Embrace, a wearable convulsive seizure detection and alert system  
First performance report of a case study in real-life settings  

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INTRODUCTION  
- Empatica’s Embrace is a comfortable wristband wearable convulsive seizure (CS) detection system (Figure 1).  
- It is based on accelerometer (ACC) and electrodermal activity (EDA) data and works with a smartphone app, Alert.  
- Embrace with Alert app is a medical device (CE) in the European Union. Alert is available only through a clinical trial in the USA.

RATIONALE  
- In EMU settings, the system has achieved Sens = 92-100% and false alarm rate (FAR) = 0.15-2.02 false alarms per day\(^1\).\(^2\).  
- EMU settings may differ from the real-life environment.  
- We have recently shown that adding outpatient data to the EMU-based training set allows to attain better performance\(^3\).

RESULTS  
- The system detected 32 out of 24 recorded CSs (Sens = 92%), with a delay from 15-64 seconds (38 sec avg) between the onset and the alert, and 6-57 seconds (11 sec avg) between the alert and call.  
- The 2 missed seizures were characterized by a low EDA and a mild brief clonic component (Figure 3A).  
- FAR = 0.35 false alarms per day worn, with a total of 39 FAs. In 88 days out of 113 there were no FAs. In only 2 days out of 113 were there more than 2 FAs (Figure 2B).

CONCLUSION  
- We reported the performance of Embrace+Alert system used 3 months in real-life settings.  
- The performance, both Sens and FAR, mirrored the results obtained in EMU settings.  
- All seizures during sleep were detected (Figure 2A).  
- Caregiver reported that FAs were generated by activities like hands shaking, car transport and dancing.

AIM  
To present the first case study about long-term Embrace recordings and alerts in real-life settings.

METHOD  
1. A patient with Dravet Syndrome (14y) wore the Embrace 113 days for 1,973 hours (average daily wear = 17.2±5 hrs/day).  
2. This patient’s data were not used to train the classifier.  
3. As a gold truth, the patient’s caregiver was asked to meticulously annotate the occurrence of each CS. Alert without a CS were labeled as a false alarm (FA).

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REFERENCES  
\(^1\) Migliorini et al. “An improved wrist-worn convulsive seizure detector based on accelerometry and electrodermal activity sensors”, 6th AES, December 4-6, 2015, Philadelphia, PA.  