



University of California  
San Francisco

# Leveraging Electronic Patient Diaries to Forecast Seizure Risk

TS Alliance Town Hall

May 15, 2020

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# Disclosures

- Patent related to systems for cluster detection

# Gaps and research priorities in acute repetitive seizures (ARS) – aka seizure clusters

Variability in  
ARS  
definitions



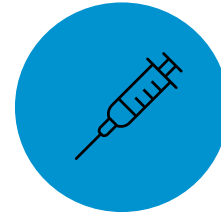
Individualized  
ARS detection

Difficulty  
quantifying /  
recording ARS



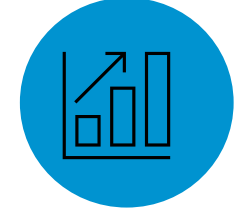
Linkage with  
seizure diaries

Gaps in doctor-  
patient  
communication



Export  
algorithm  
outputs to EHR

Uncertainty  
about ARS  
timing



Predicting ARS

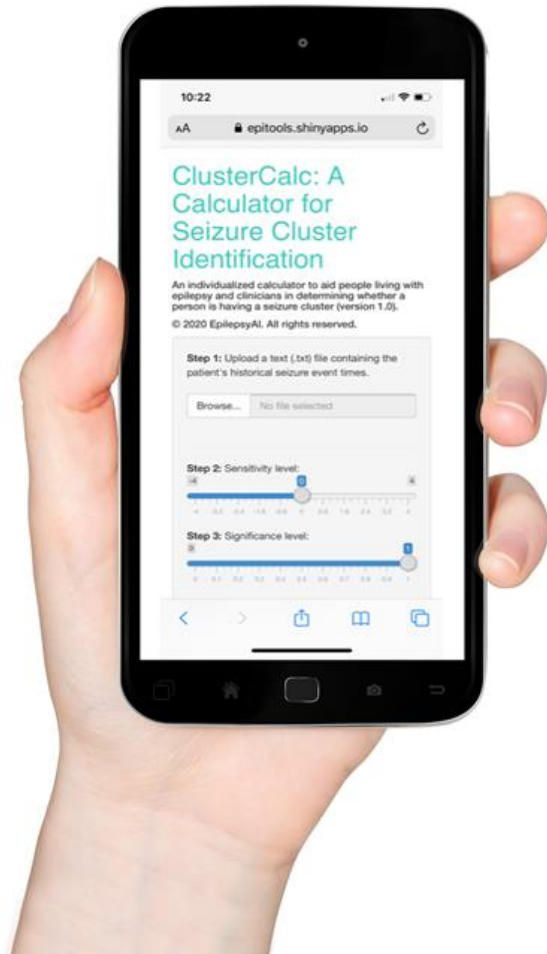
# Acute repetitive seizures (ARS)

- Acute repetitive seizures are **closely grouped series of seizures**, with **return to baseline** between seizures
  - Considered a measure of **seizure burden** by many doctors – increasing occurrence of ARS may be a sign of worsening seizure burden
- Why is it important to communicate clearly with your doctor about seizure clusters?
  - **Alert your doctor** when epilepsy is evolving
  - **Know when to use rescue therapy**

# Clinically used definitions

- 2 or more seizures in 48 hours
- 2 or more seizures in 24 hours
- 2 or more seizures in 12 hours
- 2 GTCs in 4 hours
- 3 focal unaware seizures in 4 hours

# Software tools to individualize seizure cluster detection



- CLUSTERCALC™
  - Import seizures from e-diary and automatically determine what constitutes a cluster for you
  - For future seizures, tells you whether you should count this as a seizure cluster
  - Used to aid patient-doctor communication

## Features

- Thresholds are adjustable and set within patient-doctor communication
- Current tool can accept imported data files
- Can be linked up to electronic seizure diaries

← → ↻ 🌐 www.clustercalc.com

### ClusterCalc: A Calculator for Seizure Cluster Identification

An individualized calculator to aid people living with epilepsy and clinicians in determining whether a person is having a seizure cluster.

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**Step 1:** Upload a text (.txt) file containing the patient's historical seizure event times.

Browse... No file selected

**Step 2:** Sensitivity level:

-4 -3.2 -2.4 -1.6 -0.8 0 0.8 1.6 2.4 3.2 4

**Step 3:** Significance level:

0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1

**Step 4:** Zoom magnification:

0 10 20 30 40 50 60 70 80 90 100

**Step 5:** Date and time of most recent seizure:

Date: 04/15/2020

Time: 15 30 00

**How to use**

**Step 1:** Upload your seizure event times (HH:MM:SS).

**Step 2:** Select the channel.

**Step 3:** Select the sensitivity level.

**Step 4:** Select the significance level.

**Step 5:** Select the zoom magnification.

**Graph of Inter-seizure Intervals**

Preceding inter-seizure interval (hours)

0 200 400 600 800

03-13 10:30:00  
03-17 11:30:00  
04-02 11:30:00  
04-15 15:00:00

the clusters you find appropriate. You may zoom in u

**Step 4:** Enter the date/time of the most recent seizure.

**Step 5:** There are three tabs to view data. The first tab shows t<sub>i</sub> uploaded seizure timestamps. The third tab shows whether or not

Graph of Inter-seizure Intervals Table of Seizure Events

The most recent seizure is

LIKELY

to be part of a seizure cluster, based on your pre-selected sensitivity and significance level.

### EVIDENCE ON THIS TOOL

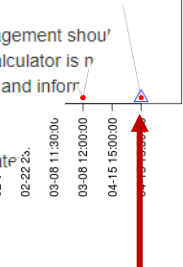
- This calculator uses a statistical algorithm to learn what you identify as seizure clusters. The calculator is based on a database of more than 1,700 patients with seizure clusters. For more information on this model, please see the reference below.
- Reference: Chiang S, Haut S, Ferastraoaru V, Rao VR, Baud MO, Theodore WH. Seizure cluster analysis. Epilepsy Research, 9(163):106330. PMID 32305858.

### GUIDELINES FOR USE

- Clinical decisions regarding acute seizure cluster management should be made by a healthcare provider.
- This website is made for medical professionals. This calculator is not a replacement for a standard care and information.

### NEXT STEPS

- If you think you have having a seizure cluster, take what you can learn from this tool and discuss it with your doctor.
- If you have no specific direction from your doctor, call your doctor.



# Using e-diary linked algorithms to improve your own care



- Improve patient-doctor communication to tailor rescue medication plans
- Import your discussions directly into Seizure Action Plans
- Help your doctor identify when your epilepsy is worsening
- Communicate to your doctor what you find important to treat as a seizure cluster



# On the horizon

- Predicting future high-risk times for seizure clusters
- Predicting when seizures clusters are about to terminate
- Predicting which seizure clusters will turn into status epilepticus

