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# **The knowledge and skills on pediatric EEG in medical education - Lublin experience**

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## **Background**

Electroencephalography is a study that records the electrical activity of the cerebral cortex. This record of neuronal communication supports clinical diagnosis of epilepsy and status epilepticus and monitoring of its future courses. That is why electroencephalography is considered one of the most important examination in children neurology.

## **Aim and methodology**

Due to the interest of medical students in neuroscience, the Pediatric EEG Training was conducted and its efficacy was measured. The study group included 68 international students, who attended lectures in 10-15 participant groups in year 2014-2017. Both knowledge and students self-confidence were rated before and after conduction of the workshops.

## **Results**

After the conduction of the workshop, 73% increase of knowledge was observed. In aspect of self-confidence, 91% of participants confirmed they are confident in reasonable ordering of the examination to their future patients, and 72% of participants feel confident in technical

preparation of the examination. Small groups of participants and sufficient amount of time for both theoretical lecture and practical skills training were essential to the significant results and participants' satisfaction.

### **Conclusions**

EEG workshops are a great example of combined theoretical and practical training which supports not only the knowledge improvement, but also the practical skills and teamwork experience for future healthcare professionals.

**Keywords:** EEG, electroencephalography, medical education

### **Background**

The innervated universe of human body, the brain, has always been a mystery for researchers all around the world. Starting from the Surgical Papyrus of Ancient Egypt and first observations of battlefield wounds of the brain and consequent impairment of the bodies of the patients, through the anatomical dissections of Vesalius and Willis, the curiosity of the scientists about this unique organ was never truly satisfied. [1;2] The breakthrough began in 19<sup>th</sup> century with animal experiments of nerves electricity by Luigi Galvani, and later hemispheres electricity by Richard Caton, which along with histological achievements of Golgi and Cajal mark as the beginning of modern neuroscience. [3] The bioelectrical activity of the brain was studied in 20<sup>th</sup> century, when Hans Berger observed firstly the pattern of uniform electric waves of the brain, later in 1929 described alfa and beta waves. 7 years later, W. Gray Walter proved the presence of new, high-voltage waves, emitted on the surface of the malignant brain tumor. [4-6] Before the introduction of the modern diagnostic imaging, examination of bioelectrical activity via EEG was the most important non-invasive way of diagnosing brain tumors. [7]

It is now a common knowledge, that neuronal activity passes on the information through the transmission of electrical (along dendrites and axons) as well as chemical impulses (using neurotransmitters in synaptic connections). Electroencephalography, known as EEG, examines the electrical communication of the cortex. It is one of the most important examinations in pediatric neurology, primarily used in clinical diagnosis of epilepsy, status epilepticus, helps in proper classification of epilepsy and status epilepticus, supports the localization of the epileptic locus, and is used in the follow-up of the antiepileptic treatment. [8-9] Due to the interest of

medical students in field of neurological disciplines and broadening horizons in practical pediatric neurology, the Pediatric EEG Training was conducted and its efficacy was measured.

### **Aim of the study**

The aim of our study is firstly to determine the knowledge of medical student about usage and preparations of electroencephalography. Secondly the efficacy of the Pediatric EEG workshops within the improvement of knowledge after workshops was measured.

### **Materials and methods**

Study group consisted of 68 international medical students of Medical University of Lublin, attendees of Pediatric EEG workshops in years 2014-2017. The lectures were held in 10-15 participants groups, where both the theoretical and practical aspects of the examination preparation was being shown. The knowledge and students self-confidence of attendees in proper request of the EEG examination in patients and understanding of the EEG result were rated before and after conduction of the workshops. Respondents age, year of study, previous attendance to EEG procedures information was also obtained. Knowledge on EEG procedures was measured within 15-questions test, Self-confidence with 2 questions on reasonable requesting of EEG and technical preparation steps. Results then were divided depending on the type of question (requesting EEG, steps of conducting EEG, understanding the EEG result).

### **Results**

Within our study group, students of faculty of medicine of all years took part in the questionnaire. Most of the students attended their 4th year of medicine (33,8%), 60,3% women and 49,7% of men. The average age of the respondents was 23 years old. Participants of the workshops were chosen on basis: first come, first served within a google registration form. 48,5% of respondents claimed to start or already attended neurology or pediatric neurology course as part of their studies.

