trends for hypertension and high cholesterol, although these were not significant. In contrast, there were no significant changes in these risk factors among those aged 45-54 years. ■

**Disclosures:** The study is funded by the National Institute of Neurological Disorders and Stroke. Dr. Kissela and his coinvestigators reported no relevant financial relationships.

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