

Rehabilitation robots uncover stroke disabilities and improve care

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When it comes to stroke rehabilitation, it takes a dedicated team to help a person regain as much independence as possible: physicians, nurses, physiotherapists, occupational therapists, speech-language pathologists, recreation therapists, caregivers and others. Now, a University of Calgary research team has added a robot to help identify and customize post-stroke therapy.

Rehabilitation robots improve detection of post-stroke impairments and can enhance the type and intensity of therapy required for recovery, according to a study presented today at the Canadian Stroke Congress.

Researchers studied 185 subjects—87 recovering from stroke and 98 people unaffected by stroke—and found that tests using a robot better measure patients' sense of limb position, speed and direction of [limb movement](#). Patients were assessed approximately 15 days after stroke.

"For years, therapists have known that limb awareness is very important to predicting a person's outcomes after stroke. Yet we have never before been able to quantify it," says lead researcher Dr. Sean Dukelow. "Identifying these deficits opens the door to the next step: how do we treat it?"

Until now, rehabilitation experts have relied on their judgment and subjective rating scales to assess impairment after stroke. Robotic technology standardizes these measurements.

"Awareness and control of our limbs' location allows us to do everyday things like reach for a [coffee cup](#) while [watching television](#)," Dr. Dukelow says.

In the Calgary study, a robotic frame moved each patient's stroke-affected arm at a preset speed and direction while they attempted to mirror its movement with their unaffected arm. Participants

were not able to rely on their vision for assistance.

Dr. Dukelow and his team found:

- 20 per cent of the stroke patients failed to acknowledge that the robot had moved their affected arm;
- 70 per cent of stroke patients took significantly longer to react to the robot's movements;
- 78 per cent of [stroke patients](#) had significantly impaired sense of movement direction; and
- 69 per cent had diminished ability to match movement speed.

"Impaired limb function is a serious problem for people with stroke," says Dr. Mark Bayley, Co-Chair of the Canadian Stroke Congress and Medical Director of the Neurological Rehabilitation Program at Toronto Rehab. "It can prevent people from performing small daily tasks that give them some measure of independence."

The final goal of precise assessment is more patient-specific treatment, a concept Dr. Dukelow calls "personalized medicine." Ideally, robotics will be used to guide patients through the repetitive movements and personalized treatment plans required to remap the brain and restore function.

"Rehabilitation is an important part of [recovering from stroke](#)," says Ian Joiner, the director of stroke for the Heart and Stroke Foundation, who is also a physiotherapist. "[Robotic technology](#) is very useful supplement to traditional rehab. The end result – the one we're all working toward – is better patient care and improved recovery."

The Canadian Stroke Congress is co-hosted by the Canadian Stroke Network, the Heart and Stroke Foundation and the Canadian Stroke Consortium.

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