



Contents lists available at ScienceDirect

Epilepsy & Behavior

journal homepage: www.elsevier.com/locate/yebeh

Seizure care in the emergency department. Identifying and bridging the gaps. A study of care and outcomes from 644 seizure presentations

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ARTICLE INFO

Article history:

Received 7 June 2017

Revised 31 August 2017

Accepted 31 August 2017

Available online xxx

Keywords:

Seizure

Emergency department

Emergency care

Integrated care pathway

ABSTRACT

Care for seizures in an emergency department setting can be variable, and there are disparities in access to onward specialist referral. The purpose of this study was to evaluate the utilization and implementation of an evidence-based seizure care pathway in a busy urban tertiary referral center. A total of 644 seizure presentations over two time points were examined. Initial pathway utilization rates were low at 26.2% but increased to 61.6% after environmental barriers had been addressed. We found that patients placed on the care pathway had higher rates of neurological examination, documentation of safety and legal guidelines as regards driving, and lower rates of seizure readmission. Twelve patients not placed on the pathway had passed away at follow-up (1.86%); the cause of death were related to significant comorbidities rather than the seizures themselves though in five, seizures could potentially have been a contributing factor. For the first time we have demonstrated that an evidence-based guideline for seizure management can be implemented in Ireland and used to standardize care for seizures in the emergency department improving documentation rates and clinical evaluation.

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1. Introduction

1.1. Epilepsy and the emergency department (ED)

Most people with epilepsy will be admitted to hospital at some point in their illness, and many will require repeated admissions usually via the ED [1]. Studies in the USA and Europe have demonstrated that seizure presentations account for between 1 and 2% of all ED visits, approximately 1.4% of all medical admissions to hospital and that many patients are often reattenders [2–6]. Up to 20% of people with epilepsy visit the ED each year with seizures, and those in socially deprived areas are particularly likely to do so [2,3]. Studies have further shown that some patients are unnecessarily admitted to hospital after presenting to the ED [7]. The burden of seizure presentations to the ED is also complicated by high numbers of acute symptomatic seizures and potential mimic disorders such as convulsive syncope and nonepileptic seizures.

1.2. Inconsistencies of care within the ED

There is currently no Irish national data on the evaluation of seizures in the ED. A UK based study called the National Audit of Seizure management in Hospitals (NASH) showed that evaluation of seizures in the ED setting can be variable in this dynamic pressurized emergency setting [6]. This landmark study and those carried out in the USA demonstrated that approach to seizure management and care can be inconsistent and may not meet standards of international best practice [6,8,9]. All these suggest that there is scope for a practical clinical tool which has clinical care guidelines embedded into it for use in the ED in order to guide emergency room clinicians as to the expected care journey and assessments required for a patient presenting with seizures. Another area that has been highlighted which lacks consistency and adherence to best practice is the link between patient seizure ED presentation and follow-up with specialist epilepsy services [6,10]. Though epilepsy is a chronic condition, the unpredictability of acute seizures means that people with epilepsy require different models of care in addition to the traditional preplanned outpatient visits which are usually suitable for other chronic conditions. They need access in a rapid and efficient fashion to specialist expertise in epilepsy when they have a breakthrough seizure and this care sometimes cannot be efficiently obtained via the ED leading to increased admissions, length of stay and

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unnecessary investigations [11]. This can be challenging in already resource poor and overburdened healthcare system where access between primary and tertiary care settings can vary. Since 2012, there has been an evidence based seizure care pathway in operation in the ED at our hospital for the evaluation, investigation, and management of seizures. This pathway tool (Appendix A.) was part of an initiative to streamline epilepsy care at a national level in Ireland. The pathway was developed by key stakeholders including epilepsy and emergency medicine physicians, specialist nurses from both fields, and representatives from patient advocacy groups. The pathway document is used in conjunction with a decision tree that can be utilized by the emergency room clinicians when faced with a patient with potential seizures. The decision tree and pathway aid the work-up of patients with seizures and potential seizure mimics. Previous work from our group has demonstrated that the use of this integrated care pathway (ICP) tool in the hands of an epilepsy specialist reduced unnecessary admissions, length of stay, and investigations [11]. However, in order for this tool to be utilized countrywide and sustainable long-term, it would need to be administered by ED physicians themselves in a way akin to acute stroke and acute chest pain pathways. The seizure pro-forma sought to standardize and lend clarity to the way in which patients with seizures should be assessed in the ED. We undertook this study to evaluate the pathways' utilization by the ED staff and identify areas for potential improvement.

