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Utilisation of specialist epilepsy services and antiseizure medication adherence rates in a cohort of people with epilepsy (PWE) accessing emergency care.

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Abstract

Background

An epilepsy-related attendance at A&E is associated an increased risk of subsequent death within 6 months. Although further work is required to provide a definitive explanation to account for these findings, in the interim it would seem reasonable that services are designed to ensure timely access and provide support at a time of greatest risk.

We aim to determine the frequency of patients accessing specialist neurology services following an epilepsy-related admission/unscheduled care episode and consider ASM adherence at the point of attendance.

Methods

Patients were identified retrospectively via the NHS Greater Glasgow and Clyde live integrated epilepsy Dashboard following an unscheduled epilepsy-related admission or A&E attendance between 1st January 2022 and 30th June 2022. We calculated adherence to anti-seizure medication for a period of 6 months prior to admission and defined poor medication adherence as a medication possession ratio of less than 80%. We evaluated the rate of any outpatient neurology clinic attendance in the subsequent 3, 6 and 12 months following an epilepsy-related unscheduled care episode. Additional clinical information was identified via the electronic patient records.

Results

Between 1st Jan 2022 and 30th June 2022, there were 266 emergency care seizure-related attendances. The mean age at attendance was 46 years (range: 16-91). Most of PWE were males (63%) and 37% were females.

Epilepsy classification-29.3% had GGE, 41.7 % had focal epilepsy, and in 29% of cases the epilepsy was unclassified.

Of the admissions, 107/ 266 (40.2%) generated follow-up within 6 months of attendance.

Poor medication adherence was noted in 54/266 (20.3%). 28.2% of cases had input from on-call neurology service during admission/ED attendance, and of those 60% had ASM adjusted.

18% of attendances had a background diagnosis of learning disability. One-third of

attendances of PWE had a history of mental health disorder 35% (93/266). 25% of ED

attendances noted an active history of alcohol consumption misuse or/and recreational drug use.

14 (5.5%) of PWE died during the period of interest (12 months following the last ED visit).

In 6/14 (42.3%) death was associated with poor medication adherence.

Conclusion

This study demonstrates that a significant proportion of patients who experienced seizure-related admissions/ attendance did not access specialist neurology services in a timely manner. In addition, poor medication adherence remains a problem for a substantial number of people living with epilepsy. Early access to specialist services may go some way to improving care and reducing excessive mortality in PWE by allowing anti-seizure medication to be titrated and poor medication adherence to be addressed in those at greatest risk.

Keywords: Epilepsy service, ED seizure-related attendance, ASM adherence, People with epilepsy.

1. Introduction:

People living with epilepsy (PWE) have been found to face a higher risk of premature death compared to the general population (1) (2). A number of factors have been consistently associated with increased mortality in PWE including increased levels of physical and mental health comorbidity (including congenital anomalies and substance abuse) and nonadherence to anti-seizure medications (ASMs) (3). A number of recent studies have highlighted an increased risk of death within 6 months of an epilepsy-related attendance at the emergency department (ED) (2) (4). It is entirely plausible that this finding simply represents a confounding factor and reflects increased levels of poor medication adherence and comorbidity in those attending the ED. If so, early intervention provides an opportunity for healthcare professional (HCP) to address potentially reversible factors associated with increased mortality. Such intervention requires access to HCP in a timely manner following an ED visit but previous studies in the UK and Europe have highlighted that services often do not provide the required support(5) (6).

A previous study examining epilepsy-related deaths between 2009 and 2016 found that out of 1,921 deaths, 62% of the cases were preceded by hospitalizations for seizures, but only 27% received outpatient neurology clinic care between discharge and subsequent death (7).

In light of this situation, our study aims to evaluate the frequency of neurology specialists' involvement in all epilepsy-related ED attendances within the NHS Greater Glasgow and Clyde (NHS GGC) hospitals over a 12-months period and assess ASM adherence during the six months preceding ED attendance. By examining this data, we aim to gain insights into the extent of specialist care provided to PWE after ED visits and understand the adherence patterns to anti-seizure medications leading up to these ED attendances.

By improving support and access to specialist services for people with epilepsy, we are aiming to improve outcomes and reduced mortality rates in this vulnerable population.

2. Methods:

2.1 Cohort Identification:

Patients were identified retrospectively via the NHS Greater Glasgow and Clyde live integrated epilepsy Dashboard following an unscheduled epilepsy-related admission to the ED between 1st January 2022 and 30th June 2022. We calculated adherence to anti-seizure medication for a period of 6 months prior to admission, and consistent with previous studies we defined poor medication adherence as a medication possession ratio (MPR) of less than 80% (8).

