Hippotherapy

**Indexing Metadata/Description**

- **Procedure:** Hippotherapy
- **Synonyms:** Equine-assisted therapy
- **Area(s) of specialty:** Neurological rehabilitation, pediatric rehabilitation
- **Description/use:** The term “hippotherapy” is derived from *hippos*, the Greek word for horse. It refers to the use of the movement of a horse as a tool or strategy to influence impairments, functional limitations, and disabilities in patients with neuromuscular dysfunction.\(^1\) In hippotherapy a physical therapist (PT) or occupational therapist (OT) guides the patient’s posture and movement while on a horse, and the therapist or therapy team, rather than the patient, controls the horse.\(^2\) It differs from therapeutic horseback riding (THR), which focuses on horseback riding skills for riders with disabilities by teaching specific skills to control the horse’s movement.\(^1,2\) Hippotherapy is a therapeutic intervention, whereas THR is generally a recreational activity; however, the two are sometimes referred to together as “equine-assisted activities” in the literature\(^3\)

* Objectives of hippotherapy\(^4\)
  - Improving core strength, balance, and coordination
  - Utilization of the movement of the horse to facilitate the rider’s pelvis to simulate walking movement
* The rationale for hippotherapy is based on principles of motor learning and control\(^5\)
  - Learning to respond to perturbations under variable conditions is achieved by intense practice

**Indications:** Hippotherapy is indicated for children or adults with neuromuscular dysfunction.\(^6\) People with cerebral palsy (CP) constitute one of the main user groups of hippotherapy.\(^2\) Other conditions for which it is indicated include:\(^6\)

* Autism spectrum disorder (ASD)
* Developmental delay
* Learning disabilities
* Sensory integration disorders
* Traumatic brain injury (TBI)
* Stroke

**CPT codes:** S8940

**Reimbursement:** Many insurance carriers (e.g., Aetna) consider the use of hippotherapy to be experimental or investigational because there is insufficient literature in peer-reviewed medical journals to support its effectiveness

**Indications for Hippotherapy**

- Abnormal muscle tone\(^6\)
- Impaired balance responses\(^6\)
- Impaired coordination\(^6\)
- Impaired communication\(^6\)
- Impaired sensorimotor function\(^6\)
Postural asymmetry
Poor postural control
Decreased mobility
Limbic system dysfunction related to arousal and attentional skills
To improve respiratory function

Guidelines for Use of Hippotherapy

The team providing hippotherapy includes a therapist, at least one side walker (a person who supports the rider from the ground), a horse handler, and the horse

- The therapist may ride along with the rider or handle the rider from beside the horse
- The horse provides a dynamic base of support and sets up patterns of perturbations that the rider must master in order to maintain balance

In addition, the 3-dimensional reciprocal movements of the walking horse produce pelvic movement in the rider that closely resembles pelvic movement during ambulation

- It is assumed that the rider is a passive element, stimulated by mechanical impulses produced by the moving horse’s back. Spatiotemporal variables of a horse’s walking are not influenced by the rider

A typical hippotherapy session lasts from 45 minutes to 1 hour. There is a lack of evidence regarding the definitive frequency or duration for this treatment. Some researchers recommend at least 30-minute sessions, twice a week, for at least 10 weeks

During a typical hippotherapy intervention a rider experiences several thousand horse strides in a 45-minute session. The rider usually changes positions during the session (e.g., forward astride, side seated, prone, kneeling) so different motor units can be targeted

- In addition to rhythmical gait, a horse also moves in less predictable ways during a hippotherapy session, such as stopping and starting, turning in circles, or walking on changing terrain. This can provide additional challenge to the vestibular system

Horses are generally trained for hippotherapy by specially trained horse leaders. A leader leads the horse with a rope clipped under the chin to the horse’s halter

- The horse leader is an important factor in determining the direction and speed of the horse’s movement in order to have the desired effect

In the United States, PTs can receive training and certification in hippotherapy from the American Hippotherapy Association. Specialized training and certification to do hippotherapy are required in Australia and many European countries

Therapists establish the treatment plan and goals for each patient

- Each horse’s movements are modified during treatment sessions depending on the needs of the patient
- While the horse walks, patients are encouraged to maintain postural alignment and symmetrical positioning of the trunk, pelvis, and lower extremities and to sit independently with little or no assistance

