QUESTION: Tonic-clonic, or grand mal seizures are obviously easy to recognize. Can you explain what partial seizures are, and how to recognize them?

ANSWER: Partial seizures originate in a localized area of the cerebral cortex, whereas generalized seizures do not have a local focus and are bilaterally symmetrical. The frontal, parietal, and temporal lobes are most frequently affected in partial seizures.

Partial seizures may be further classified into three subgroups: partial seizures with elementary symptomatology, partial seizures with complex symptomatology, and partial seizures secondarily generalized. Partial seizures with elementary symptomatology may involve motor, sensory and autonomic signs and symptoms. Generally, there is no loss of consciousness with this type of seizure.

In complex partial seizures, the onset may begin with a blank stare, unresponsiveness, or automatisms of nonpurposeful movements (lip smacking, fidgeting, or rubbing body parts of the body). There may be an impairment of consciousness although the individual usually retains an upright posture. It is important to keep in mind that partial seizures may progress to a secondary, generalized seizure.

In partial seizures, the characteristic EEG abnormality is a spike or sharp wave that occurs locally. (Spike waves are defined as transient activity with a pointed peak and duration of 20-70 milliseconds. Sharp waves are also transient phenomena, with similar characteristics of a spike wave, but the duration is 70-200 milliseconds.) Most spike and sharp waves are followed by a slow wave.

It is important to note that the onset of partial seizures during sleep occur most frequently during Stage II sleep. Furthermore, it has been documented in the literature, for more than 150 years, that there are peak periods of seizure activity during sleep (regardless of the type). Be aware that peak seizure activity occurs most often 1 to 2 hours after falling asleep and in the early morning, around 5 a.m.★

Bibliography

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QUESTION: Are the eye movements during REM different in the blind than in sighted individuals?

ANSWER: Let me begin by saying that I assume you are asking about individuals who have been blind since birth, as opposed to acquired blindness that could occur as a result of illness or injury.

I think it germane to revisit the recording of eye movements as published in the Rechtschaffen and Kales manual. The recommended procedure is to record the potentials from an electrode placed 1 cm. above and slightly lateral to the outer canthus, referenced to the same side ear lobe or mastoid, while a second eye movement channel is recording potentials from another electrode placed 1 cm. below and slightly lateral to the outer canthus of the other eye referenced to the contralateral ear or mastoid. R & K goes on further to state that this recommended array is intended to survey eye movements for the scoring of Stage REM. A four-channel arrangement would provide more specific information about the direction and the size of eye movements, which may provide more information in this case. Obviously, in performing biological calibrations prior to the initiation of a polysomnogram, an accurate assessment will be made of the individual's voluntary control over the extracocular muscles. This information will contribute to the assessment of whether a blinded individual is capable of rapid eye movements.

The question then becomes whether or not a blind individual is having "REM Sleep" if "rapid" eye movements cannot be detected.

During the 1950s Drs. Dement and Kleitman studied a congenitally blind man over a two-night period during their intense investigations of REM sleep. Direct observation of this gentleman detected slow, conjugate eye movements, which could not be recorded electrically, during periods which the EEG pattern was compatible with dreaming. Of the six remembered dreams that were indicated by EEG criteria, only one would have been corroborated had the experimenter used the presence of rapid eye movements as the criterion for the presence of dreaming. It was therefore noted that the presence of Stage I EEG indicated the presence of dreaming in the congenitally blind, and it was therefore hypothesized that REMs are an indicator of visual activity during dreaming, and that the congenitally blind do not have visual imagery in their dreams. Newer studies that have been recently published that have found evidence to the contrary and determined that those who have never been sighted are able to visualize during dreams.

Yes, it is possible that the eye movements in a congenitally blind individual are different than in the sighted. It would also appear that rapid eye movements should not be the sole indicators of "REM" sleep in this population.
Technical Corner

**By Mary Jones-Parker, RRT, RPFT, RPSGT**

**Question:** “Please post some disinfection guidelines for sleep related equipment (EEG leads, CPAP masks). I have had difficulty finding any federal/state/other documents to reference.”

**Answer:** I agree wholeheartedly that locating these references can be a very time consuming task. What would seem to be a relatively simple topic to do an Internet search on in these days of information overload, is in fact not that simple. The answers to your question are scattered all across the Internet.

