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EpiCARE – a network for rare and complex epilepsies

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Report on the availability and standard of EEG investigations across centres in EpiCARE

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Lead beneficiary for this deliverable:

Contributors: All 28 EpiCARE healthcare providers

Reviewer: Dr Sandor Beniczky

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| Dissemination Level | | |
| PU | Public | x |
| CO | Confidential, only for members of the consortium (including the Commission Services) | |
| CI | Classified, as referred to in Commission Decision 2001/844/EC | |

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1. Version log

| Version | Date | Released by | Nature of Change |
|-----------|--------------------------------|---|---|
| Version 1 | 18 th December 2017 | Dr Sandor Beniczky Danish Epilepsy Centre/ SCORE Consortium | First version of the report based on WP4 questionnaires |
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2. Definition and acronyms

| Acronyms | Definitions |
|----------|----------------------|
| EEG | Electroencephalogram |
| LTM | Long-term monitoring |
| ECG | Electrocardiogram |
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3. Introduction

Dr Sandor Beniczky (Danish Epilepsy Centre/ SCORE Consortium), the lead of Work Package 4 devised a survey in order to be able to report on the EEG resources and practices across centres in the EpiCARE ERN. A simple EEG survey was devised and circulated within the network of 28 EpiCARE members. The survey period covered November-December 2017 and coincided with mapping up the EEG specialists in each and every EpiCARE healthcare provider. The survey collected information about the use of EEG in both paediatric and adult settings.

4. Activities carried out and results

EEG, and in general clinical neurophysiology, provides valuable information for diagnosing the epilepsies, with specific patterns identified in many diseases requiring expert interpretation. Thus, integration of recent advances into EpiCARE is essential. However experience and expertise is required to recognise the advantage of accurate recording and interpretation; geographical variation requires specifically to be addressed. The survey provides information about the use of EEG in every centre and the information collected could potentially feed into the cross-country EpiCARE patient referral pathway to be developed.

The following survey was sent to all EpiCARE healthcare providers in order to map up their EEG use and standards as well as to map up the local EEG specialists in each hospitals in order to be able to form a specialist clinical neurophysiology expert group.

Questionnaire on the EEG resources – EpiCare WP4

1. Your name:
2. Name of the centre:
3. Number of standard EEGs performed per year in your centre:
 - a. Total
 - b. Paediatric:
 - c. Adult:
4. Number of sleep EEGs performed per year in your centre:
5. Number of long-term video-EEG monitoring sessions (at least 24 h video-EEG) per year in your centre:
6. Number of electrodes in the EEG array for standard recordings:
7. Number of electrodes in the EEG array for sleep recordings:
8. Number of electrodes in the EEG array for long-term video EEG recordings. Specify the range if different arrays are used:

9. Which of the following polygraphic channels are included in long-term video-EEG monitoring:
 - a. ECG:
 - b. EMG:
 - c. Respiration:
10. Do you have internal guideline (instruction) on behavioural testing of patients during seizures?
11. Do you do electric source imaging as part of the presurgical evaluation?
12. Do you do magnetic source imaging as part of the presurgical evaluation?
13. Are you interested in participating in the prospective, blinded study on the accuracy of source imaging, if the analysis will be performed for you by another group of experts (i.e. you need to provide EEG and MRI data; you will get the source imaging results)?
14. Do you record high density EEG for presurgical evaluation?
15. If you answered yes to the previous question, specify:
 - a. the number of electrodes:
 - b. the EEG equipment you use:
 - c. the name of equipment for measuring the position of the electrodes:
16. Do you have a database that includes EEG features?
17. If you answered yes to the previous question – specify the features included into the database:
18. How long time after the recording do you store the digital video-EEG recordings?
19. Storing the EEG files for long-term monitoring:
 - a. The whole recording?
 - b. Selected segments of the recording?
 - c. Not at all
20. Storing the video files for long-term monitoring:
 - a. The whole recording?
 - b. Selected segments of the recording?
 - c. Not at all
21. Do you have local guidelines / instructions for:
 - a. How to record EEGs:
 - b. Hyperventilation:
 - c. Intermittent Photic Stimulation:

5 Conclusions

All 28 EpiCARE centres completed the survey.

Table 1 shows the details about the number and types of EEG recordings. More than 120 thousand recordings are done in the EpiCARE network every year.

| | Total | Mean | Median | Minimum | Maximum |
|-----------------------|--------------|-------------|---------------|----------------|----------------|
| Total – standard EEG | 93381 | 3335 | 3071 | 800 | 12000 |
| Paediatric - standard | 45560 | 1627 | 1100 | 0 | 6000 |
| Standard - standard | 46960 | 1677 | 1586 | 0 | 7200 |
| Sleep recording | 19893 | 737 | 400 | 0 | 3200 |
| LTM | 8223 | 294 | 174 | 0 | 1200 |

There is variation in the number of electrodes in the EEG arrays used for standard and sleep recordings (median: 21; range: 9 – 25) as well as for LTM (median: 26; range: 12 – 256), the lower number of electrodes being used for neonatal recordings. Concerning polygraphic channels: all centers always record ECG simultaneously with EEG. In selected cases EMG electrodes are added in all but two centers and respiration sensors are used in 16 centers.

Most centers (n=21) store digitally the whole EEG recordings and selected parts of the video recordings.

High-density EEG (64-256 electrodes) are recorded in 12 centers, but in only five of them, the 3D placement of the electrodes is digitized.

Electric source imaging is done in 14 centers. Magnetic source imaging is done in four centers.

Almost all centers use local guidelines for: (a) How to record EEGs (n=27), (2) Hyperventilation (n=28), (3) Intermittent Photic Stimulation (n=27) and for behavioral testing of patients during seizures (n=26).

Conclusion: Deliverable has been achieved and updates are ongoing and will be reviewed and updated on a regular basis. Clinical neurophysiology expert group to be formed.

6 Bibliography / References

N/A.