Exclusion criteria:

- (I) Patients under the age of 16.
- (II) Patients with a diagnosis of new onset seizure.
- (III) Patients with Non-epileptic attack disorder (NEAD) were excluded from the study. Patients with dual pathology (NEAD plus epilepsy) were included in the study and classified based on the International League Against Epilepsy (ILAE) classification. To minimize reporting bias, the electronic patient records (EPR) of the patient cohort was reviewed and assessed independently by three different clinicians (MT, GD, SH).

2.2 Definitions:

Hospitalizations were categorized as epilepsy-related if they had an ICD-10 code (G40.x) for epilepsy listed in any position in the patient's EPR.

Epilepsy specialist follow-up was classified as:

- A. Outpatient appointment scheduled within 3 months, 6 months, or 12 months, with either a specialist nurse or neurologist,
- B. On-call neurology input received via a hotline, or
- C. No neurology specialist follow-up, if there was no record of the above (A & B) found in the EPR.

Comorbidities, such as alcohol excess use, recreational drug use, mental health illness (depression, anxiety, psychosis, or combinations of these), and learning disability, were classified based on clinical documentation found in the patient's EPR.

Based on the ILAE definition for epilepsy(9), patients were classified as having focal epilepsy, generalised epilepsy or unclassified epilepsy.

Anti-seizure medications were categorized as adjusted or non-adjusted:

- Adjusted: when change in dosage, addition of another anti-seizure medication, or reinstating the same ASM due to compliance issues, was made during hospital admission as documented in the EPR.
- Non-adjusted: When none of the above was made.

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3. Results:

3.1 Basic demographics

Between 1st Jan 2022 and 30th June 2022, 266 emergency care seizure-related attendances were identified, generated by 219 PWE. The mean age at attendance was 46 years (range: 16-91). 168 were males (63%) and 98 (37%) were females (ratio: 12:7).

3.2 Epilepsy classification

29.3% had GGE, 42.1% had focal epilepsy, and in 28.6% of cases the epilepsy was unclassified.

3.3 Comorbidity

18% of attendances had background diagnosis of Learning disability.

One third of attendances of PWE have mental health illness 93/266 (35%).

66/266 (25%) of ED attendances noted to have active history of alcohol consumption misuse and/or recreational drugs use.

3.4 Support from Epilepsy Services

At point of ED attendance- Of the 266 admissions, advice from the on-call neurology service was sought in 75/266 (28.2%) admissions. In 45/75 (60%) this resulted in an ASM dose adjustment prior to discharge.

Within outpatient setting - 107/ 266 (40.2%) generated follow up in an out-patient clinic within 6 months of attendance. Notably, the majority in this group, comprising 82 out of the 107 (76.6%), were promptly scheduled for outpatient clinic appointments within a three-month timeframe.

Outpatient clinic appointments between 6 months to 12 months from ED attendances were offered to 23/266 (8.6%)

Overall, 22.9% of seizure attendances to the ED did not lead to neurology outpatient follow up.

3.5 Poor medication adherence

Overall, a MPR of less than 80% was noted in the 6 months prior to 54/266 (20.3%) ED attendances.

Poor medication adherence was noted in 22/93 (24%) ED attendances with a history of mental health illness, and in a third of ED attendances with active history of alcohol misuse and/or recreational drugs use (22/66, 33%).

Of the 219 PWE, 39 (17.8%) patients had a rescue medication protocol in place.

3.6 Mortality

14/219 (5.5%) of PWE died during the period of interest (12 months post the last ED visit). In 6/14 (42.8%) death was associated with poor medication adherence. The median duration of time of death from the last ED attendance is 9 months (range from 1-12.5 months). A current history of mental health illness was seen in 8/14 (57.1%) of the deceased, and 5/14 (35.7%) had active history of alcohol misuse or/and recreational drugs use. Only 5/14 of deaths had input via on-call neurology service in NHSGGC during this period and of the 5 cases who had input from specialist service, 4/5 had ASM adjusted.

4. Discussion:

The study demonstrates a significant proportion of PWE experiencing an epilepsy-related emergency attendance did not receive support from specialist services at a time of greatest risk, either while an in-patient or in an out-patient setting. Early out-patient/ immediate inpatient review would allow potentially reversible factors associated with poor outcome to be considered (e.g., medication adherence) and allow those at greatest risk to receive additional support. The numbers needed to see within an out-patient clinic to potentially improve care are relatively small with poor adherence during the preceding six months noted to be 20% and 33% of those with comorbid substance misuse.

