

Subject: Ambulatory Electroencephalographic (EEG) and Video EEG Monitoring in the Out-Patient Setting for Adults and Children		Original Effective Date: 4/24/2013
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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.¹

Electroencephalography (EEG) is the recording of the brain's spontaneous electrical activity over a short period of time, usually 20–40 minutes, as recorded from multiple electrodes placed on the scalp. At times, a routine EEG is not sufficient, particularly when it is necessary to record an individual while they are having a seizure.

Ambulatory electroencephalography (AEEG) monitoring allows prolonged electroencephalographic (EEG) recording in the home setting, with a device slightly larger than a portable cassette player that continuously records brain wave patterns during 24 hours of a patient's routine daily activities and sleep. The device has the ability to record continuously for up to 72 hours increasing the chance of recording a seizure (i.e. ictal event, or the time between seizures, known as the interictal period). The interictal period is often used by neurologists when diagnosing epilepsy since an EEG trace will often show small interictal spiking and other abnormalities known by neurologists as subclinical seizures. The monitoring equipment consists of an electrode set, preamplifiers, and a cassette recorder. The electrodes attach to the scalp, and their leads are connected to a recorder, usually worn on a belt.

Video electroencephalography (VEEG) monitoring is the synchronous recording and display of EEG patterns and video-recorded clinical behavior. Short recordings of several hours can be performed as an outpatient in an EEG laboratory, while longer recordings of 24 hours or more are generally done in a hospital inpatient setting. Since seizure medicine is often reduced or stopped in order to provoke a seizure, the hospital setting is preferable so as to ensure the safety of the patient undergoing the seizure. The average hospital stay in the VEEG monitoring unit ranges from 3 to 4 days. VEEG) monitoring is conducted for two main reasons: (1) for diagnostic monitoring when it is not clear from the clinical evaluation and routine EEG whether the patient has epileptic seizures or non-epileptic (psychiatric) events; and (2) for identifying the area of the brain from which seizures arise, especially for patients whose seizures are not controlled with antiepileptic medications and for whom surgery for epilepsy is being considered.

A prolonged 24-hour ambulatory EEG also known as long-term VEEG monitoring in the outpatient/home setting may be used to differentiate between the presence of epileptic, non-epileptic or psychogenic seizure disorders. Documenting electrical seizure activity accompanied by physical manifestations aids in the diagnosis and treatment of seizure disorders. Occasionally EEGs are offered to patients in their home. These ambulatory EEGs allow for long-term monitoring in the natural home environment and may be more conducive to seizure occurrence. A major disadvantage to routine ambulatory EEG is that it is difficult to differentiate between recording artifact and true epileptic activity in the absence of visual observation, thus there may not be valid synchronous documentation of the physical activity that accompanies any electrical seizure. Adding a home video component to the ambulatory EEG is proposed as a solution to meet these questions.

POSITION STATEMENT CRITERIA ^{1 3-9 10-31 32-38 39-41}

1. **Outpatient ambulatory encephalography (EEG) monitoring** may be considered medically necessary for up to 48 hours when all of the following criteria are met: [ALL]
 - Routine EEG, history and physical exam are inconclusive or non-diagnostic; and
 - Non-neurological causes of symptoms (e.g., syncope, cardiac arrhythmias) have been ruled out; and
 - Used to diagnose the following suspected conditions: [ONE]
 - Seizures or seizure like activity occurring ≥ 3 times per week;
 - To differentiate epileptic from non-epileptic events (i.e. a pseudo-seizure such as a psychogenic non-epileptic event, syncope or other);
 - To characterize the frequency or location of seizures in a nonclinical setting;
 - To document epilepsy response to treatment or to medication adjustment

2. **Out-patient video encephalography (EEG) monitoring** may be considered medically necessary when all of the following criteria are met: [ALL]
- Used to diagnose the following suspected conditions: [ONE]
 - Know seizure disorder: [ALL]
 - recurrent refractory seizures despite treatment with ≥ 2 anticonvulsant medications; and
 - no current seizure provoking medications
 - Suspected non-epileptic seizure: [ALL]
 - recurrent symptoms not classic for seizures; and
 - history or lab results are non-diagnostic for seizure etiology; and
 - routine EEG non-specific; and
 - No sudden cessation of heavy alcohol use within 48 hours of seizure activity; and
 - No intoxication due to abuse of drugs within 48 hours of seizure activity
 - Prior to epilepsy surgery or intracranial electrode implantation and surgery to localize the seizure focus in members with documented medically refractory seizures.
 - In the home setting when used to differentiate between the presence of epileptic, non-epileptic or psychogenic seizure disorders when standard EEG and clinical assessment are non-diagnostic. ^{4 39}
 - If Anticonvulsant medication withdrawal is deemed unsafe in the outpatient setting (documentation is required), and ALL criteria above are met, then *inpatient video encephalography* (EEG) monitoring may be authorized; and
 - Out-patient Video EEG length of stay is 23-72 hour observation and if the event being monitored does not occur in this time frame, then *inpatient video encephalography* (EEG) monitoring may be authorized

