Time to emergency medication and intubation in Paediatric Convulsive Status Epilepticus: A single centre audit

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Introduction

The initial emergency management of children presenting with convulsive status epilepticus (CSE) in the United Kingdom (UK) is based on the Acute Paediatric Life Support (APLS) guidlines[1]. These are stepwise time based guidelines culminating in patients receiving a rapid sequence induction (RSI). These guidelines are time based as seizures lasting over 30minutes have the potential to cause long term consequences based on experimental research and clinical data [2]. It has also been shown that delayed treatment can lead to more prolonged seizures and complications [3].

Recent work by the pediatric Status Epilepticus Research Group (pSERG) has shown there is poor adherence to national guidelines, even after publication of previous poor compliance, in North American hospitals [4].

There is however increasing evidence that targeted quality improvement can reduce time to receive anti-seizure medication, reduce seizure time and reduce the need for intensive care [5,6& 7]

We report the time to receive anti-seizure medication, intubation and compliance to APLS guidelines for paediatric status epilepticus in a single UK District General Hospital.

Method

21 patients identified who had been referred to the transport service between Sept 2018 and August 2020 from the DGH with primary diagnosis recorded as "Status Epilepticus" in the database

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DGH electronic and paper notes were reviewed for case details

8 cases excluded:
- 6 did not meet criteria for CSE
- 1 had personal management plan
- 1 inadequate documentation

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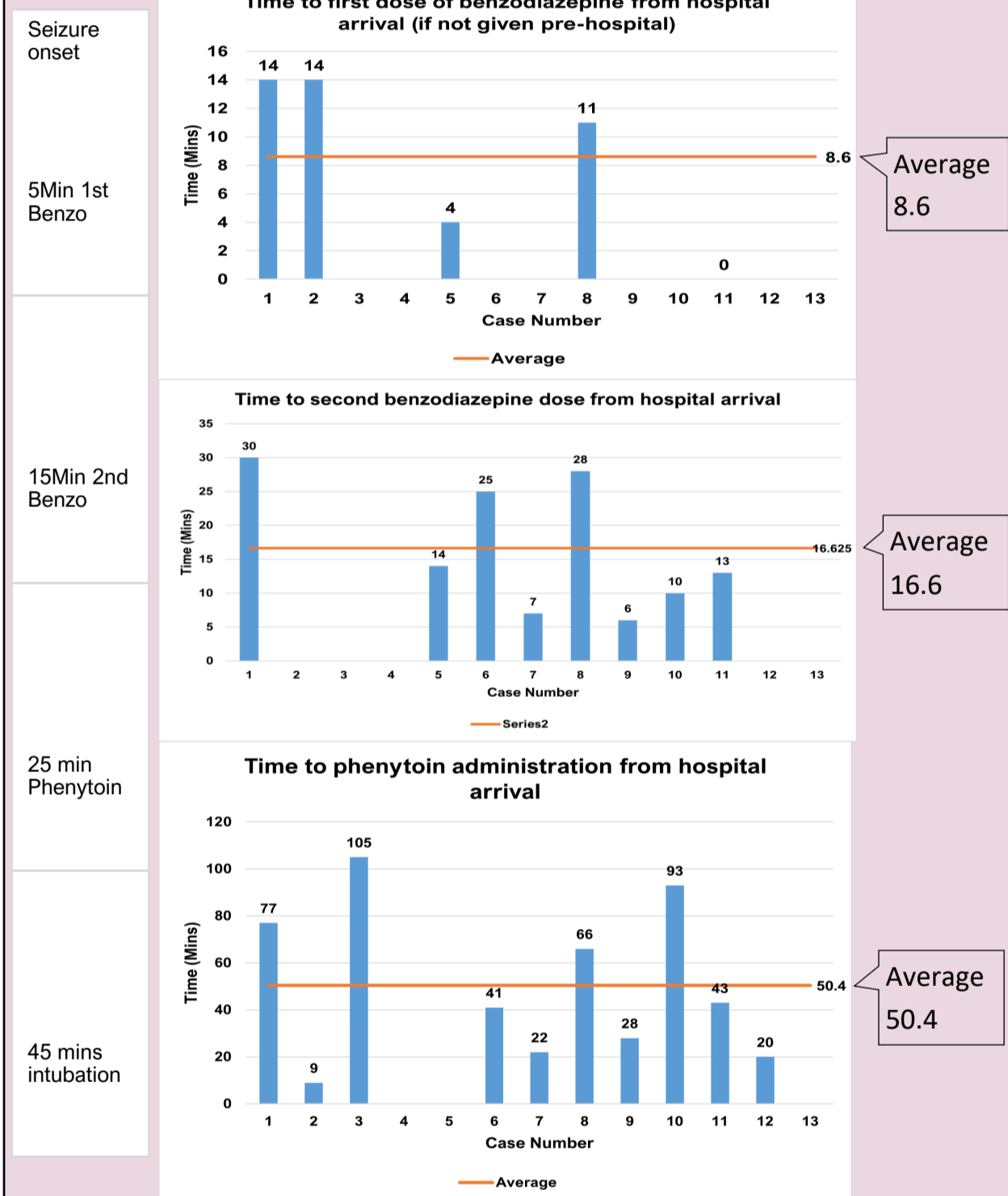14 patients data included using standard proforma for collection

