AmeriHealth Caritas Ohio

Biofeedback for chronic pain

Clinical Policy ID: CCP.1151

Recent review date: 2/2025

Next review date: 6/2026

Policy contains: Non-malignant musculoskeletal pain; primary headache disorders.

AmeriHealth Caritas Ohio Next has developed clinical policies to assist with making coverage determinations. AmeriHealth Caritas Ohio Next'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, on a case by case basis, by AmeriHealth Caritas Ohio Next 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 Ohio Next'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. AmeriHealth Caritas Ohio Next's clinical policies are reflective of evidence-based medicine at the time of review. As medical science evolves, AmeriHealth Caritas Ohio Next will update its clinical policies as necessary. AmeriHealth Caritas Ohio Next's clinical policies are not guarantees of payment.

Coverage policy

Biofeedback is clinically proven and, therefore, may be medically necessary for the treatment of any of the following indications:

- Thermal or electromyography biofeedback, alone or in combination with behavioral modalities, for treatment of migraine headache in members ages 16 years or older (Ailani, 2021; Martino Cinnera, 2023; Nestoriuc, 2008b).
- Electromyography biofeedback with or without relaxation therapy for treatment of tension-type headache in children, adolescents, and adults (Nestoriuc, 2008b).
- Electromyography biofeedback for treatment of chronic low back pain (Qaseem, 2017; Sielski, 2017).
- Electromyography biofeedback for muscle re-education of specific muscle groups or treatment of either pathological (disease-based) muscle abnormalities of spasticity or incapacitating muscle spasm or weakness, when more conventional treatments (e.g., heat, cold, massage, exercise, support) have not been successful (Castelnuovo, 2016).

Members must meet all of the following criteria:

- Demonstrate motivation to actively participate in the treatment plan and responsiveness to the care plan requirements (e.g., practice and follow-through at home).
- Are capable of participating in the treatment plan (physically and cognitively).

- Have a condition that can be appropriately treated with biofeedback (i.e., there is no pathology to prevent success of the treatment).
- The biofeedback therapy is performed by a licensed health care professional with training in biofeedback.

Limitations

All other uses of biofeedback are considered experimental/investigational and not clinically proven.

Alternative covered services

Physician office visits, pharmacotherapy, physical therapy, and behavioral health treatments.

Background

Pain is a subjective and individual experience, and biobehavioral pain techniques (i.e., relaxation techniques, cognitive-behavioral treatment, and biofeedback) have been proposed to modulate pain processing and reduce pain (Kropp, 2013). Biobehavioral treatment strategies focus on “unlearning” of pain and on modification of pain triggers and conditions that reinforce and maintain pain.

Biomechanical and physiological responses are the two groups used in biofeedback. The body’s activity and movement are measured via biomechanical techniques using simple or complex sensors. Physiologic activity is measured by differing means. Electromyography is frequently used to measure muscle movement, and other modes are used to measure heart, lung, and skin activity. Different forms of biofeedback have been used as an adjunct to physical therapy for more than 50 years. The most common biofeedback use, aside from neuromuscular retraining, is the treatment of chronic pain, anxiety, and incontinence, by impacting the sympathetic nervous system response (Malik, 2023).

Biofeedback therapy promotes the visual, auditory, or improvement in certain types of bodily functions that are either under involuntary or voluntary control to alleviate an abnormal bodily condition. Biofeedback is based on the principle that a desired response learned by the member, can and will affect a desired physiological response. Patients need to be able to understand analog and digital signals received from an auditory or visual display. They must be self-motivated to perform via observation learning (Malik, 2023).

The goal of biofeedback treatment is to learn to actively change a normally involuntary physiologic function into a desired direction, by feeding the function back visually or acoustically so it can be perceived consciously by the patient (Kropp, 2013). The effects of biofeedback can be measured by monitoring skin temperature, skin conductance, galvanic skin response, muscle tension using electromyography, heart rate using electrocardiography, and brain wave activity using electroencephalography, also known as neurofeedback. While the mechanisms by which biofeedback acts to control pain or prevent the onset of headache are not understood completely, the cognitive processes of attention, expectancy, and memory may help to understand how non-pharmaceutical methods achieve pain relief (Sieberg, 2012).

A professional license is not required to provide biofeedback training, although biofeedback therapists are often licensed in another healthcare field and practice according to those guidelines. Because of its potential effects on physiology, the Association for Applied Psychophysiology and Biofeedback (2020) recommends that biofeedback therapy involve a trained therapist, a motivated patient, and a monitoring instrument capable of providing accurate physiological information.

Findings

Guidelines

Evidence-based guidelines support the use of electromyography or thermal biofeedback as adjunctive treatment for migraine or tension-type headache and chronic low back pain. There is insufficient evidence to support electroencephalography biofeedback (i.e., neurofeedback) for chronic pain conditions.

