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Therapy, R2D2 Style

Here's a smart robot that keeps patients safe and helps clinicians to do their jobs.

By: [Katie Gilbert](#)

The recovering stroke patient takes a successful step on the balance beam, then stumbles and falls. The therapist doesn't move to catch her. After all, that's the robot's job.

Researchers at Northwestern University—Dave Brown, Michael Peshkin and Ed Colgate—founded Chicago PT to develop the 500-pound robot KineAssist. So far the device has been used primarily in the treatment of stroke victims, who have lost control of one or more limbs. As a patient is regaining the use of his legs, for example, the robot is designed to stay out of the patient's way until he starts to fall, at which point it catches him. It keeps patients safe and allows clinicians to do their jobs without having their hands tied with safety measures. "Clinicians' skills and intelligence can't be replaced," says Brown. "What they need is a hand to help them do their job better."

According to the American Stroke Association, 700,000 Americans suffer from stroke every year. Of those, a third lose the ability to walk. Physical therapy is an integral part of recovery, and can set the foundation for exercise programs to help restore lost function. However, therapists often acknowledge a basic contradiction in a patient's needs that can hinder recovery: Actions like re-learning to walk, for example, require risk-taking. In fact, mistakes are part of the process. But a therapist cannot allow mistakes if patient safety is compromised.

Some rehab robots attempt to do everything for the patient—moving paralyzed limbs or fetching items across the room. But these robotic interventions encourage dependence. KineAssist, however, does not interfere. Nor does it usurp the therapist's job. It does, however, force the patient to exercise autonomy. The robot uses sensors and follows the patient, providing support if she teeters.

"KineAssist challenges the patient in a safe manner," Brown says. This challenge is a necessary part of the treatment, he explains. "If you feel too safe, you don't feel compelled to move well." "Moving well" in the case of these patients means taking risks—which are often as deceptively simple as putting one foot in front of the other. Assured that patients are safe, therapists can introduce all kinds of challenges that otherwise would have been impossible in a clinical setting—climbing stairs to walking on balance beams, for example. As therapy progresses, the robot can even create disturbances, shoving the patient to simulate

real-world situations that help him learn to recover.

Brown emphasizes that continuing research is needed, especially in the field of movement science. He describes KineAssist as a "device with many possible applications," but it's up to humans to develop KineAssist into its full potential. Then patients will be better able to reach theirs.

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