Riders wear helmets for safety purposes

Hippotherapy does not typically use a saddle. A sheepskin or soft pad better allows the rider to be treated in various positions on the horse’s back

Depending on the patient, stretching, relaxation techniques, or other preparatory activities may be necessary before mounting the horse

Contraindications/Precautions to Hippotherapy

- Contraindications
  - Severe osteoporosis
  - Osteogenesis imperfecta
  - Severe scoliosis
  - Painful hip subluxation
  - Severe behavioral problems
• Complete spinal cord injury (SCI) above T6
• Atlanto-axial instability
• Lack of head control
• Anxiety around animals
• Pressure sores
• Excessive hip adductor or internal rotator tone accompanied by potential hip subluxation or dislocation

› Precautions
• Care must be taken to ensure the patient does not fall from the horse
  – Sufficient staff must be present to support the rider and control the horse
• Hip subluxation
  – Hippotherapy has been identified as a risk factor associated with the emergence of pain in totally dislocated hips of children with severe spastic CP
    - Based on a study conducted in Poland of newly referred patients presenting with hip dislocation to a CP outpatient clinic
    - 73 consecutive new-intervention patients were included
    - Patients who had undergone hippotherapy had a higher incidence of pain than those who had not
    - Intensity of pain increased as children underwent a higher frequency of hippotherapy
• Scoliosis
• Impaired cognition
• Rider’s weight
  – The American Hippotherapy Association recommends that body weight not exceed 20% of the horse’s weight
• Incomplete SCIs
• Medical complications (e.g., seizures) that could increase the risk of injury during hippotherapy
• Allergies to horse or environment

Examination

› Contraindications/precautions to examination
• Obtain parental consent prior to assessment or treatment of a minor

