Biofeedback and Neurofeedback

MEDICAL POLICY NUMBER: 270

Effective Date: 12/1/2024

Last Review Date: 11/2024

Next Annual Review: 11/2025

INSTRUCTIONS FOR USE: Company Medical Policies serve as guidance for the administration of plan benefits. Medical policies do not constitute medical advice nor a guarantee of coverage. Company Medical Policies are reviewed annually and are based upon published, peer-reviewed scientific evidence and evidence-based clinical practice guidelines that are available as of the last policy update. The Company reserves the right to determine the application of medical policies and make revisions to medical policies at any time. The scope and availability of all plan benefits are determined in accordance with the applicable coverage agreement. Any conflict or variance between the terms of the coverage agreement and Company Medical Policy will be resolved in favor of the coverage agreement. Coverage decisions are made on the basis of individualized determinations of medical necessity and the experimental or investigational character of the treatment in the individual case. In cases where medical necessity is not established by policy for specific treatment modalities, evidence not previously considered regarding the efficacy of the modality that is presented shall be given consideration to determine if the policy represents current standards of care.

SCOPE: Providence Health Plan, Providence Health Assurance, and Providence Plan Partners as applicable (referred to individually as “Company” and collectively as “Companies”).

PLAN PRODUCT AND BENEFIT APPLICATION

☒ **Commercial** ☐ **Medicaid/OHP*** ☐ **Medicare****

*Medicaid/OHP Members

Oregon: Services requested for Oregon Health Plan (OHP) members follow the OHP Prioritized List and Oregon Administrative Rules (OARs) as the primary resource for coverage determinations. Medical policy criteria below may be applied when there are no criteria available in the OARs and the OHP Prioritized List.

Biofeedback and Neurofeedback: Statement of Intent 1 - Palliative Care

**Medicare Members

This *Company* policy may be applied to Medicare Plan members only when directed by a separate *Medicare* policy. Note that investigational services are considered **"not medically necessary"** for Medicare members.

COVERAGE CRITERIA

I. Biofeedback may be considered **medically necessary** for the following indications (A. and B.):

   A. Urinary incontinence (please see **Urinary Incontinence Treatments** policy for medical necessary criteria); **or**
   B. Migraine headaches

II. Biofeedback with EEG monitoring (i.e., neurofeedback) is considered **not medically necessary** for the treatment of any indication, including but not limited to:

   A. Anxiety
   B. Attention deficit hyperactivity disorder
   C. Depression
   D. Obsessive-compulsive disorder
   E. Post-traumatic stress disorder
   F. Substance use disorder
   G. Asthma
   H. Epilepsy
   I. Fibromyalgia
   J. Primary headaches
   K. Traumatic brain injury

III. The use of home biofeedback devices is considered **not medically necessary** for all conditions.

Link to Evidence Summary

POLICY CROSS REFERENCES

- Urinary Incontinence Treatments, MP180

The full Company portfolio of current Medical Policies is available online and can be accessed here.

POLICY GUIDELINES

BACKGROUND

Indications

Anxiety disorder

Anxiety is the most common mental health disorder in the United States, affecting 18.1% of the population annually.[1] Anxiety disorders interfere with daily activities, and feelings of anxiety and panic are difficult to control and can persist for long periods of time and throughout a person's life. Anxiety disorders may develop from a myriad of mental health and physical issues. Some examples of anxiety disorders include generalized anxiety disorder, social anxiety disorder, separation anxiety disorder, and specific phobias. Common treatments for anxiety include therapy, medication, and mindfulness practices.

Attention deficit hyperactivity disorder (ADHD)

Attention deficit hyperactivity disorder (ADHD) is neuropsychiatric condition that most commonly affects children and adolescence and often continues into adulthood.[2] The disorder commonly manifests as persistent difficulties in sustaining attention, hyperactivity, and impulsive behavior and may affect cognitive, academic, behavioral, emotional, and social functioning. While symptoms tend to become less severe with age, ADHD can persist throughout adulthood. Standard treatments are designed to manage symptoms and include behavior/psychotherapy interventions and pharmacotherapy. Other treatments that have limited evidence include physical exercise, diets, mindfulness, and other complementary and alternative therapies.

Depression/major depressive disorder

Depression is a mood disorder that is characterized by prolonged and persistent feelings of sadness and a loss of interest. Major depressive disorder is defined as a period of at least 2 weeks of depressed mood or a loss of interest in daily activities while experiencing a majority of specified symptoms such as issues with sleep, eating, energy, concentration, or self-worth. In 2017, it was estimated that 7.1% of US adults experienced at least one major depressive episode.[3] Antidepressant medications and psychotherapy are common, effective treatments for people experiencing depression.

Obsessive-compulsive disorder (OCD)

Obsessive-compulsive disorder (OCD) is a type of anxiety disorder, defined by UpToDate as a disorder "characterized by recurrent intrusive thoughts, images, or urges (obsessions) that typically cause anxiety or distress, and by repetitive mental or behavioral acts (compulsions) that the individual feels driven to perform, either in relation to an obsession or according to rules that he or she believes must be applied rigidly or to achieve a sense of "completeness."[4] OCD generally occurs in childhood or adolescence and can persist throughout a person's life, impairing daily functioning. OCD has a lifetime prevalence of 2.3% in the United States. Standard treatments are psychotherapy and medications, often in combination. When medication and therapy are not effective, more intensive treatments are sometimes used, including intensive outpatient and residential treatment programs, deep brain stimulation, and transcranial magnetic stimulation.

Post-traumatic stress disorder (PTSD)

Post-traumatic stress disorder (PTSD) is a mental health condition triggered by a traumatic event that can cause intrusive thoughts, nightmares, flashbacks to the trauma, sleep disturbance, and other issues that disturb social, occupational, and interpersonal daily experiences.[5] Lifetime prevalence rates of PTSD range from 6.1 to 9.2% in the United States and Canada. PTSD is associated with other mental health disorders, including depression and anxiety. Standard treatment is psychotherapy, using specific therapy modalities such as cognitive therapy, exposure therapy, eye movement desensitization and reprocessing therapy, and other behavioral treatments developed specifically for PTSD. Medication may also be used to alleviate PTSD symptoms such as depression and anxiety.

Substance use disorder

Substance use disorder occurs when an individual's use of alcohol and/or other substances (drugs) leads to health, social, occupational, and interpersonal issues. Substance abuse is highly prevalent in the United States, affecting approximately 7.2% of individuals age 12 and over.[6] Individuals with substance use disorders are at higher risk for and more likely to have other mental health disorders, including depression, anxiety, bipolar disorder, post-traumatic stress disorder, and attention deficit hyperactivity disorder. Common therapies for substance use disorder include medically-supervised withdrawal management, psychotherapy, medications, and support groups. Treatment differs based on the substance being used.

Asthma

Asthma is a respiratory condition in which inflammation in the lungs causes airflow obstruction and bronchial spasms.[7] Asthma is characterized by symptoms of intermittent dyspnea, coughing, and wheezing. Asthma often begins in childhood and management of the condition focuses on reducing risk of triggers (e.g. allergens, irritants), controlling symptoms, and minimizing medication adverse effects. Medications include both long term treatments, such as inhaled corticosteroids, and quick-relief medications, such as short-acting beta agonists. More intensive treatments, such as bronchial thermoplasty, are used for severe cases, although high-quality evidence on its efficacy is lacking. The prevalence of asthma in the United States is approximately 7.7%.[8]

Epilepsy

Epilepsy is a group of neurological disorders characterized by recurrent and unpredictable seizures caused by excessive and abnormal electrical activity in the brain.[9] Brain disfunction leading to epilepsy may be caused by a plethora of medical issues. Symptoms can vary greatly, with some episodes causing minor reactions such as twitching while others causing severe reactions that can lead to injury, such as vigorous shaking. Treatments for epilepsy include anti-seizure medication, vagus nerve stimulation, ketogenic diet, and, for severe cases, brain surgery. As of 2015, 1.2% of the United States had active epilepsy.[10]

Fibromyalgia

Fibromyalgia is a medical disorder characterized by chronic widespread musculoskeletal pain and often accompanied by fatigue, cognitive disturbance, psychiatric symptoms, and multiple somatic symptoms. The etiology and pathophysiology of fibromyalgia is unknown as there is no evidence of inflammation in the areas of pain. Due to the unidentifiable source of pain and the absence of inflammation, fibromyalgia is a controversial condition and has been considered psychosomatic, although evidence suggests that it is a disorder of pain regulation and over-sensitization of nerves.

Primary headaches/Migraines

Headaches are a continuous pain in the head and are among the most common medical complaints.[11] Headaches vary in intensity, location on the head, frequency, and cause. Common headaches include migraine headaches, tension headaches, and cluster headaches. Migraine headaches are characterized by intense throbbing pain on one side of the head and symptoms such as sensitivity to light, sound, and smell accompany the pain. Tension headaches are characterized by dull, constant pain on both sides of the head. Cluster headaches are severe and recurrent headaches characterized by intense piercing pain behind or around one eye. Causes of headaches are unclear, but stress, anxiety, dehydration, and poor sleep are common triggers. Headaches are commonly treated with over the counter nonsteroidal anti-inflammatory drugs, although severe cases of migraine and cluster headaches may be treated with prescription medications such as triptans and preventive medications (including beta blockers, anti-seizure drugs, and Botox injections).

