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**Article:**

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(2017) Can neonatal staff site EEG leads in the correct position? A pilot study. *ADC Fetal & Neonatal Edition*. ISSN 1359-2998

<https://doi.org/10.1136/archdischild-2017-314249>

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Archives of  
**Disease in Childhood**

**Can neonatal staff site EEG leads in the correct position? A  
pilot study**

Journal:	<i>Archives of Disease in Childhood</i>
Manuscript ID	fetalneonatal-2017-314249
Article Type:	Letter (correspondence)
Edition:	not in use
Date Submitted by the Author:	06-Oct-2017
Complete List of Authors:	Hart, Anthony; Sheffield Children's NHS Foundation Trust, Paediatric Neurology Alix, James; University of Sheffield, Sheffield Institute for Translational Neuroscience
Keywords:	Neonatology, newborn, epilepsy, neonatal seizures, EEG

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## Can neonatal staff site EEG leads in the correct position? A pilot study

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**Word count:** 486

**Figures:** 2

**Key words:** Neonate, newborn, epilepsy, neonatal seizures, EEG

**Conflict of interest:** None known

**Funding:** The finance for this project was funded personally by Dr Hart. Dr Hart has no affiliation with the company that produces the BraiNet template.

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2  
3 Under and over diagnosis of neonatal seizures is common, with 73% of suspected seizures  
4 not being associated with epileptiform activity on electroencephalography (EEG) and 66% of  
5 EEG detected seizures having no clinical features.(1) As a result, recent studies into  
6 treatments for neonatal seizures have utilised prolonged EEG for accurate outcome  
7 measurement.(2) Study design and funding is hampered by logistical and financial difficulties  
8 in accessing EEG throughout the day and weekend. If neonatal staff could site EEG leads  
9 and start monitoring then EEG could be started in a timely fashion with a view to, for  
10 example, physiologist input within office hours. Commercial templates to aid EEG lead  
11 positioning are available, using a modified neonatal EEG montage.(3)

12  
13 For this pilot study, 24 participants (7 ST1-3 trainees; 6 ST4-8 trainees, 3 consultant  
14 neonatologists, 3 advanced neonatal nurse practitioners and 5 staff nurses) from a neonatal  
15 intensive care unit in Sheffield were recruited. Ethical approval was granted by the University  
16 of Sheffield, and signed consent obtained. Participants reviewed a 10minute video  
17 explaining how to site EEG leads on a resuscitation doll using a BraiNet template and EEG  
18 paste. This is an elastic template with holes and colour boxes to indicate the correct location  
19 for EEG leads (figure 1). A member of the neurophysiology team measured the linear  
20 distance of each lead was away from the gold standard. In physiologist training, a lead within  
21 5mm of the optimal site is considered satisfactory,(4) which was the standard adopted in this  
22 study.

23  
24 11(45.8%) participants sited all leads within 5mm of the ideal position. 9 (37.5%) sited all  
25 but one lead in the correct location. The suboptimal leads varied: 2 participants T6, 2 O2,  
26 and 1 each for FP2, F7, F8, T4, O1. The maximum distance away from the ideal location for  
27 any of these leads was 10mm. One participant sited 2 leads incorrectly, and 2 participants  
28 site 3 leads incorrectly. A final participant sited the 7 leads incorrectly, with the distances  
29 from the ideal location for these leads ranging from 10-30mm. This participant adopted a

1  
2  
3 haphazard approach. Table one shows the frequency the EEG leads were sited within 5mm  
4  
5 of the correct location for each of the leads, and the median distances for each lead. Two  
6  
7 qualified physiologists also completed the study and sited all leads within 5mm of the  
8  
9 standard using the template.  
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14  
15 These results show that 87.5% neonatal staff can site all EEG leads appropriately or with  
16  
17 only 1 or 2 leads in suboptimal position on a resuscitation doll. With adjustment to our  
18  
19 training package to rectify commonly made mistakes, this figure may increase. Future work  
20  
21 will examine whether these results are replicated in real babies, especially those who are  
22  
23 ventilated and whether neonatal staff can undertake the further requirements of EEG  
24  
25 recording such as skin preparation and impedance checking. Should this prove successful,  
26  
27 early EEG recording of neonates at high risk of seizures may be possible, particularly in  
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29 research studies.  
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**Table one:** Frequency each lead was sited to the optimal position, and medial (IQR) from the optimal position

Lead	% within 5mm of ideal location	Median distance from optimal position (IQR)
FP1	100%	2mm(0.75,5)
FP2	95.8%	3.5mm(1.5,5)
F7	91.7%	5mm(1.75,5)
F8	95.8%	5mm(0,5)
Cz	95.8%	0mm(0,5)
C3	95.8%	0mm(0,5)
C4	95.8%	0mm(0,5)
T3	91.7%	5mm(0,5)
T4	91.7%	2mm(0,5)
T5	91.7%	0mm(0,5)
T6	79.2%	0mm(0,5)
O1	85.5%	5mm(3,5)
O2	87.5%	5mm(0,5)

**Figure 1:** EEG leads attached to the resuscitation doll using the BraiNET template

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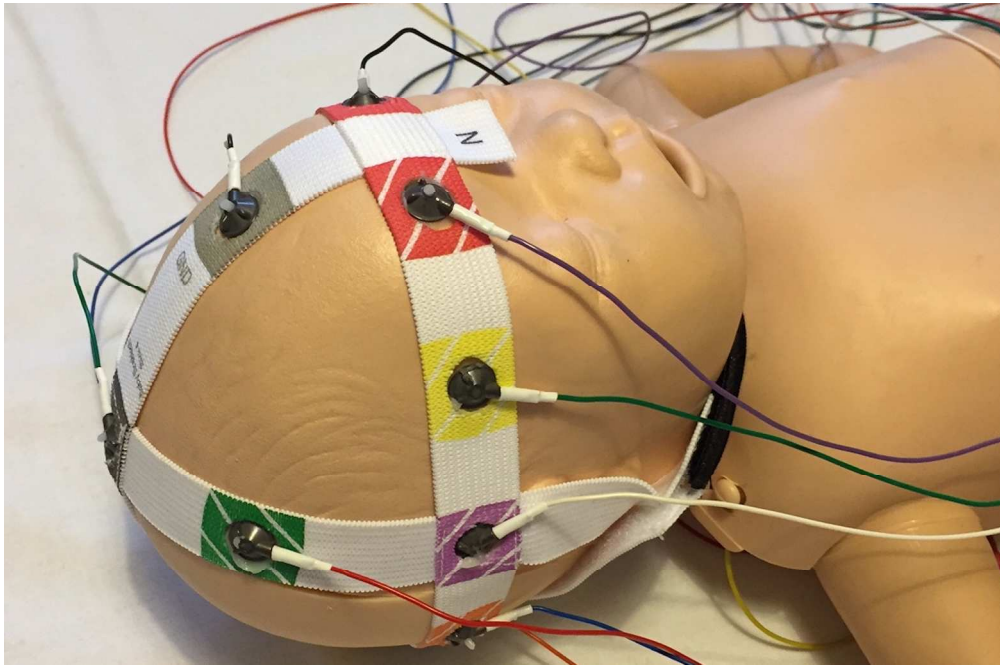


Figure 1: EEG leads attached to the resuscitation doll using the BrainNET template

412x272mm (300 x 300 DPI)