Establishing Protocol for Continuous EEG Placement Expedites Start of Monitoring

Dennis Leung, MD; Daniel Lercher, MD
Dept. of Pediatrics, Division of Pediatric Critical Care

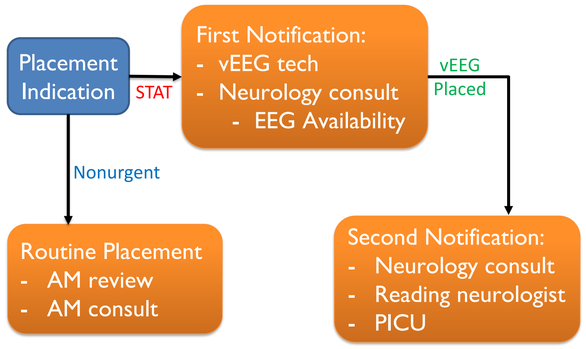
Background

- In the intensive care population, the diagnosis of subclinical status epilepticus is often aided by rapid placement of continuous electroencephalogram (EEG) monitoring. Delay in identifying status leads to poorer patient outcomes.
- In our institution, we identified a delay in care in patients needing continuous EEG monitoring.
- We postulate that, after identifying a set of objectives and putting it forth in a protocol, the time and variability to continuous EEG placement will decrease by 20%.

Methods

- We conducted a retrospective chart review of our institution between 6/1/18 to 6/1/19.
  - We identified 61 patient events during this time period where continuous EEG leads were placed for various indications; these events comprised the **first group** of data.
- Using electronic medical record documentation, we compared the time of order placement to the start of continuous EEG monitoring.
- Beginning 6/1/19, we implemented a standardized EEG placement process designed by a multidisciplinary team. The events collected after this intervention formed the **second group** of data.

Results

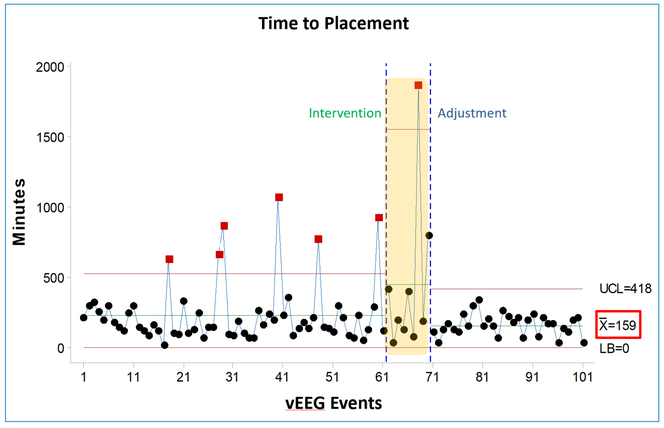


Protocol

- First, placement indications were reviewed
- If nonurgent, routine placement was pursued with a daytime consult order and daytime review
- If stat, the following would occur:
  - EEG tech was stat paged by the nurse
  - Neurology team was stat paged by the physician team. Not only would they know to read an incoming EEG, but they could help arrange for situations of machine unavailability
- Once leads were placed, the cEEG tech would page the Neurology team. The neurologist would note the time and read the first 20 minutes of the strip.
- Meanwhile, if the PICU did not receive notification within 20 minutes of placement, they would reach out to the Neurology team again.

Results

- The first 61 events were our first group and our control
- Between 6/1/19 and 1/22/20, we recorded 40 patient events which all occurred after protocol implementation
- The mean time from order placement to start of monitoring was 230 minutes for the group prior to intervention (UCL 728 minutes)
- The first 9 events that occurred after intervention were during a period of unusually high EEG demand and machine scarcity in the hospital; in order to adjust for confounding, those were removed from analysis



Results continued

- After implementation of protocol and adjusting for a confounding period with elevated times due to machine unavailability, we found our mean time dropped to 159 minutes (UCL 418; p = 0.024), corresponding to 31% of previous.

Conclusions

- In our PICU, the implementation of a protocol for continuous EEG placement was associated with a 31% decrease in our placement times. More importantly, it decreased UCL substantially, bringing down our variability and high extremes for placement time

Discussion

- Our protocol was clearly effective in facilitating human factors
- The 9 events after intervention were in a time of high machine demand. However, part of the high time to placement could also have been adjustment to new protocol.
- We identified another point of delay in machine availability, and we took steps after this study to assure we had more machines on hand and dedicated to pediatric patients

References

- Williams RP, et al. Impact of an ICU EEG monitoring pathway on timeliness of therapeutic intervention and electrographic seizure termination. Epilepsia. 2016 May;57(5):786-95. doi:10.1111/epi.13354.
- Jette N, et al. Frequency and predictors of nonconvulsive seizures during continuous electroencephalographic monitoring in critically ill children. Arch Neurol. 2006; 63:1750–1755.
- Abend NS, et al. Impact of continuous EEG monitoring on clinical management in critically ill children. Neurocrit Care. 2011; 15:70–75.
- Herman ST, et al. Consensus statement on continuous EEG in critically ill adults and children, Part I: Indications. J Clin Neurophysiol. 2015; 32:87–95. [PubMed: 25626778]