Traumatic brain injury (TBI)

The Centers for Disease Control and Prevention defines traumatic brain injury (TBI) as “a disruption in the normal function of the brain that can be caused by a bump, blow, or jolt to the head, or penetrating head injury.”[12] Severity of TBI varies from mild to severe, with severe injury at times leading to permanent disability or death. Mild TBI is commonly called concussion, and most recover completely from these injuries. Symptoms include difficulty thinking clearly and concentrating, headache, blurry vision, sensitivity to noise or light, balance issues, malaise, irritability and sadness, and sleeping issues. For mild cases, generally no treatment other than rest is recommended, with pain medication offered to alleviate headache symptoms. Those with severe TBI requiring rehabilitation commonly work with occupational therapists, physical therapists, speech and language pathologists, neuropsychologists, and other rehabilitation specialists to improve daily activity performance.

Urinary incontinence

Urinary incontinence refers to the involuntary loss of urine. It has a high degree of prevalence in the older population and is a significant contributor to healthcare costs, disability and reduced quality of life.

Urinary incontinence is categorized as stress incontinence (SUI), urge incontinence (UUI) or mixed incontinence (MUI) (a combination of stress and urge incontinence). Stress urinary incontinence is the predominant type of urinary incontinence in women, and is the complaint of involuntary leakage of urine during exertion, sneezing or coughing. Urge urinary incontinence is the predominant type of urinary incontinence in men, and describes the sudden urge to urinate and the involuntary loss of urine. Nearly all people with incontinence will benefit from conservative treatment including physical therapy, increasing fitness and weight loss. Those with an element of urge incontinence may also benefit from treatment with a medication aimed at reducing detrusor muscle over activity. Stress incontinence may be effectively treated in some women with a pessary.

Treatment

Biofeedback

Biofeedback is a technique used to control bodily processes that are generally thought to be involuntary. Biofeedback therapy works by recording physiological signals such as brain waves or heart rate and presenting them as audio or visual cues to patients, who then are guided by practitioners to develop control over these signals.[13] There are a multitude of biofeedback modalities, including electromyograph to detect muscle action potential, feedback thermometer to detect skin temperature, electro-dermograph to measure skin conductance and potential, electrocardiogram to measure electrical activity of the heart, and others. This technique is used to treat a variety of different physiological and psychological issues, including headaches, chronic pain, anxiety, hypertension, urinary incontinence, post-traumatic stress disorder, and more.

Neurofeedback

Neurofeedback is a type of psychophysiological biofeedback treatment in which neural activity is measured and feedback is presented as audio or video to teach self-regulation of brain function. The most common type of neurofeedback treatment is electroencephalogram (EEG) neurofeedback, where sensors are placed on the scalp and computer software detects and records brain activity, most commonly. The information is played back to the patient through an audio or visual training that allows the patient to view changes in neural activity in real time. Another form of neurofeedback used is functional magnetic resonance imaging (fMRI) neurofeedback, similar to EEG neurofeedback, where fMRI readings of brain activity can be played back to patient in real time. By viewing changes in activity, patients are thought to learn to alter brain function and train their brain to control emotion, attention, and behaviors. As neurofeedback is repeated, habits are formed in brain function with the help of practitioner guidance, creating new, healthy patterns in neural activity. Neurofeedback is designed to treat psychological and medical disorders such as attention deficit disorder (ADHD), anxiety, depression, autism, headaches, brain damage due to trauma, and other conditions. It is also used to improve creative performance.

REGULATORY STATUS

U.S. FOOD AND DRUG ADMINISTRATION (FDA)

Approval or clearance by the Food and Drug Administration (FDA) does not in itself establish medical necessity or serve as a basis for coverage. Therefore, this section is provided for informational purposes only.

Table 2: FDA regulated devices for neurofeedback

Device Name, Manufacturer, Product Code	Indications for Use	Contraindications for Use
Monarch ETNS System by NeuroSignma, QGL[14]	The Monarch external Trigeminal Nerve Stimulation (eTNS) System is indicated for treatment of pediatric Attention Deficit Hyperactivity Disorder as a monotherapy in patients ages 7 through 12 years old who are not currently taking prescription ADHD medications. The device is used for patient treatment by prescription only and is intended to be used in the home under the supervision of a caregiver during periods of sleep.	The device is contraindicated for use by patients with: • Implanted cardiac and/or neurostimulation systems • Implanted metallic or electronic device in their head
BrainMaster 2E by BrainMaster, HCC[15]	The BrainMaster 2E is indicated for relaxation training using alpha EEG Biofeedback.	n/a
Neurosearch (NRS)-2D by Lexicor, OLT[16]	The NRS-2D uses Lexicor's BioLEx software to perform its intended use. BioLex is indicated for relaxation training using alpha EEG biofeedback.	BioLex is contraindicated in patients with the following conditions: • Individuals who are unwilling or unable to understand the general principles and goals of feedback used. This includes individuals with excessive behavioral problems or low IQ. • Individuals who experience anxiety or an unpleasant experience associated with EEG biofeedback training.

CLINICAL EVIDENCE AND LITERATURE REVIEW

EVIDENCE REVIEW

A review of the ECRI, Hayes, Cochrane, and PubMed databases was conducted regarding the use of biofeedback and neurofeedback as a treatment for behavioral health and medical indications. Below is a summary of the available evidence identified through October 2024.

Medically Necessary Indications for Biofeedback

Urinary Incontinence

- In 2019, Nunes and colleagues published a systematic review investigating the efficacy of biofeedback (BF) with pelvic floor muscle training (PFMT) in women with stress urinary incontinence.[17] Eleven randomized studies were included in the analysis, totalling 649 participants. Sample sizes ranged from 32 to 120 participants. Perineometer BF improved quality of life measurements in lower quality RCTs, but a higher quality trial found that PFMT and PFMT with electrical stimulation were better than perineometer BF. Urine leakage frequency was improved with PFMT plus perineometer BF when compared with alternative treatments in 2 studies, while a third study found that alternative treatments were more effective. The authors noted that the ambiguity of the results prevent them from demonstrating a clear advantage of PFMT with perineometer BF versus alternative treatments. Electromyography BF showed similar results, with improved quality of life and urine leakage, but the low quality of trials and the considerable heterogeneity of results led authors to conclude that no advantages can be determined with the present data.

- A 2018 systematic review and meta-analysis by Kannan and colleagues investigated the effectiveness of pelvic floor muscle training (PFMT) alone in combination with biofeedback (BF), electrical stimulation (ES), or both for urinary incontinence in men following prostatectomy.[18] Fifteen publications on 16 randomized controlled trials (RCTs) were included in the analysis, with 3503 participants aged 45 to 90 years. Sample sizes ranged from 16 to 203 participants. Comparators included no treatment (13 studies) and sham ES in 2 studies. Analysis from the 374 men in the trials comparing PFMT + BF to no treatment found that more men in the experimental group achieved continence (63/194) after intervention compared to the control group (38/180), although the effect was not significant (RR: 1.70; 95% CI, 0.95-3.04; p= 0.07). Similar non-significant benefit was found at follow up. Limitations of the study include small sample sizes in many of the trials, heterogeneity among studies, and low-quality study designs. The authors concluded that the review found low to moderate quality of evidence that suggests that PFMT alone could improve recovery of continence in men following prostatectomy and the addition of BF to PFMT may further improve recovery, although tis remains uncertain. More high-quality, large RCTs are needed to determine efficacy of BF as an additional treatment for this population.

- In 2011, Cochrane published a systematic review on biofeedback (BF) to augment pelvic floor muscle training (PFMT) for urinary incontinence in women.[19] Twenty-four randomized and quasi-randomized trials involving 1583 women were included in the analysis. One trial was deemed to have a low risk of bias, ten had a moderate risk, and 12 were at a higher risk. Pooled analysis found that PFMT+BF led to more cases of improved or cured urinary incontinence compared to PFMT alone (RR: 0.75; 95% CI, 0.66-0.86). These results may be confounded by a difference in PFMT programs across studies. Among 3 trials that assessed participant satisfaction with progress or outcome, participants favored PFMT+BF (RR: 0.65; 95% CI 0.46-0.90). While outcomes favored the addition of BF to PFMT, the authors noted that participants in the BF arms had more contact with health professionals than those in the non-BF arms and many of the trials had moderate to high risk. Small sample sizes, variation in regimens, and

variations in outcomes are among the limitations of the available studies in this review. The authors concluded that BF may provide benefit in addition to PFMT in women with urinary incontinence, yet further research is needed to determine if the benefits seen in these trials are affected by other factors such as more interactions with health professionals.

