

Rehabilitation of the Hip and Knee: Functional Training with NeuroGym® Technologies

Hip and knee replacements are one of the most common inpatient surgeries for Medicare beneficiaries. The high volume of these surgeries and their associated costs have made these procedures the focus of government cost-savings initiatives. As a result, the Centers for Medicare & Medicaid Services (CMS) recently instituted the Comprehensive Care for Joint Replacement Program (CCJR) which requires bundled payments for episodes of care that include hip or knee replacement surgery or other major leg procedures.

By 'bundling' payments for all services provided during the hospitalization and 90 days of post-discharge care, including fees for hospitals, physicians and post-acute care providers, CMS hopes to encourage better coordination of care and better outcomes. Total payments will be reconciled against a target amount, and if the hospitals that are accountable for the bundled payments come in under budget, they will receive a bonus. If they spend more than the target, they will owe money to CMS. Maximizing outcomes in the time available means stakeholders are incentivized to provide the most effective rehabilitation possible.

Recovery of the hip and knee is critical to overall mobility and, as has been clearly established in clinical statistics from both acute and LTC settings, it is also critical to an individual's overall health outcomes. The post-surgical hip and knee, orthopedic injuries, the sequella of neurologic impairments and the effects of age-related joint deterioration, all require functional rehabilitative training that includes range of motion (ROM), strength, control and coordination and ultimately mobility training.

NeuroGym® Technologies Inc.'s line of movement-enabling products provide for effective and functional training for the injured, paralyzed, weakened or post-surgical hip and knee joints. The following examples demonstrate both the usability and the efficacy of the NeuroGym® tools.

The Pendulum Stepper allows for easy, active-assisted motion of the hip and knee in a reciprocal fashion. Motion can be assisted by using the upper extremities

or by the therapist. It is convenient for the therapist to control the extent (ROM) and effort level of the user. As well, the training can be done in supine, thus maximizing the available range at each joint and allowing for early patient accessibility to functional training.



The Pendulum Stepper in supine and seated position

The Sit-to-Stand Trainer allows for early, effective training of the standing up motion assisted by counter-weight. Such early, upward mobility is crucial to a successful rehabilitation process, but in the past has often not been possible early in recovery because of the need to overcome full gravity.



The Sit-to-Stand Trainer in action

The Exercise Wheelchair allows for supported early flexion/extension motion of the hip and trunk – with or without accompanying knee flexion/extension. The early, supported and intense motion around the hip and knee are necessary for the most effective rehabilitation process.



The Exercise Wheelchair in action

The Bungee Mobility Trainer is a unique rehabilitation tool that allows for early mobility with graduated Body Weight Support from below. This option is extremely desirable for therapists who train and progress patients/residents who are unsafe or not yet able to walk or weight-shift independently on injured or weakened hip or knee joints. By gradually reducing the level of unweighting, the therapist is able to progress the individual in a safe, yet effective manner.



The Bungee Mobility trainer in action

The TIM Trainer is a training tool that combines computer games with motion-sensing feedback. It enables training to be done actively while providing real-time feedback. The computer game environment increases the effectiveness of training by creating greater motivation to perform desired movements and by providing speed-sensitive and spatially oriented environmental goals. The TIM Trainer can be used in combination with each of the above mobility tools by placing a sensor on a moving element, enabling more intensive and therefore more effective training.



The TIM Trainer

In the case of hip/knee replacement, both speed and degree of improvement is crucial to the recovering individual. In an environment of limited healthcare dollars and bundled payments, it is also significant to the treating facility and healthcare professionals involved. The effectiveness of using the above NeuroGym® equipment to enable and intensify early movement and then to functionalize it, has been already demonstrated in convalescent care facilities in Ontario, Canada. 'Stay days' in general have been significantly shortened through the combination of this equipment and the NeuroGym® methodology. It is anticipated that recovery time following hip and knee replacement, specifically, would decrease in a similar manner.

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