



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, 2017
Next Review Date: September 2018

Policy contains:

- Arthroplasty.
- Motor imagery.
- Multi-disciplinary rehabilitation.
- Neuromuscular reeducation.
- Physical Therapy.

Related policies:

CP# 15.02.09 Aquatic therapy

ABOUT THIS POLICY: AmeriHealth Caritas has developed clinical policies to assist with making coverage determinations. AmeriHealth Caritas' 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 AmeriHealth Caritas 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. AmeriHealth Caritas' 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. AmeriHealth Caritas' clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, AmeriHealth Caritas will update its clinical policies as necessary. AmeriHealth Caritas' clinical policies are not guarantees of payment.

Coverage policy

AmeriHealth Caritas 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 represent a heterogeneous group of disorders, including motor neuron diseases, disorders of motor nerve roots or peripheral nerves, neuromuscular transmission disorders, and muscle diseases. There are approximately 600 different neuromuscular diseases whose needs vary greatly.

Neuromuscular reeducation represents a series of therapeutic techniques to restore normal function of nerves and muscles, to include movement, balance, coordination, decreased kinesthetic sense, and impaired proprioception. A broad array of treatments, including repetitive movement, posturing, and stimulation, are included in reeducation programs. Neuromuscular reeducation was first defined in a December 11, 1954 article in the Journal of the American Medical Association (AMA, 2017).

The code used by the Current Procedural Terminology system, developed by the American Medical Association, that is used for neuromuscular reeducation is 97112. This code requires 1-on-1 patient contact by a physician or qualified therapists, for 15 minute intervals (ACA, 2015).

Neuromuscular reeducation 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 reeducation is a stand-alone, hands-on technique/approach to the evaluation and functional treatment of 90+ percent 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 reeducation techniques help patients regain normal, controlled movement patterns, and awareness of position of extremities.

Neuromuscular reeducation 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.

Biofeedback is a relatively common practice that is used to re-train patients to acquire voluntary control of a normally automatic bodily function. Biofeedback is classified as an adjunct for neuromuscular reeducation (Vanswearing, 2008).

No professional guideline specifically addressing neuromuscular reeducation exists, but the topic can be included in guidelines for any of a broad range of disorders. For example, the American Heart Association/American Stroke Association guideline on stroke rehabilitation and recovery states that the effectiveness of neuromuscular facilitation has not been established. This guideline is also endorsed by the American Academy of Neurology (Weinstein, 2016).

Searches

AmeriHealth Caritas 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 August 8, 2017 using the terms "neuromuscular reeducation" "physical therapy" "motor imagery" and "multi-disciplinary rehabilitation".

We included:

- **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

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. 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 (Judd, 2015).

In several randomized controlled trials conducted involving stroke patients, the aim was to determine whether physical rehabilitation approaches, including neuromuscular reeducation, are effective in recovery of function and mobility. The review 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 (Pollock, 2014).

The purpose of another study that included 40 subjects who were post-stroke for three months and more, was to determine the effects of lower extremity task specific motor imagery training as an adjunct to task oriented training in stroke rehabilitation. Both groups had significant increases in paretic muscle strength ($p < .05$). The group with training had significantly greater gains in strength than those without training, for hip flexors, hip extensors, knee extensors, ankle dorsiflexors, and gait speed, all at $p < .01$. Non-significant improvements were observed for the with-training group (compared to the without-training group) for knee flexors and ankle plantarflexors (Kumar, 2016).

In several randomized controlled trials (RCTs) regarding patients with acquired brain injury, 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.

One review analyzed outcomes for 32 cancer patients given either a broad spectrum of techniques (including reeducation of scapulothoracic postural muscles) for three months versus those given no such treatment after neck dissection surgery. No technique was able to demonstrate a reduced risk of subsequent shoulder disability (Lauchlan, 2011).

In a systematic review of 30 articles and rehabilitation programs that addressed patients after anterior cruciate ligament surgery, authors concluded that the principal components of effective treatment included instruction and reeducation. Reduction of pain, swelling, and inflammation, regaining range of motion, strength and neuromuscular control are the most important aims in any such program (van Grinsven, 2010).