In 1982, the Centers for Disease Control and Prevention, (the “CDC”), issued a document entitled “Guideline for Hospital Environmental Control” to provide specific directions for the selection and use of disinfectants. Three years later, the guideline was revised and the title became “Guideline for Hand washing and Hospital Environmental Control, 1985.” This revised guideline focused on the strategies for disinfecting and sterilizing medical equipment in the health care setting. The shortcoming of this document was that there were no specific recommendations for the chemical germicides that should be used on medical equipment or environmental surfaces in health care facilities. Yet another five years would pass before the Association of Professionals in Infection Control and Epidemiology would publish specific guidelines to assist healthcare professionals in selecting and using the proper disinfectants.

More recently, back in 2001, the Food and Drug Administration also entered the picture and made even more guidelines for hospitals and sleep laboratories to follow as they realized that some items, designed by the manufacturer for single patient use, (i.e. cpap masks), were being used over and over again, and, furthermore, not all of the disinfection/reprocessing techniques that were being used were effective.

Equipment that we routinely use for polysomnography testing generally falls into 2 of the 3 categories of Spaulding criteria, which was developed back in 1968. (The Spaulding criteria are a way of classifying medical equipment according to the degree of risk involved in the spread of infection.) CPAP masks fall into the category of semi-critical equipment in as much as masks can come into contact with mucous membranes or skin that is not intact. The EEG electrodes that we use fall into the noncritical category because the electrodes come into contact with intact skin, but not necessarily with mucous membranes. Semi critical items (such as EEG leads) may be rendered clean by using a low-level type disinfectant without a label claim for tuberculocidal activity.

You will find that each manufacturer of cpap masks will have different recommendations from one another, but will provide you with the specific information needed for cleaning their masks and the number of times that their piece of equipment can be used repeatedly before it must be discarded.

Because space is limited in this column, and the amount of information to be obtained on this topic is so great, I further recommend that you visit the following websites:

- http://www.fda.gov/cdhr/reuse/1168.html (there is also a link to this website on the APT website, www.aptweb.org)
- http://www.apic.org (click on link for practice guidelines)

These websites will help you to locate more detailed information regarding this topic, and I recommend that you read these documents in their entirety. You will come away with a new appreciation for infection control. For example, the APIC Guideline for Selection and Use of Disinfectants article highlights the different properties of bleach, alcohol, gluteraldehyde, and so on. Even though your goal may be to select a chemical agent that will provide the ultimate germ protection for your patients, this document will also educate you about the effect that these chemicals have on you, the end user. Another noteworthy item that the APIC article points out is the shortcomings of isopropyl alcohol, which most of us in the health care setting take for granted; especially when we use it to disinfect external surfaces, such as the stethoscopes that we use to take blood pressures with.

**Question:** “I wonder about the way to calculate PLM or jerk index. We use TST as a denominator of jerk or PLM index, while we count jerks regardless of sleep stage. Is it fair to count all jerks through the night-time, but only use TST for the calculation?”

**Answer:** Leg movements are most often reported as an index of total sleep time. Only movements occurring during sleep are counted for the index; events occurring during drowsiness before the onset of Stage I sleep should not be included.

Movements may be included as long as they occur in episodes of 4 or more movements; movements occurring in isolation should not be included. The time interval between each movement should be greater than 5 seconds, but not greater than 90 seconds from the last movement. (The average interval between leg movements is 20 to 40 seconds.)

Simultaneous movements in both legs are counted as 1 movement; movements occurring in both legs are added together in calculating the index. Some labs report the periodic limb movement- arousal index in which only movements that are associated with an arousal are included in the tally, and again, the index is expressed as events per hour of sleep.

It is uncommon to see limb movements during REM sleep. Periodic limb movements occur most frequently during Stage II sleep, and decrease in frequency during Stage III/IV sleep.

**Reference**

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Mary Jones-Parker works in the Center for Sleep Research in the Department of Sleep and Respiratory Neurobiology at the University of Pennsylvania, Philadelphia, was the first recipient of the Sleep Multi Media Award for Recent Advances in Polysomnography; past Director of the Board of Registered Polysomnographic Technologists (BRPT) from 1995-2002 as well as a past member on the Exam Development Committee; and is a member of the APT Editorial Board Special Projects Team for *The A2Zzz Magazine*. Additionally, she is a member of the Education Committee and a Course Director for the Annual APT meeting.