Subject: Monarch Trigeminal Nerve Stimulation (eTNS) System	**Original Effective Date:** 12/9/2020
Policy Number: MCP-392	**Revision Date(s):**
Review Date: 1/19/21	
MCPC Approval Date: 12/9/2020	

DISCLAIMER

This Molina Clinical Policy (MCP) is intended to facilitate the Utilization Management process. It expresses Molina's determination as to whether certain services or supplies are medically necessary, experimental, investigational, or cosmetic for purposes of determining appropriateness of payment. The conclusion that a particular service or supply is medically necessary does not constitute a representation or warranty that this service or supply is covered (i.e., will be paid for by Molina) for a particular member. The member's benefit plan determines coverage. Each benefit plan defines which services are covered, which are excluded, and which are subject to dollar caps or other limits. Members and their providers will need to consult the member's benefit plan to determine if there are any exclusion(s) or other benefit limitations applicable to this service or supply. If there is a discrepancy between this policy and a member's plan of benefits, the benefits plan will govern. In addition, coverage may be mandated by applicable legal requirements of a State, the Federal government or CMS for Medicare and Medicaid members. CMS's Coverage Database can be found on the CMS website. The coverage directive(s) and criteria from an existing National Coverage Determination (NCD) or Local Coverage Determination (LCD) will supersede the contents of this Molina Clinical Policy (MCP) document and provide the directive for all Medicare members.

RECOMMENDATION

Monarch Trigeminal Nerve Stimulation (eTNS) System is considered experimental, investigational or unproven for attention deficit hyperactivity disorder (ADHD) or for any indication.

Current evidence supporting the use of external trigeminal nerve stimulation (eTNS) for the treatment of ADHD is limited by the lack of high-quality randomized trials, small sample sizes, short-term duration, and the absence of comparative efficacy and safety of pharmacological and non-pharmacological treatments in head-to-head trials. The safety and effectiveness eTNS therapy beyond 4 weeks have not been evaluated. Studies on long-term effects and potential harms are needed, including adverse tissue reaction from electrical stimulation, nerve damage, or other implications from device failure or misuse. There is insufficient evidence to determine the impact of this technology on health outcomes.

DESCRIPTION OF PROCEDURE/SERVICE/PHARMACEUTICAL

Attention deficit hyperactivity disorder (ADHD) is a developmental condition of inattention and distractibility, with or without accompanying hyperactivity. ADHD is defined in the Diagnostic and Statistical Manual, Fifth Edition (DSM-5) of the American Psychiatric Association as 3 basic forms: inattentive; hyperactive-impulsive; and combined. Treatment options for ADHD include pharmacological, non-pharmacological or multiple treatment methods. Non-pharmacological treatments for ADHD may involve behavioural, psychological, social, educational and lifestyle interventions. ADHD is one of the most commonly diagnosed psychiatric disorders in

children and adolescent and is estimated to affect 9.5% of school-age children in the United States, or about 6.1 million American children between the ages of 2 and 17 (Journal of Clinical Child and Adolescent Psychology, 2018). In the past year, about two-thirds of people with ADHD are currently receiving medication, less than half have received behavioral therapy for ADHD, and nearly one-quarter (23.0%) have not received treatment. Nonpharmacological treatment with minimal side-effects offer an alternative to ADHD patients who do not respond to, or have experienced undesirable side effects to pharmacologic therapy.

According to the FDA, the Monarch external Trigeminal Nerve Stimulation (eTNS) is a non-invasive device that uses electrical signals to therapeutically stimulate the largest cranial nerve, the Trigeminal nerve. Although the exact mechanism of eTNS is still unclear, neuroimaging studies have shown that eTNS enhances activity in brain regions known to be important for regulating attention, mood, and behavior. The device consists of two primary components: the external pulse generator and the external (cutaneous) electrical patches, which are single use disposable patches worn on the forehead (FDA, 2019). The small stimulator, powered by a 9-volt battery, is worn on the clothes during sleep and removed in the morning. The stimulator device emits a low-level current through thin wires connected to an adhesive electrode patch that is worn across the forehead delivering the low-level electrical stimulation to the branches of the trigeminal nerve sending therapeutic signals to the parts of the brain thought to be involved in ADHD. The stimulation, described as mild to the skin and barely perceptible to the child, leads to activation of deeper brain areas associated with concentration and impulse control. It has been suggested that treatment takes at least one month to deliver a noticeable effect and caregivers should consult their providers to reassess the treatment after this period (FDA, 2019).

