

The Impact of 1 Month of Intensive Training on a Resident's EEG Interpretation Skills

Inpatient electroencephalography (EEG) studies are becoming more widely used,¹ with seizures, coma, hypothermia, and altered mental status being some common indications. It is likely that the demand for skilled EEG interpreters will increase in the future; however, studies have found that EEG reads are often erroneous, with resulting overmedication and unnecessary hospitalization.²

In many academic centers, neurology residents are the first ones asked to interpret EEGs, especially at night. Thus, competence in EEG interpretation is an essential element of the Accreditation Council for Graduate Medical Education's milestones to be met by neurology residents.³ Many residency programs use a 2-month "clinical electrophysiology" block for this purpose. However, there are very few studies to date that assess the effectiveness of the standard, monthlong approaches to EEG teaching.⁴

We decided to assess the improvement in a single resident's EEG skills over a monthlong EEG rotation. The University of Alabama (UAB) neurology residency program has 2 months dedicated to EEG training. The first month is focused on gaining familiarity with EEG montages, lead placement, and terminology. The second month involves the resident reading EEGs before the attending epileptologist, and comparing his or her read with the attending's read (this was the training period assessed in our investigation). In a 1-month period from November 24 to December 22, 2014, 106 routine inpatient EEGs were read by the epilepsy service at UAB—first by a second-year resident and then by the attending epileptologists. Resident and attending reads were compared for the first 25 and last 25 EEGs. The findings assessed were drowsiness, stage II sleep, posterior dominant rhythm (PDR), generalized slowing, focal slowing, and epileptiform activity (EA; comprising epileptiform discharges and seizures). Whether the EEG was

considered normal was also compared. The sensitivity and specificity of the resident's reads were obtained for each of these findings, with the attending's reads considered the gold standard. A Kappa statistic was calculated to assess interobserver reliability.

Between the first and last 25 EEGs, the Kappa statistic increased for all findings except EA and PDR (FIGURE). It is likely that the small number of EEGs showing EA is responsible for part of this anomaly. For the PDR, the resident's sensitivity improved, but the specificity decreased, indicating that the PDR was being incorrectly noted as present when the EEG actually did not show any. Based on standard criteria,⁵ the Kappa statistic showed "good" agreement between the resident and attending in the last 25 EEGs for all parameters except for the presence of EA, and all were statistically significant. Results are summarized in the FIGURE.

Improving residency training in EEG interpretation is crucial to reducing the high number of incorrectly read EEGs that have been noted in previous studies. This small investigation of how a resident learns EEG interpretation shows that months dedicated to EEG, with a focus on the resident reading EEGs, and then comparing his or her read with that of an attending epileptologist, are very effective. Larger studies will be of value in this understudied aspect of resident education.

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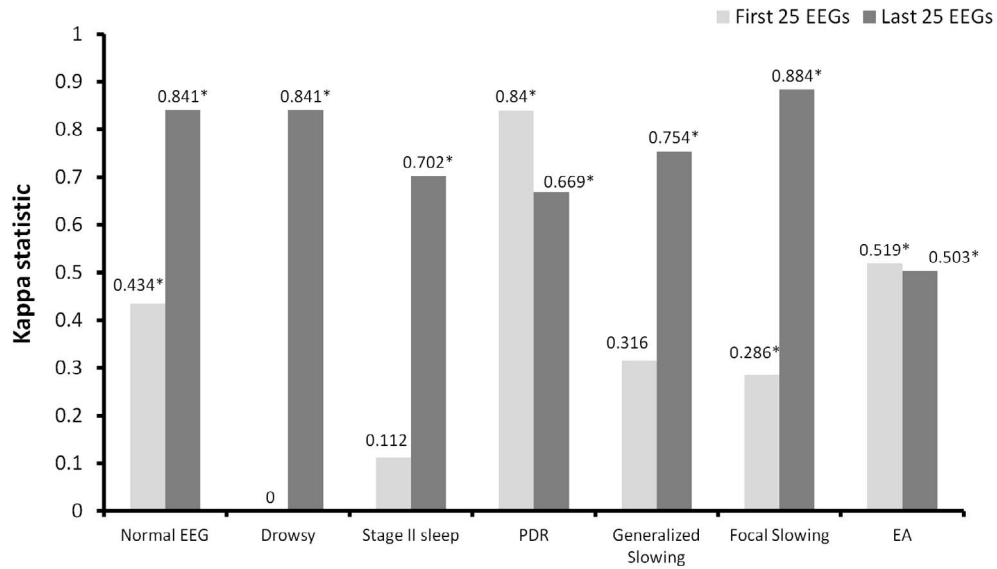
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2. Benbadis SR, Lin K. Errors in EEG interpretation and misdiagnosis of epilepsy. *Eur Neurol*. 2008;59:267–271.



Parameter	First 25 EEGs					Last 25 EEGs				
	Prevalence	Sensitivity	Specificity	Kappa	P	Prevalence	Sensitivity	Specificity	Kappa	P
Normal EEG	9/25	0.78	0.69	0.434	.025	11/25	1.00	0.86	0.841	< .001
Drowsy	15/25	0	1.00	0		14/25	0.86	1.00	0.841	< .001
Stage II sleep	7/25	0.14	0.94	0.112	.47	4/25	0.75	0.95	0.702	< .001
PDR	14/25	0.85	1.00	0.840	< .001	14/25	0.93	0.73	0.669	.001
Generalized slowing	14/25	0.43	0.91	0.316	.06	11/25	0.82	0.93	0.754	< .001
Focal slowing	5/25	0.20	1.00	0.286	.041	6/25	0.83	1.00	0.884	< .001
EA	3/25	1.00	0.81	0.519	.003	3/25	0.67	0.91	0.503	.011

FIGURE
Comparison of Kappa Statistic Between First 25 and Last 25 EEGs for Various EEG Findings (Top); Prevalence of EEG Findings, With Sensitivity and Specificity of Resident Reads for Each, for First 25 and Last 25 EEGs (Bottom).
Abbreviation: EEG, electroencephalography.

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