***NOTE: For inpatient video encephalography (EEG) monitoring please use appropriate criteria for inpatient reviews that may include but is not limited to McKesson InterQual and/or MCG.**

CONTINUATION OF THERAPY ³⁹⁻⁴¹

- Outpatient ambulatory EEG may be used for 48 hours.
- Out-patient Video EEG length of stay is 23-72 hour observation but if the event being monitored does not occur in this time frame admission may be necessary for further monitoring or for preoperative localization of seizure foci.
- Once the cause of seizures and specific type of epilepsy has been established, continued video EEG monitoring is considered not medically necessary.

LIMITATIONS

N/A

SUMMARY OF MEDICAL EVIDENCE ¹⁰⁻³⁸

Ambulatory EEG Monitoring: ^{13 15 17 31}

The majority of the body of evidence published in the peer reviewed literature consists of retrospective and prospective cohort studies, retrospective studies and, retrospective reviews. The available literature shows the use of ambulatory EEG (AEEG) for diagnosis of epilepsy. Several studies focused on pediatric populations and/or video monitoring in addition to, or compared with, ambulatory EEG. Sample size ranged from 60 to >300 and included both children and adults. Follow up ranged from 1-3 years. The primary reasons for the AEEGs were to differentiate between seizures and non-epileptic events; to determine the frequency of seizures and epileptiform discharges; to characterize seizure type or localization; and to potentially diagnose epilepsy. Overall the majority of studies changed the diagnosis and refined the diagnosis by

classifying the epilepsy into focal or generalized and confirmed the diagnostic utility of outpatient ambulatory EEG in the diagnosis of paroxysmal events.

Video EEG Monitoring: ^{10-12 14 16 18-30}

The majority of the body of evidence published in the peer reviewed literature consists of retrospective and prospective cohort studies, retrospective studies and, retrospective reviews. Sample size ranged from 29 to >400 and mean age ranged from 35 to 52 years. Indications for referral included seizures requiring diagnostic clarification and presurgical evaluation. The duration of seizures across a lifetime was noted in 3 studies, with median/mean values of approximately 15 years with wide ranges. One study included patients that had a new-onset seizure. The studies reported that VEEG altered the diagnosis for some patients. The studies reported changes in antiepileptic drugs (AEDs) as a result of VEEG. The available evidence shows that video electroencephalogram (VEEG) monitoring can provide valuable information to guide the diagnosis and treatment of patients who report seizures, when a standard electroencephalogram (EEG) has not provided a clear diagnosis and in patients with refractory epilepsy. Studies have shown that VEEG changed the diagnosis from epileptic seizures to psychogenic non-epileptic seizures (PNES), and the vice versa. In addition, some of the studies reported elimination or reductions in medication after diagnostic changes.

Home Setting Video EEG ³²⁻³⁸

Primiani et al.; (2020) evaluated the yield of ambulatory EEG-video for the diagnosis of epilepsy. A retrospective review of the ambulatory EEG-video monitoring data from 200 consecutive and unselected patients aged 12 years and older was performed by a single company (RSC Diagnostic Services) between January 2018 and May 2018. Studies were processed by two senior certified long-term monitoring EEG technologists and interpreted by neurologists. The results showed that of the 200 patients, 130 (65%) were women, mean age was 45 years. Mean duration of studies were 76.6 hours (range 23-175 hours). There were 110 studies (55%) with events recorded and 101 (92%) were captured on video. Epileptic events accounted for 17.8% (18/101) of the events captured and 9% (18/200) of our total cohort. Nonepileptic diagnosis accounted for 38% of the total number of patients in study (76/200). The authors concluded that “ambulatory EEG-video monitoring may be a useful alternative to inpatient epilepsy monitoring unit, particularly with high clinical suspicion for nonepileptic events.” ³⁶

Carlson et al.; (2018) performed a prospective study that compared home video telemetry (HVT) to inpatient video telemetry (IVT) in 62 children. Study participants were ages 1-17 years, had video telemetry duration of 24-72 hours and were excluded if they had undergone anti-epileptic drug withdrawal. There were 29 children in the inpatient video telemetry group and 33 children in the home video group. During the inpatient video telemetry, 62% of studies captured ictal events compared to 64% of studies captured ictal events during the home video telemetry recordings. Equipment difficulties were reported in 51% of the studies and included issues regarding camera placement and activation of the infrared camera capability, which resulted in a loss of diagnostic video information in 15% of the home video telemetry studies. The authors concluded that “the diagnostic efficacy and study quality of HVT and IVT are similar in pediatric patients.” Limitations include the lack of randomization of study participants and equipment difficulties. ³²

