Clinical Policy Title: Neuromuscular reeducation

Clinical Policy Number: 15.02.10

Effective Date: January 1, 2017
Initial Review Date: September 21, 2016
Most Recent Review Date: September 21, 2016
Next Review Date: September 2017

RELATED POLICIES:
CP# 15.02.09 Aquatic therapy

ABOUT THIS POLICY: Keystone First has developed clinical policies to assist with making coverage determinations. Keystone First’s clinical policies are based on guidelines from established industry sources, such as the Centers for Medicare & Medicaid Services (CMS), state regulatory agencies, the American Medical Association (AMA), medical specialty professional societies, and peer-reviewed professional literature. These clinical policies along with other sources, such as plan benefits and state and federal laws and regulatory requirements, including any state- or plan-specific definition of “medically necessary,” and the specific facts of the particular situation are considered by Keystone First when making coverage determinations. In the event of conflict between this clinical policy and plan benefits and/or state or federal laws and/or regulatory requirements, the plan benefits and/or state and federal laws and/or regulatory requirements shall control. Keystone First’s clinical policies are for informational purposes only and not intended as medical advice or to direct treatment. Physicians and other health care providers are solely responsible for the treatment decisions for their patients. Keystone First’s clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, Keystone First will update its clinical policies as necessary. Keystone First’s clinical policies are not guarantees of payment.

Coverage Policy

Keystone First considers the use of neuromuscular reeducation to be clinically proven and therefore, medically necessary for impairments which affect the body’s neuromuscular system such as:

- Documented loss of deep tendon reflexes and vibration sense accompanied by paresthesia, burning, or diffuse pain of the feet, lower legs, and/or fingers.
- Documented nerve palsy, such as peroneal nerve injury causing foot drop.
- Documented muscular weakness or flaccidity as a result of cerebral dysfunction, a nerve injury or disease or having had a spinal cord disease or trauma.
- Documented poor static or dynamic sitting/standing balance.
- Documented loss of gross and fine motor coordination.
- Documented hypo/Hyper tonicity.

Documentation for neuromuscular reeducation must show impairments which affect the neuromuscular system as listed above, and must contain objective measurements/ratings of loss of...
motion, strength, balance, coordination, and/or mobility (e.g. degree of motion, strength grades, assist for balance and mobility, specific tests for balance and coordination).

Limitations:

All other uses of neuromuscular reeducation are not medically necessary.

Alternative Covered Services:

Physical therapy.

Background

Neuromuscular diseases (NMD) represent a heterogeneous group of disorders, including motoneuron diseases, disorders of motor nerve roots or peripheral nerves, neuromuscular transmission disorders, and muscle diseases. There are approximately 600 different NMDs with great variety in need for physical therapy (PT). There is no consensus regarding the type and intensity of PT. PT often includes exercise therapy to improve or preserve muscle function and aerobic capacity to reduce or prevent secondary problems such as contractures, pain, or fatigue.

Neuromuscular re-education is one technique used by rehabilitation therapists to facilitate the return of normal movement in individuals with neuromuscular impairments. Muscle movement patterns are affected when nerves or muscles experience damage or injury as a result of trauma, medical conditions, and neurological conditions, such as a stroke and traumatic brain injury.

Neuromuscular re-education is a stand-alone, hands-on technique/approach to the evaluation and functional treatment of 90+% of the soft tissue injuries a professional will see in practice. It is similar to balance training and can also be used to improve balance, strength, coordination, posture, kinesthetic sense and restore normal soft tissue tone and elasticity. Neuromuscular re-education techniques help patients regain normal, controlled movement patterns.

Neuromuscular re-education plays a major role in the outpatient, orthopedic physical therapy setting. If the proper techniques, activities and exercises are not performed on an injured body part, an acute injury can develop into a chronic situation. In these approaches, tasks are broken down into their most simple component single-joint movement patterns. These patterns are perfected with proper alignment, breathing, and muscle stabilization in non-weight bearing postures using manual or mechanical assistance.

Methods

Searches:

Keystone First searched PubMed and the databases of:

- UK National Health Services Centre for Reviews and Dissemination.
- Agency for Healthcare Research and Quality’s National Guideline Clearinghouse and other evidence-based practice centers.
- The Centers for Medicare & Medicaid Services.
Searches were conducted on July 13, 2016 using the terms “neuromuscular reeducation” “physical therapy” and “rehabilitation”.

Included were:

- **Systematic reviews**, which pool results from multiple studies to achieve larger sample sizes and greater precision of effect estimation than in smaller primary studies. Systematic reviews use predetermined transparent methods to minimize bias, effectively treating the review as a scientific endeavor, and are thus rated highest in evidence-grading hierarchies.

- **Guidelines based on systematic reviews**.

- **Economic analyses**, such as cost-effectiveness, and benefit or utility studies (but not simple cost studies), reporting both costs and outcomes — sometimes referred to as efficiency studies — which also rank near the top of evidence hierarchies.

