

"The Clinical Advantage"™



Body-Weight Support Treadmill Training (BWSTT) with Transition to Over Ground Ambulation:

A Clinical Guideline for the
Treatment of Patients with
Neurological Conditions using
Biodex Unweighing System
and Gait Trainer

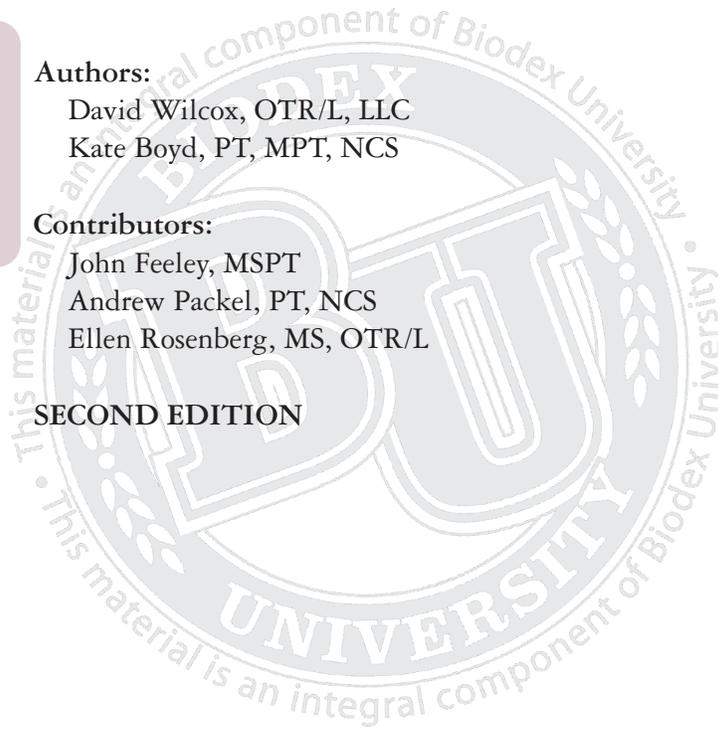
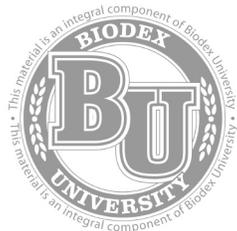
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SECOND EDITION



BIODEX

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ABOUT THE AUTHORS:

David Wilcox, OTR/L, LLC

David is an experienced Occupational Therapist and business consultant for Biodex Medical Systems, Inc. As an Occupational Therapist, David has developed his clinical expertise in the treatment of people with neurological conditions such as stroke, traumatic brain injury, and spinal cord injury in the rehabilitative setting. David expanded his skills from treating therapist to clinical mentor, student supervisor, guest lecturer, and adjunct professor with specific focus on neuroscience and cognition. As a business consultant, he has used his advanced clinical knowledge to train therapists on the Biodex Unweighing System, Gait Trainer, and Balance System SD, from both a logistical and clinical perspective. David has developed and taught advanced courses on each of these three products.

Kate Boyd, PT, MPT, NCS

Kate is an experienced Physical Therapist who has practiced in numerous settings across the rehabilitation continuum. Kate successfully completed Moss Rehab's Neurological Physical Therapy Residency Program in 2007 and is a board certified specialist in Neurologic Physical Therapy. She has participated in research in neurologic gait training and has taught physical therapy curricula at various universities in the Philadelphia area. Kate has extensive clinical work experience treating individuals following stroke and traumatic brain injury in both the inpatient and outpatient settings.

Special thanks to:

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**CLINICAL GUIDELINE
for Neurological Conditions**

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GENERAL CONSIDERATIONS

Patients likely to be enrolled in the guideline are those who show movement disorders due to a wide variety of neurological and orthopedic pathologies. The clinician is expected to set patient goals and establish the direction of intervention based on patient examination and evaluation. The guideline aims to maximize the patient's neurological, sensory perceptual, motor, musculoskeletal, and/or cognitive functioning while supporting neuroplasticity and motor learning principles.

Patients, for whom these goals apply, may be candidates with the following considerations in mind:

- Use of this guideline is not a substitute for sound clinical judgment.
- Tests and measures are proposed, however additional tests or measures may be needed.
- Patient inclusion in the interventions described in the guideline must depend on the clinician's interpretation of individual patient status.
- Progression is dependent on the patient's ability determined from reassessment (repeat examination and evaluation).

BEFORE GETTING STARTED



CAUTION: Tests and measures used in the guideline should only be performed with *medically stable* patients. Stability should be achieved in:

- | | |
|--|--|
| - Prescription Medication | - Bowel/Bladder Control. |
| - Blood Pressure and Circulation | - Decreased or absent sensation |
| - Respiration | and/or proprioception should also be noted |
| - Mental Capacity for Cognition and Behavior | and caution taken accordingly. |

- Goals should be determined collaboratively with the patient and his or her family/caregiver after the patient examination
- Treatments should be modified based on the patient's response and with the patient's well-being in mind.
- Should no improvement be noted by week four, alternative intervention strategies may be necessary to challenge the patient. If alternative programming also fails to lead to improvement, intervention may be terminated, a maintenance program may be outlined, or the patient may need to be referred to another health professional.