Migraine Headaches

- In 2016, Stubberud and colleagues published a meta-analysis on biofeedback as a prophylaxis for pediatric migraines.[20] Twelve randomized controlled trials were included in the review, and 5 studies were deemed appropriate to include in a pooled analysis. Data from 3 studies (72 participants) showed that biofeedback significantly reduced frequency of migraines compared to a waiting-list control group ($p< 0.0001$), by a mean difference of 1.97 attacks per week. One study compared biofeedback and waiting-list control at 6 months follow up and found significant reductions in headache frequency and duration across time for all subjects. One study compared biofeedback to an active control (progressive relaxation) and found no significant differences in migraine frequency, intensity, duration, or analgesic intake. One study compared biofeedback to sham biofeedback and found no differences in frequency, but the biofeedback back had a significantly higher proportion of responders compared to the sham group.
  Limitations of the meta-analysis included small sample sizes, heterogeneity of interventions, and moderate risk of bias in the majority of studies analyzed. The authors concluded:
  "Biofeedback delivered together with relaxation therapy or autogenic training seems to be effective in reducing the frequency of migraine in the pediatric population. In addition, the apparent lack of adverse advents should qualify biofeedback as an attractive treatment alternative for pediatric migraine. Despite the positive findings, the number of identified studies and participants was small, and a series of methodologic issues hampered proper meta-analyses. Therefore, continued research is warranted."[20]

- In 2007, Nestoriuc and colleagues published a meta-analysis on the efficacy of biofeedback in treating migraines.[21] The analysis included 55 studies, either randomized trials or pre- post-comparator trials, totalling 2229 migraine patients. In comparison to wait-list control groups, biofeedback showed a significant reduction in headache relief. This reduction was also seen when comparing biofeedback to pseudo-feedback and pseudo-relaxation. The effect of biofeedback appeared to be stable over follow-up periods up to several years. No significant differences between biofeedback and relation or ergotamine treatment were found. Limitations of this analysis include small sample sizes, considerable heterogeneity in treatment protocol and methodology, as well as high risk of bias in many of the studies. The authors conclude that biofeedback has a medium effect sizes for short and long-term outcomes in adults with migraines. Biofeedback can substantially reduce pain and psychological symptoms of patients. They recommend biofeedback as an evidence-based behavioral treatment option for the prevention of migraine.

- A 2004 Hayes report (archived in 2009) assessed the efficacy of biofeedback for headache and chronic musculoskeletal pain. Reviewing the literature identified a number of randomized trials and 2 meta-analyses that supported the use of biofeedback for recurrent tension headaches in adults and pediatric migraines. Data on the efficacy of biofeedback for chronic neuromuscular pain was more limited. Hayes gave the following ratings:

- B rating (some proven benefit): For the treatment of pediatric migraine and tension type headache.
- C rating (Potential by unproven benefit): For the treatment of headache in adults and for chronic low back pain and temporomandibular joint disorders.
- D rating (No proven benefit): For the treatment of other chronic pain syndromes, including fibromyalgia. This rating reflects the paucity of evidence regarding the efficacy of biofeedback for these indications.[22]

Not Medically Necessary Indications for EEG Biofeedback/Neurofeedback

Anxiety disorder

Systematic reviews

- A 2017 evidence review was conducted by ECRI on biofeedback for treating generalized anxiety disorder.[23] A literature search was conducted from January 1, 2012 to November 25, 2017, and one systematic review, 3 RCTs, one nonrandomized comparative study, 6 case series, and 4 narrative reviews were included. The systematic review analyzed 5 studies on EEG biofeedback for OCD and anxiety, and 4 of 5 studies found significantly improved symptoms compared to baseline. Two of three RCTs analyzed EEG biofeedback, and both found that EEG biofeedback improved symptoms of generalized anxiety disorder compared to waitlist. Evidence from these studies had a number of limitations. All trials included had small sample sizes and were single-center studies. Variability was high across studies in terms of treatment protocol, study methodology, outcome assessment, and follow up times. These limitations reduce generalizability and validity of results. ECRI concluded that additional multi-centered studies are needed with larger participant groups and standardized protocol to determine efficacy.

- A 2020 quantitative and qualitative systematic review was conducted by Tolin and colleagues on the effects of biofeedback and neurofeedback for anxiety disorders.[24] The authors searched medical and psychological databases for peer-reviewed literature from 1987 to 2019 and included 21 randomized controlled trials in their analysis. Among the included articles, 10 investigated EEG neurofeedback and one investigated fMRI neurofeedback. The effect size analysis found that EEG neurofeedback (n=130) was associated with a moderate effect size (g=0.79; 95% CI, -0.03 to 1.62) when compared to various control conditions. When comparing EEG neurofeedback to waitlist (4 trials), the effect size was large (g=1.84; 95% CI, 0.49 to 3.18). When comparing EEG neurofeedback to active treatment (3 trials), there was a small negative effect (g= -0.26; 95% CI= -1.5 to 0.97). One study compared neurofeedback to a reverse neurofeedback condition and the results showed a negligible effect. There was high heterogeneity between studies.

  Only one RCT by Zilverstand and colleagues investigated fMRI neurofeedback for anxiety disorders.[25] The study recruited patients with specific phobias and randomized them to fMRI neurofeedback or to a control behavioral modification training. During exposure to the specific phobic stimuli, neurofeedback patients reported lower fear levels compared to control patients, and at 3 months, both groups experienced significant reductions in fear. No effect size analysis was done on fMRI neurofeedback do to a lack of useable data.

The authors concluded that the majority of the trials had significant methodological limitations. Sample sizes were very small, there was inadequate blinding or research participants and assessors, measures of anxiety were highly variable, and there was high dropout rate and loss to follow up. The meta-analysis found that neurofeedback showed efficacy in reducing anxiety symptoms over waitlist or no treatment, but did not appear to be as effective as active treatment.

Randomized controlled studies

- Results from a 2020 randomized controlled non-inferiority trial by Schoneveld and colleagues investigated the preventive effects of a neurofeedback video game, *MindLight*, on mental health outcomes associated with anxiety symptoms (internalizing problems, externalizing problems, and self-efficacy).[26] One hundred seventy-four children, ages 8 to 12 years, were randomized to *MindLight* or a cognitive behavioral therapy (CBT) program and outcomes were assessed at baseline, end of intervention, and at 3 and 6 months follow-up. A significant reduction in mother-reported internalization and externalization of problems was reported in both groups, as well as an increase in self-efficacy. *MindLight* was found to be noninferior to CBT in affecting internalizing problems and self-efficacy, but not decreasing externalizing symptoms. A number of limitations exist in this trial. Participants were excluded if they already received anxiety treatment or if they were previously diagnosed with obsessive compulsive disorder, post-traumatic stress disorder, or autism spectrum disorder, potentially restricting the participant group to children with less intense anxiety symptoms and limiting the generalizability of the cohort. Indeed, the authors include the fact that the cohort comprised of highly-functioning children as a main limitation to the study. Children were recruited from primary schools in the Netherlands, which may have different cultural and educational noms than the United States, and therefore results may not be generalizable to US children with anxiety. The publication did not specify whether the mothers or investigators were blinded, an important factor in determining the levels of potential bias. The study was designed as a non-inferiority study, yet there is no justification for this study design. Neurofeedback is an expensive treatment and has no addressed advantages over CBT. The authors conclude that more research is needed on the effectiveness of *MindLight* neurofeedback game in children with anxiety, but the treatment could be implemented as a prevention program in schools to reduce anxiety symptoms in children. Mixed results and methodology limitations bring into question the results of this study.

<u>Neurofeedback for Attention deficit hyperactivity disorder (ADHD)</u>

Due to the large quantity of studies on neurofeedback for ADHD, only systematic reviews and meta-analyses were included in this evidence review.

Systematic Reviews

- In 2023, Hayes published an evolving evidence review on the Monarch eTNS System for treatment of ADHD in children. The review found 2 fair and poor-quality studies demonstrating that about half of patients treated with the device achieved clinically significant responses. Studies found that treatment effects waned after treatment ended, and one fair quality study found no difference between the Monarch eTNS and a sham treatment. No systematic reviews

were found. The review concluded that there was minimal support for the device based on clinical studies and no/unclear support based on systematic reviews.[27]

- A 2024 evidence review was conducted by ECRI on neurofeedback for treating ADHD in children and adolescents.[28] ECRI conducted a literature search from 2015- January 2020 and identified 3 systematic reviews and 3 randomized controlled trials (RCTs) that met their inclusion criteria, reporting in >10,000 patients total.

