Review basic safety and infection control information, including:

- Use of patient identifiers.
  - Patient identifiers refer to ways the patient can be identified not the source of the information. Therefore, another person is not an acceptable identifier. Identifiers are unique to the patient, such as a birthdate, social security number, medical record identification number, or some other information unique to a particular patient. Use at least two patient identifiers – neither can be the patient’s room number.

- Infection control procedures such as preventing spread of infection by washing your hands before and after working with each individual patient.

Review documentation guidelines, including:

- Correcting an error in handwritten documentation by drawing a line through the error, initialing it and documenting the correct information.

Review considerations for testing patients who have particular conditions or in special circumstances such as,

- A child who has Down syndrome. Down syndrome children and those with sensory integration disorders may not tolerate the tactile interaction required for sensor placement. The very presence of the sensors may be overstimulating.
- A seizure study. Recommended high frequency filter setting is 70 – 75 Hz.
- An EEG in the operating room. Label the plug end of each electrode with the electrode name including the back-up leads. This is necessary because once the patient is draped for surgery it is not possible to access the patient’s head for electrode identification.

Review procedures for preparing patients for an EEG, such as:

- Asking the patient about medications he is taking. Many drugs produce EEG changes.
- Preparation for evoked potential (EP) testing. Educate the patient about the setup and monitoring process, including the stimuli he will experience. EP testing uses an EEG to measure the electrical activity of nerves or to determine areas of the brain, brain stem, or spinal cord serving an individual nerve. An EP measures the time it takes for a nerve impulse generated by a specific stimulus to reach the brain as determined by an EEG.
Review procedures for applying electrodes and sensors, including:

- Similarities and differences in testing children and adults. Distraction during application of electrodes is recommended for all age groups - reading material or TV is recommended for adults, for children a favorite DVD. Children are likely to want to play with the electrodes.

- Locating landmarks is the first step in the process.

- Giving instructions to patients to assist in locating landmarks, such as
  
  - When locating the inion, ask the patient to tilt his/her head all the way back, or forward, while you try to feel the ridge.
  
  - When locating the preauricular points, ask the patient to open and close his jaw.

- Locating Cz. Identify the point at which the 50% mark between the inion and the nasion intersects the 50% point between the preauricular points.

- Locating Fpz. Standing in front of the patient, draw a vertical line in the middle of the forehead, lining up with the bridge of the nose, and intersecting the line drawn 10% up from the nasion. This location is Fpz.

- Placing the patient grounding electrode. Typically placed in the middle of the forehead between the nasion and the start of the hairline. The exact location of the ground electrode is not critical. To ensure a good connection try to avoid areas with deep creases or wrinkles. A flat area just below the hairline works well for this application.

- Decreasing artifacts when placing reference electrodes by placing the sensors over the flattest and boniest area. These electrodes are placed over the mastoid process between the crease of the earlobe and where the hair begins.

- Calculating locations based on the International 10/20 System of Electrode Placement, given distances between specific points.

- Avoiding use of excessive amounts of prep material because it has conductive properties, and also because electrodes attached with tape will not stick to the prep material.
Review common terms, procedures, and guidelines in use in EEG testing, such as:

- **Biocalibration of the EEG.** Ask the patient to relax with eyes open for at least 30 seconds, and then relax with eyes closed. Alpha waves are typically prominent in the occipital channels with the eyes closed.

- **Checking electrode impedances and signal quality.** If an electrode has a high impedance level (>5 kilohms), it should be removed and the site should be re-prepped before reattaching the electrode.

- **Common EEG frequency bands used for wave scoring:** alpha (8 – 13 Hz), beta (greater than 13 Hz), delta (less than 4 Hz), and theta (4 – 7 Hz).

- **Alpha wave.** The major rhythm seen in normal relaxed adults - it is present during most of life especially beyond the thirteenth year when it dominates the resting tracing.

- **Theta wave.** Abnormal in awake adults but is perfectly normal in children up to 13 years and in sleep. It can be seen as a focal disturbance in focal subcortical lesions; it can be seen in generalized distribution in diffuse in diffuse disorder or metabolic encephalopathy or deep midline disorders or some instances of hydrocephalus.

- **Troubleshooting artifacts.** The first step in eliminating a possible artifact is to check electrode impedance with the electrode test or lead imbalance features of the EEG machine.

- **EEG normal variants, artifacts, and abnormalities such as,**
  - Spikes. Narrow-based waves that have a relatively high amplitude, giving them a narrow and high form and a sharp top. A hallmark of seizure activity.
  - A sharp wave is slightly broader than a spike, but has the same significance - it is the common hallmark of seizure activity and implies multiple synchronous firing or activity (of dendrites). Sharp waves are thought to represent the discharge as seen from some distance away while spikes are recorded from close to the focus.
  - Artifacts, including,
    - **Common cause.** The major class of artifacts is machine and impedance artifact. The most common ones relate to problems with the electrode, such as the electrode being broken or improperly attached.
Sweat artifacts, caused by the salts in perspiration which short out the electrodes.

Pulse artifacts which occur when a pulse beneath an electrode moves the electrode periodically.

POPs

- Spindles and vertex waves are normal variants.

Interpreting strips, including:

- Stage 2 sleep. Defined by the presence of transient sleep spindles and/or K-complexes against a background of relatively low voltage, mixed frequency EEG. A sleep spindle is a burst of rhythmic EEG activity in the range of 12 – 14 Hz, lasting at least 0.5 sec. (Hz is the abbreviation for Hertz and = cycles per second). A K-complex is composed of a sharp negative wave followed by a slower positive component. Duration of a K-complex is at least 0.5 sec.

- REM sleep. The EEG activity returns to a relatively low voltage, mixed frequency pattern. A characteristic sawtooth EEG pattern, typically within the theta frequency range is fairly common though not prerequisite. The EEG pattern is often similar to Stage 1 sleep, but the sawtooth waves are present in REM and not in Stage 1. Slow rapid eye movements and chin muscle tone are present during Stage 1 sleep.