PATIENT CONSIDERATIONS



CAUTION: Patients should be *medically stable* before starting an active program of physical therapy.

- Breaks should be incorporated throughout the treatment session as needed, especially with patients who have cardiac, pulmonary dysfunction, and/or general deconditioning.
- Consider the patient's bowel and bladder status when using this equipment. The upright position and harness system may affect the patient's control.

CLINICAL GUIDELINE for Neurological Conditions

Checklist

DONNING THE BIODEX UNWEIGHING SYSTEM HARNESS ON THE PATIENT:

1. Determine if you want to don the *harness* with the patient in supine, sitting, or standing position.
2. Apply the *neoprene wrap* around the patient's waist.
3. Fasten the *two front waist straps* (blue) to a moderate tension. Adjust the *vest straps* in the front and back as needed, until the anterior buckle aligns with the patient's greater trochanter.
4. Fasten the *thigh cuff*. It should not be tight around the patient's thigh.
5. Fasten the *anterior strap* by bringing it along and inside of the leg and attach it to the *color-coded anterior buckle*.
6. Fasten the *gluteal fold strap* (red) to the appropriate *colored-coded buckle*.
7. Thread upper extremities through the *shoulder straps*.

PREPARING THE BIODEX UNWEIGHING SYSTEM:

1. Position the seated patient and *Unweighing System* wherever you want to initiate BWSTT.
NOTE: The Unweighing System's *single-point suspension cord* should be directly over the patient.
2. Lock all four castors.
3. Using the *% unloading chart* for reference, determine the desired % offload in preparation for BWSTT.
4. Set the unweighing parameters using the *unloading scale's handle #2*.
5. Loosen the *safety tether* (green).
6. Using *handle #1* (on the opposite side), lower the *single-point cord*, and attach the *harness* with patient to the *O rings* of the *harness spreader bar* on the *Unweighing System*.
7. Using *handle #1*, raise the patient into a standing position until the *digital display* reads the desired offloaded weight.
8. Tighten the *safety tether*.
9. Initiate BWSTT.

INITIATING BWSST WITH THE BIODEX GAIT TRAINER, -2, OR -3:

1. Select <Gait Trainer> icon.
2. Complete *setup information*. Patient's name, age, gender and height are all required to advance to the gait training regimen.
3. Using the <A/V> icon, determine biofeedback: audio, visual, none, or both.
4. Once back to the setup information page, select <next>.
5. Once the Gait Trainer screen appears, press <start>.

STEP I:

CLASSIFICATION OF THE NEUROLOGICALLY INVOLVED PATIENT

- It is important for the therapist to first classify the impairment of body function(s) of the patient.
- The therapist should refer to the common characteristics and impairment of body function(s) phase categories below to determine if patient is in Phase I (profound neurologic involvement), Phase II (moderate neurologic involvement), or Phase III (mild neurologic involvement).
- Once the phase is identified, follow the appropriate Body-Weight Support Treadmill Training (BWSTT) regimen.
- These phases are not mutually exclusive. Patients may fluctuate on an hourly daily, weekly, or monthly basis, or present with certain characteristics from any phase of neurological recovery.
- It is recommended that the primary treating therapist reassesses frequently and uses clinical judgment to best determine the appropriate phase and BWSTT regimen for the treatment session(s).

Recommended Minimal Qualifications for Body-Weight Support Treadmill Training (BWSTT) Participation:

- Patients should be able to follow simple two-step commands have adequate sustained, divided, and alternating attention, and ample vision to see the Gait Trainer screen. They should also be able to communicate (verbally or nonverbally), or demonstrate signs of tolerance effectively.
- Take note of any external bowel, or bladder management devices, or other medical devices such as a foley catheter, colostomy bag, suprapubic catheter, and/or percutaneous endoscopic gastrostomy (PEG) tube. They may interfere with the harness while the patient is participating in unweighted gait training. Make the necessary adjustments as clinically indicated.
- The harness should not interfere with a Foley catheter if it is positioned correctly. Once the harness is applied, the therapist should reassess to determine that it is not pulling on the catheter.

Common Presentations of Patients with Neurologic Involvement:

- Impairments of body functions including mental functions, sensory functions and pain, voice and speech functions, neuromuscular and movement-related functions, functions of the skin and related functions. Other components may include functions of the cardiovascular, hematological, digestive metabolic, immunological, genitourinary, respiratory and endocrine systems.

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- Lesion to the upper motor neuron system with impairments, including paralysis or weakness, decreased endurance, motor control, dexterity and/or speed, changes in muscle tone resulting in hypotonia, hypertonia, spasticity, abnormal reflexes, and/or associated reactions.
 - Secondary impairments such as the emergence of flexor and extensor synergies, increased muscle stiffness, muscle overactivity, disuse atrophy, learned non-use, and/or the onset of contractures.
 - Lesion to the lower motor neuron that can lead to paralysis, paresis, areflexia, and/or muscle fiber loss.
 - Changes in sensory processing such as limitations in proprioception, sensory interpretation, and/or kinesthetic memory.
 - Changes in cognition contributing to decreased problem solving, attention, and ability following direction.
 - Changes in vision/perception.

