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Pre-hospital care after a seizure: Evidence base and United Kingdom management guidelines

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ABSTRACT

Purpose: Seizures are a common presentation to pre-hospital emergency services and they generate significant healthcare costs. This article summarises the United Kingdom (UK) Ambulance Service guidelines for the management of seizures and explores the extent to which these guidelines are evidence-based.
Methods: Summary of the Clinical Practice Guidelines of the UK Joint Royal Colleges Ambulance Liaison Committee relating to the management of seizures. Review of the literature relating to pre-hospital management of seizure emergencies.
Results: Much standard practice relating to the emergency out of hospital management of patients with seizures is drawn from generic Advanced Life Support (ALS) guidelines although many patients do not need ALS during or after a seizure and the benefit of many ALS interventions in seizure patients remains to be established. The majority of studies identified pertain to medical treatment of status epilepticus. These papers show that benzodiazepines are safe and effective but it is not possible to draw definitive conclusions about the best medication or the optimal route of administration.
Conclusion: The evidence base for current pre-hospital guidelines for seizure emergencies is incomplete. A large proportion of patients are transported to hospital after a seizure but many of these may be suitable for home management. However, there is very little research into alternative care pathways or criteria that could be used to help paramedics avoid transport to hospital. More research is needed to improve care for people after a seizure and to improve the cost-effectiveness of the healthcare systems within which they are treated.

1. Introduction

Seizures are one of the most common reasons why emergency care services are contacted[1] and a substantial number of those with chronic seizure disorders use such services frequently.[2] Pre-hospital services are a crucial determinant of Emergency Department (ED) attendances. Previous studies have demonstrated that a large proportion of patients who present to EDs with seizures have a diagnosis of epilepsy already.[3] In the UK up to 18% of adults with active epilepsy attend EDs annually and 40–60% of

Abbreviations: TIA, transient ischaemic attack; UK, United Kingdom; ALS, advance life support; ED, Emergency Department; PWE, people with epilepsy; QoL, quality of life; SE, status epilepticus; JRCALC, Joint Royal Colleges Ambulance Liaison Committee; ABCD, airway breathing circulation disability; IV, intravenous; PR, per rectum; USA, United States of America; ECG, electrocardiogram; ECA, emergency care assistant; EEG, electroencephalography; IM, intramuscular; IN, intranasal; AEDs, automatic external defibrillators; NEAD, non-epileptic attack disorder.

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these visits by people with epilepsy (PWE) result in hospital admission.[2] The commonest reasons for attending EDs with seizures include unusual or new-onset seizures and increase in seizure frequency, with cessation of anti-epileptic drugs and alcohol withdrawal being the most important contributing factors.[3,4] Injuries after a seizure are another common reason (observed in approximately 9% of seizure patients who receive medical care), making a considerable contribution to seizure-related healthcare costs.[5]

Explanations for the use of emergency services include a lack of knowledge and a feeling of social responsibility amongst bystanders, fears of adverse consequences and new or unexpected symptoms.[6] Those who repeatedly attend EDs report poorer Quality of Life (QoL), increased stigmatisation and higher levels of anxiety and depression.[7] ED visits and subsequent hospitalisations contribute to the majority of the economic burden of uncontrolled epilepsy[8] with previous authors recently estimating an annual cost of €417,074 (£347,544) per 100,000 per year for hospital admissions alone.[9]

In this paper we initially present a summary of the current official UK guidance for the pre-hospital management of seizures by ambulance clinicians. We then explore to what extent these guidelines are based on currently available evidence by carrying out a review of studies of pre-hospital care interventions for patients with seizures (the majority of papers focus on the treatment of generalised convulsive status epilepticus (SE)). The UK guidelines are described as an exemplar of a national clinical guideline and are not intended to reflect practice internationally which is likely to vary (a review of guidelines in individual countries is beyond the scope of this article).

2. Literature review methods

The MEDLINE database (Ovid, 1946 to January 2014) was searched for relevant articles. Two broad categories were used: (i) seizures and (ii) pre-hospital care. Search terms in the seizure category included: "seizures", "epilepsy", "non-epileptic attack disorder", "fits", "convulsions", "status epilepticus", "epileptological emergencies" and "pseudo-seizures". Seizure aetiologies with alternative management priorities (e.g. febrile convulsions, eclampsia) were not the main focus of the review and were therefore not included in the original search strategy. Those relating to pre-hospital care were: "pre-hospital care", "emergency medical services", "ambulances", "emergency medical technicians", "allied health personnel" or "paramedic".