  Overall, neurofeedback was found to be less effective than pharmacotherapy and behavioral therapy for managing ADHD symptoms. A meta-analysis by Yan and colleagues, published in 2019, reviewed 18 studies and found that methylphenidate, a stimulant medication, had a greater 6-month reduction in teacher-reported inattention but there was no significant difference in patent-reported changes.[29] A 2017 meta-analysis by Catalá-López and colleagues found neurofeedback to be less effective than stimulants combined with non-stimulant drugs (Odds ratio: 7.8; p5% CI: 1.6 to 34.6) or with behavioral therapy (OR: 6.9; 95% CI: 1.4 to 30.7).[30] When comparing neurofeedback to placebo or inactive interventions such as sham neurofeedback, waiting list, attention training, and physical exercise, the results were mixed. A 2019 meta-analysis by Van Doren and colleagues found that neurofeedback had a greater 1-year ADHD improvement htan inactive interventions. Catalá-López et al found no difference in ADHD symptom scores between neurofeedback and placebo. Three RCTs comparing neurofeedback to delayed treatment, physical activity, and electromyography biofeedback muscle training reported inconsistent results.

  Evidence from 3 meta-analyses of low-quality studies and 3 additional randomized controlled trials (RCTs) shows that NF is less effective than pharmacotherapy and behavioral therapy for managing ADHD symptoms. Whether NF is more effective than inactive interventions (sham NF, waiting list, attention training, physical exercise) or placebo is unclear because studies reported mixed findings. Studies used different NF protocols, outcome assessment methods, and patient groups. Larger RCTs using standardized methods for NF are needed to assess comparative safety and effectiveness. Clinical guidelines state that evidence is insufficient to recommend NF for ADHD management.

  Limitations in the RCTs and studies included in the systematic review included:
  - Small sample sizes
  - Single-center trials
  - Lack of blinding
  - Short follow up
  - High heterogeneity in participant group, ADHD severity, age, outcome assessors, and protocols

  ECRI concluded that the evidence available raises concerns as to whether neurofeedback is an appropriate treatment for ADHD in children and adolescents. They recommend larger RCTs using standardized methods be conducted to assess comparative safety and effectiveness.

- A systematic review published in 2018 by Razoki and colleagues evaluated the efficacy of neurofeedback compared to stimulant medication in children and adolescents with ADHD.[31] Twelve publications reporting on 8 randomized controlled trials were included in the analysis.

Age range of participants was 6-18 years in 11 studies, with one study reporting on participants aged 12-24 years. Sample sizes ranged from 32 to 130 participants. Four studies compared neurofeedback plus medication to medication alone, and 4 studies compared neurofeedback alone to medication. Outcomes measured were largely subjective behavioral assessments by parents and teachers. Other outcomes measures included self-reports, neurocognitive tests, electroencephalogram parameters, and event-related potentials.

Among the studies that compared neurofeedback alone to medication alone, 2 showed improvement in both groups, with no significant differences in results, while 3 showed greater improvement among the medication groups compared to neurofeedback groups. Among the studies that compared combination therapy to medication alone, neurofeedback plus medication was found to be statistically superior to medication alone in two studies, and a third found no difference between groups. Medication dosages were reduced when neurofeedback was given in conjunction in two studies, implying that neurofeedback may be helpful in reducing dosages for ADHD patients with side effects from medication. When only analyzing trials in the review that include probably ratings, those that are sham controlled or semi-active controlled, or those that employed optimally titration procedures, theta/beta neurofeedback was shown to be not as effective as standard treatment for children or adolescents with ADHD. Authors concluded that neurofeedback in combination with medication may decrease medication dosage in children already using ADH medication and may improve treatment effects and that neurofeedback should be considered a complementary treatment for children with ADHD. Still, they note that neurofeedback is expensive and it is important to conduct further research to ensure effectiveness of the treatment.

- A 2016 meta-analysis was conducted by Cortese and colleagues on the clinical and neuropsychological outcomes of neurofeedback as a treatment for ADHD.[32] Thirteen trials were included, totalling 520 participants. Similar to the analysis conducted by Razoki and colleagues,[31] Cortes and colleagues found that neurofeedback improved ADHD symptoms such as inattention and hyperactivity/impulsivity, but these effects disappeared when probably blinded ratings were the outcome or in trials with active or sham controls. The authors conclude that current literature fails to support the use of neurofeedback for ADHD. Future research should include standardized treatment/training protocol, ensuring learning, and optimizing clinically relevant transfer in order to determine effectiveness.

- In 2009 (reviewed in 2013 and archived in 2014), Hayes conducted a health technology assessment on neurofeedback as a nonpharmacological treatment for ADHD.[33] A search was conducted for peer-reviewed medical literature published from 1990 to May 2009 and 9 studies were selected for inclusion in the review. Sample sizes ranged from 20 to 100 participants, 3 studies used randomization, and all but one had a comparator group. The participant population consisted primarily of children, ages 7 to 13 years, with a DSM-IV diagnosis of ADHD. The systematic review found that neurofeedback was associated with a reduction in parent or teacher reported ADHD symptoms (inattention, hyperactivity, and impulsivity) in all 9 studies. Neurofeedback was also associated with improvements in objective assessments of attention and impulsivity and estimated of IQ (measured in 3 studies). Four studies measured ability to control brain activity, which is thought to be the mechanism behind neurofeedback, and found that regulation of brain activity was improved along with behavioral measures. Three studies collected follow up outcome data at 6 months and 10 months and found that neurofeedback

effects remained. No negative side effects were reported. A number of limitations were identified among the included studies.

Limitations:

- Sample sizes were small.
- Studies comparing neurofeedback did not randomize groups, leading to potential selection bias and limiting generalizability of results.
- Randomized studies had inappropriate control groups, comparing neurofeedback to no treatment, waiting list, or attention skills training program rather than standard of care.
- Lack of blinding in the studies may influence subjective outcome reporting by teachers and parents.
- Majority of studies had short-term follow up.

Hayes concluded that the quality of evidence was moderate. They gave a B rating (some proven benefit) for neurofeedback in children with a diagnosis of ADHD, for whom ADHD and its related symptoms impair functioning. Hayes gave a D rating for neurofeedback in adolescents and adults with ASHS, due to a lack of studies evaluating participants above the age of 13 years. Hayes also offered a safety consideration, stating, "It should be noted that neurofeedback may alter seizure threshold (Sterman, 2000). Patients with a history of such seizures should receive neurofeedback training only from a practitioner with experience in neurofeedback for seizure disorders."[33]

Neurofeedback for Depression/ Major Depressive Disorder

A 2017 evidence review was conducted by ECRI on biofeedback for major depressive disorder, searching peer-reviewed medical literature from January 1, 2012 to November 28, 2017.[34] One systematic review and 3 RCTs were included in the analysis. The systematic review included 9 studies, 5 RCTs, one nonrandomized comparative study, and 3 case series. The review found evidence that biofeedback, including EEG alone or multimodel biofeedback, improved depression symptoms over standard of care in patients with major depression disorder. Similarly, the 3 RCTs reviewed found that patients treated with fMRI neurofeedback plus standard treatment reported greater depression symptom reduction compared to sham biofeedback and standard treatment.

The reviewed publications suffered from a number of limitations. All studies were single-centered trials with small participant groups, with potential for patient selection bias. Treatment protocols, patient populations, and research methodology were highly variable, limiting generalizability of results. Most of the studies only collected data for short term follow up, and therefore long term efficacy cannot be confidently determined from the included data. ECRI concluded that evidence suggests biofeedback may improve depressive symptoms, but larger, multicenter RCTs are needed to confirm results.

Neurofeedback for Obsessive-compulsive disorder (OCD)

A 2017 evidence review was conducted by ECRI on biofeedback for treating OCD.[35] Four randomized controlled trials were included in the analysis, totalling 121 participants. Two of the RCTs assessed EEG biofeedback and reported OCD symptoms improvements. One study found that participants who received biofeedback plus cognitive behavioral therapy had significantly greater improvement compared to cognitive behavioral therapy alone. The second RCT found that effects of EEG biofeedback were

similar to pharmacotherapy. Two other RCTs found that EEG biofeedback had no added benefit compared with pharmacotherapy alone or sham biofeedback. The 4 reviewed RCTs suffered a number of limitations. The sample sizes were small and participants were recruited from single centers. Treatment protocols, methodology, and outcome assessment varied considerably, limiting generalizability. ECRI concluded that larger, multicenter studies with standardized protocols are needed to validate EEG biofeedback.

Neurofeedback for Post-traumatic stress disorder (PTSD)

Systematic reviews

- A 2019 systematic review was conducted on neurofeedback as a treatment for PTSD. Chiba and colleagues included 13 trials in their review, 10 of which investigated EEG neurofeedback, and 3 of which investigated fMRI neurofeedback.[36] Four of the studies had a randomized trial design and sample sizes varied from 2 to 29 participants. The review did not analyze the results of the included studies, although they discussed a 2016 randomized, waitlist-controlled trial by van der Kolk that found that patients with chronic PTSD showed significant PTSD symptom improvement and improvement in affect regulation capacities compared to the control group.[37] The authors concluded that "Despite promising results are derived from both EEG and fMRI neurofeedback (Table 1), the efficacies of these approaches have not yet been warranted."[36]

- In 2018, Panisch and Hai published a systematic review on neurofeedback as a treatment for PTSD.[38] Ten studies were included in the review, 3 of which were randomized trials. Eight studies used EEG neurofeedback and 2 used functional MRI. Due to differences among studies, the authors did not pool study outcomes. They concluded that all studies found positive findings in at least one outcome but that variability among study designs and the relatively small number of RCTs limit the ability to draw conclusions about the efficacy of neurofeedback for treating PTSD, and additional rigorous studies are needed.