Phase I: The Patient with Profound Neurologic Involvement

Impaired body function(s) and body structure limitation(s) resulting in limitations in activity participation:

- Impairments to one or more of the following body structures: nervous, cardiovascular, immunological, respiratory, digestive, metabolic, endocrine, genitourinary, reproductive systems, the eye, ear, and related structures, structures involved in speech and voice.
- Clinically, the patient may present with, but not limited to, the following deficits:
 - Poor static standing tolerance and balance. The patient may be able to tolerate standing with total to maximal assistance for a time no more than one minute. He or she may also require total to maximal assistance to remain upright in the static standing position during that one-minute timeframe. Lastly, the patient is unable to reach out of his or her base of support.
 - Poor static and dynamic sitting balance, requiring total to maximal assistance.
 - Dense hemiplegia or significant hemiparesis.
 - Significant fear of movement or poor volitional control, requiring total to maximal assistance from the therapist with any movement.
 - Minimal or no ability to tolerate weight through one or both sides with therapeutic assistance.
 - Demonstrates poor attention span, but should be able to follow two-step commands.
 - Significant impairments to the visual/perceptual system(s) resulting in deficits such as neglect, inattention, and/or in midline orientation.
- As a result of these possible limitations, the patient may require total to maximal assistance with ADLs or other activities.

These impairments result in the patient requiring total to maximal assistance with Activities of Daily Living (ADL) or other activities.

Phase II: The Patient with Moderate Neurologic Involvement

Impaired body function(s) and body structure limitation(s) resulting in limitations in activity participation:

- Impairments to one or more of the following body structures: nervous, cardiovascular, immunological, respiratory, digestive, metabolic, endocrine, genitourinary, reproductive systems, the eye, ear, and related structures involved in speech and voice.
- Clinically, the patient may present with, but not limited to, the following deficits:
 - Limitations in static standing tolerance and balance. The patient may be able to tolerate standing with minimal to moderate assistance for one- to three-minutes. He or she may also require moderate assistance to remain upright in the static standing position during that one- to three-minute timeframe. Lastly, the patient may be able to initiate reaching out of his or her base of support with moderate assistance.
 - Demonstrates limited attention span, but is able to follow two- to three-step commands.
 - Minimal to moderate impairments to the visual/perceptual system(s) resulting in deficits such as neglect, inattention, and/or in midline orientation.
 - Emergence of non-isolated gross volitional control of the neurologically involved side(s).
 - Development of synergistic movements.
- As a result of these possible limitations, the patient may require moderate assistance with ADLs or other activities.

Phase III: The Patient with Mild Neurologic Involvement

Impaired body function(s) and body structure limitation(s) resulting in limitations in activity participation:

- Impairments to one or more of the following body structures: nervous, cardiovascular, immunological, respiratory, digestive, metabolic, endocrine, genitourinary, reproductive systems, the eye, ear, and related structures, structures involved in speech and voice.
- Clinically, the patient may present with, but not limited to, the following deficits:
 - Limitations in static standing tolerance and balance. The patient may tolerate three to five minutes of standing with minimal assistance to supervision. He or she may also require minimal assistance to remain upright in the static standing position during that three- to five-minute timeframe. Lastly, the patient is able to reach out of his or her base of support with minimal to moderate assistance.
 - Limitations in static and/or sitting dynamic balance, requiring minimal assistance to supervision.
 - Increased confidence with movement, and may require minimal assistance to supervision with any movement.
 - Increased ability to weight bear through one or both sides with minimal assistance to supervision.

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- Evidence of gross synergistic movements with the emergence of isolated control out of synergy.
 - Demonstrates a good attention span and the ability to follow multi-step directions.
 - Minimal or no impairments to the visual/perceptual system.
- As a result of these possible limitations, the patient may require minimal assistance to supervision with ADLs or other activities.

STEP II:

ESTABLISHING A BASELINE FOR ALL THREE PHASES

The physical therapist conducts a thorough examination and evaluation to determine the body function impairment(s) and how balance and/or gait are affected. These should include identifying both primary impairments as a direct result of the neurologic event(s) and the onset of any possible secondary impairment(s).

Based on the initial evaluation findings and ongoing reassessment, the therapist determines the objectives for each session, and develops a plan to meet the objectives. The plan should include determining the amount and location of therapeutic assistance, the frequency and type of verbal cues, while establishing parameters such as offload percentage, time intervals, and intended number of trials.

Once determined, the therapist obtains vital signs including blood pressure, heart rate, and blood oxygen level through pulse oximetry. If the vital signs are within normal limits, the therapist may proceed. If vital signs are unstable, sound clinical judgment to take the appropriate steps is required to assure patient safety.