› History
• History of present illness/injury for which the procedure is needed
  – Mechanism of injury or etiology of illness: Describe the history of patient’s condition, including onset, progression, complications, and treatment. Document initial Glasgow Coma Scale (GCS) score for TBI patients and initial American Spinal Injury Association (ASIA) score for SCI patients
  – Course of treatment
    - Medical management: Describe hospitalizations, surgeries, immobilization, and weight-bearing status as relevant to the condition
    - Medications for current illness/injury: Determine what medications the clinician has prescribed; are they being taken? Medications commonly prescribed for neurological conditions include:
      - Seizure prevention medications (e.g., levetiracetam [Keppra], phenytoin [Dilantin])
      - Medications for spasticity (e.g., tizanidine [Zanaflex])
      - Antidepressants
    - Diagnostic tests completed: Depend on underlying condition. Diagnostic imaging results such as radiograph and magnetic resonance imaging (MRI) results, and electromyographic (EMG) test results should be obtained where available
    - Home remedies/alternative therapies: Document any use of home remedies (e.g., ice or heating pack) or alternative therapies (e.g., acupuncture), what they are used for, and whether or not they help
    - Previous therapy: Document whether the patient has had occupational or physical therapy for this or other conditions and what specific treatments were helpful or not helpful
  – Aggravating/easing factors (and length of time each item is performed before the symptoms come on or are eased): Document any changes in symptoms that occur with activity or fatigue
  – Body chart: Use a body chart to document location and nature of symptoms
- **Nature of symptoms:** Document nature of symptoms (e.g., pain, spasticity, weakness, sensory impairment)
- **Rating of symptoms:** Use a visual analog scale (VAS) or 0-10 scale to assess symptoms at their best, at their worst, and at the moment (specifically address if pain is present now and how much). In very young children or nonverbal patients, the FLACC (Face, Legs, Activity, Cry, Consolability) scale can be used
- **Pattern of symptoms:** Document changes in symptoms throughout the day and night, if any (AM, mid-day, PM, night); also document changes in symptoms due to weather or other external variables
- **Sleep disturbance:** Document number of wakings/night
- **Other symptoms:** Document other symptoms the patient may be experiencing that could exacerbate the condition and/or symptoms that could be indicative of a need to refer to physician (dizziness, bowel/bladder/sexual dysfunction, saddle anesthesia)
- **Respiratory status:** Document any history of respiratory compromise or use of supplemental oxygen
- **Barriers to learning**
  - Are there any barriers to learning? Yes__/No__
  - If Yes, describe
- **Medical history**
  - **Past medical history**
    - **Previous history of same/similar diagnosis**
    - What is the patient’s age? At what age was diagnosis made?
    - **Comorbid diagnoses:** Ask the patient or parent/caregiver about other problems, including diabetes, cancer, heart disease, complications of pregnancy, psychiatric disorders, orthopedic disorders, etc.
    - **Medications previously prescribed:** Obtain a comprehensive list of medications prescribed and/or being taken (including over-the-counter drugs)
  - **Other symptoms:** Ask the patient about other symptoms he or she may be experiencing
- **Social/occupational history**
  - **Patient’s goals:** Document what the patient hopes to accomplish with hippotherapy and in general
  - **Vocation/avocation and associated repetitive behaviors, if any:** Does the patient attend school? If so, what grade, and what activities are included in a typical day? Is the patient employed? What are the job requirements? Does the patient participate in any recreational activities?
  - **Functional limitations/assistance with ADLs/adaptive equipment:** Does the patient require assistance with functional activities and ADLs? Do family members feel they have adequate assistance and support available? What adaptive equipment does the patient use? Does the patient receive assistance with transportation?
  - **Living environment:** stairs, number of floors in home, with whom the patient lives, caregivers, etc. For pediatric patients, describe family structure, including parents, siblings, and extended family if relevant. Identify if there are barriers to independence in the home; any modifications necessary? Does the patient have access to community resources?
- **Relevant tests and measures** (While tests and measures are listed in alphabetical order, sequencing should be appropriate to the patient’s medical condition, functional status, and setting)
  - **Anthropometric characteristics:** Measure height and weight and calculate body mass index (BMI). The rider’s weight may affect ability to participate in hippotherapy
  - **Arousal, attention, cognition** (including memory, problem solving): Assess orientation to name, place, time, and situation; attention; short- and long-term memory; and problem solving as indicated. Obtain neuropsychological testing results where available. Problems occurring in neurological conditions may include:
    - Poor memory
    - Poor attention and concentration
    - Poor decision making
    - Impulsivity
    - Disorientation
    - Language and communication difficulties
      - Inability to speak
      - Inability to understand when spoken to
  - **Assistive and adaptive devices:** Describe any assistive and adaptive devices that the patient uses. Assess need for splints or orthoses (e.g., ankle-foot orthoses) as indicated
• **Balance**: Assess sitting and standing balance using a standardized test such as Berg Balance Scale (BBS) or Pediatric Balance Scale (PBS)

• **Cardiorespiratory function and endurance**: Monitor blood pressure, heart rate, respiratory rate, and oxygen saturation

• **Cranial/peripheral nerve integrity**: Assess as indicated by condition

• **Ergonomics/body mechanics**: Document any impaired body mechanics and compensatory strategies

• **Functional mobility** (including transfers, etc.): Assess using a standardized tool such as the functional independence measure (FIM), WeeFIM, or Timed Up & Go (TUG) test

• **Gait/locomotion**: Since hippotherapy typically focuses on trunk stability, posture, and pelvic movement, for improvements in gait and balance, a thorough gait assessment is indicated
  - Assess gait at self-selected walking speed and at maximal velocity if possible
  - A 10-meter walk test may be performed to assess quantitative gait parameters such as stride length, cadence, single limb support (percentage), and velocity
  - Qualitative gait observation should include posture, symmetry, joint positions, and use of assistive devices
    - Of particular interest are pelvic and hip kinematics: average anterior pelvic tilt, posterior pelvic tilt at initial contact, anterior pelvic tilt at terminal stance, pelvic range of motion (ROM), maximal hip extension, hip flexion at initial contact, and range of hip flexion/extension
    - If available, use a video camera to record and analyze gait for deviations
    - Temporal and kinematic analysis of gait may be performed using a motion analysis system if available
    - Dynamic Gait Index (DGI) may be used to assess gait safety

• **Joint integrity and mobility**: Assess passive ROM and joint stability as indicated

