Clinical Policy Title: Neuromuscular re-education

Clinical Policy Number: CCP.1262

Effective Date:	**January 1, 2017**
Initial Review Date:	September 21, 2016
Most Recent Review Date:	August 1, 2018
Next Review Date:	August 2019

Related policies:

CCP.1127	Aquatic therapy

Policy contains:

- Alexander technique.
- Motor imagery.
- Multidisciplinary rehabilitation.
- Neuromuscular re-education.
- Physical 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 re-education of movement, balance, coordination, kinesthetic sense, posture, and/or proprioception for sitting and/or standing activities to be clinically proven and, therefore, medically necessary for documented impairments which affect the body's neuromuscular system, including, but not limited to:

- Documented therapeutic procedures including proprioceptive neuromuscular facilitation, Feldenkrais, Bobath, Biomechanical Ankle Platform System boards, and desensitization techniques.
- Documented therapeutic procedures which affect the body's neuromuscular system, including:
  - Loss of deep tendon reflexes and vibration sense accompanied by paresthesia, burning, or diffuse pain of the feet, lower legs, and/or fingers.
  - Nerve palsy, such as peroneal nerve injury causing foot drop.
  - Muscular weakness or flaccidity resulting from a cerebral dysfunction, a nerve injury or disease, or having had a spinal cord disease or trauma.
  - Poor static or dynamic sitting/standing balance.
  - Loss of gross and fine motor coordination.
  - Hypo- or hypertonicity.

Documentation for neuromuscular re-education 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., degrees of motion, strength grades, assist for balance and mobility, or specific tests for balance and coordination).

Neuromuscular re-education is considered medically necessary for a maximum of 18 visits within a four- to six-week period, unless documentation exists supporting continued treatment beyond this frequency and duration (Centers for Medicare & Medicaid Services LCD L33942, 2015).

Limitations:

All other uses of neuromuscular re-education 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 with greatly varying needs.

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

The code for neuromuscular reeducation used under the Current Procedural Terminology system, developed by the American Medical Association, is 97112. This code requires one-on-one patient contact by a physician or qualified therapist, for 15-minute intervals, for up to 18 visits in a four- to six-week period, unless further care is needed (American Chiropractic Association, 2015).

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, or neurological conditions, such as a stroke or traumatic brain injury.

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

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.

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

No professional guideline exists specifically addressing neuromuscular re-education, 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 (American Academy of Neurology, 2016; 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 June 8, 2018 using the terms "neuromuscular re-education," "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 stair climbing. Participants in the neuromuscular re-education 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 re-education creates a unique effect on movement strategy and function for patients following total hip arthroplasty (Judd, 2015).

A recent systematic review of nine studies of the effectiveness of neuromuscular re-education of musicians with focal hand dystonia included constraint-induced therapy plus motor control retraining, sensory motor retuning, learning-based sensorimotor training, and slow-down exercise. The review yielded moderate evidence to support effectiveness on reducing abnormal movements during instrument play in these musicians (Enke, 2018).

In a Cochrane study of 96 randomized controlled trials (n = 10,401) involving stroke patients, the aim was to determine whether physical rehabilitation approaches, including neuromuscular re-education, 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).

Another study that included 40 subjects who were post-stroke for three months or more was meant 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 group with training (compared to the group without training) for knee flexors and ankle plantarflexors (Kumar, 2016).

In several randomized controlled trials including patients with acquired brain injury, researchers assessed the effects of multidisciplinary rehabilitation as compared to the effects of routinely available local services or lower levels of intervention in adults ages 16 to 65 (Turner-Stokes, 2015). According to the trials, the context of multidisciplinary 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 re-education of scapulothoracic postural muscles) for three months as compared to outcomes for patients given no such treatment after neck dissection surgery. No technique demonstrated 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 re-education. Reduction of pain, swelling, and inflammation and 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 the effects of an intensive six-week course of neuromuscular re-education 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 re-education in patients recovering from anterior cruciate ligament surgery is given, specifically for improving muscular activation onset times (Dingenen, 2015).

A randomized controlled trial 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 re-education (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 re-education for recovering from facial paralysis (Terzis, 2012; Sardaru, 2013).

The Alexander technique is a type of neuromuscular re-education 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 and in general chronic pain, posture, respiratory function, and stuttering (Woodman, 2012).

Most recently, one study of 21 persons with knee osteoarthritis given 20 lessons in the Alexander technique collected information on knee muscle co-contraction and electroencephalogram 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 re-education. A randomized controlled trial 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 one guideline/other and one peer-reviewed reference were added to this policy in June 2018. Policy ID was changed from 15.02.10 to CCP.1262.

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
Kumar (2016) Motor imagery training effect on muscle strength and gait in stroke patients	**Key points:** • Randomized controlled trial, April – June 2013, 40 hemi-paretic subjects (> three months post-stroke), given task-oriented training with or without motor imagery. • Subjects underwent lower extremity training for 45 – 60 minutes, four days/week, for three weeks. • Both groups had significant change for all of outcomes (P <.05). • Group with motor imagery had significantly greater improvement (P <.05) in paretic hip muscles, knee extensors, ankle dorsiflexors, and gait speed.
Judd (2015) Neuromuscular re-education after total hip arthroplasty	**Key points:** • Eight-week exercise program following total hip arthroplasty, emphasizing targeted neuromuscular re-education technique. • Five subjects had targeted neuromuscular re-education; five others had none. • Four with re-education raised internal hip abduction during level walking, versus zero controls. • Three with re-education raised internal hip abduction movement, versus one control. • Five with re-education reduced stair climb time, versus two controls. • Four with re-education reduced four-meter walk time, versus two controls. • Five with re-education increased balance scale, versus zero controls.
Turner-Stokes (2015) Multi-disciplinary rehab for acquired brain injury	**Key points:** • 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. • Multidisciplinary rehabilitation can influence outcomes.
Pollock (2014) Physical rehab for recovery of function and mobility following stroke	**Key points:** • Cochrane review of 96 studies of post-stroke patients, 50 of whom are from China. • Twenty-seven studies (n = 3,423) show physical rehab is 22 percent (%) more beneficial than no treatment, and effect persists beyond the intervention period. • Dose of intervention 30 – 60 minutes/day, five to seven days/week, found to be effective. • Physical rehab 63%, 69%, and 54% more effective for improving motor function, balance, and gait velocity. • No single physical rehab approach found to be more effective than others in activities of daily living independence (P < .71) and motor function (P < .41).

