7 Simple Steps to Assess & Document any Neonatal aEEG

Created for you by:

Your aEEG coach

www.aEEGcoach.com
Hi!

It’s Kathi Randall here – Your aEEG coach. I’m so excited to share this new e-work book with you.

Feel free to print the checklist on the next page and use as a guide the next time you are standing in front of your aEEG monitor or need to write up a summary of aEEG to include in your progress note.

If you’d like more details about each of the seven steps in my method for assessing neonatal aEEG, read on in this workbook or join me for a free upcoming live training.

To be registered for the next online course go to www.aEEGcoach.com

I promise after reading this or watching the video you will feel confident to assess any neonatal aEEG.

Enjoy,

Kathi Salley Randall, RNC MSN CNS NNP

Owner of www.aEEGcoach.com

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The 7 Step Checklist for Complete aEEG Review & Documentation

**STEP 1:** Describe the background *Story* or Infant History

_________________________________________________________

**STEP 2:** Evaluate the *Sensors* and *Signal* Quality

- How well are the sensors attached? ______________________________________________________
- How low are the Impedance values? ______________________________________________________

**STEP 3:** Classify the *Shape* of the aEEG Waveform using Pattern Descriptions or Voltage:

- Continuous Normal Voltage (Min > 5, Max > 10)
- Discontinuous Normal Voltage (Min < 5, Max > 10)
- Burst Suppression (Min < 5 with no variability, Max >10 with hi-voltage bursts)
- Continuous Low Voltage (Min < 5, Max < 10)
- Inactive (Min and Max < 5)

**STEP 4:** Identify *Sleep-Wake* Cycling on the aEEG (Describe as: Present, Absent, Regular, Interrupted)

_________________________________________________________

**STEP 5:** Evaluate the aEEG pattern for *Symmetry* (if more than 1 channel is available for comparison)

_________________________________________________________

**STEP 6:** Identify *Suspicious Areas* and examine EEG closely. Be sure to look for:

- Evidence of EEG Seizure Activity (spike-wave, repetitive patterns on the EEG)
- Marked Events on the tracing may contain valuable clinical notes (medications given, infant activity)
- Artifacts within the EEG signal (look for EKG, respiratory, movement, EMG)

**STEP 7:** Describe the *Stability* (or long term trend) of the aEEG pattern. Consider the last shift, hour, or day:

_________________________________________________________

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Consider the Infant’s Story

Before you assess the aEEG tracing itself, stop and think about why you have decided to put the monitor on this baby.

What information are you seeking

- Are you hoping to identify electrographic and sub-clinical seizures?
- Are you using the aEEG to manage anti-epileptic medication dosage?
- Are you screening the infant to determine if he/she is eligible for hypothermia treatment?
- Are you using the aEEG to trend the baby’s background brain activity over a few days to determine the severity of injury or watch the recovery of injury?

Consider the Infant’s Birth, Labor, and Prenatal history

Take the Physical & Neurological Exam in to account:

What is the condition of the scalp?
Is there evidence of trauma on the scalp?
Does the infant show evidence of encephalopathy?
Are there tone issues?
Sudden episodes of vital sign instability that make you think seizure?

Medications

Has the baby received any anti-convulsant medications?
When was the last dose of sedation and analgesics?
Is the baby chemically paralyzed?
What medications were given during delivery? Before admission? On transport?

Age

Gestational age and corrected age both impact EEG and aEEG waveforms.
At all costs, avoid high impedance values

**Before you go any further, do you have a quality tracing?**

If the aEEG recording you are about to assess has high impedance, *then stop here.* Only spend your time analyzing aEEG tracings that have acceptable impedance levels.

**Have you felt like this when you step up to your aEEG monitor??**

*Train everyone to read the impedance graphs.* Have you ever walked up to the aEEG monitor after several hours of monitoring and found that there is not even one minute of quality tracing to review?? To avoid this frustration, you must make sure that everyone on the team knows how to identify when the monitor impedance levels are increasing and when they must be addressed.

*The two most common causes of sensors not sticking* (and then getting high impedance levels) are ....

#1: Inadequate skin exfoliation before placing the sensors and
#2: Just too much hair!!
Rate the Shape & Voltage of the aEEG

The whole reason you decided to monitor a baby with your aEEG monitor is to determine if the tracing you see reflects normal or abnormal brain activity.

In order to know this, you must, assess the actual aEEG waveform that appears on your screen.

There are a few different approaches that you can take.

- By far the simplest way to assess the aEEG is using standard voltage definitions on the next page. To determine the aEEG voltage just trace the top and bottom margins of the aEEG using your eyes. This tells you the maximum and minimum voltage.
- The second option is to compare the shape of the pattern with standard patterns described in journal articles and books. There are only five basic shapes. (I’ve included four shapes below).
- Or you can use a combination of both the voltage and shape. (This is by far the most popular way in the literature today).

The most common aEEG patterns—Compare the shapes!

![Image of aEEG patterns]

After you have examined the shape and the voltage of the aEEG waveform, you will need to assign it a name.
Just like a judge at a sporting event, you will need to judge the aEEG’s form (the shape) and performance (the voltage).

Below, are the standard definitions used today to describe the most common Neonatal aEEG Patterns

(Using both shape and voltage which is now the most popular method):

- **Continuous Normal Voltage** – A narrow band with minimum voltage above 5 microvolts. Maximum voltage above 10.

