



SeizureStat[®]

A PDA Software for ED Seizure/SE Therapeutics and the 2004 ACEP Seizure Clinical Policy

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Case Presentations

A paramedic in the field calls in a request for rectal diazepam in a two year old child. What is the correct dose?

In the ED, a child is actively seizing and has no IV access. What is the best IM benzodiazepine for use in SE? What alternate routes exist for the treatment of pediatric SE?

An ED patient continues to seize despite the administration of lorazepam. What options exist for the EM physician in treating this seizing patient?

A patient presents to the ED with a new onset seizure and has a normal neurological exam. What are appropriate options for the evaluation and disposition of this patient?

Key Learning Points

- PDA software applications are being more frequently used by clinicians in order to deliver medical care, both in the inpatient and outpatient settings.
- The 2004 ACEP Seizure Clinical Policy address six questions in two areas.
- Regarding new onset seizure patients, the ACEP clinical policy addresses the lab and neuroimaging requirements, as well as the need for AED loading and hospital admission.
- Regarding seizures and status epilepticus (SE), the ACEP clinical policy addressed optimal phenytoin loading strategies, the treatment of patients who continue to seize despite the administration of a benzodiazepine, and the indications for acute EEG monitoring in ED patients.
- SeizureStat[®] is a free PDA software that highlights seizure/SE therapeutics and the 2004 ACEP Seizure Clinical Policy. It is available as of April 1, 2004 for beta testing from the FERNE website www.ferne.org.
- SeizureStat[®] provides specific information for ten urgent seizure medications, as well as a SE treatment protocol, the 2004 ACEP Clinical Policy questions and recommendations, and written materials for use by the clinician.

The Use of PDA Devices in Clinical Medicine

The personal digital assistant (PDA) is becoming more frequently used by health care providers around the world. Only used by 26% of physicians in 2000, use increased to 60% by 2001.(1) Multiple medical software packages exist for PDA use; some are free, others cost up to \$130.(2) PDAs have been tested in both the inpatient and outpatient settings, and have been described in clinics, radiology departments, ICUs, pharmacies, and in specific services such as an acute pain service and a cardiac surgery service.(3-7) They have also been described as part of medical student and resident education, both as a source of data, and as a means by which procedures and patient encounters can be documented.(8-11)

PDAs have been demonstrated to improve the process of gaining access to medical information and providing patient care. Specifically, authors have suggested that PDAs are able to facilitate radiology interpretation, provide anticoagulation care, enhance patient education, reduce in the number of medical errors, gain greater access to biomedical databases, make patient encounters more efficient, and enhance residents in completing procedure and patient encounter logs.(3;4;6;7;9;11-13)

Many different aspects of PDA use have been discussed, including how to develop PDA “channels” that provide specific information from the internet on an ongoing basis using wireless technology.(14) Several PDAs have been compared, noting that those that are superior are able to get to the clinically relevant data through the least number of screens,

or pages, on the PDA.(2) It was noted in this study that neither the quality of the information nor the efficiency with which relevant data is provided was correlated to the cost of the software.

Suffice it to say that many physicians, especially young physicians in training, utilize PDAs in various situations in order to enhance patient care and their practice of medicine.

SeizureStat[®] Development

SeizureStat[®] was developed using Satellite Forms, version 5.2.1. It is termed a MobileApps Designer. This software allows individual pages to be filled with content and linked to one another in a logical method. The work, although time-intensive, does allow for specific page formats to be developed in order to meet specific clinical needs.

The key steps in this process include:

1. Finding a clinically relevant topic.
2. Developing the material for the software.
3. Determining what content is on each page and the page layout.
4. Developing a roadmap as to how the pages are linked.
5. Beta testing the software.
6. Providing the software via the internet or a hard copy medium.

SeizureStat[®] Content

SeizureStat[®] contains four main materials: clinical information on acute seizure therapeutics, a protocol for managing SE, written materials that provide an overview of seizures and SE, and the six questions and answers from the 2004 ACEP Seizure Clinical Policy.

The acute seizure therapies section describes 10 specific drugs, including information on all applicable routes and doses, general clinical data, and clinical notes on the use of the drug in seizures or SE. The SE treatment protocol includes activities in four 30 minute intervals, the objective of which is to complete all of the necessary ED interventions, diagnostic tests, therapies, consultations, and determine final ED disposition within 120 minutes in an actively seizing SE patient.

The written materials describe nine seizure/SE topic areas, including epidemiology, pre-hospital care, ED diagnosis and management, status epilepticus, pediatric seizures, and seizures/SE in special populations. These special populations include patients whose

seizures are related to toxic ingestions, alcohol, traumatic brain injury, stroke, pregnancy, and psychogenic disorders.