SAFETY FEATURES of the Biodex Unweighing System and Gait Trainer

Prior to working with the patient with Body-Weight Support Treadmill Training (BWSST), it is important for the therapist to have adequate knowledge of the safety features for the Biodex Unweighing System and Gait Trainer, especially in the case of emergency. On the Unweighing System, the ***green safety tether should be taut*** once the position of the offloading cord is determined when patient is standing, prior to ambulation.

IN CASE OF EMERGENCY:

1. Detach the safety lanyard located just below and to the left of LCD display on the Gait Trainer.
2. On the Unweighing System, loosen the green safety tether and pull the harness release mechanism. In seconds the patient can be safely positioned in the wheelchair.

PHASE I OF RECOVERY:

THE PATIENT WITH PROFOUND NEUROLOGIC INVOLVEMENT

Equipment preparation recommendations:

Blood pressure cuff, pulse oximeter, therapeutic objects (e.g. mirror, therapy ball, etc.). Obtain the patient's current weight.

Therapist assistance recommended:

Patient's primary therapist to facilitate or inhibit movement in the lower extremity(ies), pelvis, and/or trunk. Additional aide(s) are recommended to assist the primary therapist. The primary therapist will also clinically determine the amount of additional assistance needed to optimize the patient's gait.

STEP 1: PREPARE THE BIODEX UNWEIGHING SYSTEM

- Refer to the unloading scale to select the weight range you want to unload the patient. For the patient in Phase I of recovery, it is recommended the primary therapist initiates the unweighing regimen by offloading 40%.
- Refer to the percentage guide above the digital scale to determine the desired offload weight.
- Adjust the offloading mechanism (handle #2) to the appropriate unweighing parameters.
- Zero the digital scale.

STEP 2: DONNING THE PATIENT WITH THE HARNESS

- As a result of the patient's significant physiological impairment(s), it is recommended the therapist dons the harness while he or she is in supine. Once the harness is securely fastened, the therapist assists the patient into sitting and transfers him or her into the wheelchair. Additional assistance may be clinically indicated.
- Refer to harness application manual for step-by-step donning instructions.
- Lower the single-point cord, using handle #1.
- Fasten the two shoulder straps of the harness to the attachment rings on the horizontal pull bar of the Unweighing System. Adjust as needed.
- Therapist uses clinical judgment whether to position the lower extremities on the Gait Trainer or treadmill versus the floor in preparation for sit to stand.
- Primary therapist assists the patient into standing while the aide manipulates handle #1 to offload. Refer to the digital scale to achieve the desired offload weight. If the patient is able, therapist may cue him or her to hold onto the handrail(s).

STEP 3: ATTACHING THE PATIENT TO THE UNWEIGHING SYSTEM AND PROGRESSION FROM SITTING TO STANDING

- Position patient seated in the wheelchair at the back end of the Gait Trainer, so the display is facing the patient.
- Lock the wheelchair brakes and remove leg rests.
- Position the Unweighing System so the single-point suspension is directly over the seated patient.
- Lock the four castors.
- Lower the single-point cord, using handle #1.
- Fasten the two shoulder straps of the harness to the attachment rings on the horizontal pull bar of the Unweighing System. Adjust as needed.
- Therapist uses clinical judgment whether to position lower extremities on the Biodex Gait Trainer or treadmill versus the floor in preparation for sit to stand.
- Primary therapist assists the patient into standing while the aide manipulates handle #1 to offload.
- Refer to the digital scale to achieve the desired offload weight. If the patient is able, therapist may cue him or her to hold onto the handrail(s).

STEP 4: BODY-WEIGHT SUPPORT TREADMILL TRAINING (BWSTT)

Body-Weight Support (BWS) offloading:

- Re-verify 40% offload. Initial harness adjustments may cause changes in the % offloading.

Gait Trainer setup and initiation:

Option #1:

- From the Gait Trainer icon, use the keyboard to type in mandatory patient information (gender, height, age).
- Use the keyboard to type in patient's name.
- The appropriate parameters will appear on the biofeedback screen once <enter> is selected.
- Initiate program and increase the speed.

NOTE: The Gait Trainer speed will initiate at 0.1 mph, however visual and auditory feedback will not function until the speed is increased to 0.3 mph.

- The timer will initiate from "0".
- As the patient ambulates at 0.3 mph or more, the Gait Trainer will provide visual and auditory feedback when footfall occurs. These two features are optional.

Option #2:

- If the therapist determines that it is too challenging to manage the patient with the goal of achieving specific parameters, switch to the "Treadmill" mode.

Option #3:

- The unique Biodex RTM Treadmill is another option for ambulation training. This treadmill's speed also initiates at 0.1 mph.

Option #4:

- If the Biodex Gait Trainer has not yet been purchased, the facility's treadmill will be sufficient.

Selecting temporal parameters and frequency:

Speed selection:

- Initiate ambulation so Gait Trainer speed is set up to 0.5 mph. Therapist assesses gait kinematics and postural control while monitoring vital signs.
- Therapist strives to increase the speed of the Gait Trainer by 0.1 – 0.2 mph above the patient's comfortable walking speed. The therapist observes, evaluates, and determines what speed works best for the patient while taking the interval, BWS offloading percentage, and therapeutic intervention into consideration.
- Based on clinical presentation of the patient, the therapist uses clinical judgment as to when to adjust the speed.
- If warranted, the therapist may need to adjust step-length parameters if using the "Gait Trainer" mode.