Regulatory Status

The FDA granted marketing approval of the Monarch external Trigeminal Nerve Stimulation (eTNS) System for Attention Deficit Hyperactivity Disorder (ADHD) based primarily on results of a small, 4-week study that found active eTNS significantly more effective than sham eTNS for improving ADHD symptoms (FDA, 2019). This study represents the best available published evidence to date on eTNS for ADHD (McGough et al., 2019). Larger and longer randomized sham-controlled studies are needed to confirm these results.

The FDA issued marketing authorization on April 19, 2019 for the Monarch eTNS system through its "de novo" premarket review pathway, which is used for new low- to moderate-risk devices with no existing market equivalent. Monarch eTNS System and substantially equivalent devices of this generic type are classified into **Class II** with **product code QGL** and the generic name **transcutaneous electrical nerve stimulator for ADHD,** a device that stimulates transcutaneously or percutaneously through electrodes placed on the forehead. The Monarch eTNS system, a prescription-only device, is indicated for treatment of pediatric ADHD as a monotherapy in patients ages 7 through 12 years old who are not currently taking prescription ADHD medications. The device is intended for use in the home under the supervision of a caregiver during periods of sleep.

Limitations

The device is contraindicated for use with:

- Implanted cardiac and/or neurostimulation systems
- Implanted metallic or electronic device in their head

Currently, no other eTNS systems have received FDA approval for the treatment of ADHD.

SUMMARY OF MEDICAL EVIDENCE

Evidence for the effectiveness of an external Trigeminal Nerve Stimulation (eTNS) device for ADHD is limited to one small (n=62) 5-week clinical trial of 62 patients randomized to receive active or sham TNS nightly (McGough et al., 2019). The patients were medication-free for at least 1 month prior to the trial and remained medication-free throughout the trial. The primary efficacy outcome measure was the clinician-completed ADHD-RS total score completed at baseline and over subsequent weeks. The group using eTNS device had a statistically significant improvement in ADHD symptoms versus the placebo group. At the end of week four, the average ADHD-RS score in eTNS decreased from 34.1 to 23.4 points, versus decrease from 33.7 to 27.5 points in placebo. Compared with the placebo group, children who used the eTNS device showed statistically significant improvements in ADHD symptoms, with average ADHD-RS scores dropping about 31%. An average decrease of about 18% was seen in children in the placebo group. Slightly over half of participants in the intervention group showed improvement that was clinically meaningful, defined as a score of "much improved" or "very much improved" on the CGI Improvement scale. No serious adverse events in either treatment group or withdrawal from the study due to adverse events were reported. The most common side effects with eTNS were drowsiness, an increase in appetite, trouble sleeping, teeth clenching, headache and fatigue. The authors concluded that TNS efficacy for ADHD was shown in this blinded sham-controlled trial; however, additional research is recommended to assess treatment response durability and potential impact on brain development with sustained use.

McGough et al. (2015) conducted the first study using TNS in children and adolescents in an 8-week open trial examining the potential feasibility and utility of eTNS for ADHD in a small group of 24 participants ages 7 to 14 years. TNS was well-tolerated with no clinically meaningful adverse events. Subjective improvements on rating scales and laboratory measures of cognition suggest that TNS therapy for youth with ADHD appears to be both feasible and without significant risk. It was concluded that future research in anticipation of designing definitive controlled efficacy trials should evaluate time to onset of TNS response and durability of treatment effects following TNS discontinuation, as well as validate an effective active sham comparator suitable for blinded studies.

In a recent UpToDate review, TNS is not recommended as a treatment option for ADHD due to the limited clinical experience and the need for additional studies to confirm efficacy and safety. (Krull, 2019).

American Academy of Pediatrics (AAP)

AAP practice guidelines for the diagnosis, evaluation, and treatment of ADHD in children and adolescents updated in October 2019 stated: '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.' The guidelines mentioned 'mindfulness, cognitive training, diet modification, EEG biofeedback, and supportive counseling.' However, more specifically, the guidelines did not recommend external trigeminal nerve stimulation (eTNS) as a treatment of ADHD noting that although eTNS is FDA approved, it was not able recommend it use 'without considerably more extensive study on its efficacy and safety' since the efficacy of the eTNS was based on one 5-week randomized controlled trial with only 30 participants (McGough JJ, et al. 2019) and thus far 'there is no long-term safety and efficacy evidence for eTNS.' The guidelines concluded: 'Overall, the current evidence supporting treatment of ADHD with eTNS is sparse and in no way approaches the robust strength of evidence documented

for established medication and behavioral treatments for ADHD; therefore, it cannot be recommended as a treatment of ADHD without considerably more extensive study on its efficacy and safety.'