Brunnhuber et al.; (2014) conducted a single center study of 34 participants to describe the development and implementation of video EEG telemetry (VT) in the patient's home. The feasibility study found no difference in the quality of recording or clinical yield between inpatient IVT and home VT. The pre-implementation study showed excellent patient satisfaction. The authors concluded that “findings show that diagnostic home video telemetry for seizure classification and polysomnographies can be carried out safely in the patients' home and poses no security risks for staff. HVT can be effectively integrated into an existing tertiary care service as a routine home or community-based procedure.”

PROFESSIONAL SOCIETY GUIDELINES ³⁻⁹

American Academy of Neurology, the Child Neurology Society, and the American Epilepsy Society ⁵ published guidelines in 2000 (reaffirmed in 2020) for the evaluation of non-febrile seizures in children. This guideline recommends EEG testing as part of the neurodiagnostic evaluation of a child with an apparent first unprovoked seizure.

American Academy of Neurology and the Practice Committee of the Child Neurology Society ⁵ published guidelines in 2006 (reaffirmed in 2019) for the diagnostic assessment of the child with status epilepticus (SE). This guideline has the following recommendations:

- An EEG may be considered in a child presenting with new onset SE as it may determine whether there are focal or generalized abnormalities that may influence diagnostic and treatment decisions.
- Although non-convulsive status epilepticus (NCSE) occurs in children who present with SE, there are insufficient data to support or refute recommendations regarding whether an EEG should be obtained to establish this diagnosis.
- An EEG may be considered in a child presenting with SE if the diagnosis of pseudo status epilepticus is suspected.

National Institute for Health and Clinical Excellence (NICE) published guidelines (updated 2020) called “The epilepsies: the diagnosis and management of the epilepsies in adults and children in primary and secondary care.” According to these guidelines “Long-term video or ambulatory EEG may be used in the assessment of children, young people and adults who present diagnostic difficulties after clinical assessment and standard EEG.” ⁴

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
95700	Electroencephalogram (EEG) continuous recording, with video when performed, setup, patient education, and takedown when performed, administered in person by EEG technologist, minimum of 8 channels
95705	Electroencephalogram (EEG), without video, review of data, technical description by EEG technologist, 2-12 hours; unmonitored
95706	Electroencephalogram (EEG), without video, review of data, technical description by EEG technologist, 2-12 hours; with intermittent monitoring and maintenance
95707	Electroencephalogram (EEG), without video, review of data, technical description by EEG technologist, 2-12 hours; with continuous, real-time monitoring and maintenance
95708	Electroencephalogram (EEG), without video, review of data, technical description by EEG technologist, each increment of 12-26 hours; unmonitored
95709	Electroencephalogram (EEG), without video, review of data, technical description by EEG technologist, each increment of 12-26 hours; with intermittent monitoring and maintenance
95710	Electroencephalogram (EEG), without video, review of data, technical description by EEG technologist, each increment of 12-26 hours; with continuous, real-time monitoring and maintenance
95711	Electroencephalogram with video (VEEG), review of data, technical description by EEG technologist, 2-12 hours; unmonitored
95712	Electroencephalogram with video (VEEG), review of data, technical description by EEG technologist, 2-12 hours; with intermittent monitoring and maintenance
95713	Electroencephalogram with video (VEEG), review of data, technical description by EEG technologist, 2-12 hours; with continuous, real-time monitoring and maintenance

95714	Electroencephalogram with video (VEEG), review of data, technical description by EEG technologist, each increment of 12-26 hours; unmonitored
95715	Electroencephalogram with video (VEEG), review of data, technical description by EEG technologist, each increment of 12-26 hours; with intermittent monitoring and maintenance
95716	Electroencephalogram with video (VEEG), review of data, technical description by EEG technologist, each increment of 12-26 hours; with continuous, real-time monitoring and maintenance
95717	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, interpretation and report, 2-12 hours of EEG recording; without video
95718	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, interpretation and report, 2-12 hours of EEG recording; with video (VEEG)
95719	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, each increment of greater than 12 hours, up to 26 hours of EEG recording, interpretation and report after each 24-hour period; without video
95720	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, each increment of greater than 12 hours, up to 26 hours of EEG recording, interpretation and report after each 24-hour period; with video (VEEG)
95721	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, interpretation, and summary report, complete study; greater than 36 hours, up to 60 hours of EEG recording, without video
95722	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, interpretation, and summary report, complete study; greater than 36 hours, up to 60 hours of EEG recording, with video (VEEG)
95723	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, interpretation, and summary report, complete study; greater than 60 hours, up to 84 hours of EEG recording, without video
95724	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, interpretation, and summary report, complete study; greater than 60 hours, up to 84 hours of EEG recording, with video (VEEG)
95725	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, interpretation, and summary report, complete study; greater than 84 hours of EEG recording, without video
95726	Electroencephalogram (EEG), continuous recording, physician or other qualified health care professional review of recorded events, analysis of spike and seizure detection, interpretation, and summary report, complete study; greater than 84 hours of EEG recording, with video (VEEG)