Recommended intervals:

- A patient's performance may be variable. It is important to obtain a baseline by having the patient participate between one and five minutes of BWSTT.
- Therapist examines and assesses the patient during the baseline ambulation trial. If vitals are unstable and/or the patient does not feel well, take the necessary steps to assure patient safety.
- If vitals are stable, proceed.
- Work to increase interval goal time of five minutes as patient gains activity tolerance, muscular, and postural control, and an optimal gait pattern.

Recommended number of trials and days/week:

- Two to five trials for up to thirty minutes of the session, with therapist using their own discretion.
- One to seven days/week, as clinically indicated. As the patient improves, therapist increases the amount of time and days the patient participates in BWSTT.

Therapeutic intervention:

- Once the patient is 40% offloaded, the therapist determines and provides an appropriate level of facilitation, inhibition, and/or verbal cues to promote optimal symmetrical step length, cadence, and foot clearance, while limiting knee buckling on the neurologically involved side(s), and any developed compensatory strategies.
- Primary therapist facilitates or inhibits movements at the neurologically involved lower extremity(ies).
- Aide(s) may facilitate or inhibit movement at the upper body, trunk, and/or pelvis.

NOTE: If the patient's quality cadence is compromised during the ambulation trials, the therapist needs to determine whether to make changes to the speed, intervals, BWS, and/or therapeutic intervention. Bracing should be considered.

Unique features of the Biodex Gait Trainer:

Progress Report from data collection:

- This feature of the Gait Trainer allows the therapist to measure numerous features of the patient's gait. The ability to save the data allows the therapist to more easily identify specific issues, document progress, and compare outcomes. This unique data will complement the therapist in treatment planning and therapeutic intervention on and off the Gait Trainer.
- These progress reports include:
 1. Total time report
 2. Average walking speed report
 3. Total distance and step report
 4. Average step length report
 5. Step length variability report
 6. Time on each foot report
- The unweighing percentage and therapist comments can also be recorded.

Compares the patient's actual results to the normative data:

- This unique feature allows the therapist to compare the patient's actual progress report(s) to age- and gender-based normative data in healthy individuals. The ability for the therapist to compare actual data with normative data will assist in goal development for the patient.

STEP 5: TRANSFERRING SKILLS TO OVER GROUND AMBULATION

- It is recommended that over ground ambulation follows BWSTT every session.

Duration and clinical decision making:

- Recommended duration up to half of the therapy session. This is solely based on therapist's clinical judgment. The patient's ability to carry over optimal gait pattern techniques learned on the Gait Trainer or treadmill is stressed.
- As the patient demonstrates increased ability to actively tolerate body weight through his or her trunk, pelvis and/or lower extremities, it is recommended that the primary therapist discourages the use of the handrails and encourage reciprocal arm swing.

Effectively combining the use of BWSTT and therapeutic intervention:

The therapist performs ongoing reassessments throughout sessions, using clinical reasoning to determine the appropriate amount of body-weight support, therapeutic assistance, and/or cueing needed for the patient to practice the repetitive gait cycle and optimal gait pattern that contributes to motor learning. The goal is for the therapist and aide(s) to withdraw therapeutic assistance as gait improves. In addition, as the patient makes those gains, the therapist strives to de-emphasize the use of the handrail hold, decrease the amount of body-weight support over time, while balancing the level of therapeutic assistance. Each session should end with an evaluative process to determine the outcomes of the session and make proper adjustments in one or more of the above areas (speed selection, intervals, number of trials, body-weight support offloading, and therapeutic intervention) as clinically indicated for future sessions.

PHASE II OF RECOVERY:

THE PATIENT WITH MODERATE NEUROLOGIC INVOLVEMENT

Equipment preparation recommendations:

Blood pressure cuff, pulse oximeter, therapeutic objects (e.g. mirror, therapy ball, etc.). Obtain patient's current weight.

Therapist assistance recommended:

Patient's primary therapist to facilitate or inhibit movement in the lower extremity(ies), pelvis, and/or trunk. Additional aide(s) are recommended to assist the primary therapist. The primary therapist will also clinically determine the amount of additional assistance needed to optimize the patient's gait.

STEP 1: PREPARE THE UNWEIGHING SYSTEM

- Refer to the unloading scale to select the weight range you want to unload the patient. For the patient in Phase II of recovery, it is recommended that the primary therapist initiates the unweighing regimen by offloading up to 40%.
- Refer to the percentage guide above the digital scale to determine the desired offload weight.
- Adjust the offloading mechanism (handle #2) to the appropriate unweighing parameters.
- Zero the digital scale.