The American Headache Society recommends biobehavioral therapies, including biofeedback, for preventing and treating acute migraine in adults. These therapies may be particularly beneficial for those who prefer nonpharmacologic interventions; have inadequate response, poor tolerance, or medical contraindications to specific pharmacologic treatments; are pregnant, lactating, or planning to become pregnant; have a history of acute medication overuse or medication overuse headache; exhibit significant stress or deficient stress-coping skills; or have high migraine-related disability or low health-related quality of life or comorbidities (Ailani, 2021). The American Academy of Neurology and the American Headache Society's guideline on migraine treatment for children does not mention biofeedback (Oskoui, 2019).

For the treatment or prevention of headache, a joint Department of Veterans Affairs/Department of Defense clinical practice guideline found insufficient evidence to recommend for or against biofeedback received through a smartphone application based on heart rate variability monitoring. The conclusion was based on one randomized controlled trial that failed to demonstrate a difference in disability or quality of life outcomes in individuals with migraine who received biofeedback through a smartphone application compared with a waitlist control group. However, biofeedback is accepted historically as standard practice in the treatment of headache, and additional research is less likely to be published because of their well-known effectiveness in addressing headache (Sico, 2024).

For chronic low back pain, the American College of Physicians recommends electromyography biofeedback as an initial non-pharmacologic treatment option (Qaseem, 2017), whereas a joint Department of Veterans Affairs/Department of Defense guideline did not address biofeedback as a non-pharmaceutical treatment option (Macedo, 2024).

Few evidence-based guidelines either include or recommend biofeedback for persons with other types of chronic musculoskeletal pain such as chronic knee pain (American Academy of Orthopaedic Surgeons, 2021; Hunter, 2022; Jones, 2015), or temporomandibular disorders (Busse, 2023; American Association of Oral and Maxillofacial Surgeons, 2024).

The Italian Consensus Conference on Pain in Neurorehabilitation provided recommendations for treating various types of neuromuscular pain, but only tension-type headache and migraine were supported by high quality evidence; all other indications were based on case reports, small case series, or expert opinion. For other musculoskeletal indications, there remains insufficient evidence of effectiveness to support biofeedback as a first-line treatment option, although for some, it may offer some pain relief when other standard of care therapies fail (Castelnuovo, 2016).

Evidence review

Biofeedback is generally regarded as a safe treatment alternative for chronic pain. Although its adverse effects have not been reviewed systematically or reported consistently in the research, headache, nausea, and drowsiness were commonly reported. Overall, low-quality evidence supports the effectiveness of electromyography biofeedback in achieving a clinically significant reduction in chronic pain symptoms associated with tension-type headache, migraine headache, and chronic low back pain. There is insufficient evidence to determine the optimal treatment protocol or the potential of biofeedback to reduce other symptoms associated with chronic pain such as sleep disturbances, mood disturbances, fatigue, and anxiety (Patel, 2020).

There is insufficient evidence to support neurofeedback for chronic pain. Most studies applied neurofeedback that targeted reinforcing either alpha or sensorimotor rhythms and suppressed theta and/or beta bands on one

brain region at a time. While a modest, short-term analgesic effect on pain intensity may be achieved, for all indications, higher quality studies are needed to confirm these findings (Hesam-Shariati, 2022).

Primary headache disorders

For primary headache disorders, most of the evidence was published prior to 2000. The studies included adult and pediatric participants with predominately tension-type and migraine headache disorders and contained a moderate to high risk of bias. The few randomized controlled trials published since 2000 generally support the effectiveness of electromyography biofeedback to reduce headache symptoms in adult and pediatric populations, when compared to no-treatment, placebo controls, and relaxation techniques. There is insufficient evidence to support biofeedback as treatment for other primary headache disorders.

Two seminal reviews address the effectiveness of biofeedback for primary headache disorders of the migraine or tension type, on which guideline recommendations have been made (Nestoriuc, 2008a, 2008b). In a recent systematic review (29 studies) and meta-analysis, about one-third of the studies on biofeedback achieved comparable results to those of drug therapy in some patients and for durations longer than one year, with a low risk of side effects. Treatment with electromyography biofeedback appeared to reduce the intensity of headache pain (Hedges' g effect size 0.21, 95% confidence interval 0.02 to 0.44; *P* = .07; n = 293) (Martino Cinnera, 2023).

Biofeedback may reduce the frequency and duration of headache attacks depending on the outcome measure used (Lee, 2019). There was no evidence supporting electromyography biofeedback in reducing disability in terms of quality of life and limitation of work and social activities. However, variation in protocols across studies may have influenced the effect size and the variability of results.

With regard to pediatric migraine, Koechlin (2021) found biofeedback was significantly more effective than waiting list controls in the short-term (standard mean difference 1.41; 95% confidence interval 0.64 to 2.17; three studies) and were maintained up to three to four months after randomization.