• **Motor function** (motor control/tone/learning)
  - Assess tone and coordination in upper and lower extremities and trunk
    - Modified Ashworth Scale can be used to assess spasticity
  - Assess voluntary movement noting quality of movement patterns and ability to isolate muscle groups
    - Depending on age, movement may be assessed by observing age-appropriate functional or play activities
    - Note any abnormal patterns, reflexes, or tone occurring with activity
  - Standardized tests of motor function that can be used in the pediatric population include the Gross Motor Function Measure (GMFM), the Pediatric Evaluation of Disability Inventory (PEDI), and the WeeFIM
    - The GMFM can be used to assess change in gross motor function in children with CP
      - Has been demonstrated to have high levels of validity, reliability, and responsiveness in assessing motor function and the results of physical therapy in children with CP
    - The PEDI can be used to track change in mobility and function
    - Developed for use in children aged 6 months to 7.5 years
    - The WeeFIM can be used to assess self-care, sphincter control, and transfers and locomotion, as well as communication and social cognition, in young children (2-5 years)

• **Muscle strength**: Assess using manual muscle testing (MMT) or handheld dynamometry as indicated. MMT is not considered valid in the presence of abnormal tone or coordination
  - Assess strength through function in young children and in patients unable to follow verbal commands
  - Assess trunk strength

• **Neuromotor development**: Use a standardized test such as the Peabody Developmental Motor Scales, Second Edition (PDMS-2) as indicated

• **Observation/inspection/palpation** (including skin assessment)
  - Document any skin breakdown, bruising, or rashes
  - Palpation may assist in detecting any subluxations
  - Inspect any bracing/orthoses for proper wear

• **Perception** (e.g., visual field, spatial relations): Visuospatial impairment may be present in patients with neurological dysfunction. Assess as indicated by condition

• **Posture**: Assess body alignment for asymmetric posture in sitting, standing, and walking. Note asymmetry in weight-bearing. Assess spinal alignment and posture of head, neck, shoulders, trunk, pelvis, and lower extremities. Is the posture stooped (head forward and shoulders rounded)? Is the lumbar curve flattened or excessively lordotic?

• **Range of motion**: Assess upper and lower extremity ROM and flexibility
• **Reflex testing:** Assess deep tendon reflexes for asymmetry and hyper- or hyporeflexia as indicated. Assess for primitive reflexes in children with CP and patients with neurological disorders

• **Self-care/activities of daily living (objective testing):** Evaluate as indicated. Self-care and ADL assessment are included in the WeeFIM, the GMFM, and the PEDI (see *Motor function*, above)

• **Sensory testing:** Assess light touch, temperature, and pinprick as indicated

**Assessment/Plan of Care**

› **Contraindications/precautions**
  • Patients with a diagnosis for which this procedure is used may be at risk for falls; follow facility protocols for fall prevention. Ensure that patient and family/caregivers are aware of the potential for falls and educated about fall prevention strategies. Discharge criteria should include independence with fall prevention strategies
  • Riders should wear helmets
  • There must be sufficient staff appropriately trained in hippotherapy present

› **Diagnosis/need for procedure:** Children and adults with neuromuscular dysfunction who may benefit from the stimulus of a horse’s movement to improve pelvic movement, trunk stability, balance, and posture, with a goal to improve motor function and gait

› **Prognosis:** Depends on the underlying condition and its severity

› **Referral to other disciplines:** As indicated by each patient’s condition

› **Other considerations:** Patients may have a positive response to hippotherapy due to various other aspects of the experience besides movement facilitation
  • Hippotherapy typically occurs in a barn, arena, or outdoor location,(19) and the patient may respond positively to this unique setting
  • The human-horse interaction has been proposed to be a powerful motivator for patients to become fully engaged in therapeutic activities(19)
  • Psychological effects reported include improved self-confidence, self-esteem, motivation, attention span, spatial awareness, concentration, and verbal skills(20)
  • Classic hippotherapy is used for physical rehabilitation.(21) Modern hippotherapy can be used for developing attention, communication, learning, and social skills as well(21)
  • Hippotherapy as a treatment for socialization after sexual abuse and emotional distress was reported to be effective in a case study involving 2 female patients conducted in Brazil.(31) After twenty 30-minute sessions of hippotherapy, the patients demonstrated improved posture and coordination, as well as improved sociability and self-esteem(31)
  • The cost-effectiveness of hippotherapy is an area requiring further study. Hippotherapy requires more assistance and incurs higher costs (maintaining horses, an arena, and training volunteers) than conventional physical therapy(32)

