

# Extra Set of Hands

ZeroG<sup>®</sup> technology provides therapists and patients with needed support

By Susan Ryerson, PT, DSc, Diane Nichols, PT, NCS, and Kathaleen Brady, PT, MS, NCS

▶▶ When training balance, walking or dynamic functional activities, have you ever wished you had an “extra pair of hands”—at least for an hour? Therapists at Medstar National Rehabilitation Hospital in Washington, D.C., and at 33 rehabilitation facilities around the country, have found a new technological advance that complements their clinical expertise by providing that extra pair of hands to ensure safe but challenging practice: the ZeroG<sup>®</sup> dynamic overground body-weight support system (Aretech LLC). Developed 8 years ago by biomechanical engineer Joseph Hidler, PhD, and a group of consulting engineers and physical therapists, the ZeroG<sup>®</sup> system provides consistent, safe bodyweight support whether your patient is practicing basic balance tasks, sit-to-stand, over-ground walking, treadmill walking, obstacle avoidance, or relearning how to kick, jump or run. The ZeroG system is a physical therapist’s “extra set of hands.”

How does this system differ from other bodyweight support systems? Over the past 15 years, many different systems have been developed to provide assistance with walking. These systems range from robotic exoskeletons that move the lower extremities with or without bodyweight support over treadmills to static unloading suspension systems attached to moveable frames or ceiling-mounted tracks.

The ZeroG consists of a robotic bodyweight support system attached to a motorized trolley that rides along a ceiling-mounted track. The patient is connected to the system via a harness. This overhead suspension omits

any barriers between the patient and therapist, allowing hands-on assistance, if necessary, and provides the needed space for limb movement and easy direction changes. The system features an adjustable “fall distance” to provide proprioceptive error knowledge during near falls; a safety feature within the system catches a fall if the rope lets out beyond the distance set by the clinician. This makes ZeroG an excellent device to safely train postural activities in individuals with significant lower limb impairments.



**Kathaleen Brady, PT, MS, NCS, using ZeroG with a patient as he practices walking and balance activities.**

The combination of the ZeroG’s unique suspension system and the ability of the trolley to track overhead with the patient’s movement allows patients to practice walking up and down curbs and stairs, in addition to training gait over level surfaces. Therefore, activities that challenge moving one’s base of support and postural control can be practiced within the system with an added measure of safety or additional body weight support if needed. The ZeroG system provides accurate control and monitors the amount of bodyweight support provided to the patient.

Therapists use the ZeroG system to retrain balance and walking in children and adults with spinal cord injuries, post-stroke hemiparesis, cerebral palsy, Down syndrome, Parkinson’s disease, amputation, traumatic brain injuries and imbalance from concussion, aging or vestibular dysfunction. With the limited length of stay for acute inpatient rehabilitation, and no signs of the Medicare therapy cap disappearing, it is imperative that therapists find ways to challenge patients to progress as much as possible within their limited insurance window. ZeroG creates an environment that allows physical therapists to retrain these daily functions with greater intensity and creativity, more safely and earlier.

Indeed, research findings with acute stroke patients have shown that earlier and more intense therapy correlates with gains in

walking and the ability to function. The ZeroG system does this without putting the patient or the therapist at risk for injury.

This issue is being investigated in a NIDRR-funded research study at MedStar National Rehabilitation Hospital in Washington, D.C. The study, “Training walking and postural control with the ZeroG dynamic body-weight support system,” aims to determine whether an intensive, over-ground gait training protocol with a focus on retraining anticipatory postural adjustments and walking leads to greater improvements in walking ability than conventional physical therapy in individuals with acute hemiparetic stroke.

The study protocol requires a harness system that provides adequate bodyweight support and safety to allow patients to practice basic and advanced functional movements without the use of their hands or external aids such as canes or walkers. The protocol focuses on retraining the anticipatory postural adjustments (APAs), the linked pre-functional muscle activity of the trunk and limbs, necessary for walking.

The ZeroG system provides the safe environment in which therapists help patients practice these dynamic anticipatory balance responses: sit-to-stand, stepping and fast movements of both the paretic and non-paretic limbs without relying on arm support or touch assistance from the therapist. Since APAs are dependent on proprioceptive feedback, the features of graded, monitored maximal loading and the ability to set a “fall distance” allow the clinician to optimize a postural response.

The ZeroG system’s external support allows patients to feel safe while experiencing the freedom to move. This environment, made possible by technology, allows patients to practice challenging activities that will allow them to regain more control of movement and move toward independence.

The Medstar NRH researchers look forward to sharing the results of their study in the spring of 2014. ■

**For more information on the ZeroG, visit [www.aretechllc.com](http://www.aretechllc.com)**

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