Give your rehab facility a boost with bodyweight-supported treadmill therapy.

By Jason Fiske, MPT, NHA

The applications for body-weight supported treadmill training (BWS-TT) are expanding. Although BWS-TT is used mainly for post-stroke and spinal cord injury rehabilitation, this modality isn't limited to clients with compromised nervous systems.

Current research demonstrates the effects of BWS-TT on fractures, joint replacements, amputations and general debilities. Known by several terms, such as bodyweight supported gait training and partial weight-bearing gait training, BWS-TT uses a harness or system of straps to support a patient's trunk without impairing the mobility of the hips. The patient is supported in the harness over a low-end torque treadmill, with speeds that can be adjusted by increments as small as one-tenth of a mile per hour.

BWS-TT is enjoying a robust amount of supporting literature, and current studies are examining applications for a variety of orthopedic, neurological and debility diagnoses.

The Science of Locomotion

BWS-TT capitalizes on the theory of locomotion, which is comprised of posture, balance and coordination.1 During conventional physical therapy, it can be difficult to coordinate lower limb movements, control posture, prevent loss of balance and reduce a patient's fear of falling. Failure to address these components during gait training results in an abnormal gait pattern and less than desired results.

For instance, using an ambulatory device may improve posture, but it can increase the base of support and displace the center of gravity, which leads to an asymmetrical gait pattern. With BWS-TT, you can facilitate a symmetrical gait pattern with proper weight shift and lower limb loading in stance phase. This proficiency translates to better clinical outcomes.

Locomotor neurology research has demonstrated that BWS gait training is twice as effective as conventional physical therapy improving gait following stroke. And gait continues to progress after discharge.2 In another study, non-ambulatory post stroke patients became ambulatory with BWS gait training, and many subjects required only verbal cues after five weeks of training.

Also, BWS-TT is more effective than conventional physical therapy teaching non-ambulatory people with incomplete spinal cord injury to walk. In one study, 91 percent of acute patients were able to walk independently after 20 weeks of treatment, compared to 50 percent of patients in the study who received conventional therapy.

Essential neuroanatomy for basic locomotion includes muscle spindles, peripheral nerves, spinal cord pattern generators, spinal cord pathways, the brainstem and midbrain. Other components of the nervous system impact the adaptability and quality of gait, including sensation, the pons, cerebellum and substantia nigra.

This knowledge allows clinicians to predict the rehab potential of patients who have difficulty walking after an injury to the central nervous system. It also demonstrates that an intact cerebral cortex isn't essential for the recovery of gait.

For these reasons, BWS-TT has shown promise over conventional physical therapy for people with Parkinson's disease (Hoehn and Yarh stages 2.5 or 3), when the condition isn't complicated with dementia.5 With BWS-TT, these patients significantly increased ambulation speed and longer stride length, and these positive influences continued well after the four-month intervention period ended.

In most applications of treadmill training, treatment sessions typically last from 30 minutes to an hour. When clients require extensive therapist assistance to advance their lower limbs, treatment duration is often limited by the fatigue of a therapist. When treating a client who is able to advance his limbs without assistance, set a goal of two or three 15-minute intervals on the treadmill. When symmetrical gait stops, fatigue has likely set in and the patient needs a brief rest period.

The therapist may provide tactile cues to the pelvis, knee & ankle as needed to promote a symmetrical gait, facilitate hip extension at terminal stance, heel strike at initial contact and posterior tibial translation in loading response. A variety of clinical equipment can assist in promoting the symmetrical gait, erect posture, horizontal gaze and axial rotation as well as limit posterior transgression on the treadmill.

In the outpatient clinic limit treatment to 2-3 times per week for outpatients and, if you're applying treadmill training in a hospital setting, 3-4 times per week for at least two to six weeks.

Once a symmetrical gait with heel strike and hip extension is established by the patient with cues from a therapist treatment may be progressed adjusting multiple variables, such as treadmill speed, duration of treatment intervals and the amount of body weight supported by the harness. Some devices allow a final progression of supported gait training over ground. For reimbursement purposes the therapist would benefit from utilizing gait assessments such as the Timed Up and Go, Wisconsin Gait Scale, or the Functional Ambulation Profile to objectively

measure improvements in rate of speed, symmetrical stance time, and assess fall risk.

Emerging Applications

Clinicians can expand treatment parameters and apply treadmill training to several other conditions, such as the following:

- *Total hip replacement*. Research indicates that BWS-TT is more effective than conventional physical therapy in restoring symmetrical independent walking following unilateral total hip arthroplasty.7 Study results showed that gait symmetry was 10 percent higher, hip extension deficit was nearly 7 degrees lower and Harris outcomes scores were 13.6 points higher in patients after a 10-day trial period.

In addition, the affected hip adductor gained more strength with BWS-TT, and the amplitude of gluteus medius activity with gait was 41.5 percent greater in the treatment group. The treatment group abandoned their assistive devices at three weeks, versus eight weeks with the control group. These findings were supported at three months and 12 months post-op.

- *Lower extremity fractures.* Patients recovering from a lower extremity fracture have limited weight-bearing precautions, and BWS-TT offers a viable treatment intervention.

Use a pressure plate or integrated scale to support the patient's weight through the mechanical lift. This maintains weight-bearing limitations without constant monitoring or effort on the part of the patient.

Also, BWS-TT can benefit geriatric patients who lack the upper body strength or endurance that's required for traditional gait training with weight-bearing restrictions. As a result, you can focus your attention on facilitating a symmetrical gait. And once the patient becomes familiar with BWS-TT, the fear of falling dissipates.

- *Cardiovascular rehab*. Conventional gait training following a cardiac or respiratory event often requires the use of an assistive device, which can cause an abnormal gait pattern. Gait training can also can be taxing to the patient, which limits the duration of activity at target heart rate.

BWS-TT can be a viable option for these patients. One trial showed that BWS-TT resulted in a 9 percent decrease in VO_2 at 30 percent of body-weight supported gait training, versus 0 percent BWS over a treadmill.8 This finding indicates that BWS-TT reduces the energy requirement for ambulation at 30 percent BWS, and demonstrates that BWS-TT can reduce exertion and increase treatment duration in deconditioned patients.

Body weight supported gait training has created a unique evidence-based niche for our rehabilitation facility—it could be just what your own practice is looking for.

References are available online. Go to www.advanceweb.com/REHAB and click on the references tool bar.