Exclusion criteria were: (i) case reports, (ii) in-hospital or ED care, (iii) not specific to emergency care by pre-hospital services or (iv) not specific to seizure management, (v) alternative aetiologies with different management priorities e.g. trauma and eclampsia, (vi) review articles, (vii) articles not in English and (viii) letters, editorials or supplements. Some articles captured within the search did not evaluate formal pre-hospital services but were included, because they looked at emergency treatment of a seizure in the residential setting in patients with an established diagnosis of epilepsy. We complemented the search outlined with hand searches for relevant articles in the reference lists of articles retrieved by the search, the grey literature such as national guidelines and our own archives.

The initial search generated 287 titles and abstracts of which 257 articles were excluded (104 articles were not specific to seizure management, 48 did not relate to pre-hospital services, 104 were case reports, review articles, articles not in English, editorials, letters or supplements and one article was a duplicate of a paper included within the review). 30 articles were retrieved in full; they all met the criteria and were included in the review. Two more papers were added after reviewing the reference lists of the retrieved articles.[10,11] 16 further articles/sources which were considered relevant by the authors but not captured by the original search were also included.[4,7–9,12–21,38,40] Articles referenced but not captured within the original search were used to complement the review and included those which highlight the scale of the problem,[4,7–9] papers which do not relate directly to pre-hospital services[10,13–18,38,40] or seizure management itself[11,19,20] and one article on simple febrile seizures.[21] There is an extensive literature on the management of the seizure patient after arrival in the ED, however, this is beyond the scope of this review. Recent reviews on in-hospital management have been published in both adults[22] and children[23] that provide evidence on further management of established and refractory SE. Including these two review articles a total of 50 articles/sources are cited in this paper.

3. UK Ambulance Services clinical practice guidelines

The Guideline Development Group of the UK Ambulance Service's Joint Royal Colleges Ambulance Liaison Committee produces Clinical Practice Guidelines which are used to guide paramedic practice in the UK.[12] These Clinical Practice Guidelines are intended to be evidence-based whenever possible. The 'JRCALC' (as it is colloquially known) contains two sections on 'convulsions' (one for adults and one for children) plus separate sections on the relevant drug doses and administration schedules.

3.1. Initial assessment and resuscitation

Initial assessment and resuscitation is based on the airway, breathing, circulation, disability (ABCD) approach to ALS and the important issues which are related to seizures are summarised in Table 1.

3.2. Medications for status epilepticus

Benzodiazepine treatment to terminate seizures is suggested in the Clinical Practice Guidelines after 5 min of seizure activity (2–3 min in eclampsia) or if repeated seizures occur (not secondary to hypoxia or hypoglycaemia). First line treatment is the patient's own midazolam if this is available (UK ambulances do not carry midazolam); this should be administered via the buccal or intranasal route. This is preferred to diazepam because of the delay in onset of diazepam caused by obtaining intravenous (IV) access or by slow per rectum (PR) absorption. Midazolam can be administered by the carer or the ambulance clinician (if the latter is competent at this). A second dose of midazolam should be given after 10 min if the seizure continues. Alternatively diazepam may be used for the second dose.

Diazepam is the benzodiazepine of second choice for termination of seizures. IV is the preferred route in adults if IV access can be gained rapidly. If IV access is difficult then the PR route should be used. In children, because of the difficultly gaining IV access, PR is the preferred route. A second dose of diazepam should be given after 10 min if the seizure continues but this must be via the IV route (or via the intra-osseous route in children).

3.3. Transfer to hospital

According to the Guidelines, a time critical transfer to hospital should be undertaken if the patient can safely be moved and any of the following features are present: major ABCD problems, serious head injury, SE (following failed treatment), underlying infection e.g. meningococcal septicaemia or eclampsia. Other criteria for transfer to hospital are: serial seizures (three or more in an hour), first seizure, difficulties monitoring the patient, all children under one year old and first febrile convulsion in children (non-first

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