A retrospective cohort study reviewed effects of an intensive six-week course of neuromuscular reeducation in 71 patients who had undergone surgery to repair a damaged anterior cruciate ligament. Comparisons before and after therapy were made between the involved and uninvolved legs. Involved legs had significantly greater improvements for 1) the single-leg hop - 13.4 percent (138.30 cm/156.89 cm) versus 7.9 percent (159.30cm/171.87 cm) and 2) the triple crossover hop – 14.3 percent (370.05 cm/423.11 cm) versus 10.2 percent (427.50 cm/471.27 cm). The timed hop improved 10.0 percent (2.21

s/1.99 s for the involved leg. Patients under 18 had greater improvements than older patients (Meierbachtol, 2016). Further support for using neuromuscular reeducation in patients recovering from ACL surgery is given, specifically for improving muscular activation onset times (Dingenen, 2015).

An RCT for Bell’s palsy, in which facial muscles on one side become weak or paralyzed, causing drooping or stiffness, consisted of 59 subjects. Improvements in the Facial Grading Scale after two weeks were more significant for those given neuromuscular reeducation (100 percent, or 33 to 66), than for controls given conventional treatment (70 percent, or 32 to 54.5) (Manikandan, 2007). These results are supported in later reviews of muscular reeducation for recovering from facial paralysis (Terzis, 2012; Sardaru, 2013).

The Alexander technique is a type of neuromuscular reeducation that develops potential to avoid unnecessary muscular tension by retraining physical movement reactions. A systematic review of 18 articles concluded that strong evidence exists for the technique’s effectiveness for chronic back pain; moderate evidence exists for Parkinson's-associated disability; and preliminary evidence suggests improvements in balance skills in the elderly, in general chronic pain, posture, respiratory function, and stuttering (Woodman, 2012).

Most recently, one study of 21 persons with knee osteoarthritis given 20 lessons of the Alexander technique collected information on knee muscle co-contraction and EEG data, characterizing brain activity during anticipation of pain. Average pain levels decreased 56 percent, from 9.6 to 4.2, immediately after instruction, and this decline was maintained for 15 months (Preece, 2016).

Patterned Electrical Neuromuscular Stimulation is a novel type of electrical stimulation that attempts to improve neuromuscular reeducation. An RCT of 18 individuals with a history of knee injury or pain compared 15 minute sessions to hamstrings and quadriceps against a control group receiving sub-sensory stimulation. No differences were observed in change scores between the two groups for pre- and post-intervention for maximal voluntary isometric contraction (Glaviano, 2014).

Policy updates:

A total of three guidelines/other and 11 peer-reviewed references were added to this policy in 2017; a total of two guidelines/other and two peer-reviewed references were removed.

Summary of clinical evidence:

Citation	Content, Methods, Recommendations
<p>Kumar (2016)</p> <p>Motor imagery training effect on muscle strength and gait in stroke patients</p>	<p>Key points:</p> <ul style="list-style-type: none"> • RCT, April-June 2013, 40 hemiparetic subjects (>3 months post-stroke), given task oriented training with or without motor imagery. • Subjects underwent lower extremity training 45-60 minutes, 4 days/week, 3 weeks. • Both groups had significant change for all of outcomes (p<.05).