2. Study aims

There were three main aims to this study. The first was to calculate the seizure pathway utilization rates at our hospital at two predefined time points. We chose two time points as we wanted to assess if pathway utilization rates could be optimized after environmental barriers to its use had been addressed between time point one and time point two. The second aim was to evaluate the documentation of specific care metrics between patients who were placed on the pathway and those that were not in order to assess if there was a difference in quality of care received between the two groups. The third aim of the study was to evaluate patient outcomes between those placed on the seizure care pathway and those that were not.

3. Methods

3.1. Study site and approval

This retrospective study was conducted in the Department of Neurology at St. James's Hospital Dublin, a large tertiary referral center in an urban area. The hospital has over 1000 inpatient beds. The latest end of the year figures (2016) available from the hospital's own data and the national hospital in-patient enquiry (HIPE) scheme of disease revealed that there were a total of 47,989 presentations to the ED, 732 which were due to seizures. Thus, seizures accounted for approximately 1.5% of all ED presentations to our hospital in 2016; this is in line with data from previous studies in the USA [4,5] and UK.

3.2. Study time points and case identification

The study was approved by the audit committee at the hospital and was carried out in two phases examining two distinct predefined time points. The first period for evaluation was from Sept. 2014 to April 2015, and the second period for evaluation was from Feb. 2016 to June 2016. During these two time periods, all patients who presented to the ED with a diagnosis of seizure were identified via our hospital electronic patient record system. Each patient was identified using the electronic triage code for "seizure", "fit", "status epilepticus", or "epilepsy". Once these patients were identified, their electronic and, where necessary, paper ED records

were reviewed by an experienced epilepsy specialist to ensure that their inclusion in the study was appropriate. This was to ensure that patients who were potentially misclassified at triage as having a genuine seizure, who after review turned out to have an alternative diagnosis, for example, bradycardia, cardiogenic collapse, or psychogenic nonepileptic events, were correctly excluded.

3.3. Definition of the two study groups and calculation of pathway utilization rates

Procedure in our hospital dictates that all ED patient notes are scanned onto an electronic system which can be reviewed with document viewer software by patient identification number. After identifying all the seizure presentations for each time period, we retrospectively reviewed patient records with the use of this system, and patients were then classified as either having been placed on the seizure ICP or not during their ED presentation. From these figures, we were able to calculate the seizure care pathway utilization rates for each time period.

3.4. Patient demographics and quality of care metrics

A database of every seizure presentation for the two time periods was established and saved on a secure hospital server only accessible to the study investigators. For each seizure presentation, patient demographics, ED care metrics, and outcome data were recorded. The patient demographics recorded included sex, age, and if the seizure was the first event or if the patient had a known seizure disorder. We defined the ED care metrics similar to those reported in the NASH dataset [6] as follows: heart rate, temperature, glucose, cranial nerve and limb examination, fundoscopy, plantar responses, and legal and safety advice as regards driving. We identified four types of patient outcome data: admission to hospital, representation to the ED with a seizure within the following 6 months, percentage of patients given specialist outpatient follow-up, and mortality. We also recorded whether or not the patients received an electroencephalogram (EEG). These outcomes and metrics were all recorded on the database, and we calculated the percentage from each group for each metric and outcome allowing us to compare each group.

Table 1
Patient demographics and seizure characteristics from time point one.

	Total patients (454)	On ICP (119) (26.2%)	No ICP (335) (73.8%)
Male	301 (66.3%)	79 (66.4%)	222 (66.3%)
Female	153 (33.7%)	40 (33.6%)	113 (33.7%)
Mean age in years	40.5 (16–97)	37 (17–76)	44 (16–97)
Admitted			
Yes	214 (47.1%)	34 (28.6%)	180 (53.7%)
No	240 (52.9%)	85 (71.4%)	155 (46.3%)
First seizure			
Yes	91 (20.0%)	30 (25.2%)	61 (18.2%)
No	300 (66.1%)	79 (66.4%)	221 (66.0%)
ND	63 (13.9%)	10 (8.4%)	53 (15.8%)
Av seizure length	2.5 min	2.7 min	2.23 min
Number documented	255 (56.1%)	83 (69.7%)	172 (51.3%)
ND	199 (43.8%)	36 (30.3%)	163 (48.7%)
Seizure classification			
Gen/Foc + Gen	232 (51.1%)	81 (68.1%)	151 (45.1%)
Focal only	53 (11.7%)	12 (10.1%)	41 (12.2%)
ND	169 (37.2%)	26 (21.8%)	143 (42.7%)
Witness acc.			
Yes	270 (59.5%)	81 (68.1%)	189 (56.4%)
No	123 (27.1%)	32 (26.9%)	91 (27.2%)
ND	61 (13.4%)	6 (5.0%)	55 (16.4%)

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