These findings are broadly consistent with both the UK National Audit of Seizure management (NASH) in adults published in 2013(5) and findings from the European Audit of Seizure Management in Hospitals (6) and emphasise that services are not currently designed to meet the need of those at greatest risk of death from epilepsy.

It is important to emphasize that among those who received neurology input during hospitalization, a 60% rate of ASM adjustments was observed. This prompts a reasonable argument in favour of increased provision of specialized neurology services during ED encounters and/ or close working relationships to be fostered between ED and neurology services. This could be facilitated by ensuring a fail-safe mechanism is in place to ensure timely review is arranged. Investment in IT infra-structure and the increasing use of live integrated disease specific Dashboards may facilitate early access following an adverse event. This study stands distinct in its examination of ASM adherence patterns within the six months prior to ED attendance, the frequency of ED visits related to seizures, and the involvement of both inpatient and outpatient neurology services in the six months following ED visits. Employing retrospective cohort data derived from a singular Electronic Patient Record (EPR) system ensures consistency in data reporting. To mitigate reporting bias, data evaluation was independently conducted by three neurologists.

The study's foundation stems from evidence indicating heightened mortality risk in PWE who visit EDs within six months, as well as evidence associating poor ASM adherence with increased ED utilization(4) (3). A major limitation arises from the system's incapability to automatically report primary care records, potentially leading to an underestimation of epilepsy-related adverse events or the level of support provided as a direct result of primary care intervention.

5. Conclusion:

This study underscores that a significant proportion of PWE do not access specialist services at a time of greatest risk. Poor medication adherence remains a potential contributing factor to account for previously noted high rates of mortality within this cohort (and may in part account for the need to access unscheduled care). Addressing this situation provides an opportunity for those planning epilepsy services to enhance care and outcomes for PWE. A disease-specific clinical dashboard providing automated electronic notifications to inform specialists about recent ED visits, potentially enabling early follow-up, can be particularly helpful if viewed with surrogate measure of adherence such as dispensing ASM data. A prospective study to consider the value of electronic dashboards in epilepsy care will be published in due course.

References:

1. Fazel S, Wolf A, Långström N, Newton CR, Lichtenstein P. Premature mortality in epilepsy and the role of psychiatric comorbidity: a total population study. *Lancet Lond Engl*. 2013 Nov 16;382(9905):1646–54.
2. Wojewodka G, Gulliford MC, Ashworth M, Richardson MP, Ridsdale L. Epilepsy and mortality: a retrospective cohort analysis with a nested case-control study identifying causes and risk factors from primary care and linkage-derived data. *BMJ Open*. 2021 Oct 25;11(10):e052841.
3. E. Faught, M. S. Duh, J. R. Weiner, A. Guérin, M. C. Cunnington. Nonadherence to antiepileptic drugs and increased mortality. *Neurology*. 2008 Nov 11;71(20):1572.
4. Mbizvo GK, Schnier C, Simpson CR, Duncan SE, Chin RFM. Case-control study developing Scottish Epilepsy Deaths Study Score to predict epilepsy-related death. *Brain*. 2023 Jun 1;146(6):2418–30.
5. Dixon PA, Kirkham JJ, Marson AG, Pearson MG. National Audit of Seizure management in Hospitals (NASH): results of the national audit of adult epilepsy in the UK. *BMJ Open*. 2015 Mar 31;5(3):e007325.
6. Taylor C, Tudur-Smith C, Dixon P, Linehan C, Gunko A, Christensen J, et al. Care in Europe after presenting to the emergency department with a seizure; position paper and insights from the European Audit of Seizure Management in Hospitals. *Eur J Neurol*. 2022 Jul;29(7):1873–84.
7. Mbizvo GK, Schnier C, Simpson CR, Chin RFM, Duncan SE. A national study of epilepsy-related deaths in Scotland: Trends, mechanisms, and avoidable deaths. *Epilepsia*. 2021 Nov;62(11):2667–84.
8. Askarieh A, MacBride-Stewart S, Kirby J, Fyfe D, Hassett R, Todd J, et al. Delivery of care, seizure control and medication adherence in women with epilepsy during pregnancy. *Seizure Eur J Epilepsy*. 2022;100:24–9.
9. Fisher RS, Cross JH, French JA, Higurashi N, Hirsch E, Jansen FE, et al. Operational classification of seizure types by the International League Against Epilepsy: Position Paper of the ILAE Commission for Classification and Terminology. *Epilepsia*. 2017 Apr;58(4):522–30.

Declaration of competing interest:

CA Heath: In the last 3 years CH has received Speakers' Honoraria and Advisory Board payments from UCB Pharmaceutical, Eisai and Arvelle