

Medical Policy: Non-Invasive Electroencephalogram (EEG) Commercial



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Background

A noninvasive Electroencephalogram (EEG) records electrical activity of the brain via scalp electrodes. An EEG can be used to confirm a diagnosis of epilepsy and classify it as partial (focal) or generalized. The EEG is also helpful in the evaluation and management of coma and impaired cognitive states. A normal EEG does not necessarily exclude the diagnosis of epilepsy, and an abnormal EEG may be unrelated to the patient's clinical presentation.

Guideline

Noninvasive (scalp) EEG may be indicated for **1 or more** of the following:

- Brain death determination
- Change in neurologic status (eg, altered mental status, confusional state, delirium, encephalopathy, impaired cognition)
- Comatose patient after cardiac resuscitation

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- Differentiation of epileptic from nonepileptic events¹
- Epilepsy, known, and need for repeat evaluation, as indicated by **1 or more** of the following:
 - Change in clinical status (eg, new symptoms)
 - Focal epilepsy, and need to characterize location of seizure
 - Withdrawal of anticonvulsant medication under consideration
- Epilepsy, suspected, and need for repeat evaluation after nondiagnostic initial EEG but persistent high clinical suspicion
- Epilepsy or nonfebrile infantile spasms (ie, West syndrome), suspected new onset
- Intracranial infection, suspected, as indicated by 1 or more of the following:
 - Bovine spongiform encephalopathy
 - Creutzfeldt-Jakob disease
 - Herpes simplex encephalitis
 - Subacute sclerosing panencephalitis
- Persistent vegetative state or other disorder of consciousness
- Seizures associated with abnormal mental status or focal neurologic deficit
- Syncope with atypical features, as indicated by 1 or more of the following:
 - Automatisms (eg, chewing, lip smacking)
 - Blue face during episode
 - Clonic movements, one-sided
 - Confusion after episode, prolonged
 - Tongue biting during episode
 - Tonic-clonic movements that were prolonged and began at same time as loss of consciousness

¹Epilepsy is defined by any of the following: At least 2 unprovoked or reflex seizures occurring greater than 24 hours apart; one unprovoked or reflex seizure and a 60% or greater probability of further seizures occurring over the next 10 years; or diagnosis of an epilepsy syndrome.

Limitation/Exclusion

(See [Medical Necessity Guidelines: Experimental, Investigational or Unproven Services](#) or table below)

EEG is considered experimental, investigational or unproven for following (list not all-inclusive):

- Alzheimer disease
- Attention-deficit hyperactivity disorder (ADD/ADHD)
- Autism spectrum disorders
- Depression
- Febrile seizures in children
- Headache
- Posttraumatic Stress disorder (PTSD)
- Preterm infant neurodevelopmental prognostic evaluation

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| For Alzheimer disease, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. A literature review states that resting state EEG has variable accuracy in differentiating Alzheimer disease from mild cognitive impairment or normal healthy older patients, limiting its role as a stand-alone population screening tool. |
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For attention-deficit hyperactivity disorder, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. A systematic review found insufficient evidence to recommend EEG-based tests for the diagnosis of attention-deficit hyperactivity disorder due to limited studies that have variable and inconsistent findings. Review articles state that although some studies have shown a relationship between the EEG theta:beta ratio and attention-deficit hyperactivity disorder, other studies have questioned its use as a reliable diagnostic marker. Additional research is needed to better characterize any potential diagnostic utility of the theta:beta ratio. A specialty society practice guideline states that the EEG theta:beta ratio has an unacceptably high false-positive rate compared with clinical evaluation and should not be used for the diagnosis of attention-deficit hyperactivity disorder.

For autism spectrum disorders, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. Review articles state that although several studies have utilized EEG wave patterns to differentiate patients with autism spectrum disorders from normal controls, these measures have not been validated as being sensitive or specific for the diagnosis of autism.

For depression, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. A review article states that although resting state EEG holds promise as a means of predicting and optimizing antidepressant treatment outcomes, its specificity in predicting response to a particular intervention remains uncertain. Another review article notes that although the use of EEG parameters as a biomarker appears intriguing, randomized controlled trials are required to compare outcomes for EEG-guided and therapist-guided treatment decisions.

For febrile seizures in children, evidence demonstrates a lack of net benefit; additional research is recommended. An evidence-based review states that EEG is of limited value in the evaluation of febrile seizures; although abnormalities may be present on EEG, their clinical significance is unclear in terms of predicting febrile seizure recurrence or the development of epilepsy. Practice guidelines and review articles have concluded that EEG is not recommended for simple febrile seizures in children with normal neurologic examinations. A systematic review found that there were no randomized controlled trials to support or refute the use of EEG and determine its optimal timing after complex febrile seizures in children.

For headache, evidence demonstrates a lack of net benefit; additional research is recommended. A national neurology specialty society recommends against the use of EEG in the evaluation of headaches, citing the lower sensitivity of electroencephalography in detecting structural lesions, as compared with CT scan or MRI, lack of demonstrable value in diagnosing migraine headaches, and the potential for discovery of incidental findings that would require performing unnecessary procedures and treatment. An evidence-based specialty society consensus guideline states that EEG is not considered to be useful in the investigation of headache.

For posttraumatic stress disorder, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. A systematic review of 34 studies evaluating the efficacy of EEG wave patterns for assessment of the severity of symptoms of posttraumatic stress disorder concluded that although their use seems promising, additional studies are necessary to confirm the findings.

For preterm infant neurodevelopmental prognostic evaluation, evidence is insufficient, conflicting, or poor and demonstrates an incomplete assessment of net benefit vs harm; additional research is recommended. A systematic review and meta-analysis of 13 studies (1181 preterm infants) evaluating the predictive accuracy of EEG background activity for neurodevelopmental outcomes 1 to 10 years after birth concluded that although EEG may have potential as a surrogate marker for neurodevelopmental outcomes, additional high-quality studies were recommended to confirm the findings.

Applicable Coding

To access the codes, please download the policy **to your computer, and click on the paperclip icon within the policy**



Applicable CPT and Diagnosis Codes

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**Medical Policy:
Non-Invasive Electroencephalogram (EEG)
Commercial**



10.1097/WNP.0000000000000035.

90. Specialty matched clinical peer review.

Revision history

| DATE | REVISION |
|------------|--|
| 05/08/2020 | New policy effective August 8, 2020 Connecticare has adopted the clinical criteria of its parent corporation, EmblemHealth. |