STEP 2: PATIENT ASSESSMENT TO DETERMINE APPROPRIATE GAIT SPEED OF THE TREADMILL

- The patient participates in the 10-Meter Walk Test over ground: The velocity at which the patient self-selects will determine at what speed to initiate the treadmill speed. Refer to 10-Meter Walk Test instructions for details.

STEP 3: DONNING THE PATIENT WITH THE HARNESS – SUPINE VS. SEATED IN THE WHEELCHAIR*

There are two options depending on the patient's size and/or level of mobility. Therapist uses clinical judgment to determine which option works best for the patient. Additional assist may be clinically indicated.

Option #1:

Harness application in supine followed by transfer into wheelchair: Once the harness is securely fastened, therapist assists the patient into sitting and transfers him or her to the wheelchair.

Option #2:

Harness application with patient sitting in the wheelchair: Once harness is securely fastened, therapist positions the patient at the back end of the Gait Trainer.

* Refer to harness application manual for step-by-step donning instructions.

STEP 4: ATTACHING THE PATIENT TO THE UNWEIGHING SYSTEM AND PROGRESSION FROM SITTING TO STANDING

- Position patient seated in the wheelchair at the back end of the Gait Trainer, so the display is facing the patient.
- Lock the wheelchair brakes and remove leg rests.
- Position the Unweighing System so the single-point suspension is directly over the seated patient.
- Lock the four castors.
- Lower the single-point cord, using handle #1.
- Fasten the two shoulder straps of the harness to the attachment rings on the horizontal pull bar of the Unweighing System. Adjust as needed.
- Therapist uses clinical judgment whether to position the lower extremities on the Gait Trainer or the floor in preparation for sit to stand.
- Primary therapist assists the patient into standing while the aide manipulates handle #1 to offload the patient. Refer to the digital scale to achieve the desired offload weight. If the patient is able, therapist may cue the patient to hold onto the handrail(s).

STEP 5: BODY-WEIGHT SUPPORT TREADMILL TRAINING (BWSTT)

Body-Weight Support (BWS) offloading:

- Re-verify the desired offload %. Initial harness adjustments may change the desired offload %.

Gait Trainer setup and initiation:

Option #1:

- From the Gait Trainer icon, use the keyboard to type in mandatory patient information (gender, height, age).
- Use the keyboard to type in patient's name.
- The appropriate parameters will appear on the biofeedback screen once <enter> is selected.
- Initiate program and increase the speed.

NOTE: The Gait Trainer speed will initiate at 0.1 mph, however visual and auditory feedback will not function until the speed is increased to 0.3 mph.

- The timer will initiate from "0".
- As the patient ambulates at 0.3 mph or more, the Gait Trainer will provide visual and auditory feedback when footfall occurs. These two features are optional.

Option #2:

If the therapist determines that it is too challenging to manage the patient with the goal of achieving specific parameters, switch to the "Treadmill" mode.

Option #3:

The unique Biodex RTM Treadmill is another option for ambulation training. This treadmill's speed also initiates at 0.1 mph.

Option #4:

If the Gait Trainer has not yet been purchased, the facility's treadmill will be sufficient.

Selecting temporal parameters and frequency:

Speed selection:

- Initiate training based on the patient's self selected speed determined from the 10-Meter Walk Test performed over ground. Therapist observes and assesses gait kinematics, postural control, vital signs, and any signs of distress.
- The goal is to increase the speed of the Gait Trainer above the patient's comfortable self-selected speed by 0.1 – 0.2 mph. The patient must demonstrate optimal gait kinematics and endurance with little or no use compensatory strategies. Therapist observes, evaluates, and determines what speed works best for the patient while taking the interval, BWS offloading percentage, and therapeutic intervention into consideration.
- Based on clinical presentation of the patient, the therapist uses clinical judgment as to when to adjust the speed.
- If warranted, the therapist may need to adjust step-length parameters.

Recommended intervals:

- A patient's performance may be variable. It is recommended for the therapist to obtain a baseline by having the patient participate between one and five minutes of BWSTT based on his or her self-selected speed.
- Reassess patient following the baseline ambulation trial. If vitals are unstable and/or patient does not feel well, therapist takes the necessary steps to assure patient safety.
- If vitals are stable, proceed.
- Therapist strives to increase initial interval goal times between five and fifteen minutes as the patient gains activity tolerance, muscular and postural control with an optimal gait pattern. The long-term goal is twenty to thirty minutes.

Recommended number of trials and days/week:

- Two to five trials for up to half of the therapy session, with therapist using their own discretion.
- One to seven days/week, as clinically indicated. As the patient improves, the therapist increases the amount of time and days the patient participates in BWSTT.

Therapeutic intervention:

- Once the patient is offloaded the desired percentage, the therapist determines and provides an appropriate level of facilitation, inhibition, and/or verbal cues to promote optimal symmetrical step length, cadence, and foot clearance, while limiting knee buckling on the neurologically involved side(s), and any developed compensatory strategies.

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- Primary therapist facilitates or inhibits movements at the neurologically involved lower extremity(ies).
 - Aide(s) may facilitate or inhibit movement at the upper body, trunk, and/or pelvis.