Chronic musculoskeletal pain

For chronic low back pain, results of a meta-analysis of 21 studies (n = 1,062) demonstrated the efficacy of biofeedback as a standalone and an adjunctive treatment in reducing pain intensity (Hedges' g = 0.60; 95 % confidence interval 0.44 to 0.76). Treatment effects were stable over an average follow-up period of eight months. Biofeedback significantly reduced depression, disability, and muscle tension, and improved cognitive coping (Sielski, 2017).

For other chronic musculoskeletal pain conditions, the results from systematic reviews of any form of biofeedback performed alone or as adjunctive therapy are inconclusive or conflicting. While evidence from randomized controlled trials suggest a potential reduction in pain symptoms in the short term, the overall study quality was very low, and studies lacked long term data and comparisons to placebo controls. The included systematic reviews addressed: temporomandibular joint disorders (Tao, 2023); chronic neck pain (Campo, 2021; Tsiringakis, 2020); shoulder pain (Kamonseki, 2021); patellofemoral pain syndrome (Ferlito, 2024: Souto, 2024); and osteoarthritis of the knee (French, 2024).

Fibromyalgia

An early systematic review and meta-analysis of seven studies (n = 321 adults) found electromyography, but not electroencephalography biofeedback, significantly reduced pain intensity in comparison to control groups (Hedges' g = 0.86; 95% confidence interval 0.11 to 1.62). Biofeedback did not reduce sleep problems, depression, fatigue, or health-related quality of life in comparison to a control group, and long-term results were lacking (Glombiewski, 2013).

Two systematic reviews update these findings. Steen (2024) included three studies of electromyography and electroencephalography biofeedback. While electromyography biofeedback improved pain symptoms in some

patients, all studies were significantly flawed preventing any firm conclusions from being drawn. Torres (2024) examined 17 studies of electroencephalography biofeedback for treating fibromyalgia and associated symptoms. The most commonly used method was traditional electroencephalography neurofeedback based on a sensorimotor rhythm protocol, which has been validated, but other novel protocols were also used. Wide variation in study protocols prevented any generalization of findings to a clinical population to treat psychological variables, chronic pain, or general health.

Other chronic pain conditions

Systematic reviews found limited and low quality evidence suggesting biofeedback may be effective for treating pain and associated symptoms in patients with the following conditions: chronic pelvic pain such as anorectal disorders, chronic prostatitis, and female pelvic pain disorders (Byrnes, 2022; Evans, 2019; Wagner, 2022); irritable bowel syndrome (Scaciota, 2021); sickle cell disease (van Veelen, 2023); spinal cord injury (Allison, 2024); and post-stroke shoulder-hand syndrome (Feng, 2023). Further research is needed to confirm a role for biofeedback as a standalone or adjunctive treatment.

In 2017, we updated the literature and made no changes to the policy.

In 2018, we identified new evidence and added an evidence-based guideline (Qaseem, 2017) addressing biofeedback treatment for acute, subacute, or chronic low back pain. The new information supports electromyography biofeedback as an initial non-pharmacologic treatment option for chronic low back pain. The policy was changed to reflect these findings.

In 2019, we added no new information to the policy and made no policy changes. The policy ID was changed from CP# 03.03.06 to CCP.1151.

In 2020, we added the results of several systematic reviews and meta-analyses of biofeedback interventions for treating chronic pain conditions that require no changes to the policy.

In 2021, we updated the references that confirm previous findings and warrant no changes to the policy.

In 2022, we added more conditions, updated and added references to reflect the most current data, and identified no new relevant research for the policy.

In 2023, we described how biofeedback works, included more current data which supported previous findings. No changes are warranted to the policy.

In 2024, we updated the references and made no policy changes.

In 2025, we reorganized the findings and updated the references. No policy changes are warranted.

References

On December 16, 2024, we searched PubMed and the databases of the Cochrane Library, the U.K. National Health Services Centre for Reviews and Dissemination, the Agency for Healthcare Research and Quality, and the Centers for Medicare & Medicaid Services. Search terms were “neurofeedback” (MeSH), “biofeedback, psychology” (MeSH), “pain” (MeSH), “pain management” (MeSH), “headache disorders” (MeSH), and “headache” (MeSH), “musculoskeletal diseases/rehabilitation” (MeSH), and “musculoskeletal diseases/therapy” (MeSH). We included the best available evidence according to established evidence hierarchies (typically systematic reviews, meta-analyses, and full economic analyses, where available) and professional guidelines based on such evidence and clinical expertise.

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Policy updates

2/2014: initial review date and clinical policy effective date: 6/2015

2/2017: Policy references updated.

2/2018: Policy references updated. Policy changed.

2/2019: Policy references updated. Policy ID changed.

2/2020: Policy references updated.

2/2021: Policy references updated.

2/2022: Policy references updated.

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