The 2004 ACEP seizure/SE Clinical Policy asks six questions related to the ED management of patients with new onset seizures and patients who have seizures that require either phenytoin loading, SE therapies beyond the benzodiazepines or phenytoins, or EEG monitoring. The six clinical questions include:

I. What laboratory tests are indicated in the otherwise healthy adult patient with a new onset seizure who has returned to a baseline normal neurological status?

II. Which new onset seizure patients who have returned to a normal baseline require a head computed head tomogram (CT) in the ED?

III. Which new onset seizure patients who have returned to normal baseline need to be admitted to the hospital and/or started on an antiepileptic drug?

IV. What are effective phenytoin or fosphenytoin dosing strategies for preventing seizure recurrence in patients who present to the ED after having had a seizure with a sub-therapeutic serum phenytoin level?

V. What agent(s) should be administered to a patient in status epilepticus who continues to seize after having received a benzodiazepine and a phenytoin?

VI. When should electroencephalographic (EEG) testing be performed in the ED?

Intended SeizureStat[®] Clinician Use

It is intended that the clinician become familiar with SeizureStat[®] by clicking on many of the pages, most importantly accessing the pages for the 10 specific seizure/SE therapies and the SE treatment protocol pages. The clinician also can do survey reading regarding seizure and SE patients by accessing the written information pages, and can become familiar with the 2004 ACEP Seizure/SE Clinical Policy questions and recommendations.

When treating an actively seizing patient in the pre-hospital or ED setting, it is anticipated that the clinician will quickly access the pages that contain the routes, dosing, and clinical notes on the 10 urgent therapies used to treat seizures and SE. The SE treatment protocol pages also will guide the clinician in efforts to terminate the SE as quickly as possible in order to minimize morbidity and mortality in this important neurological emergency.

Obtaining SeizureStat[®] from the www.FERNE.org Website

SeizureStat[®] will be available from the www.ferne.org website as of April 1, 2004 for beta testing. This process, which should take approximately one month, should allow users to determine that the software can be loaded correctly, can run without

complications, that there are no clinically relevant errors in the content, and that it is, indeed, useful in the urgent setting of an actively seizing patient.

After May 1, 2004, the final version of the software will be available from the FERNE website. In order to download the software, it will be necessary to provide FERNE with the email address of the user, so that important updates can be provided to the user in the instance of an error or a clinically relevant change in the diagnosis or treatment of patients with seizures or SE.

FERNE recommends that every user will go to the www.ferne.org website every six months in order to obtain the most recent updates to SeizureStat[®]. FERNE will provide an update to the software every six months beginning July 1, 2004.

Impact Assessment

With the use of SeizureStat[®], it is hoped that four outcomes can be achieved:

1. That clinicians will become more familiar with the 10 important urgent seizure/SE therapies available to treat seizing patients.
2. That a majority of Emergency Physicians can become familiar with the recommendations provided in the 2004 ACEP Seizure/SE Clinical Policy so that patient care can be optimized and outcomes enhanced.
3. That the SE treatment protocol contained in the SeizureStat[®] application will prompt physicians rapidly and effectively treat SE patients and to develop local protocols that optimize the treatment of SE patients within their own institutions, if desired.
4. That patients who suffer from seizures or sustain an episode of SE can be effectively treated and returned to a productive life with a minimum of disability and psychological burden.

Conclusions

SeizureStat[®] was developed in order to improve the care of patients with seizures and SE. This free software, available at www.ferne.org, includes a SE treatment protocol, a description of 10 urgent seizure therapies, and the six questions addressed in the 2004 ACEP clinical policy that addresses patients with seizures and SE. It is hoped that this information will enhance the treatment of patients with this neurological emergency and the practice of the physicians who provide their emergency care.

Case Outcomes

The correct dose of rectal diazepam is 0.5 mg/kg per dose. For a 20 kg child, that would be a rectal dose up to 10 mg.

Midazolam is the most reliably absorbed and effective IM benzodiazepine. Other routes include intranasal and buccal benzodiazepine administrations.

A directed metabolic work-up, a non-contrast CT, and close outpatient follow-up are appropriate for a non-complicated new onset seizure patient with a normal neurological exam.

If a patient remains actively seizing despite the administration of a benzodiazepine at a full mg/kg dose, the options for further Rx include fosphenytoin or phenytoins infusions up to 30 mg/kg, infusions of valproate and/or phenobarbital, or a continuous infusion of propofol, midazolam, or pentobarbital.

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