- **Discontinuous Normal Voltage** – A moderately wide band. Minimum voltage below 5 microvolts, but variable. Maximum voltage above 10.

- **Burst Suppression** – An extremely wide band with maximum and minimum voltages both very low and very high, and without variability to the lower margin.

- **Continuous Low Voltage** – A narrow band with the maximum and minimum voltages below 10 microvolts (not shown below).

- **Inactive** – A very narrow band with all activity below 5 microvolts
While we can look at an infant and determine if they are asleep or awake, we know very little about the quality of their sleep by just looking at them.

Sleep-wake cycling can be seen on aEEG even in extremely premature infants (as young as 28-30 weeks). Sleep-wake cycling becomes more organized and well defined as the infant matures.

A mature sleep-wake pattern lasts for approximately 20-40 minutes (if not interrupted) and has a smooth entry and exit. (I’ll be showing examples of this during the live training on July 27 – be sure you are registered at www.aEEGcoach.com)

For infants with HIE, the presence and onset of sleep-wake patterns on aEEG during the first three days of life has been shown to be very highly predictive of long-term neurodevelopmental outcome.
Symmetry of the aEEG – The blessing & curse

Many new aEEG monitors give you the ability to apply more than one pair of sensors to the baby’s head (this is the curse – you have to actually apply more sensors to the baby). But, here is the blessing, the extra sensors allow you to compare the electrical signal from each hemisphere of the brain.

To assess for symmetry apply more than one pair of electrodes. You must apply one pair of sensors to each side of the baby’s head. Each electrode pair will collect and display one channel of EEG signal. Each channel of EEG will become its own separate aEEG waveform.

Assess each aEEG pattern separately. Evaluate the shape and voltage of each of the aEEG patterns (just like in STEP 3) and then compare them.

Are the patterns similar or different? If asymmetries are present, then the infant may have a unilateral or focal ischemic injury. You may also be able to see that seizures arise more from one hemisphere than the other.
Suspicious Areas on the aEEG
Is that a seizure?

Any suspicious areas along the aEEG should be examined more closely. Focus on the following three areas during your detailed review of any suspicious areas of aEEG.

EEG – Electrographic seizures have been defined as repetitive, spike-wave patterns which repeat for more than 10 seconds. The sample EEG recording on the right shows one channel of EEG with seizures and one channel without.

Marked Events – Review any marked/flagged events that have been documented on the monitor. Staff often provide vital clues that can explain changes seen in the aEEG.

Events that might be marked include:
- Hands-on care and suctioning
- Changes in vitals like apnea, bradycardia, desaturations,
- Clinical seizure movements,
- Crying and patting to console,
- Medications given
- Ventilator changes

Artifacts – Artifacts can obscure your raw EEG making it very difficult to see any true patterns. The sample EEG recording to the right show a “fuzzy” artifact throughout this tracing and caused a drastic shift in the aEEG baseline that looked like a seizure. Another common pitfall is that artifacts can cause a “drift” to the lower margin of the aEEG giving the impression that the infant’s minimum baseline activity is better than it is in reality. You must always be on the lookout for artifacts.

Artifacts may be caused by:
- movement
- EMG (muscle-nerve activity
- Ventilators pulsations, especially high frequency oscillating ventilators,
- EKG breaking through the EEG.

Remember, that the only way to know if a suspicious area on the aEEG is really being caused by a seizure is to open up the original EEG and check it out.
The power of the aEEG is in the long term trend

In order to see the trends emerge, you really should be looking at the aEEG every few hours: It is fascinating to observe changes in the aEEG trend from hour to hour, shift to shift, and day to day. Especially in combination with other changes in the infant’s clinical picture.

The first 6 hours: The aEEG has been shown to be very predictive of long term neurodevelopmental outcomes in infants who have experienced perinatal crisis and who demonstrate evidence of hypoxic-ischemic encephalopathy. (See E. Spitzmiller Meta-Analysis)

Keep the aEEG on for long periods of time: You will gain additional prognostic value by reviewing trends over long periods of time (I’m talking days, not just hours).

Improving aEEG is a good thing.
An aEEG trend that improves within the first 36 hours after a hypoxic event at birth is very reassuring. Also, there is strong positive predictive value for the timing of onset of sleep-wake cycling during this early time period (with or without therapeutic hypothermia). Remember, sleep wake cycling is much easier to discover using aEEG than traditional EEG recordings.

Worsening or no change in the aEEG is a bad thing.
Many infants with HIE at birth will display an abnormal aEEG. If the aEEG trend does not improve within the first three days after birth is worrisome and has been shown to be highly predictive of poor long term outcome in a number of studies. (To see more examples, join my next online training – go to: www.aEEGcoach.com)
Kathi was first introduced to aEEG in 2004 and was responsible for creating the first clinically-based education program for aEEG monitoring in North America. For nearly 5 years Kathi and her team of Clinical Educators conducted on-site education and training on neonatal aEEG monitoring with the primary goal of empowering staff to integrate aEEG monitoring into daily NICU practice.

Kathi is an international clinical educator known for programs which are tailored to those with varying levels of experience. Her passion extends beyond aEEG to all topics related to neonatal neurology, and is available for on-site lectures and consultations.

Kathi has been a neonatal nurse since 1994 and a board-certified NNP since 2006. She is a California native and resides in Southern California near her family. Kathi is an avid hiker, traveler and dog lover.

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