# Clinical Policy: Digital EEG Spike Analysis

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Coding Implications
Revision Log

**Description**
Electroencephalography (EEG) is a significant component of epilepsy diagnosis, along with a thorough medical history and neurological workup. Most EEGs today are performed on digital machines which record data and automatically detect spikes that may indicate seizures (ACNS, 2008). For the purpose of this policy, digital EEG spike analysis refers to additional analysis of digitally recorded EEG spikes by a physician and/or technician. Digital EEG spike analysis is also called 3D dipole localization or dipole source imaging.

**Policy/Criteria**

**I.** It is the policy of PA Health & Wellness that digital EEG spike analysis is **medically necessary** for members meeting the following criteria:
   A. Intractable epilepsy with a need for presurgical evaluation including topographic voltage and/or dipole analysis in conjunction with any of the following:
      1. Video EEG
      2. Quantitative EEG.

**II.** It is the policy of PA Health & Wellness that digital EEG spike analysis is **not medically necessary** for any other indication.

**Background**
According to the American Clinical Neurophysiology Society's (ACNS) Guidelines for Long Term Monitoring of Epilepsy, digital EEG is the industry standard (2008). Ambulatory EEG, video EEG, and routine EEG all use digital technology and usually incorporate automatic spike detection. A report by the American Academy of Neurology (AAN) and the ACNS states that multiple well-designed studies have established automatic spike and seizure detection via digital EEG as highly sensitive, though not very specific (1997, p. 280). This is also true of EEG in general. There are several reasons that an EEG would record a false positive, and most EEG patterns can be caused by a wide variety of neurologic conditions, while many diseases can produce more than one type of EEG pattern (Moeller, Haider & Hirsch, 2015). Nonetheless, the AAN recommends EEG with automatic seizure and spike detection in clinical practice, commenting that "general clinical use in the community has been very positive" (AAN & ACNS, 1997). Automatic spike detection can save a great amount of time as a technician or electroencephalographer does not have to visually review hours or days of data. However, there are some circumstances in which further analysis of the EEG is required, beyond the automatic digital spike analysis.

The ACNS states that in general, 3D dipole localization would require an extra hour of work by a technician, and 20-30 minutes of physician time to review the technician's work and data produced. Moreover, digital EEG analysis by 3D dipole localization is an advanced procedure that is most commonly used at epilepsy surgery centers, where staff are familiar with how to perform it. The AAN and ACNS recommend further digital analysis, in conjunction with review

by a technician or provider, in the noninvasive evaluation of candidates for epilepsy surgery (AAN & ACNS, 1997, p. 281). They note that:

> "The well-designed studies of this specific technique [dipole analysis] are few but consistent and confirmed in follow-up postoperatively. The clinical rationale seems clear. Control testing for evoked potential known cortical generator sites has confirmed the technical accuracy of dipole localization. The use of dipole analysis seems sufficiently demonstrated to warrant its clinical use in patients undergoing evaluation for surgical therapy for epilepsy. In other clinical settings, it has not been demonstrated to be sufficiently clinically useful to warrant general clinical use at this time" (AAN & ACNS, 1997, p. 280).

It is important to note that the ACNS specifically states that ambulatory EEG is not appropriate for "detailed characterization of EEG features as is required in presurgical evaluation" (ACNS, 2008, p. 15).

3D spike dipole source analysis, or digital EEG spike analysis, has been shown to be concordant with other modes of presurgical evaluation of epilepsy, including a thorough neurological workup with video EEG, magnetic resonance imaging (MRI), and multiple other imaging and neuropsychological tests; electrocorticography; and magnetoencephalography (Park et al., 2015). Furthermore, Park and others cite three other studies demonstrating "that dipole source models can be successfully employed to detect the epileptogenic foci of interictal epileptiform discharges" (2015). Park and others agree with the AAN and ACNS that digital EEG spike analysis is "recommended for the presurgical evaluation of intractable epilepsy patients (2015).

**Coding Implications**

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| CPT®* Codes | Procedure codes that support medical necessity criteria |
|---|---|
| **95957** | **Digital EEG spike analysis** when performed in conjunction with any of the following: |
| 95830 | Insertion by physician or other qualified health care professional of sphenoidal electrodes for electroencephalographic (EEG) recording |
| 95950 | Monitoring for identification and lateralization of cerebral seizure focus, electroencephalographic (eg, 8 channel EEG) recording and interpretation, each 24 hours |

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| CPT®* Codes | Procedure codes that support medical necessity criteria |
|---|---|
| 95951 | Monitoring for localization of cerebral seizure focus by cable or radio, 16 or more channel telemetry, combined electroencephalographic (EEG) and video recording and interpretation (eg, for presurgical localization), each 24 hours |
| 95953 | Monitoring for localization of cerebral seizure focus by computerized portable 16 or more channel EEG, electroencephalographic (EEG) recording and interpretation, each 24 hours, unattended |
| 95954 | Pharmacological or physical activation requiring physician or other qualified health care professional attendance during EEG recording of activation phase (eg, thiopental activation test) |
| 95955 | Electroencephalogram (EEG) during nonintracranial surgery (eg, carotid surgery) |
| 95956 | Monitoring for localization of cerebral seizure focus by cable or radio, 16 or more channel telemetry, electroencephalographic (EEG) recording and interpretation, each 24 hours, attended by a technologist or nurse |
| 95958 | Wada activation test for hemispheric function, including electroencephalographic (EEG) monitoring |

**ICD-10-CM Diagnosis Codes that Support Coverage Criteria**
+ indicates a code requiring an additional character

| ICD-10-CM Code | Diagnosis codes that support medical necessity criteria |
|---|---|
| G40.011 | Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, intractable, with status epilepticus |
| G40.019 | Localization-related (focal) (partial) idiopathic epilepsy and epileptic syndromes with seizures of localized onset, 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 |
| G40.211 | 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 |
| G40.311 | Generalized idiopathic epilepsy and epileptic syndromes, intractable, with status epilepticus |
| G40.319 | Generalized idiopathic epilepsy and epileptic syndromes, intractable, without status epilepticus |

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| ICD-10-CM Code | Diagnosis codes that support medical necessity criteria |
|---|---|
| G40.411 | Other generalized epilepsy and epileptic syndromes, intractable, with status epilepticus |
| G40.419 | Other generalized epilepsy and epileptic syndromes, intractable. without status epilepticus |
| G40.803 | Other epilepsy, intractable, with status epilepticus |
| G40.804 | Other epilepsy, intractable, without status epilepticus |
| G40.813 | Lennox-Gastaut syndrome, intractable, with status epilepticus |
| G40.814 | Lennox-Gastaut syndrome, intractable, without status epilepticus |
| G40.823 | Epileptic spasms, intractable, with status epilepticus |
| G40.824 | Epileptic spasms, intractable, without status epilepticus |
| G40.911 | Epilepsy, unspecified, intractable, with status epilepticus |
| G40.919 | Epilepsy, unspecified, intractable, without status epilepticus |
| G40.A11 | Absence epileptic syndrome, intractable, with status epilepticus |
| G40.A19 | Absence epileptic syndrome, intractable, without status epilepticus |
| G40.B11 | Juvenile myoclonic epilepsy, intractable, with status epilepticus |
| G40.B19 | Juvenile myoclonic epilepsy, intractable without status epilepticus |

| Reviews, Revisions, and Approvals | Date | Approval Date |
|---|---|---|
| Policy created. | 04/18 | 07/18 |

**References**


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