National Institute for Health and Care Excellence (NICE)

NICE's guidelines on the diagnosis and management of attention deficit hyperactivity disorder (ADHD) in children, young adults, and adults were released in March 2018, and the latest update was in September 2019. The guidelines include recommendations for pharmacotherapy and non-pharmacological treatment, but do not cover external trigeminal nerve stimulation (eTNS).

DEFINITIONS

N/A

CODING INFORMATION

THE CODES LISTED IN THIS POLICY ARE FOR REFERENCE PURPOSES ONLY. LISTING OF A SERVICE OR DEVICE CODE IN THIS POLICY DOES NOT IMPLY THAT THE SERVICE DESCRIBED BY THIS CODE IS COVERED OR NON-COVERED. COVERAGE IS DETERMINED BY THE BENEFIT DOCUMENT. THIS LIST OF CODES MAY NOT BE ALL INCLUSIVE.

CPT	Description

HCPCS	Description
	External trigeminal nerve stimulation for the treatment of ADHD--No Specific code

ICD-10	Description: [For dates of service on or after 10/01/2015]

REFERENCES

FDA

- FDA News Release. FDA permits marketing of first medical device for treatment of ADHD. April 19, 2019. Available at: FDA. Accessed on November 2020**.**
- FDA. De Novo classification request for Monarch eTNS System: decision summary. Available at: https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/denovo.cfm?ID=DEN180041

Peer Reviewed Publications

Danielson, ML, Bitsko, RH. Ghandour, R. et al.Prevalence of Parent-Reported ADHD Diagnosis and Associated Treatment among U.S. Children and Adolescents, 2016. Journal of Clinical Child and Adolescent Psychology. Published online before print January 24, 2018. [Link]

McGough JJ, Loo SK, Sturm A, et al. An eight-week, open-trial, pilot feasibility study of trigeminal nerve stimulation in youth with attention-deficit/hyperactivity disorder. Brain Stimul. 2015;8(2):299-304. McGough et al. (2015) Study

McGough JJ, Sturm A, Cowen J, et al. Double-blind, sham-controlled, pilot study of trigeminal nerve stimulation for attention-deficit/hyperactivity disorder. J Am Acad Child Adolesc Psychiatry. 2019;58(4):403–411.e3. Available at: McGough et al. (2019) https://www.sciencedirect.com/science/article/abs/pii/S0890856719300450

- http://clinicaltrials.gov/; NCT02155608.

Moffitt TE, Houts R, Asherson P, Belsky DW, Corcoran DL, Hammerle M, et al. Is Adult ADHD a Childhood-Onset Neurodevelopmental Disorder? Evidence From a Four-Decade Longitudinal Cohort Study. *Am J Psychiatry*. 2015 May 22. appiajp201514101266.

Professional Society Guidelines and Other Publications

American Academy of Pediatrics

- Wolraich ML, Hagan JF, Allan C, et al. Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. Pediatrics October 2019, 144 (4) e20192528; DOI: https://doi.org/10.1542/peds.2019-2528
- Wolraich ML, Hagan JF, Allan C, et al. Subcommittee on Children and Adolescents with Attention-Deficit/Hyperactive Disorder. Clinical Practice Guideline for the Diagnosis, Evaluation, and Treatment of Attention-Deficit/Hyperactivity Disorder in Children and Adolescents. Pediatrics. Pediatrics March 2020, 145 (3) e20193997; DOI: https://doi.org/10.1542/peds.2019-3997 https://pediatrics.aappublications.org/content/145/3/e20193997

NICE guideline [NG87]. Attention Deficit Hyperactivity Disorder: Diagnosis and Management. Published date: 14 March 2018 Last updated: 13 September 2019. Available at: https://www.nice.org.uk/guidance/ng87/resources

UpToDate [website]: Waltham, MA: Wolters Kluwer Health; 2020.
Krull, KR. Augustyn, M (ed). Attention deficit hyperactivity disorder in children and adolescents: Overview of treatment and prognosis. Topic last updated: Oct 10, 2019. Topic 623 Version 61.0

Hayes [website]: Emerging Technology Report. Monarch eTNS for Attention-Deficit/Hyperactivity Disorder. Dec 17, 2019.

Revision/Review History:

12/9/2020: New Policy. Peer Review: Policy reviewed by AMR practicing physician board-certified in Psychiatry, Psychiatry Child & Adolescent. Date: 11/23/2020