Citation	Content, Methods, Recommendations
	<ul style="list-style-type: none"> Group with motor imagery had significantly greater improvement ($p < .05$) in paretic hip muscles, knee extensors, ankle dorsiflexors, and gait speed.
<p>Judd (2015)</p> <p>Neuromuscular reeducation after total hip arthroplasty</p>	<p>Key points:</p> <ul style="list-style-type: none"> Eight week exercise program following total hip arthroplasty, emphasizing targeted neuromuscular reeducation technique; Five subjects had targeted neuromuscular reeducation, five others didn't. 4 of 5 with reeducation raised internal hip abduction during level walking, vs. 0 controls 3 of 5 with reeducation raised internal hip abduction moment, vs. 1 of 4 controls 5 of 5 with reeducation reduced stair climb time, vs. 2 of 5 controls 4 of 5 with reeducation reduced 4 meter walk time, vs. 2 of 5 controls 5 of 5 with reeducation increased balance scale, vs. 0 of 5 controls
<p>Turner-Stokes (2015)</p> <p>Multi-disciplinary rehab for acquired brain injury</p>	<p>Key points:</p> <ul style="list-style-type: none"> A meta-analysis of 19 studies ($n=3480$); 12 studies of good quality. Patients with moderate to severe brain injury who received more intensive rehabilitation showed earlier improvement; those who had continued outpatient therapy sustained initial gains. Earlier rehabilitation was better than delayed treatment. Multi-disciplinary rehabilitation can influence outcomes.
<p>Pollock (2014)</p> <p>Physical rehab for recovery of function and mobility following stroke</p>	<p>Key points:</p> <ul style="list-style-type: none"> Cochrane review of 96 studies of post-stroke patients, 50 of which are from China 27 studies ($n=3423$) show physical rehab 22% more beneficial than no treatment, and effect persists beyond the intervention period Dose of intervention 30-60 minutes/day, 5-7 days/week found to be effective Physical rehab 63%, 69%, 54% more effective for improving motor function, balance, and gait velocity No single physical rehab approach found to be more effective than others in ADL independence ($p < .71$) and motor function ($p < .41$)

References

Professional society guidelines/other:

American Chiropractic Association (ACA). ACA Coding Policy: CPT procedure code 97112, Neuromuscular reeducation. ACA, 2015.

<https://www.acatoday.org/LinkClick.aspx?fileticket=AIV4xuZtg6Q%3D&portalid=60>. Accessed August 8, 2017.

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Peer-reviewed references:

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neuromuscular reeducation in people with knee osteoarthritis. *BMC Musculoskelet Disord.* 2016;17(1):372.

Sardaru D, Pendefunda L. Neuro-proprioceptive facilitation in the reeducation of functional problems in facial paralysis. A practical approach. *Rev Med Chir Soc Med Nat Iasi.* 2013;117(1):101 – 06.

Terzis JK, Karypidis D. Therapeutic strategies in post-facial paralysis synkinesis in pediatric patients. *Plast Reconstr Aesthet Surg.* 2012;65(8):1009 – 18.

Turner-Stokes L, Pick A, Nair A, Disler PB, Wade DT. Multi-disciplinary rehabilitation for acquired brain injury in adults of working age. *Cochrane Database Syst Rev.* 2015(12):CD004170.

van Grinsven S, van Cingel RE, Holla CJ, van Loon CJ. Evidence-based rehabilitation following anterior cruciate ligament reconstruction. *Knee Surg Sports Traumatol Arthrosc.* 2010;18(8):1128 – 44.

Vanswearingen, J. Facial rehabilitation: a neuromuscular reeducation, patient-centered approach. *Facial Plast Surg.* 2008;24(2):250 – 59.

Woodman JP, Moore NR. Evidence for the effectiveness of Alexander Technique lessons in medical and health-related conditions: a systematic review. *Int J Clin Pract.* 2012;66(1):98 – 112.

CMS National Coverage Determination (NCDs):

No NCDs identified as of the writing of this policy.

Local Coverage Determinations

Physical Therapy - Home Health (L33942). In effect October 1, 2015. <https://www.cms.gov/medicare-coverage-database/details/lcd-details.aspx?LCDId=33942&ver=25&s=45&DocType=All&bc=AgIAAAAAAAAAAAAA%3d%3d&> Accessed August 8, 2017.

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.

CPT Code	Description	Comment
97112	Therapeutic procedure, 1 or more areas, each 15 minutes; neuromuscular reeducation of movement, balance, coordination, kinesthetic sense, posture, and proprioception.	

ICD-10 Code	Description	Comment
	Numerous; non-specific in policy	

HCPCS Level II Code	Description	Comment
N/A		