**Findings**

The goal of neuromuscular reeducation is to develop conscious control of individual muscles and awareness of position of extremities. Interdisciplinary rehabilitation interventions are assumed to represent the mainstay of post stroke care. One of the key disciplines in interdisciplinary stroke rehabilitation is physical therapy (PT) which is primarily aimed at restoring and maintaining activities of daily living (ADLs). In several randomized and controlled trials regarding physical therapy in stroke rehabilitation, only 12% of the patients with stroke are independent in basic activities of daily living (ADL) at the end of the first. In the long term, 25-74% of patients have to rely on assistance for basic ADLs like feeding, self-care and mobility. Standard treatment is 12 to 18 visits within a 4 to 6 week period. (Veerbeek 2014).

In a meta-analysis involving patients following total hip arthroplasty, patients demonstrated compensatory movement strategies during activities of daily living such as walking and chair climbing (Judd 2015). Participants in the neuromuscular reeducation program improved their internal hip abductor moments and vertical ground reaction forces during walking and stair climbing, while improving their functional performance and hip abductor strength outcomes. The results of this study suggest that neuromuscular reeducation offers a unique effect on movement strategy and function for patients following total hip arthroplasty.

Neuromuscular reeducation is one of many stroke therapies. The American Stroke Association (Steultjens 2003) states that one year after the onset of the first stroke, physical independence (for 66% of the stroke survivors) and occupation (for 75% of the stroke survivors) are the most affected domains of handicap. Therefore, in regards to stroke rehabilitation, the National Guidelines Clearinghouse recommends that at least 45 minutes of each relevant stroke rehabilitation therapy for a minimum of five days per week should be offered to people who have the ability to participate, and where functional goals can be achieved. On the other hand, if a person is unable to participate in 45 minutes of each rehabilitation therapy, it should be ensured that therapy is still offered five days per week for a shorter time at an intensity that allows them to actively participate.

In several randomized controlled trials conducted involving stroke patients, the aim was to determine whether physical rehabilitation, including neuromuscular reeducation, approaches are effective in recovery of function and mobility (Pollock 2014). It has been determined that physical rehabilitation is beneficial,
when compared with no treatment, on functional recovery after stroke. Physical rehabilitation proved to be more effective than usual care or attention control in improving motor function. However, no one physical rehabilitation approach was more or less effective than any other approach in improving independence in activities of daily living.

In another study (Kumar 2016) that included subjects who were post-stroke 3 months and above, the purpose was to determine the effects of lower extremity task specific motor imagery training (MIT) as an adjunct in stroke rehabilitation. The results of the study showed that combined MIT training was found to be more beneficial in comparison to task-specific training alone to improve the paretic muscle strength and gait performance in ambulant stroke subjects. There are limitations to the study such as an inadequate sample size or the effect size of the interventions were not addressed hence the difference in the groups may have been arisen by chance that reduces the generalizability of the results. There is also a need to conduct a high quality clinical trial with more objective outcome measures because the study could not determine long-term follow up.

In several randomized controlled trials (RCTs) regarding patients with acquired brain injury (ABI), researchers wanted to assess the effects of multidisciplinary rehabilitation versus routinely available local services or lower levels of intervention in adults 16 to 65 years of age (Turner-Stokes 2015). According to the trials, the context of multi-disciplinary rehabilitation appears to influence outcomes. For instance, strong evidence supports the use of a milieu-oriented model for patients with severe brain injury.

