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Teresa Jahn

CentraCare Health, teresa.jahn@centracare.com

Elizabeth Plante

CentraCare Health, elizabeth.plante@centracare.com

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Jahn, Teresa and Plante, Elizabeth, "Recognition of Nonconclusive Seizures in Patients After Cardiac Arrest Using" (2023). *Nursing Posters*. 156.

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Recognition of Nonconvulsive Seizures in Patients After Cardiac Arrest Using Rapid EEG Technology

Teresa Jahn, APRN CCRN CCNS and Elizabeth Plante, BSN CNRN SCR N PCCN

Saint Cloud Hospital, St. Cloud, Minnesota



Background

Evidence

Prevalence of nonconvulsive status epilepticus or other epileptiform activity in patients who are comatose after a cardiac arrest is between **12-22%**. Consistent with the literature, at this facility approximately **12%** were found to have nonconvulsive seizures. Prolonged epileptiform discharges may cause secondary brain injury and increase mortality. In 2020, the American Heart Association recommended EEG monitoring should be **promptly** performed and interpreted for the diagnosis of seizures in all comatose patients following cardiac arrest.

Local Problem

Comatose patients admitted to critical care after cardiac arrest who require targeted temperature management (TTM) have continuous EEG monitoring ordered STAT. Neurodiagnostic technologists who apply EEG monitoring are not available 24/7.

Practice Change

- Rapid EEG technology implemented August 2022.
- TTM order set change:
 - Allows nursing to apply rapid EEG when a neurodiagnostic technologist is unavailable within one hour.
 - Patient transitions to continuous EEG monitoring when technologists is available.

Elizabeth.Plante@centracare.com or Teresa.Jahn@centracare.com

Technology



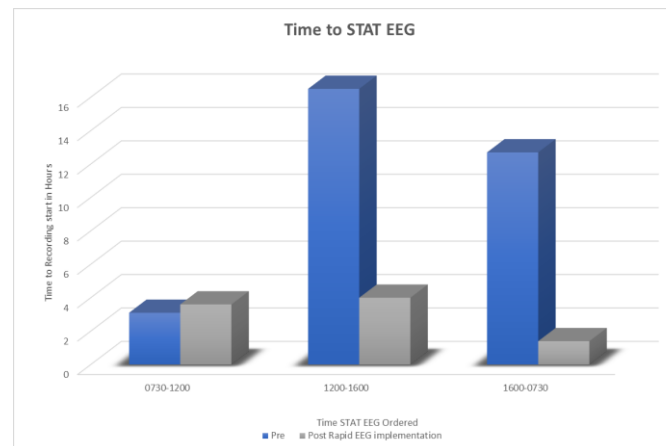
Figure 1. Ceribell Rapid EEG Equipment. Source: <https://ceribell.com/guidelines/>

Analysis/Results

A retrospective chart review was completed on 59 comatose, post-cardiac arrest patients admitted to critical care for TTM between January 2022 - December 2022. Thirty-six patients were admitted prior to the initiation of the rapid EEG technology and 23 patients after implementation. Delays in continuous EEG application were noted to occur when patients were admitted between 1200 and 0730 extending up to **21 hours**. Prior to rapid EEG implementation time delay for antiepileptic treatment ranged from **9 hours 40 minutes to 12 hours**.

Figure 2. Time to STAT EEG.

Average time in hours from STAT EEG order to start of recording was affected by availability of neurodiagnostic technologists. On average it takes 45 minutes to set up a continuous EEG. Rapid EEG set up takes 5 minutes. After implementation of the rapid EEG, time to EEG monitoring was reduced. **Overall average time to STAT EEG went from 11.25 hours to 1.9 hours.**



Conclusions/Implications

- While the rapid EEG recording may have limitations compared to continuous recordings for diagnostic purposes, it has immediate feedback for monitoring of nonconvulsive status epilepticus.
- Continuous EEG monitoring can take 45 minutes to set up and much longer to obtain diagnosis of status epilepticus.
- Continuous EEGs have broader diagnostic capabilities, however, are not monitored continuously by neurology providers, which could delay the identification of seizure activity.

Recommendations

- Continue immediate placement of rapid EEG if technologists are not available within one hour.
- Continue to replace rapid EEG with continuous EEG when technologist becomes available
- Explore improved capabilities for more timely reading and diagnosis of continuous EEG.

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