Randomized controlled trials

- A 2016 randomized waitlist-controlled study (mentioned in the systematic review above) was conducted by van der Kolk and colleagues on the effects of EEG neurofeedback in patients with chronic PTSD.[37] Fifty-two participants were randomized to neurofeedback or waitlist, and it was found that PTSD symptoms were significantly reduced in the neurofeedback group. Both groups experienced significant decreases in Clinician Administered PTSD scores from pre-treatment to one month post treatment, but the neurofeedback group had substantially larger reductions (d= -1.71). Limitations of the study include small sample size, short follow up, and non-active control. The authors conclude that EEG neurofeedback may improve symptoms of PTSD, but further clinical trials are need to substantiate their findings.

Substance use disorder

- A 2015 study was conducted by Lackner and colleagues on the effectiveness of visual short-term neurofeedback on brain activity and clinical characteristics in alcohol use disorders.[39] Twenty-five male patients with alcohol use disorder were randomized to neurofeedback or treatment as usual. Absolute alpha and theta amplitudes were higher by trend (nonsignificant) in the eyes-

open neurofeedback treatment compared to the control group, but not in the eyes closed treatment. No significant differences were found in psychometric parameters when comparing pre- and post-test results. Patients' psychological well-being, including depressive and psychiatric symptoms, posttraumatic growth, and coping strategies improved in the neurofeedback group and not in the control group.
Aspects of this study limit its results generalizability and utility. This was a single-center study with a small sample size of only men. Over half of the participants did not complete the study and no long-term effects could be analyzed. The control was not active and does not address potential biases and placebo effect. The results were conflicting, as there was no significant neurological changes from neurofeedback and only small effects were seen in terms of subjective, patient reported clinical variables.

- A 2013 trial was conducted on neurofeedback training for opiate addiction.[40] Twenty opiate dependent patients undergoing Methadone or Buprenorphine maintenance treatment were randomized to neurofeedback training or no additional treatment and outcomes were compared pre and post treatment. Multivariate analysis of covariance showed that the experimental group achieved improvement in somatic symptoms, depression, and total score in general mental health; and in anticipation of positive outcome, desire to use opioid, and relief from withdrawal of craving in comparison with the control group. Limitations of the study include small sample size of only men, no statistical comparisons between groups, lack of generalizability of the study cohort, high risk of bias due to lack of blinding, and short follow up. Further research should focus on long-term follow up, a more representative cohort, and a sham/placebo control.

Neurofeedback for Asthma

No systematic review, randomized trials, prospective/retrospective cohort studies, or case series were identified on the use of neurofeedback for relieving asthma symptoms.

Neurofeedback for Epilepsy

In a 2009 meta-analysis on EEG biofeedback in treating epilepsy, Tan and colleagues identified 10 studies that met their inclusion criteria.[41] Nine of the ten studies had fewer than 10 subjects and were published between 1974 and 2001. All studies reported a decrease in seizure incidence among patients treated with EEG biofeedback, with 64 out of 87 patients (74%) reporting fewer weekly seizures after treatment. While results showed improvement for patients, the limitations of the studies, namely small sample size and nonrandomized, non-comparator designs, make it difficult to interpret results and prove efficacy of the treatment for patients with epilepsy.

No newer prospective comparator studies have been identified on the treatment of epilepsy with neurofeedback therapy. Due to the lack of current evidence and the paucity of large randomized trials on neurofeedback for epilepsy, effectiveness of the treatment cannot be determined with the available data.

Neurofeedback for Fibromyalgia

- In 2010, Kayiran and colleagues published results from a randomized controlled trial on neurofeedback for treating fibromyalgia syndrome.[42] Thirty-six patients were randomized to 20 sessions of neurofeedback sensory motor rhythm treatment or to escitalopram treatment (control group) for 8 weeks. Both groups had a significant decrease in Visual Analog Scale (VAS) pain and fatigue scores after treatment and scores stayed significantly lower at 24 weeks follow up. The neurofeedback group's mean VAS-pain and VAS-fatigue scores were significantly lower than the control group at every follow-up visit. Depression and anxiety scores decreased in both groups, and neurofeedback scores were significantly lower than the control group. Overall, the neurofeedback group showed significant improvements compared to the control. The study was limited by a small sample size from one center, the lack of a placebo/sham control group, and significantly different baseline depression and anxiety scores at baseline between groups. Further studies are needed with larger cohorts and sham control groups.

- In 2008, Kravitz and colleagues published results of a randomized controlled trial on low-intensity neurofeedback as a treatment for fibromyalgia syndrome.[43] Sixty-four patients with fibromyalgia were randomized to EEG neurofeedback or sham treatment. At the end of treatment, the treatment group had more improvement in Clinical Global Impressions scores compared to the control group ($p= 0.01$) and this difference continued at follow up ($p= 0.04$). Clinicians reported improved response rates from neurofeedback, but there was no difference in patient-reported improvements between groups. Side effects were more prevalent in the neurofeedback group compared to the control group ($p< 0.007$) and included fatigue/tiredness and pain. The authors concluded that neurofeedback was ineffective in treating chronic, non-remitting fibromyalgia and that research should focus on other noninvasive techniques to reduce pain in this population.

<u>Neurofeedback for Headaches</u>

Systematic reviews

- In 2020, a systematic review was published on the effects of neurofeedback for pain management.[44] The review included 24 studies, including 3 randomized trials, 19 nonrandomized studies, and 2 case series. Pain types investigated were mainly headaches, followed by fibromyalgia, spinal cord injury, and chronic pain. Nineteen of the studies examined EEG neurofeedback and 5 used fMRI neurofeedback. The neurofeedback protocols differed across studies and there was high heterogeneity. Across the studies, neurofeedback improved pain intensity and frequency when comparing pre and post treatments, with some studies reporting positive follow up results. Yet there were high levels of heterogeneity across the cohorts and outcomes measured. The analysis did not separate results by pain type. The nonrandomized, non-comparator design of the studies, along with the variability of protocols, participants, and outcomes act as limitations in interpreting these results. Neurofeedback for treating pain may potentially benefit patients, but more RCTs with standardized protocols are needed.

Randomized controlled trials

- A randomized controlled trial published in 2014 compared the effects of neurofeedback and transcutaneous electrical nerve stimulation (TENS) as treatments for primary headaches.[45] A

total of 45 participants who suffered from primary headaches were randomized to neurofeedback, TENS, or a control group. Both the neurofeedback and TENS groups had a reduction in pain frequency, pain severity, and headache duration after treatment and both treatment groups had significantly improved symptoms compared to the control group. This study has several limitations. The sample size was small, and the cohort was chosen through convenience sampling. The statistical analysis was powered to detect inconsequential clinical differences and the results therefore cannot be used to determine treatment efficacy for neurofeedback or TENS in relieving headache pain or frequency.

Non-randomized trials

- A 2011 study on quantitative EEG (QEEG) neurofeedback was performed on 71 patients with recurrent migraine headaches from a single neurological center.[46] Forty-six patient opted for neurofeedback and 25 chose to continue treatment with medications. After treatment, 54% of the participants in the neurofeedback group experienced complete cessation of their migraines, and 39% experienced a reduction in frequency greater than 50%. Sixty-eight percent of those in the drug (control) group had no change in migraine frequency, and 8% of them experiencing a reduction in frequency greater than 50%. While these results show potential for migraine pain relief and frequency reduction with the use of QEEG neurofeedback, several limitations exist. The cohort was small, chosen from a single center, and participants chose their preferred treatment, which can introduce bias. Larger, multicenter, randomized controlled trials are needed to determine the effects of neurofeedback on migraine headache frequency.

<u>Neurofeedback for Traumatic Brain Injury (TBI)</u>

A 2013 literature review was conducted by May and colleagues on neurofeedback as a treatment for TBI.[47] The review included 22 research studies, consisting of 2 RCTs and 5 studies which were self-published (rather than published by peer reviewed journal). When excluding case studies, sample sizes ranged from 6 to 26 participants. All studies showed improvements in cognitive outcomes with neurofeedback treatment. Outcomes investigated included attention, impulse control, processing speed, and short-term memory. Although the findings are promising, there were numerous limitations in the studies reviewed. Small sample sizes and largely uncontrolled, unblinded, single center studies were conducted. Treatment protocol was high variant, as were patient symptoms, making it difficult to generalize findings. The review concluded that neurofeedback has promise but is currently an unproven treatment for TBI. Randomized, double-blind, placebo-controlled trials are needed.