NOTE: If the patient's quality cadence is compromised during the ambulation trials, the therapist needs to determine whether to make changes to the speed, intervals, BWS, and/or therapeutic intervention. Bracing should be considered.

Unique features of the Gait Trainer:

Progress Report from data collection:

- This feature of the Gait Trainer allows the therapist to measure numerous features of the patient's gait. The ability to save the data allows the therapist to more easily identify specific issues, document progress, and compare outcomes. This unique data will complement the therapist in treatment planning and therapeutic intervention on and off the Gait Trainer.
- These progress reports include:
 1. Total time report
 2. Average walking speed report
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 6. Time on each foot report
- The unweighing percentage and therapist comments can also be recorded.

Compares the patient's actual results to the normative data:

This unique feature allows the therapist to compare the patient's actual progress report(s) to age- and gender-based normative data in healthy individuals. The ability for the therapist to compare actual data with normative data will assist in goal development for the patient.

STEP 6: TRANSFERRING SKILLS TO OVER GROUND AMBULATION

- It is recommended that over ground ambulation follows BWSTT every session.

Duration and clinical decision making:

- Recommended duration up to half of the therapy session. This is solely based on therapist's clinical judgment. The patient's ability to carry over optimal gait pattern techniques learned on the Gait Trainer or treadmill is stressed.
- As the patient demonstrates increased ability to actively tolerate body weight through his or her trunk, pelvis, and/or lower extremities, it is recommended that the primary therapist discourages the use of the handrails and encourage reciprocal arm swing.

Effectively combining the use of BWSTT and therapeutic intervention:

The therapist performs ongoing reassessments throughout sessions, using clinical reasoning to determine the appropriate amount of body-weight support, therapeutic assistance, and/or cueing needed for the patient to practice repetitive the gait cycle and optimal gait pattern that contributes to motor learning. The goal is for the therapist and aide(s) to withdraw therapeutic assistance as gait improves. In addition, as the patient makes those gains, the therapist strives to de-emphasize the use of the handrail hold, decrease the amount of body-weight support over time, while balancing the level of the therapeutic assistance. Each session should end with an evaluative process to determine the outcomes of the session and make proper adjustments in one or more of the above areas (speed selection, intervals, number of trials, body-weight support offloading, and therapeutic intervention) as clinically indicated for future sessions.

PHASE III OF RECOVERY:

THE PATIENT WITH MILD NEUROLOGIC INVOLVEMENT

Equipment preparation recommendations:

Blood pressure cuff, pulse oximeter, therapeutic objects (e.g. mirror, therapy ball, etc.). Obtain patient's current weight.

Therapist assistance recommended:

Patient's primary therapist to facilitate or inhibit movement in the lower extremity(ies), pelvis, and/or trunk. Additional assistance may be clinically indicated if the therapist cannot achieve an optimal gait pattern alone.

STEP 1: PATIENT ASSESSMENT TO DETERMINE APPROPRIATE GAIT SPEED OF THE TREADMILL

- The patient participates in the 10-Meter Walk Test over ground: The velocity at which the patient self-selects will determine at what speed to initiate the treadmill. Refer to 10-Meter Walk Test instructions for details.

STEP 2: PREPARE THE UNWEIGHING SYSTEM

- Refer to the unloading scale to set the weight range you want to unload the patient. For Phase III of recovery, it is recommended the primary therapist initiates the unweighing regimen by offloading them up to 40%.
- Refer to the percentage guide above the digital scale to determine the desired offloading weight.
- Adjust the offloading mechanism (handle #2) to the appropriate unweighing parameters.
- Zero the digital scale.

STEP 3: DONNING THE HARNESS – SEATED IN THE WHEELCHAIR VS. STANDING*

- There are two options depending on the patient's size and/or level of mobility. Therapist uses clinical judgment to determine which option works best for the patient. Additional assist may be clinically indicated.

Option #1:

Harness application with patient sitting in the wheelchair: Once harness is securely fastened, the patient is positioned at the back end of the Gait Trainer.

Option #2:

Harness application while patient is standing: Recommended method for the patient able to stand for at least four minutes with minimal assistance.

* Refer to harness application manual for step-by-step donning instructions.

STEP 4: ATTACHING THE PATIENT TO THE UNWEIGHING SYSTEM

While patient seated in wheelchair:

- Position patient seated in the wheelchair at the back end of the Gait Trainer, so the display is facing the patient.
- Lock the wheelchair brakes and remove leg rests.
- Position the Unweighing System so the single–point suspension is directly over the seated patient.
- Lock the four castors and lower the single–point cord, using handle #1.
- Fasten the two shoulder straps of the harness to the attachment rings on the horizontal pull bar of the Unweighing System. Adjust as needed.
- Therapist uses clinical judgment to either initiate the sit to stand with patient’s lower extremities positioned on the Gait Trainer or the floor.
- Primary therapist assists the patient into standing while the aide manipulates handle #1 to offload the patient. Refer to the digital scale to achieve the desired offload weight. If the patient is able, therapist may cue the patient to hold onto the handrail(s).