Definition: "*A generalized convulsion lasting 30 minutes or longer, or when successive convulsions occur so frequently over a 30-minute period that the patient does not recover consciousness between them*"
APLS Manual 6th Ed. Ch 9 P 99
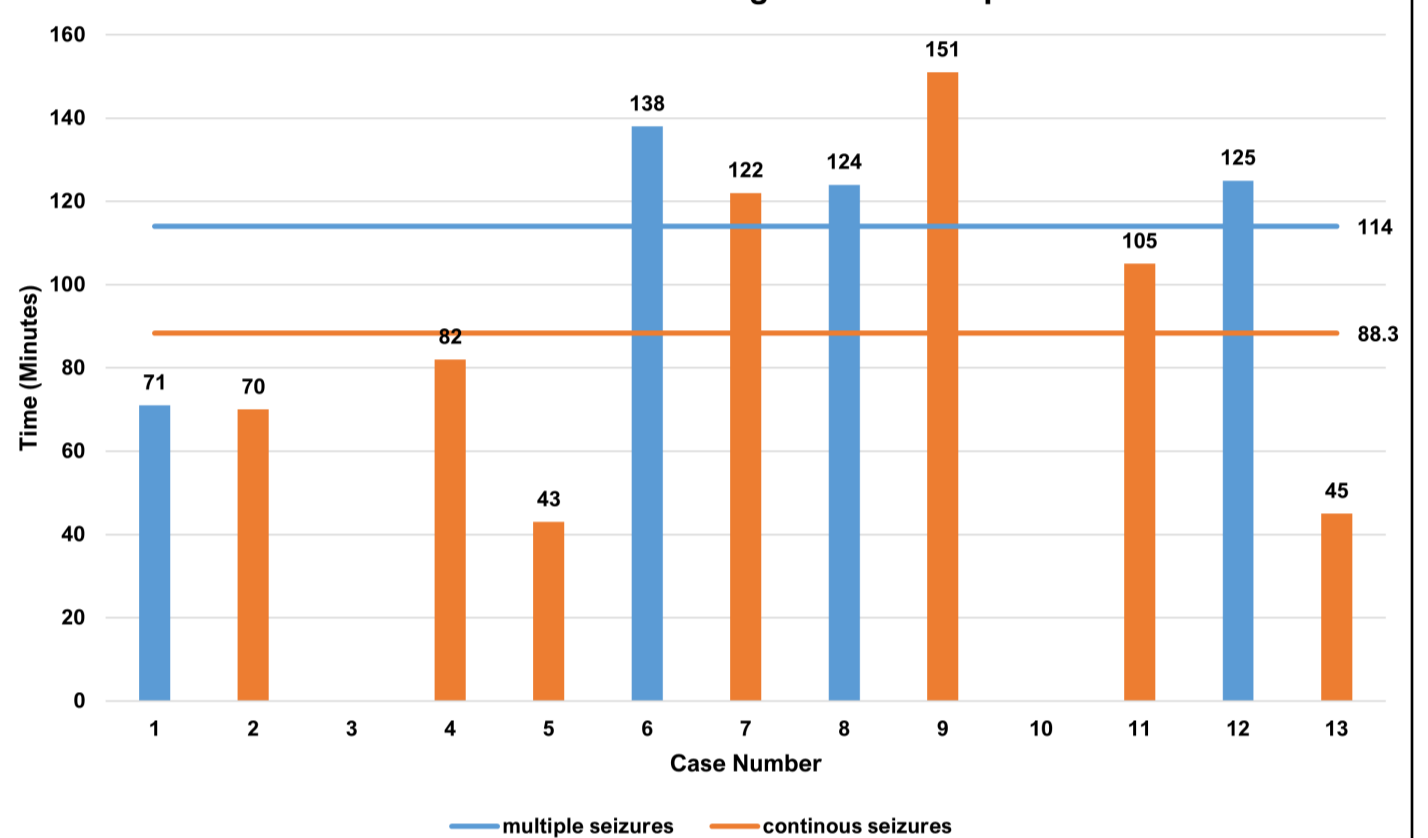
Outcomes recorded were:
- Seizures multiple or continuous episode.
- Pre-hospital treatment given .
- Time to medications.
- Time to intubation from hospital arrival or onset of seizure if in-hospital