CLINICAL PRACTICE GUIDELINES

American Academy of Pediatrics

In 2019, the Academy of Pediatrics published clinical practice guidelines for the diagnosis, evaluation, and treatment of ADHD in children and adolescents. The guidelines state: “Some nonmedication treatments for ADHD-related problems have either too little evidence to recommend them or have been found to have little or no benefit. These include mindfulness, cognitive training, diet modification, EEG biofeedback, and supportive counseling."[48]

American Academy of Family Physician

In 2019, the American Academy of Family Physicians (AAFP) published guidelines on Migraine Headache Prophylaxis. The guidelines state:

"A U.S. Headache Consortium meta-analysis concluded that relaxation training, thermal biofeedback combined with relaxation training, electromyographic biofeedback, and cognitive behavior therapy may be considered as treatment options for the prevention of migraine. Additionally, behavioral therapy (i.e., relaxation, biofeedback) may be combined with preventive drug therapy (i.e., propranolol, amitriptyline) for patients to achieve additional clinical improvement for migraine relief."[49]

American College of Obstetricians and Gynecologists

A 2015 guidelines by the American College of Obstetricians and Gynecologists (ACOG) states that "Pelvic muscle exercises may be used alone or augmented with bladder training, biofeedback, or electrical stimulation."[50]

American College of Physicians

A 2014 guideline published by the American College of Physicians (ACP) recommends pelvic floor muscle training (PFMT) with bladder training in women with mixed urinary incontinence (UI). This recommendation was graded as "strong recommendation, high quality of evidence."
The guidelines states: "Low-quality evidence showed that PFMT with biofeedback using a vaginal electromyography probe increased continence compared with no active treatment. High-quality evidence showed that this treatment improved UI compared with no active treatment."[51]

EVIDENCE SUMMARY

Low- to moderate-quality evidence indicates that biofeedback is an effective tool for improving urinary incontinence and reducing frequency, duration, and intensity of migraines in both adult and pediatric populations. Behavioral therapies such as biofeedback act as safe, noninvasive tools to support pelvic floor muscle training in those suffering with urinary incontinence. Similarly, biofeedback as a complementary therapy to relaxation techniques offers a noninvasive tool to prevent migraines.

There is insufficient evidence to support the use of biofeedback with EEG monitoring (i.e., neurofeedback) as a treatment for behavioral health or medical indications. In the case of ADHD, published data indicates that neurofeedback is ineffective compared to standard of care pharmacotherapy in improving ADHD symptoms in children, and there is not enough evidence to determine whether neurofeedback is effective as a complementary therapy. Additionally, the American Academy of Pediatrics does not recommend non-medication therapies for ADHD due to a lack of evidence or evidence indicating inefficacy. For anxiety, depression, OCD, PTSD, substance use disorder, asthma, epilepsy, fibromyalgia, headaches, and TBI, the current evidence on neurofeedback treatment suffers from a number of limitations in study design, methodology, and execution.

More randomized control trials are needed with large, multi-center cohorts and standardized protocols to determine the efficacy of neurofeedback as a treatment for behavioral health and medical disorders. Due to the paucity of evidence and the low quality of available evidence evaluating neurofeedback, there is no clinical circumstance in which this service would be medically necessary.

BILLING GUIDELINES AND CODING

CPT codes 90875, 90876, and 90901 will be considered not medically necessary and not covered for the indications addressed in this policy when the request is billed with any of the ICD-10 diagnosis codes listed in the Billing Guidelines Appendix below.

HCPCS code S9002 is not recognized as a valid code for claim submission as indicated in the relevant Company Coding Policy (HCPCS S-Codes and H-Codes, 22.0). Providers need to use alternate available CPT or HCPCS codes to report for this service. If no specific CPT or HCPCS code is available, then an unlisted code may be used. Note that unlisted codes are reviewed for medical necessity, correct coding, and pricing at the claim level. Thus, if an unlisted code is billed related to a non-covered service addressed in this policy, it will be denied as not covered.

CODES*		
CPT	90875	Individual psychophysiological therapy incorporating biofeedback training by any modality (face-to-face with the patient), with psychotherapy (eg, insight oriented, behavior modifying or supportive psychotherapy); 30 minutes
	90876	Individual psychophysiological therapy incorporating biofeedback training by any modality (face-to-face. with the patient), with psychotherapy (eg, insight oriented, behavior modifying or supportive psychotherapy); 45 minutes
	90901	Biofeedback training by any modality
HCPCS	E0746	Electromyography (EMG), biofeedback device
	S9002	Intra-vaginal motion sensor system, provides biofeedback for pelvic floor muscle rehabilitation device

***Coding Notes:**

- The above code list is provided as a courtesy and may not be all-inclusive. Inclusion or omission of a code from this policy neither implies nor guarantees reimbursement or coverage. Some codes may not require routine review for medical necessity, but they are subject to provider contracts, as well as member benefits, eligibility and potential utilization audit.
- All unlisted codes are reviewed for medical necessity, correct coding, and pricing at the claim level. If an unlisted code is submitted for non-covered services addressed in this policy then it will be **denied as not covered**. If an unlisted code is submitted for potentially covered services addressed in this policy, to avoid post-service denial, **prior authorization is recommended**.
- **See the non-covered and prior authorization lists on the Company Medical Policy, Reimbursement Policy, Pharmacy Policy and Provider Information website for additional information.**
- HCPCS/CPT code(s) may be subject to National Correct Coding Initiative (NCCI) procedure-to-procedure (PTP) bundling edits and daily maximum edits known as "medically unlikely edits" (MUEs) published by the Centers for Medicare and Medicaid Services (CMS). This policy does not take precedence over NCCI edits or MUEs. Please refer to the CMS website for coding guidelines and applicable code combinations.

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POLICY REVISION HISTORY

DATE	REVISION SUMMARY
2/2023	Converted to new policy template.
12/2023	Annual update. No changes to criteria.
4/2024	Q2 2024 code set update. Added language to Billings Guideline regarding S-codes.
12/2024	Annual update. No changes to criteria.

APPENDICES

APPENDIX I

Diagnosis codes for not medically necessary indications include but are not limited to any of the ICD-10 codes listed below. Additional ICD codes may apply.

CODE	DESCRIPTION
F064	Anxiety disorder due to known physiological condition
F10180	Alcohol abuse with alcohol-induced anxiety disorder
F10280	Alcohol dependence with alcohol-induced anxiety disorder
F10980	Alcohol use, unspecified with alcohol-induced anxiety disorder
F12180	Cannabis abuse with cannabis-induced anxiety disorder
F12280	Cannabis dependence with cannabis-induced anxiety disorder
F12980	Cannabis use, unspecified with anxiety disorder
F13180	Sedative, hypnotic or anxiolytic abuse with sedative, hypnotic or anxiolytic-induced anxiety disorder
F13280	Sedative, hypnotic or anxiolytic dependence with sedative, hypnotic or anxiolytic-induced anxiety disorder
F13980	Sedative, hypnotic or anxiolytic use, unspecified with sedative, hypnotic or anxiolytic-induced anxiety disorder
F14180	Cocaine abuse with cocaine-induced anxiety disorder
F14280	Cocaine dependence with cocaine-induced anxiety disorder
F14980	Cocaine use, unspecified with cocaine-induced anxiety disorder
F15180	Other stimulant abuse with stimulant-induced anxiety disorder
F15280	Other stimulant dependence with stimulant-induced anxiety disorder
F15980	Other stimulant use, unspecified with stimulant-induced anxiety disorder
F16180	Hallucinogen abuse with hallucinogen-induced anxiety disorder
F16280	Hallucinogen dependence with hallucinogen-induced anxiety disorder

F16980	Hallucinogen use, unspecified with hallucinogen-induced anxiety disorder
F18180	Inhalant abuse with inhalant-induced anxiety disorder
F18280	Inhalant dependence with inhalant-induced anxiety disorder
F18980	Inhalant use, unspecified with inhalant-induced anxiety disorder
F19180	Other psychoactive substance abuse with psychoactive substance-induced anxiety disorder
F19280	Other psychoactive substance dependence with psychoactive substance-induced anxiety disorder
F19980	Other psychoactive substance use, unspecified with psychoactive substance-induced anxiety disorder
F40	Phobic anxiety disorders
F400	Agoraphobia
F401	Social phobias
F402	Specific (isolated) phobias
F408	Other phobic anxiety disorders
F409	Phobic anxiety disorder, unspecified
F41	Other anxiety disorders
F410	Panic disorder [episodic paroxysmal anxiety]
F411	Generalized anxiety disorder
F413	Other mixed anxiety disorders
F418	Other specified anxiety disorders
F419	Anxiety disorder, unspecified
F4322	Adjustment disorder with anxiety
F4323	Adjustment disorder with mixed anxiety and depressed mood
F930	Separation anxiety disorder of childhood
F938	Other childhood emotional disorders
F90	Attention-deficit hyperactivity disorders
F900	Attention-deficit hyperactivity disorder, predominantly inattentive type
F901	Attention-deficit hyperactivity disorder, predominantly hyperactive type
F902	Attention-deficit hyperactivity disorder, unspecified type
F908	Attention and concentration deficit following nontraumatic subarachnoid hemorrhage
F909	Attention and concentration deficit following nontraumatic intracerebral hemorrhage
I69210	Attention and concentration deficit following other nontraumatic intracranial hemorrhage
I69310	Attention and concentration deficit following cerebral infarction
I69810	Attention and concentration deficit following other cerebrovascular disease
I69910	Attention and concentration deficit following unspecified cerebrovascular disease