References

Professional society guidelines/other:

American Academy of Neurology. Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Minneapolis MN: American Academy of Neurology, 2016. https://www.aan.com/Guidelines/Home/GetGuidelineContent/744. Accessed June 8, 2018.

American Chiropractic Association. ACA Coding Policy: CPT procedure code 97112, Neuromuscular re-education. Arlington VA: American Chiropractic Association, 2015. https://www.acatoday.org/LinkClick.aspx?fileticket=AIV4xuZtg6Q%3D&portalid=60. Accessed June 8, 2018.

JAMA Network. Principles of Neuromuscular Re-education. Chicago: American Medical Association, 2017. www.jamanetwork.com/journals/jama/article-abstract/298434. Accessed June 8, 2018.

National Institute of Neurological Disorders and Stroke. Motor Neuron Diseases Fact Sheet. Bethesda MD: National Institute of Neurological Disorders and Stroke, last modified August 22, 2017. https://www.ninds.nih.gov/Disorders/Patient-Caregiver-Education/Fact-Sheets/Motor-Neuron-Diseases-Fact-Sheet. . Accessed June 8, 2018.

Weinstein CJ, Stein J, Arena, R, American Heart Association Stroke Council, Council on Cardiovascular and Stroke Nursing, Council on Clinical Cardiology, and Council on Quality of Care and Outcomes Research. Guidelines for adult stroke rehabilitation and recovery: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2016;47(6):e98-e169. Doi: 10.1161/STR.0000000000000098.

Peer-reviewed references:

Dingenen B, Janssens L, Luyckx T, Claes S, Bellemans J, Staes FF. Lower extremity muscle activation onset times during the transition from double-leg stance to single-leg stance in anterior cruciate ligament injured subjects. *Hum Mov Sci* . 2015;44:234-245. Doi: 10.1016/j.humov.2015.09.007.

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Kumar VK, Chakrapani M, Kedambadi R. Motor imagery training on muscle strength and gait performance in ambulant stroke subjects – A randomized clinical trial. *J Clin Diagn Res*. 2016;10(3):YC01 - YC04. Doi:10.7860/JCDR/2016/16254.7358.

Lauchlan DT, McCaul JA, McCarron T, Patil S, McManners J, McGarva J. An exploratory trial of preventative rehabilitation on shoulder disability and quality of life in patients following neck dissection surgery. *Eur J Cancer Care (Engl)*. 2011;20(1):113-122. Doi: 10.1111/j.1365-2354.2009.01149.x.

Manikandan, N. Effect of facial neuromuscular re-education on facial symmetry in patients with Bell's palsy: a randomized controlled trial. *Clin Rehabil*. 2007;21(4):338-343.

Meierbachtol A, Rohman E, Paur E, Bottoms J, Tompkins M. Quantitative improvements in hop test scores after a 6-week neuromuscular training program. *Sports Health*. 2016;pii: 1941738116667933. Doi: 10.1002/14651858.CD001920.pub3.

Pollock A, Baer G, Campbell P, et al. Physical rehabilitation approaches for the recovery of function and mobility following stroke. *Cochrane Database Syst Rev*. 2014(4):CD001920. Doi: 10.1002/14651858.CD001920.pub3.

Preece SJ, Jones RK, Brown CA, Cacciatore TW, Jones AW. Reductions in co-contraction following neuromuscular re-education in people with knee osteoarthritis. *BMC Musculoskelet Disord*. 2016;17(1):372. Doi: 10.1186/s12891-016-1209-2.

Sardaru D, Pendefunda L. Neuro-proprioceptive facilitation in the re-education of functional problems in facial paralysis. A practical approach. *Rev Med Chir Soc Med Nat Iasi*. . 2013;117(1):101-106.

Terzis JK, Karypidis D. Therapeutic strategies in post-facial paralysis synkinesis in pediatric patients *Plast Reconstr Aesthet Surg* 2012;65(8):1009-1018. Doi: 10.1016/j.bjps.2012.03.026.

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. Doi: 10.1002/14651858.CD004170.pub3.

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):1128-1144. Doi: 10.1007/s00167-009-1027-2.

Vanswearingen, J. Facial rehabilitation: a neuromuscular re-education, patient-centered approach. *Facial Plast Surg*. 2008;24(2):250-259. Doi: 10.1055/s-2008-1075841.

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. Doi: 10.1111/j.1742-1241.2011.02817.x.

Centers for Medicare & Medicaid Services National Coverage Determinations:

No national coverage determinations found as of the writing of this policy.

Local Coverage Determinations:

Physical Therapy - Home Health (L33942). Effective date October 1, 2015. Accessed June 8, 2018.

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 accordingly.

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

ICD-10 Code	Description	Comment
G80.0 – G80.9	Cerebral palsy	
H49.0 –H49.2	Paralytic strabismus	
H51.0	Palsy (spasm) of conjugate gaze	
M62.81	Muscle weakness (generalized)	
G12	Spinal muscular atrophy and related syndromes	

HCPCS Level II Code	Description	Comment
N/A	No applicable codes	