HCPCS	Description
N/A	N/A

ICD-10	Description: [For dates of service on or after 10/01/2015]
G40.101	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, not intractable, with status epilepticus

G40.109	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, not intractable, without status epilepticus
G40.111	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable, with status epilepticus
G40.119	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with simple partial seizures, intractable, without status epilepticus
G40.201	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, with status epilepticus
G40.209	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, not intractable, without status epilepticus
G40.211	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, with status epilepticus
G40.219	Localization-related (focal) (partial) symptomatic epilepsy and epileptic syndromes with complex partial seizures, intractable, without status epilepticus
G40.309	Generalized idiopathic epilepsy and epileptic syndromes, not intractable, without status epilepticus
G40.311	Generalized idiopathic epilepsy and epileptic syndromes, intractable, with status epilepticus
G40.401	Other generalized epilepsy and epileptic syndromes, not intractable, with status epilepticus
G40.409	Other generalized epilepsy and epileptic syndromes, not intractable, without status epilepticus
G40.411	Other generalized epilepsy and epileptic syndromes, intractable, with status epilepticus
G40.419	Other generalized epilepsy and epileptic syndromes, intractable, without status epilepticus
G40.901	Epilepsy, unspecified, not intractable, with status epilepticus
G40.909	Epilepsy, unspecified, not intractable, with status epilepticus
R56.9	Unspecified convulsions

RESOURCE REFERENCES

Government Agency

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 - Authors:Jeremy Moeller, MDHiba Arif Haider, MDLawrence J Hirsch, MDSection Editor:Paul Garcia, MDDeputy Editor:John F Dashe, MD, PhD
 - Video and ambulatory EEG monitoring in the diagnosis of seizures and epilepsy. Authors:Lawrence J Hirsch, MDHiba Arif Haider, MDJeremy Moeller, MDSection Editor:Paul Garcia, MDDeputy Editor:April F Eichler, MD, MPH Jul 03, 2017.
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 - Dash D, Hernandez-Ronquillo L, Moien-Afshari F, Tellez-Zenteno JF. Ambulatory EEG: a cost-effective alternative to inpatient vEEG in adult patients. *Epileptic Disord* 2012;14(3):290-7. PMID 22963900

REVISION/REVIEW HISTORY

3/1/16: This policy was reviewed and the criteria for ambulatory and video EEG was updated. Routine EEG, history and physical exam, and outpatient sleep study with EEG monitoring are inconclusive or non-diagnostic was included under ambulatory EEG criteria and MRI criteria for video EEG changed to only be required in cases of a suspected non-epileptic seizure when history and lab results are either normal or non-diagnostic for etiology of symptoms or findings. MRI is not required prior to epilepsy surgery or in a case of known seizure disorder.

5/3/16: The only revision was that the following sentence was added into the exclusion section of the policy: Out-patient video encephalography (EEG) monitoring is considered NOT medically necessary in the home setting and is excluded due to insufficient evidence in the peer reviewed published literature.

9/19/16: Changed video EEG criteria to require treatment with > 2 anticonvulsant medications instead of requiring therapeutic levels of > anticonvulsant medications and changed Out-patient Video EEG length of stay to up to 72 hour observation instead of 48 hours.

6/22/17: Policy reviewed, clinical criteria has not changed.

3/8/18: Policy reviewed, clinical criteria has not changed.

7/10/18: Policy reviewed and clinical criteria has changed according to AMR review: Under Ambulatory EEG criteria removed the criteria for outpatient sleep study with EEG monitoring and defined a non-epileptic events to include the following language: (i.e. a pseudo-seizure such as a psychogenic non-epileptic event, syncope or other).

9/18/19, 9/16/20: Policy reviewed, clinical criteria has not changed. Updated references.

2/8/2021: Policy reviewed, criteria changed to allow video EEG as medically necessary in the home setting based upon new published peer reviewed evidence and guidelines. Updated guidelines and references.