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PII: S1059-1311(15)00220-4
DOI: http://dx.doi.org/doi:10.1016/j.seizure.2015.09.006
Reference: YSEIZ 2601

To appear in: *Seizure*

Received date: 11-5-2015
Revised date: 10-9-2015
Accepted date: 11-9-2015

Please cite this article as: Bidwell J, Khuwatsamrit T, Askew B, Ehrenberg J, A, Helmers S, Seizure reporting technologies for epilepsy treatment: A review of clinical information needs and supporting technologies, *SEIZURE: European Journal of Epilepsy* (2015), http://dx.doi.org/10.1016/j.seizure.2015.09.006

Seizure reporting technologies for epilepsy treatment: A review of clinical information needs and supporting technologies

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Received 1 April 2015; accepted XX April XXXX

Highlights

- Limited recording and annotation tools are available for characterizing patient motion during seizures.
- Existing seizure detection systems tend to have high false positives rates
- Inertial, wrist worn seizure detection systems coupled with video capture systems may offer promise for addressing both problems.

Abstract

This review surveys current seizure detection and classification technologies as they relate to aiding clinical decision-making during epilepsy treatment. Interviews and data collected from neurologists and a literature review highlighted a strong need for better distinguishing between patients exhibiting generalized and partial seizure types as well as achieving more accurate seizure counts. This information is critical for enabling neurologists to select the correct class of antiepileptic drugs (AED) for their patients and evaluating AED efficiency during long-term treatment. In our questionnaire, 100% of neurologists reported they would like to have video from patients prior to selecting an AED during an initial consultation. Presently, only 30% have access to video. In our technology review we identified that only a subset of available technologies surpassed patient self-reporting performance due to high false positive rates. Inertial seizure detection devices coupled with video capture for recording seizures at night could stand to address collecting seizure counts that are more accurate than current patient self-reporting during day and night time use.

Keywords: (Please select a maximum of 6 keywords from the keyword list)

1. Introduction

Epilepsy impacts approximately 50 million people worldwide [5] with an estimated annual cost of $12.5 billion for patients in the United States [1]. Epilepsy is characterized by seizures that may impact a person's motor activity with periods of uncontrolled shaking, and are often linked with changes in heart and respiratory rates [55,60]. Most patients (60-70%) can become seizure free with appropriate medication [31,32,47,56]; however finding an effective antiepileptic drug (AED) can be a long process. Neurologists evaluate how well a specific medication works in controlling a patient's seizures before adjusting dosage or selecting additional drug therapies. Many patients experience medication side effects [55] before reaching a drug therapy plan that is both tolerable and effective.

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