Within pre- and post-questionnaire regarding surgical procedures, up to 73% increase of knowledge was observed, depending on the type of question. The average score in pre-questionnaire (20%) increased up to 93% in post-questionnaire.

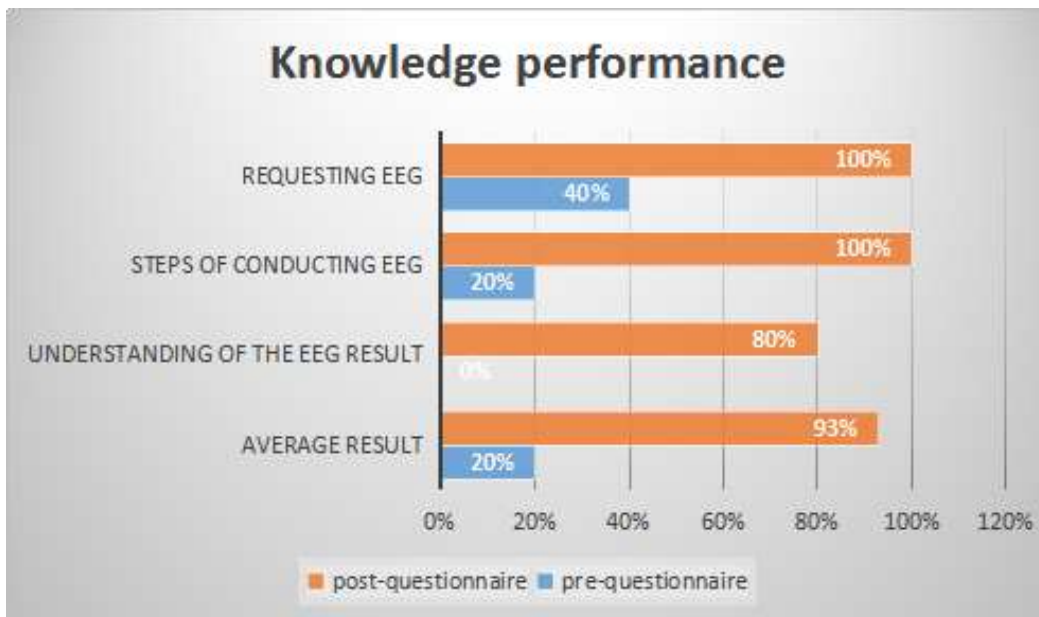


Chart 1. Performance of correct answers depending on the type of question pre and post-questionnaire. Prepared by authors.

### Self-confidence aspects

Vast majority of participants felt confident with reasonable requesting of the EEG examination (92%), and 72% felt confident with understanding the technical preparation stages (which are vital for proper conduction of the examination).

Quality measured	Amount of participants
Satisfied with the workshops	100% participants
Would recommend workshop to other peers	100% participants
Confident in reasonable requesting of the EEG in the future	92% participants
Confident with technical preparation stages of the EEG	72% participants
Confident in understanding of the result description	41% participants

Table 1. Self-confidence and satisfaction from the workshops. Prepared by the authors.

Only 41% of participants were confident in understanding of the result description, which authors consider a high value, taking into consideration that its the most difficult part of electroencephalography.

### **Discussion**

We consider our study an important factor in promotion of children neurology and neuroscience among medical students. Neuroscience is considered to be one of the most difficult topics in medicine, therefore making the knowledge easily accessible, and non-obligatory forms of education, such as EEG workshops can become a bridge between the theoretical physiology knowledge and neurological disorders, in order to fully understand the pathogenesis and diagnostic process. To our knowledge and review of literature, this workshop for medical students is unique within its structure, target group and measured success. Within reviewed research we found limited data on EEG training, only in medical doctors as a target audience. [10] As study showed, with the interactive, theoretical and practical mix of neurological challenges during the lecture helped in significant improvement of the knowledge among the participants.

### **Conclusion**

EEG workshops are a great example of combined theoretical and practical training which supports not only the knowledge improvement, but also the practical skills and teamwork experience for future healthcare professionals.

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