R41840	Attention and concentration deficit
F320	Major depressive disorder, single episode, mild
F321	Major depressive disorder, single episode, moderate
F322	Major depressive disorder, single episode, severe without psychotic features
F323	Major depressive disorder, single episode, severe with psychotic features
F324	Major depressive disorder, single episode, in partial remission
F325	Major depressive disorder, single episode, in full remission
F328	Other depressive episodes
F329	Major depressive disorder, single episode, unspecified
F330	Major depressive disorder, recurrent, mild
F331	Major depressive disorder, recurrent, moderate
F332	Major depressive disorder, recurrent severe without psychotic features
F333	Major depressive disorder, recurrent, severe with psychotic symptoms
F3340	Major depressive disorder, recurrent, in remission, unspecified
F3341	Major depressive disorder, recurrent, in partial remission
F3342	Major depressive disorder, recurrent, in full remission
F339	Major depressive disorder, recurrent, unspecified
F42	Obsessive-compulsive disorder
F422	Mixed obsessional thoughts and acts
F423	Hoarding disorder
F424	Excoriation (skin-picking) disorder
F428	Other obsessive-compulsive disorder
F429	Obsessive-compulsive disorder, unspecified
F605	Obsessive-compulsive personality disorder
R4681	Obsessive-compulsive behavior
F431	Post-traumatic stress disorder (PTSD)
F4310	Post-traumatic stress disorder, unspecified
F4311	Post-traumatic stress disorder, acute
F4312	Post-traumatic stress disorder, chronic
F1021	Alcohol dependence, in remission
F191	Other psychoactive substance abuse
F1910	Other psychoactive substance abuse, uncomplicated
F1911	Other psychoactive substance abuse, in remission
F1912	Other psychoactive substance abuse with intoxication
F19120	Other psychoactive substance abuse with intoxication, uncomplicated
F19121	Other psychoactive substance abuse with intoxication delirium
F19122	Other psychoactive substance abuse with intoxication with perceptual disturbances
F19129	Other psychoactive substance abuse with intoxication, unspecified
F1914	Other psychoactive substance abuse with psychoactive substance-induced mood disorder

F1915	Other psychoactive substance abuse with psychoactive substance-induced psychotic disorder
F19150	Other psychoactive substance abuse with psychoactive substance-induced psychotic disorder with delusions
F19151	Other psychoactive substance abuse with psychoactive substance-induced psychotic disorder with hallucinations
F19159	Other psychoactive substance abuse with psychoactive substance-induced psychotic disorder, unspecified
F1916	Other psychoactive substance abuse with psychoactive substance-induced persisting amnestic disorder
F1917	Other psychoactive substance abuse with psychoactive substance-induced persisting dementia
F1918	Other psychoactive substance abuse with other psychoactive substance-induced disorders
F19180	Other psychoactive substance abuse with psychoactive substance-induced anxiety disorder
F19181	Other psychoactive substance abuse with psychoactive substance-induced sexual dysfunction
F19182	Other psychoactive substance abuse with psychoactive substance-induced sleep disorder
F19188	Other psychoactive substance abuse with other psychoactive substance-induced disorder
F1919	Other psychoactive substance abuse with unspecified psychoactive substance-induced disorder
F1921	Other psychoactive substance dependence, in remission
F199	Other psychoactive substance use, unspecified
F1990	Other psychoactive substance use, unspecified, uncomplicated
F1992	Other psychoactive substance use, unspecified with intoxication
F19920	Other psychoactive substance use, unspecified with intoxication, uncomplicated
F19921	Other psychoactive substance use, unspecified with intoxication with delirium
F19922	Other psychoactive substance use, unspecified with intoxication with perceptual disturbance
F19929	Other psychoactive substance use, unspecified with intoxication, unspecified
F1993	Other psychoactive substance use, unspecified with withdrawal
F19930	Other psychoactive substance use, unspecified with withdrawal, uncomplicated
F19931	Other psychoactive substance use, unspecified with withdrawal delirium
F19932	Other psychoactive substance use, unspecified with withdrawal with perceptual disturbance
F19939	Other psychoactive substance use, unspecified with withdrawal, unspecified
F1994	Other psychoactive substance use, unspecified with psychoactive substance-induced mood disorder
F1995	Other psychoactive substance use, unspecified with psychoactive substance-induced psychotic disorder

F19950	Other psychoactive substance use, unspecified with psychoactive substance-induced psychotic disorder with delusions
F19951	Other psychoactive substance use, unspecified with psychoactive substance-induced psychotic disorder with hallucinations
F19959	Other psychoactive substance use, unspecified with psychoactive substance-induced psychotic disorder, unspecified
F1996	Other psychoactive substance use, unspecified with psychoactive substance-induced persisting amnestic disorder
F1997	Other psychoactive substance use, unspecified with psychoactive substance-induced persisting dementia
F1998	Other psychoactive substance use, unspecified with other psychoactive substance-induced disorders
F19980	Other psychoactive substance use, unspecified with psychoactive substance-induced anxiety disorder
F19981	Other psychoactive substance use, unspecified with psychoactive substance-induced sexual dysfunction
F19982	Other psychoactive substance use, unspecified with psychoactive substance-induced sleep disorder
F19988	Other psychoactive substance use, unspecified with other psychoactive substance-induced disorder
F1999	Other psychoactive substance use, unspecified with unspecified psychoactive substance-induced disorder
F10	Alcohol related disorders
F101	Alcohol abuse
F1010	Alcohol abuse, uncomplicated
F1011	Alcohol abuse, in remission
F1012	Alcohol abuse with intoxication
F10121	Alcohol abuse with intoxication delirium
F10129	Alcohol abuse with intoxication, unspecified
F1014	Alcohol abuse with alcohol-induced mood disorder
F1015	Alcohol abuse with alcohol-induced psychotic disorder
F10150	Alcohol abuse with alcohol-induced psychotic disorder with delusions
F10151	Alcohol abuse with alcohol-induced psychotic disorder with hallucinations
F10159	Alcohol abuse with alcohol-induced psychotic disorder, unspecified
F1018	Alcohol abuse with other alcohol-induced disorders
F10180	Alcohol abuse with alcohol-induced anxiety disorder
F10181	Alcohol abuse with alcohol-induced sexual dysfunction
F10182	Alcohol abuse with alcohol-induced sleep disorder
F10188	Alcohol abuse with other alcohol-induced disorder
F1019	Alcohol abuse with unspecified alcohol-induced disorder
F102	Alcohol dependence
F1022	Alcohol dependence with intoxication
F10229	Alcohol dependence with intoxication, unspecified
F1023	Alcohol dependence with withdrawal

F10231	Alcohol dependence with withdrawal delirium
F1024	Alcohol dependence with alcohol-induced mood disorder
F1025	Alcohol dependence with alcohol-induced psychotic disorder
F10250	Alcohol dependence with alcohol-induced psychotic disorder with delusions
F10251	Alcohol dependence with alcohol-induced psychotic disorder with hallucinations
F10259	Alcohol dependence with alcohol-induced psychotic disorder, unspecified
F1027	Alcohol dependence with alcohol-induced persisting dementia
F1028	Alcohol dependence with other alcohol-induced disorders
F10280	Alcohol dependence with alcohol-induced anxiety disorder
F10281	Alcohol dependence with alcohol-induced sexual dysfunction
F10282	Alcohol dependence with alcohol-induced sleep disorder
F10288	Alcohol dependence with other alcohol-induced disorder
F1029	Alcohol dependence with unspecified alcohol-induced disorder
F109	Alcohol use, unspecified
F1092	Alcohol use, unspecified with intoxication
F1094	Alcohol use, unspecified with alcohol-induced mood disorder
F1095	Alcohol use, unspecified with alcohol-induced psychotic disorder
F10950	Alcohol use, unspecified with alcohol-induced psychotic disorder with delusions
F10951	Alcohol use, unspecified with alcohol-induced psychotic disorder with hallucinations
F10959	Alcohol use, unspecified with alcohol-induced psychotic disorder, unspecified
F1097	Alcohol use, unspecified with alcohol-induced persisting dementia
F1098	Alcohol use, unspecified with other alcohol-induced disorders
F10980	Alcohol use, unspecified with alcohol-induced anxiety disorder
F10981	Alcohol use, unspecified with alcohol-induced sexual dysfunction
F10982	Alcohol use, unspecified with alcohol-induced sleep disorder
F1099	Alcohol use, unspecified with unspecified alcohol-induced disorder
J45	Asthma
J452	Mild intermittent asthma
J4520	Mild intermittent asthma, uncomplicated
J4521	Mild intermittent asthma with (acute) exacerbation
J4522	Mild intermittent asthma with status asthmaticus
J453	Mild persistent asthma
J4530	Mild persistent asthma, uncomplicated
J4531	Mild persistent asthma with (acute) exacerbation
J4532	Mild persistent asthma with status asthmaticus
J454	Moderate persistent asthma
J4540	Moderate persistent asthma, uncomplicated
J4541	Moderate persistent asthma with (acute) exacerbation
J4542	Moderate persistent asthma with status asthmaticus