› **Treatment summary**
  • The effectiveness of hippotherapy to improve motor function, gait, postural control, and balance in children with CP is controversial
  
  – A 2013 systematic review and meta-analysis of equine-assisted activities and therapies on gross motor outcomes in children with CP found no statistically significant evidence of therapeutic or maintenance effects on the gross motor activity status of children with CP(3)
    - Randomized controlled trials and observational studies of hippotherapy and THR for children with spastic CP were included
    - Five THR and 9 hippotherapy studies were included
    - Results indicated that short-term hippotherapy significantly reduced asymmetrical activity of hip adductor muscles and could improve postural control; however, the evidence did not show a significant effect on GMFM after long-term hippotherapy or THR (8-22 hours total riding time)
  
  – Conversely a 2012 systematic review of the therapeutic effects of hippotherapy or THR on motor outcomes in children with CP found that hippotherapy and THR appear to have positive effects(2)
    - Nine studies were included in this review
    - Children with spastic CP with a Gross Motor Function Classification System level I-III aged 4 and above are likely to have significant improvement on gross motor function as a result of hippotherapy and THR(2)
    - 45-minute sessions once weekly for 8-10 weeks were found to be effective
- Large randomized controlled trials are needed to determine the effects more conclusively.

A 2011 meta-analysis of the effects of hippotherapy and THR on postural control or balance found these therapies effective\(^{(20)}\)

- 10 studies met inclusion criteria
- The treatment effect was coded as either a positive effect or no effect
- Therapy was found to be effective in 76 out of 84 children included
- The findings are limited by the small sample size and by the fact that no differentiation was made between hippotherapy and THR.

Results of a 2015 randomized controlled trial conducted in South Korea suggest that hippotherapy improves gross motor function and balance in children with CP of various functional levels\(^{(32)}\)

- 92 children with CP, aged 4-10 years, were randomized to a hippotherapy group or a control group
- Hippotherapy consisted of twice-weekly 30-minutesessions, 1 child to 1 therapist, for 8 weeks in addition to conventional physiotherapy
- Children in the control group received 30 minutes of home-based aerobic exercise (waking or cycling) twice weekly for 8 weeks in addition to conventional therapy
- Outcome measures included the GMFM and the PBS
- Children undergoing hippotherapy had improvements in GMFM scores (both GMFM-66 and GMFM-88) and PBS scores that were significantly greater than children in the control group.

Hippotherapy has been reported to improve gross motor function and balance in children with spastic bilateral CP without adverse effects\(^{(13)}\)

- Based on a study conducted in South Korea
- 33 children with CP, aged 4 years and older, received 30 minutes of hippotherapy twice a week for 8 consecutive weeks. Children served as their own controls for the study
- Outcome measures included the GMFM and the PBS. Significant improvements were obtained in both scores
- The most prominent improvement was in dimension E of the GMFM (walking, running, jumping).

Hippotherapy has been reported to significantly improve gait parameters in children with bilateral spastic CP\(^{(2)}\)

- Based on a nonrandomized prospective controlled trial conducted in South Korea
- 32 children with CP received 30 minutes of hippotherapy twice weekly for 8 consecutive weeks
- Temporospatial gait parameters and pelvic and hip kinematic parameters were measured. Other outcome measures included the GMFM and the PBS.
- Hippotherapy significantly improved walking speed, stride length, and pelvic kinematics.

A study of the immediate effects of a hippotherapy session on temporal and spatial gait parameters in children with spastic CP did not find any significant differences between preride and postride values\(^{(22)}\)

- It appears that the positive effects of hippotherapy on gait occur when it is used over a period of time.
- Given that multiple practice sessions are required to affect motor learning, lack of significant immediate effects is not surprising.

Improvements in pelvic and hip joint positioning and more normalized vertical trunk position during ambulation have been reported in children with neurological impairments after 10 sessions of hippotherapy\(^{(16)}\)

- Based on a study conducted in the United States
- 11 children with neurological disorders and impaired ambulation participated.