Results

Target times

Seizure onset	
5Min 1st Benzo	Average 8.6
15Min 2nd Benzo	Average 16.6
25 min Phenytoin	
45 mins intubation	Average 50.4

This chart demonstrates that time to intubation was on average 88 minutes for continuous and 114minutes for multiple seizures. It should be noted that on two occasions the advised timing was met (Case 2 and 13). Case 9 was an outlier but was complicated by cardiac arrest so it is unclear if this was the accurate time of induction. Cases 3 and 10 were not intubated.

Indications for intubation were identified as: Seizure in cases 4,6,8,11,12; Apnea/low GCS in cases 1,5,7 and 9; Seizure/apnea in 2 and 13.

Discussion

We have shown that 38% of the children in our hospital treated for status epilepticus had multiple seizures with a high time to intubation (71 to 138 mins). These represent a cohort of children that could receive further long acting anti-seizure medication prior to intubation and highlight the challenges of applying the APLS guidelines.

In those treated for continuous seizures from presentation we note delays in receiving medications and time to intubation. Only 25% were compliant with APLS guidelines either due to delayed treatment or based on the medications given.

We also note that in the whole cohort 50% received pre-hospital treatment. A London based QI project has reported that they managed to increase their pre-hospital treatment given by parents from 53% to 70% reducing subsequent status epilepticus presentations [7].

The limitations of this study are that it is single centered, with a small number of patients and is retrospective, making collection of accurate timings challenging. However, these delays in management are consistent with that reported in the literature [4].

We have highlighted multiples areas for improvement in the management of status epilepticus. We recommend a national approach to prospective data collection, regular audit with multi-disciplinary team quality improvement interventions to increase pre-hospital treatment, reduce time to treatment in hospitals and reduce the need for mechanical ventilation in children presenting with status epilepticus.

References

1. https://www.alsg.org/
2. Trinka E, Cock H, Hesdorffer D, Rossetti AO, Scheffer IE, Shinnar S, Shorvon S, Lowenstein DH. A definition and classification of status epilepticus--Report of the ILAE Task Force on Classification of Status Epilepticus. Epilepsia. 2015 Oct;56(10):1515-23. doi: 10.1111/epi.13121. Epub 2015 Sep 4. PMID: 26336950.
3. Gaínza-Lein M, Sánchez Fernández I, Jackson M, et al.Pediatric Status Epilepticus Research Group: Association of time to treatment with short-term outcomes for pediatric patients with refractory convulsive status epilepticus. JAMA Neurol 2018; 75:410418
4. Association of guideline publication and delays to treatment in pediatric status epilepticus. Iván Sánchez Fernández, Nicholas S. Abend, Marta Amengual-Gual et al. on behalf of pSERG. Neurology Sep 2020, 95 (9) e1222-e1235; DOI: 10.1212/WNL.0000000000010174
5. Ostendorf AP, Merison K, Wheeler TA, Patel AD. Decreasing Seizure Treatment Time Through Quality Improvement Reduces Critical Care Utilization. Pediatr Neurol. 2018 Aug;85:58-66. doi: 10.1016/j.pediatrneurol.2018.05.012. Epub 2018 Jun 2. PMID: 30054195.
6. Williams RP, Banwell B, Berg RA, et al. Impact of an ICU EEG monitoring pathway on timeliness of therapeutic intervention and electrographic seizure termination. Epilepsia. 2016 May;57(5):786-795. DOI: 10.1111/epi.13354.
7. G10 Stop the seizure: improving the management of convulsive status epilepticus. Archives of Disease in Childhood 2019;104:A4-A5.