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Editorial/Letter

Brief Instruction Improves Resident Understanding of EEG Spectrograms: A 2-Institution Pilot Study

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To the Editor:

Brook and Lambert's article[1] and the accompanying editorial comments compellingly argue for increased education on electroencephalogram (EEG) spectrogram interpretation in anesthesiology training. Their call to action inspired us to develop a focused teaching module aimed at improving resident familiarity and competence with spectrograms (density spectral array, DSA).

The module:
https://vimeo.com/1102625098/3ba53adece?share=copy
is a brief set of narrated slides designed to introduce core concepts and clinical applications of EEG spectrograms. To assess its educational impact, we administered identical pretests and posttests (Supplement) to anesthesia residents at 2 institutions: Boston Medical Center (BMC) Brighton, where spectrograms are unused, and BMC Central, where spectrograms are integrated into daily practice.

A total of 27 residents voluntarily participated (26 live, 1 via Zoom; 13 at Brighton and 14 at Central). After viewing the module, both groups demonstrated statistically significant improvement in test scores. Using the Wilcoxon signed rank test (Figure 1), we found the following:

Brighton: $p = .005$

Central: $p = .002$

Additionally, 78% of participants (21/27) agreed that understanding the EEG DSA is essential to clinical anesthesiology. Before the intervention, 89% (24/27) reported having a basic understanding of the EEG DSA, and following the session, 93% indicated that the teaching module improved their comprehension.

These results suggest that even brief, targeted instruction can enhance understanding of EEG spectrograms regardless of baseline familiarity. We believe this supports Brook and Lambert's assertion and encourages broader adoption of spectrogram education in residency curricula.

Reference

1. Brook K, Lambert DH. Spectrograms—need for increased training and accessibility. *J Educ Perioper Med*. 2022;24(4):E692.

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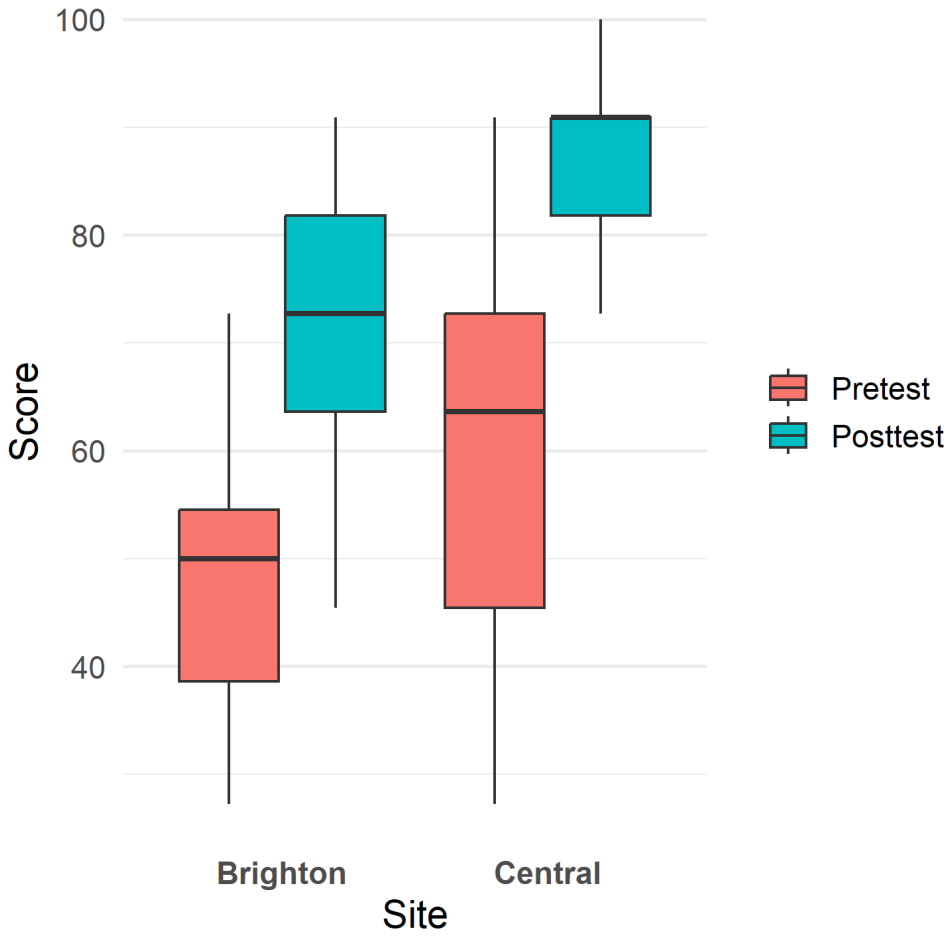
Figure

Figure 1. *Pretest and posttest scores for anesthesia residents at BMC Brighton and Central institutions after viewing the EEG spectrogram teaching module. The Wilcoxon signed rank test showed significant improvement in both cohorts.*



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Supplemental Online Material

Supplement: Pre- and Post-study Test Questions

Questions	Choices (correct answer in bold)
1. What is power of a signal frequency related to?	a. The amount of frequencies present **b. The amount that frequency contributes to the signal** c. The energy required to generate the DSA d. How long that signal persists
2. What do the colors represent on the DSA?	a. Frequency **b. Power** c. Time d. Anesthetic Depth
3. What are the three dimensions of a 3D EEG Spectrogram?	**a. Time, power, and frequency** b. Time, power, and anesthetic depth c. Power, frequency, and anesthetic depth d. Time, frequency, and anesthetic depth
4. Which of these types of brainwaves is the lowest frequency?	a. Alpha b. Beta **c. Delta** d. Theta
5. What are the frequencies of theta waves?	a. 0.5-3 Hz **b. 4-8 Hz** c. 9-14 Hz d. 15-30 Hz
6. What region of the brain is plotted on the bottom DSA plot?	a. Frontal lobe b. Temporal lobe **c. Right hemisphere** d. Left hemisphere
7. What is the SEF meant to represent?	a. The amount of power in the EEG signal b. The rate of change of the EEG signal **c. The highest frequency active in the EEG signal** d. The expected frequencies in the EEG signal
8. What frequency of brainwaves are stimulated by propofol?	a. Theta **b. Alpha** c. Beta d. Gamma
9. How would we expect the DSA to change with age?	a. Younger patients' DSAs have less power **b. Older patients' DSAs have less power** c. Older and younger patients have less power than a young adult d. There is no difference with age
10. How would we expect the SEF to change as a patient goes asleep?	**a. It should decrease** b. It should increase

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Supplemental Online Material *continued*

	c. It should remain constant d. It should get more random
11. What would a difference in the SEFL and SEFR values represent?	a. The brain hemispheres are not operating with the same amount of power **b. The brain hemispheres are not operating at the same frequencies** c. Which side is the patient's dominant hemisphere d. One of the brain hemispheres is waking up
Pre-study: To what extent do you agree with the following statement: Understanding EEG density spectral array (DSA) is essential to clinical practice in anesthesiology?	a. Agree b. Neutral c. Disagree
Pre-study: How would you rate your current level of understanding of EEG DSA?	a. Basic b. Moderate c. Good
Post-study: To what extent do you agree with the following statement: The teaching session improved my level of understanding of EEG DSA.	a. Agree b. Neutral c. Disagree