Short-term intensive hippotherapy may improve functional gait in children with CP\(^{(23)}\)

- Based on a study conducted in Finland
- A single subject design was used to determine quantitative changes in gait parameters following 3 weeks of hippotherapy.
- 3 children with spastic CP participated.
- Parameters measured included gait velocity, stride length, and cadence.
- The goal of the hippotherapy sessions was strictly the improvement of gait.
- Nine sessions were completed over 3 weeks. The initial session lasted 25 minutes; sessions were gradually increased to a maximum of 40 minutes as tolerated.
- Improvements in stride length, cadence, and velocity were obtained.
- Qualitative analysis showed improvements in upright posture and decreased reliance on walker for support.
- Improvements in dynamic trunk and head stability and functional reach have been achieved in children with CP with hippotherapy (11).
- Based on a study conducted in the United States.
- 11 children with spastic diplegia and 8 children without disabilities participated.
- Video motion capture was used to collect data.
- Significant changes in head/trunk stability and reaching/targeting, elapsed time, and efficiency were obtained after 12 weeks of hippotherapy and were retained after a 12-week washout period.

Hippotherapy in conjunction with traditional physical therapy has been reported to improve the sitting balance of children with severe CP who are unable to walk independently more than traditional physical therapy alone (24).
- Based on a randomized controlled trial conducted in South Korea.
- 45 children with CP were randomized to a hippotherapy plus physical therapy group (n = 15), a physical therapy only group (n = 15), or a control group that received no treatment (n = 15).
- After 8 weeks, sway pathway and velocity were significantly decreased in the hippotherapy group compared to the other 2 groups.

A qualitative study to explore users’ experiences of the effects of hippotherapy conducted in Germany and the United Kingdom found that many users experienced hippotherapy as fun and welcomed the fact that it takes place in a “normal” rather than a healthcare environment (2).

- Seventeen hippotherapy users with CP, aged 4 to 63 years, participated in the study.
- Many participants mentioned without prompting that they experienced hippotherapy to be more effective than conventional physiotherapy.
- A difference in perceived physical effects in Germany vs. the United Kingdom may be explained by differences in the practice and training in hippotherapy in the 2 countries.

Hippotherapy was reported to result in improvements in GMFM scores in 2 children with Down syndrome in a case report (25).

- Both children improved on many dimensions of the GMFM after an 11-week hippotherapy program.

Hippotherapy has been tried in adults with stroke (26, 27) and other chronic brain disorders (27) and has been found safe and effective in improving balance and gait.
- In a small randomized controlled trial in Brazil, 20 individuals post stroke were randomized to receive conventional treatment or conventional treatment plus hippotherapy for 16 weeks (26).
- Outcome measures included the Functional Ambulation Category Scale, the Fugl-Meyer Scale, the BBS, and functional assessment of gait.
- Significant improvements were obtained in the group receiving hippotherapy in motor impairment of the lower limbs and balance as compared to the control group.

In a study conducted in South Korea, 8 adults with chronic brain disorders (5 stroke, 2 TBI, 1 CP) participated in hippotherapy twice weekly for 8 weeks (27).

- Significant improvements in balance and gait were obtained.
- Effects were sustained for 2 months after hippotherapy.

Hippotherapy has a positive benefit on mobility, strength, and balance in older adults were assessed in a small randomized controlled trial conducted in Brazil (28).

- Twenty-eight volunteers between the ages of 60 and 84 were randomly assigned to a hippotherapy group or a control group.
- The hippotherapy group participated in an 8-week program consisting of 2, 30-minute sessions per week.
- Outcome measures included the TUG test, the BBS, and lower limb muscle strength.
- Results indicate that hippotherapy improved the lower limb strength and balance in older adults.

In a systematic review, hippotherapy was found to have a positive effect on balance in persons with multiple sclerosis (29).

- Data were limited, and all studies were either case-controlled or case series.

Hippotherapy has a positive benefit on respiratory muscle strength for patients with Down syndrome (33).

- 41 participants diagnosed with Down Syndrome (20 in hippotherapy group, 21 in non-hippo therapy group) were selected for this study (age ranged from 7-13 years old).
Respiratory function was measured based on Black and Hyatt measuring maximal expiration (MEP) and maximal inspiration (MIP). Patients were asked to perform a maximal expiration and a maximal inspiration coupled with a GERAR manovacuometer in a seated position.