**Summary of Clinical Evidence**

<table>
<thead>
<tr>
<th>Citation</th>
<th>Content, Methods, Recommendations</th>
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<tbody>
<tr>
<td>Kumar (2016)</td>
<td><strong>Key Points:</strong></td>
</tr>
<tr>
<td>Motor Imagery Training on Muscle Strength and Gait Performance in Ambulant Stroke Subjects- A Randomized Clinical Trial</td>
<td>- From April 2013 to June 2013, the trial included 40 hemi paretic subjects (&gt;3 months post-stroke) who were ambulant with good imagery ability over a 3 week period; an experimental group was included which consisted of a 30 minute audio-based lower extremity mobility tasks for motor imagery (MI) practice.</td>
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<td>- The goal of the trial is to evaluate the effects of combining motor imagery with physical practice in paretic lower extremity muscle strength and gait performance in ambulant stroke subjects.</td>
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<td>- Both the groups had found a significant change for all of the outcome measures following 3 weeks of interventions.</td>
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<td></td>
<td>- There are several limitations to this study: inadequate sample size or the effect size of the interventions were not addressed hence the difference in the groups may have arisen by chance that reduces the generalizability of the results; study could not determine the long-term follow up.</td>
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<tr>
<td>Author</td>
<td>Key Point</td>
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<td>Judd (2015)</td>
<td><strong>Five participants received an eight week exercise program following total hip arthroplasty, emphasizing targeted neuromuscular reeducation technique; Five additional participants were supervised and followed for comparison.</strong>  Participants in the neuromuscular reeducation program improved their internal hip abductor moments and vertical ground reaction forces during walking and stair climbing.  Targeted neuromuscular reeducation techniques after total hip arthroplasty provided a positive effect on biomedical outcomes, functional performance, and muscle strength.  The results suggest that neuromuscular reeducation offers a unique effect on movement strategy and function for patients following total hip arthroplasty.</td>
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<td>Turner-Stokes (2015)</td>
<td><strong>Key Point:</strong>  A meta-analysis of 19 studies involving 3480 people; randomized controlled trials (RCTs) comparing multi-disciplinary rehabilitation versus routinely available local services or lower levels of intervention.  Studies suggest that patients with moderate to severe brain injury who received more intensive rehabilitation showed earlier improvement, and that earlier rehabilitation was better than delayed treatment.  For moderate to severe injury, evidence showed benefit from formal intervention, and limited evidence indicated that commencing rehabilitation early after injury results in better outcomes.  Limited evidence shows that specialist in-patient rehabilitation and specialist multi-disciplinary community rehabilitation may provide additional functional gains, but studies serve to highlight the particular practical and ethical restraints imposed on randomization of severely affected individuals for whom no realistic alternatives to specialist intervention are available.  Intensive intervention appears to lead to earlier gains, and earlier intervention while still in emergency and acute care has been supported by limited evidence.</td>
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<td>Pollock (2014)</td>
<td><strong>Key Points:</strong>  Randomized controlled trials (RCTs) of physical rehabilitation approaches aimed at promoting the recovery of function or mobility in adult participants with a clinical diagnosis of stroke.  To determine whether physical rehabilitation approaches are effective in recovery of function and mobility in people with stroke, and to assess if any physical rehabilitation approach is more effective than any other approach.  No one physical rehabilitation approach was more (or less) effective than any other approach in improving independence in ADL (eight studies, 491 participants) or motor function (nine studies, 546 participants).  Evidence related to dose of physical therapy is limited by substantial heterogeneity and does not support robust conclusions.  Evidence indicates that physical rehabilitation should not be limited to compartmentalized, named approaches, but rather should comprise clearly defined, well-described, evidence-based physical treatments, regardless of historical or philosophical origin.</td>
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<td>Veerbeek (2014)</td>
<td><strong>Key Point</strong>  A systematic review and met-analysis that yields 467 RCTs involving 25,373 patients with stroke, identifying 53 interventions regarding new evidence for PT in stroke rehabilitation.  Neurological treatment approaches to training of body functions and activities showed equal or unfavorable effects when compared to other training interventions, while the main limitations of the present review are not using individual patient data for meta-analysis and absence of correction for multiple testing.  Strong evidence for unfavorable effects of neurodevelopment treatment is reported for motor function, gait speed, spatiotemporal gait pattern functions, kinematics of the arm, arm-hand...</td>
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activities in daily life, basic ADL, and quality of life.

- Three significant negative Summary Effect Sizes (SESs) were found; the first being for over ground walking, the second for virtual reality training for muscle tone, and the third for trunk restraint, however the meta-analysis for all these outcomes showed that more trials are needed.
- Sub group analyses revealed a significant difference in effects between post stroke phases for walking distance, cadence, stride length, balance, and walking ability.
- Non-significant SESs were found for neurological functions, motor function of the paretic leg (synergy), muscle strength, comfortable gait speed, cadence, step length, heart rate at rest, balance, walking ability, extended ADL, and quality of life.

Glossary

**Arthroplasty**— A catch-all term for reconstruction of a bony joint (e.g., total knee arthroplasty).

**Motor Imagery**— The mental representation of movement without any body movement.

**Neuromuscular reeducation**— A technique used by rehabilitation therapists to improve balance, strength, coordination, posture, kinesthetic sense, and restore normal soft tissue tone and elasticity.

**Motor neuron**— The cell that control essential voluntary muscle activity such as speaking, walking, breathing, and swallowing.

References

**Professional society guidelines/others:**


**Peer-reviewed references:**


**Clinical Trials:**

Searched clinicaltrials.gov on June 20, 2016, using the terms “neuromuscular reeducation.” Open studies. 13 studies found, 3 relevant.


**Centers for Medicare and Medicaid Services (CMS) National Coverage Determination**

None.

**Local Coverage Determinations**


**Commonly Submitted Codes**

Below are the most commonly submitted codes for the service(s)/item(s) subject to this policy. This is not an exhaustive list of codes. Providers are expected to consult the appropriate coding manuals and bill in accordance with those manuals.
<table>
<thead>
<tr>
<th>CPT Code</th>
<th>Description</th>
<th>Comment</th>
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<tbody>
<tr>
<td>97112</td>
<td>Therapeutic procedure, 1 or more areas, each 15 minutes; neuromuscular reeducation of movement, balance, coordination, kinesthetic sense, posture, and proprioception.</td>
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<table>
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<tr>
<th>ICD-10 Code</th>
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<td></td>
<td>Numerous; non-specific in policy</td>
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<tr>
<th>HCPCS Level II</th>
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