When does an EEG not add value for health care?

An EEG is not a precise test, it simply measures small electrical signals recorded from the surface of the brain, and the recording only indicates what is happening at the time of the test but may not reflect what is happening all of the time. The recording can appear abnormal, but this can be caused by artefact (for example interference from electrical devices, chewing/sucking, patting, or even from picking up the child's or nearby parents heart-beat or breathing). There is such a variation in the EEG findings in normal children that defining 'abnormal' is not always easy. Using the results of an EEG test can be harmful if the EEG test information is incorrectly interpreted, for example it can result in over-diagnosis of epilepsy (when a person does not have epilepsy), treatment with anti-seizure medications (when these are not required) or even just health anxiety over what the EEG findings mean. The most useful role of an EEG is when someone already has epilepsy, and then it helps give a clue to the underlying cause (for example an abnormality in one part of the brain on EEG can suggest an abnormality is a possibility in that area on a brain scan). An EEG test by itself cannot diagnose or exclude epilepsy, this is done on clinical assessment.

Here are circumstances where there is consensus by doctors around the world that an EEG does not help health care decisions:

1. When the event(s) themselves are unlikely to be epileptic seizures, in these situations diagnosis can be achieved using clinical assessment*. Examples include functional/non-epileptic seizures (NICE guideline 1.6.7), staring events (see *When Does a Staring Child Need an EEG?*), stereotypies, tics, benign neonatal sleep myoclonus, infant shuddering attacks, syncope (faints – including sub-types: breath-holding attacks / cyanotic breath-holding, hairgrooming syncope, reflex anoxic/toddler syncope; NICE guideline 1.6.6), and many other types of events that imitate seizures.
2. When the seizure is a febrile convulsions (including complex febrile convulsions), as it is known that an EEG does not provide diagnostic or prognostic value, differentiation from epilepsy is on clinical assessment, for which Neurology clinical opinion is available if required (Evolve, BMJ).
3. An EEG is not helpful in the evaluation of headache, vestibular conditions or vertigo.
4. For mental health disorders (behavioural disorders, aggression), developmental or learning disability or neurodevelopmental disorders (e.g. ASD, ADHD, ODD) in the absence of regression or discrete events consistent with seizures – an EEG can frequently be abnormal as an incidental finding in these disorders without inferring epilepsy is present, identifying whether there is epilepy (e.g. temporal lobe epilepsy) is done by clinical assessment*.
5. When there has been only one seizure/possible seizure – an EEG is usually performed after a second epileptic seizure, but is considered after a first seizure in certain circumstances under specialist review, where the findings on EEG would influence treatment decision or risk counselling (see NICE guideline 1.6.5).
6. An EEG is not helpful in most situations for guiding anti-seizure medication titration (up/down) or withdrawal, EEG abnormalities can persist through life after the epilepsy is resolved.
7. A standard EEG (awake or sleep) is not indicated for private driving licences, except if there is suspicion of incomplete current control of absence/myoclonic seizure types (when a standard EEG with hyperventilation/photic stimulation can be reassuring). Interictal abnormalities on EEG (such as generalized spike wave or photo-paroxysmal response) do not disqualify a person from driving.
8. An EEG cannot exclude a diagnosis of epilepsy - exclusion of epilepsy is on clinical assessment*.
9. An EEG is not always required if a patient has a known condition where seizures are expected, and these then emerge.

** **Clinical assessment** involves the assessment of the detail of the manifestations of the events, scrutinizing these for positive signs consistent with epileptic seizure or known imitators. Video of events can be crucial for correct diagnosis. Clincians can obtain support, if required, in the form of an clinical opinion from Neurology services.