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Introduction: More than 1.6 million ED visits annually are for seizure or seizure related disorders with nearly one fourth of these representing first time seizure episodes. The current standard of care recommends evaluation for toxic, metabolic, structural or cardiac causes for first time seizure with close follow up in those patients who return to baseline. Initiation of antiepileptic medication is not currently recommended in the ED setting. It has been established by the American Academy of Neurology that EEG within 24-48 hours after a seizure will demonstrate epileptiform activity in up to 50% of patients, which predicts seizure recurrence, and that the greatest risk for recurrence is in the first 6 months following the initial seizure.

Clinical Question: Can EEG performed in the ED on patients presenting with first time seizure identify individuals with epilepsy and can this be used to guide initiation of anticonvulsant therapy prior to discharge?

Methods: This was a prospective study of individuals greater than 17 years of age who presented with either first time seizure of history of previous seizure without past EEG. Patients with laboratory or neuroimaging studies suggestive of alternate cause were excluded. A total of 73 participants were enrolled, with 71 undergoing 30 min bedside EEG in the ED that were remotely interpreted by an epileptologist who gave recommendation on initiation of anticonvulsant therapy. All participants were scheduled for a 2 week follow-up appointment.

Results: 24% (n=17) of patients undergoing bedside EEG were initiated on anticonvulsant medication with 15 participants EEG's demonstrating signs consistent with epilepsy and 2 patients with abnormal but not epileptic EEG results. 4 of 17 patients were found to have neuroimaging abnormalities with epileptiform activity in those specific brain regions. 34 patients returned for 2 week follow up with 9 additional patients being started on anticonvulsant medication. All of those patients who had repeat EEG who had been diagnosed with epilepsy in the ED (3 of 9) had that diagnosed confirmed. None of those patients started on anticonvulsant medications while in the ED had those medications discontinued on follow up.

Discussion: This study suffered from significant limitations. It violated its own exclusion criteria by enrollment of 4 participants with abnormal neuroimaging. It lost approximate 2/3 of its participants to follow up. It failed to maintain a study screening log on excluded patients. And as a function of limited personnel, it was only able to enroll a convenience sample while EEG technicians were available. . Nevertheless the initial results demonstrate EEG while in the ED being capable of diagnosing epilepsy. The major clinical question not addressed by this study was if early initiation of anticonvulsants in the ED versus standard imitation at follow up results in clinically significant decrease in seizure recurrence.

Take Home Point: 30 min bedside EEG for patients presenting with first time uncomplicated seizure to the ED may have utility in early diagnosis of epilepsy and early initiation of anticonvulsant therapy. However more research is warranted as the average ED does not have the capability for efficient bedside EEG or EEG evaluation and it remains unclear if initiation of anticonvulsants while in the ED will result in clinically significant decrease or recurrent seizure.