Participants were divided into 2 groups: a non-practicing group and the practicing group. Those in the practicing group were positioned in the seated position with the hips and knees flexion at 90 degrees and spine supported. The participants were asked to maintain this position for a minimum of 2 seconds. Measurements were taken with the nostrils closed to prevent air from escaping through the nose.

Results showed that hippotherapy may provide improved respiratory strength in patients with Down syndrome when compared with patients who do not practice hippotherapy.

See Description/use, Indications for Hippotherapy, and Guidelines for Use of Hippotherapy, above.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Goal</th>
<th>Intervention</th>
<th>Expected Progression</th>
<th>Home Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impaired gross motor control.</td>
<td>Improve motor function and gait</td>
<td><strong>Hippotherapy</strong> See Guidelines for Use of Hippotherapy, above, for details</td>
<td>Challenges may be increased by increasing the amount of perturbation or altering the rider’s position</td>
<td>N/A</td>
</tr>
<tr>
<td>Impaired balance, gait.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Increased muscle tone</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Risk of fall from horse</td>
<td>Minimize safety risks</td>
<td><strong>Patient safety</strong></td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Desired Outcomes/Outcome Measures

Desired outcomes/Outcome Measures

- Improved core strength
- Improved lower extremity strength
  - MMT
- Improved balance
  - BBS, PBS
- Improved coordination
  - GMFM, PEDI, PDMS-2
- Improved gait
  - 10-meter walk test
  - Kinematic analysis of gait, qualitative gait observation
– TUG test, DGI
• Improved functional ability
  – WeeFIM, FIM
  – GMFM, PEDI
  – PDMS-2
• Improved posture
• Normalized muscle tone
  – Modified Ashworth Scale
• Increased lower extremity ROM
  – Goniometric measures of ROM

Maintenance or Prevention
› Hippotherapy can be used in conjunction with standard physical therapy to improve gait and balance
› Carryover effects of hippotherapy to motor activities off the horse have been reported.\(^2\) An activity program to maintain the gains obtained may be beneficial
› Studies of the long-term effects of hippotherapy are limited
› Improvements lasting at least 16 weeks after the therapy have been reported\(^8\)
› There is a need for comprehensive investigation that includes hippotherapy intervention followed by a long maintenance period to provide information about the long-term effectiveness of hippotherapy\(^22\)

Patient Education
› American Hippotherapy Association Website, http://www.americanhippotherapyassociation.org/
› Professional Association of Therapeutic Horsemanship International (PATH Intl.), http://www.pathintl.org/

Coding Matrix
References are rated using the following codes, listed in order of strength:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>Published meta-analysis</td>
</tr>
<tr>
<td>SR</td>
<td>Published systematic or integrative literature review</td>
</tr>
<tr>
<td>RCT</td>
<td>Published research (randomized controlled trial)</td>
</tr>
<tr>
<td>R</td>
<td>Published research (not randomized controlled trial)</td>
</tr>
<tr>
<td>C</td>
<td>Case histories, case studies</td>
</tr>
<tr>
<td>G</td>
<td>Published guidelines</td>
</tr>
<tr>
<td>RV</td>
<td>Published review of the literature</td>
</tr>
<tr>
<td>RU</td>
<td>Published research utilization report</td>
</tr>
<tr>
<td>QI</td>
<td>Published quality improvement report</td>
</tr>
<tr>
<td>L</td>
<td>Legislation</td>
</tr>
<tr>
<td>PGR</td>
<td>Published government report</td>
</tr>
<tr>
<td>PFR</td>
<td>Published funded report</td>
</tr>
<tr>
<td>PP</td>
<td>Policies, procedures, protocols</td>
</tr>
<tr>
<td>X</td>
<td>Practice exemplars, stories, opinions</td>
</tr>
<tr>
<td>GI</td>
<td>General or background information/texts/reports</td>
</tr>
<tr>
<td>U</td>
<td>Unpublished research, reviews, poster presentations or other such materials</td>
</tr>
<tr>
<td>CP</td>
<td>Conference proceedings, abstracts, presentations</td>
</tr>
</tbody>
</table>

References