J455	Severe persistent asthma
J4550	Severe persistent asthma, uncomplicated
J4551	Severe persistent asthma with (acute) exacerbation
J4552	Severe persistent asthma with status asthmaticus
J459	Other and unspecified asthma
J4590	Unspecified asthma
J45901	Unspecified asthma with (acute) exacerbation
J45902	Unspecified asthma with status asthmaticus
J45909	Unspecified asthma, uncomplicated
J4599	Other asthma
J45991	Cough variant asthma
J45998	Other asthma
G40	Epilepsy and recurrent seizures
G400	Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset
G4001	Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, intractable
G401	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures
G4010	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, not intractable
G4011	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable
G402	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures
G4020	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable
G40209	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, without status epilepticus
G4021	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable
G40219	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, without status epilepticus
G403	Generalized idiopathic epilepsy and epileptic syndromes
G4030	Generalized idiopathic epilepsy and epileptic syndromes, not intractable
G40301	Generalized idiopathic epilepsy and epileptic syndromes, not intractable, with status epilepticus
G40309	Generalized idiopathic epilepsy and epileptic syndromes, not intractable, without status epilepticus
G4031	Generalized idiopathic epilepsy and epileptic syndromes, intractable
G40311	Generalized idiopathic epilepsy and epileptic syndromes, intractable, with status epilepticus
G40319	Generalized idiopathic epilepsy and epileptic syndromes, intractable, without status epilepticus

G404	Other generalized epilepsy and epileptic syndromes
G4040	Other generalized epilepsy and epileptic syndromes, not intractable
G40401	Other generalized epilepsy and epileptic syndromes, not intractable, with status epilepticus
G40409	Other generalized epilepsy and epileptic syndromes, not intractable, without status epilepticus
G4041	Other generalized epilepsy and epileptic syndromes, intractable
G40411	Other generalized epilepsy and epileptic syndromes, intractable, with status epilepticus
G40419	Other generalized epilepsy and epileptic syndromes, intractable, without status epilepticus
G405	Epileptic seizures related to external causes
G408	Other epilepsy and recurrent seizures
G4080	Other epilepsy
G40801	Other epilepsy, not intractable, with status epilepticus
G40802	Other epilepsy, not intractable, without status epilepticus
G40803	Other epilepsy, intractable, with status epilepticus
G40804	Other epilepsy, intractable, without status epilepticus
G4081	Lennox-Gastaut syndrome
G4082	Epileptic spasms
G4089	Other seizures
G409	Epilepsy, unspecified
G4090	Epilepsy, unspecified, not intractable
G40901	Epilepsy, unspecified, not intractable, with status epilepticus
G40909	Epilepsy, unspecified, not intractable, without status epilepticus
G4091	Epilepsy, unspecified, intractable
G40911	Epilepsy, unspecified, intractable, with status epilepticus
G40919	Epilepsy, unspecified, intractable, without status epilepticus
G40A	Absence epileptic syndrome
G40B	Juvenile myoclonic epilepsy [impulsive petit mal]
G40B0	Juvenile myoclonic epilepsy, not intractable
G40B01	Juvenile myoclonic epilepsy, not intractable, with status epilepticus
G40B09	Juvenile myoclonic epilepsy, not intractable, without status epilepticus
G40B1	Juvenile myoclonic epilepsy, intractable
G40B11	Juvenile myoclonic epilepsy, intractable, with status epilepticus
G40B19	Juvenile myoclonic epilepsy, intractable, without status epilepticus
M797	Fibromyalgia
G43C	Periodic headache syndromes in child or adult
G43C0	Periodic headache syndromes in child or adult, not intractable
G43C1	Periodic headache syndromes in child or adult, intractable
G44	Other headache syndromes
G4400	Cluster headache syndrome, unspecified
G44001	Cluster headache syndrome, unspecified, intractable

G44009	Cluster headache syndrome, unspecified, not intractable
G4401	Episodic cluster headache
G44011	Episodic cluster headache, intractable
G44019	Episodic cluster headache, not intractable
G4402	Chronic cluster headache
G44021	Chronic cluster headache, intractable
G44029	Chronic cluster headache, not intractable
G441	Vascular headache, not elsewhere classified
G442	Tension-type headache
G4420	Tension-type headache, unspecified
G44201	Tension-type headache, unspecified, intractable
G44209	Tension-type headache, unspecified, not intractable
G4421	Episodic tension-type headache
G44211	Episodic tension-type headache, intractable
G44219	Episodic tension-type headache, not intractable
G4422	Chronic tension-type headache
G44221	Chronic tension-type headache, intractable
G44229	Chronic tension-type headache, not intractable
G443	Post-traumatic headache
G4430	Post-traumatic headache, unspecified
G44301	Post-traumatic headache, unspecified, intractable
G44309	Post-traumatic headache, unspecified, not intractable
G4431	Acute post-traumatic headache
G44311	Acute post-traumatic headache, intractable
G44319	Acute post-traumatic headache, not intractable
G4432	Chronic post-traumatic headache
G44321	Chronic post-traumatic headache, intractable
G44329	Chronic post-traumatic headache, not intractable
G445	Complicated headache syndromes
G4451	Hemicrania continua
G4452	New daily persistent headache (NDPH)
G4453	Primary thunderclap headache
G4459	Other complicated headache syndrome
G448	Other specified headache syndromes
G4481	Hypnic headache
G4482	Headache associated with sexual activity
G4483	Primary cough headache
G4484	Primary exertional headache
G4485	Primary stabbing headache
G4489	Other headache syndrome
R51	Headache
S062	Diffuse traumatic brain injury

S062X	Diffuse traumatic brain injury
S062X0	Diffuse traumatic brain injury without loss of consciousness
S062X0A	Diffuse traumatic brain injury without loss of consciousness, initial encounter
S062X0D	Diffuse traumatic brain injury without loss of consciousness, subsequent encounter
S062X0S	Diffuse traumatic brain injury without loss of consciousness, sequela
S062X1	Diffuse traumatic brain injury with loss of consciousness of 30 minutes or less
S062X2	Diffuse traumatic brain injury with loss of consciousness of 31 minutes to 59 minutes
S062X3	Diffuse traumatic brain injury with loss of consciousness of 1 hour to 5 hours 59 minutes
S062X4	Diffuse traumatic brain injury with loss of consciousness of 6 hours to 24 hours
S062X5	Diffuse traumatic brain injury with loss of consciousness greater than 24 hours with return to pre-existing conscious levels
S062X8	Diffuse traumatic brain injury with loss of consciousness of any duration with death due to other cause prior to regaining consciousness
S062X9	Diffuse traumatic brain injury with loss of consciousness of unspecified duration
S063	Focal traumatic brain injury
S0630	Unspecified focal traumatic brain injury
S06300	Unspecified focal traumatic brain injury without loss of consciousness
S06300A	Unspecified focal traumatic brain injury without loss of consciousness, initial encounter
S06300D	Unspecified focal traumatic brain injury without loss of consciousness, subsequent encounter
S06300S	Unspecified focal traumatic brain injury without loss of consciousness, sequela
S06301	Unspecified focal traumatic brain injury with loss of consciousness of 30 minutes or less
S06302	Unspecified focal traumatic brain injury with loss of consciousness of 31 minutes to 59 minutes
S06303	Unspecified focal traumatic brain injury with loss of consciousness of 1 hour to 5 hours 59 minutes
S06304	Unspecified focal traumatic brain injury with loss of consciousness of 6 hours to 24 hours
S06305	Unspecified focal traumatic brain injury with loss of consciousness greater than 24 hours with return to pre-existing conscious level
S06307	Unspecified focal traumatic brain injury with loss of consciousness of any duration with death due to brain injury prior to regaining consciousness
S06307A	Unspecified focal traumatic brain injury with loss of consciousness of any duration with death due to brain injury prior to regaining consciousness, initial encounter
S06309	Unspecified focal traumatic brain injury with loss of consciousness of unspecified duration

S0637	Contusion, laceration, and hemorrhage of cerebellum
S0638	Contusion, laceration, and hemorrhage of brainstem
S065X7	Traumatic subdural hemorrhage with loss of consciousness of any duration with death due to brain injury before regaining consciousness
S065X7A	Traumatic subdural hemorrhage with loss of consciousness of any duration with death due to brain injury before regaining consciousness, initial encounter
S066X7	Traumatic subarachnoid hemorrhage with loss of consciousness of any duration with death due to brain injury prior to regaining consciousness
S069X0	Unspecified intracranial injury without loss of consciousness
S069X0A	Unspecified intracranial injury without loss of consciousness, initial encounter
S069X0D	Unspecified intracranial injury without loss of consciousness, subsequent encounter
S069X0S	Unspecified intracranial injury without loss of consciousness, sequela