While patient is standing:

- Therapist uses clinical judgment to either initiate setup while the patient stands on the floor or Gait Trainer.
- Position the Unweighing System directly over the patient so the single–point cord is directly over the patient.
- Lock the four castors and lower the single–point cord, using handle #1.
- Fasten the two shoulder straps of the harness to the attachment rings on the horizontal pull bar of the Unweighing System. Adjust as needed.
- The assistant manipulates handle #1 until the digital scale reads the desired offload weight. Therapist may cue the patient to hold onto the handrail(s).

STEP 5: BODY–WEIGHT SUPPORT TREADMILL TRAINING (BWSTT)

Gait Trainer or treadmill setup and initiation:

Option #1:

- From the Gait Trainer icon, use the keyboard to type in mandatory patient information (gender, height, age).
- Use the keyboard to type in patient’s name.
- The appropriate parameters will appear on the biofeedback screen once <enter> is selected.

-
- Initiate program and increase the speed.

NOTE: The Gait Trainer's speed will initiate at 0.1 mph, however visual and auditory feedback will not function until the speed is increased to 0.3 mph.

- The timer will initiate from "0".
- As the patient ambulates at 0.3 mph or more, the Gait Trainer will provide visual and auditory feedback when footfall occurs. These two features are optional.

Option #2:

- If the therapist determines that it is too challenging to manage the patient with the goal of achieving specific parameters, switch to the "Treadmill" mode.

Option #3:

- The unique Biodex RTM Treadmill is another option for ambulation training. This treadmill's speed also initiates at 0.1 mph.

Option #4:

- If the Gait Trainer has not yet been purchased, the facility's treadmill will be sufficient.

Selecting temporal parameters and frequency:

Body-Weight Support (BWS) offloading:

- Re-verify the desired offload %. Initial harness adjustments may cause slight changes in the desired offloading %.

Speed selection:

- Initiate patient training based on the patient's self-selected speed determined from the 10-Meter Walk Test. Therapist observes and assesses gait kinematics, postural control, any signs of distress, and vital signs.
- The goal is to increase the speed of the Gait Trainer above the patient's comfortable self-selected speed by 0.1 – 0.2 mph. The patient must demonstrate optimal gait kinematics and endurance with little or no use compensatory strategies. Therapist observes, evaluates, and determines what speed works best for the patient while taking the interval, BWS offloading percentage, and therapeutic intervention into consideration.
- Based on clinical presentation of the patient, the therapist uses clinical judgment as to when to adjust the speed.
- If warranted, the therapist may need to adjust step-length parameters.

Recommended intervals:

- A patient's performance may be variable. It is recommended for the therapist to obtain a baseline by having the patient participate between one and five minutes of BWSTT based his or her self-selected speed.
- Reassess patient following the baseline ambulation trial. If vitals are unstable and/or patient does not feel well, therapist takes the necessary steps to assure patient safety.
- If vitals are stable, proceed.

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- Therapist strives to increase initial interval goal times between one and five minutes, as patient gains activity tolerance, muscular and postural control with an optimal gait pattern. The long-term goal is between twenty and thirty minutes.

Therapeutic intervention:

- Once the patient is appropriately offloaded, the therapist determines and provides a clinically determined level of facilitation, inhibition, and/or verbal cues to promote an optimal symmetrical step length, cadence, and foot clearance, while limiting knee buckling on the neurologically involved side(s), and compensatory strategies.
- Primary therapist facilitates or inhibits movements at the neurologically involved lower extremity(ies).
- Aide(s) may facilitate or inhibit movement at the upper body, trunk, and/or pelvis.
- As the patient improves, the therapist decreases BWS with the long-term goal of no body-weight support and therapeutic assisted treadmill training. Bracing should be considered.

NOTE: If the patient's quality cadence is compromised during the ambulation trials, the therapist needs to determine whether to make changes to the speed, intervals, BWS, and/or therapeutic intervention.

Unique features of the Gait Trainer:

Progress Report from data collection:

- This feature of the Gait Trainer allows the therapist to measure numerous features of the patient's gait. The ability to save the data allows the therapist to more easily identify specific issues, document progress, and compare outcomes. This unique data will complement the therapist in treatment planning and therapeutic intervention on and off the Gait Trainer.
- These progress reports include:
 1. Total time report
 2. Average walking speed report
 3. Total distance and step report
 4. Average step length report
 5. Step length variability report
 6. Time on each foot report
- The unweighing percentage and therapist comments can also be recorded.

Compares the patient's actual results to the normative data:

This unique feature allows the therapist to compare the patient's actual progress report(s) to age- and gender-based normative data in healthy individuals. The ability for the therapist to compare actual data with normative data will assist in goal development for the patient.

STEP 6: TRANSFERRING SKILLS TO OVER GROUND AMBULATION

- It is recommended that over ground ambulation follows BWSTT every session.

Duration and clinical decision making:

- Recommended duration up to half of the therapy session. This is solely based on therapist's clinical judgment. The patient's ability to carry over optimal gait pattern techniques learned on the Gait Trainer or treadmill is stressed.
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