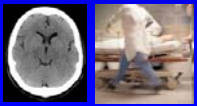



MEMC Session

Using the Internet to Improve the Care of Neurological Emergencies Patients



Edward P. Sloan, MD, MPH, FACEP



2009 MEMC V Meeting

Neurological Emergencies Track



Valencia, Spain
17 September 2009

Edward P. Sloan, MD, MPH, FACEP




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Disclosures

- FERNE Chairman and President
- FERNE grants by industry
- Participation on industry-sponsored advisory boards and as lecturer in programs supported by industry
- ACEP Clinical Policy Committee
- 2009 MEMC Educational activities supported by an Educational Grant from Alexza Pharmaceuticals


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Overview

- Neurological emergencies patients are ill
- Care can easily be optimized
- Patient case presentations
- Necessary skills
- How they can be learned real-time using the Internet

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Optimizing Seizure and SE Patient Management: Key Concepts & Clinical Policy Review




Edward P. Sloan, MD, MPH, FACEP



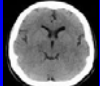
Seizures and Status Epilepticus Patients




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A Seizure/SE Patient Case




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Patient EMS Data

- 50?? yo male John Doe
- Generalized tonic-clonic seizure
- Chicago Fire Department
- Diazepam 5 mg IM, 15 mg IV
- Seizure continuous for 15 minutes +
- EMS to ED


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Patient Clinical History

- Unknown meds
- Unknown medical history
- Hx Needs surgery next month ??
- EtOH ??
- Does not appear to be homeless
- Accucheck 119


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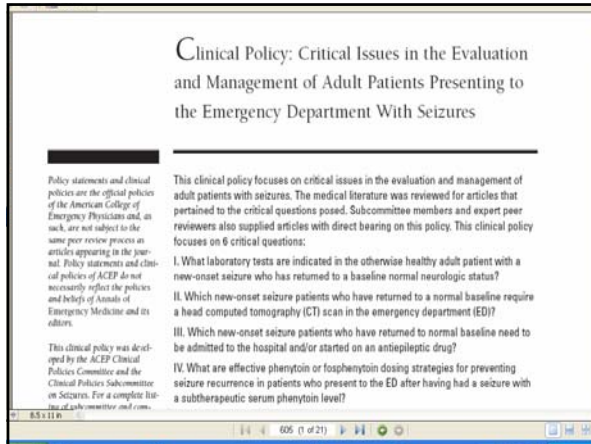


ED Presentation

- Facial and shoulder twitching R
- Pt with gurgling BS
- Nasopharyngeal airway
- No evidence of trauma or toxicity
- IV access in neck
- Seizure x minutes

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New Onset Sz: Lab Testing

- What lab tests are indicated in the otherwise healthy adult patient with a new onset seizure who has returned to a baseline normal neurological status?
- (Outcome measure: abnormal lab that changes management)

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New Onset Sz: Lab Testing

- Level B recommendations:
 - Determine a serum glucose and sodium on patients with a first time seizure with no co-morbidities who have returned to their baseline
 - Obtain a pregnancy test in women of child bearing age
 - Perform a LP after a head CT either in the ED or after admission on patients who are immuno-compromised

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New Onset Sz: Neuroimaging

- Which new onset seizure patients who have returned to a normal baseline require neuroimaging in the ED?
- (Outcome measure: abnormal CT)

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New Onset Sz: Neuroimaging

- Level B recommendations:
 - When feasible, perform a head CT of the brain in the ED on patients with a first time seizure
 - Deferred outpatient neuroimaging may be utilized when reliable follow-up is available

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New Onset Sz: Dispo/AED Use

- Which new onset seizure patients who have returned to normal baseline need to be admitted to the hospital and / or started on an AED?
- (Outcome measure: short term morbidity or mortality)

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New Onset Sz: Dispo/AED Use

- Level C recommendations:
 - Patients with a normal neurological examination can be discharged from the ED with outpatient follow-up
 - Patients with a normal neurological examination and no co-morbidities and no known structural brain disease do not need to be started on an anti-epileptic drug in the ED

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Sz/SE: Phenytoin Loading

- What are effective phenytoin dosing strategies for preventing seizure recurrence in patients who present to the ED with a sub-therapeutic serum phenytoin level?
 - (Outcome measure: short term seizure recurrence)

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Sz/SE: Phenytoin Loading

- Level C recommendation:
 - Administer an intravenous or oral loading dose of phenytoin or intravenous or intramuscular fosphenytoin, and restart daily oral maintenance dosing.

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Sz/SE SE Therapeutics

- What agent(s) should be administered to a patient in status who continues to seize despite a loading dose of a benzodiazepine and a phenytoin?
 - (Outcome measure: cessation of motor activity)

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Sz/SE SE Therapeutics

- Level C recommendation:
 - Administer one of the following agents intravenously: “high-dose phenytoin,” phenobarbital, valproic acid, midazolam infusion, pentobarbital infusion, or propofol infusion.

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Sz/SE: EEG Monitoring

- When should an EEG be performed in the ED?

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Sz/SE: EEG Monitoring

- Level C recommendation:
 - Consider an emergent EEG for patients suspected of being in non-convulsive SE or in subtle convulsive SE, for patients who have received a long-acting paralytic, or for patients who are in a drug-induced coma.

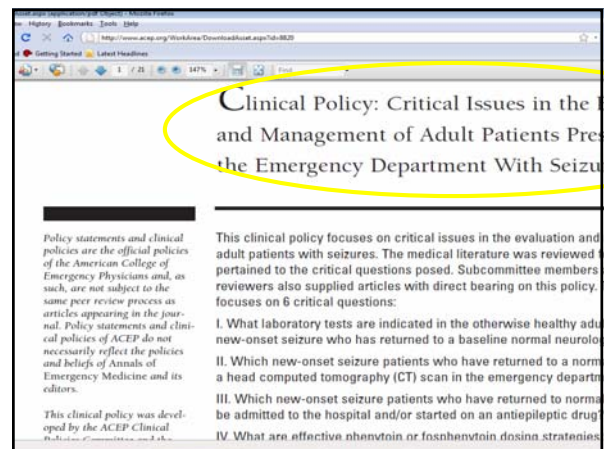
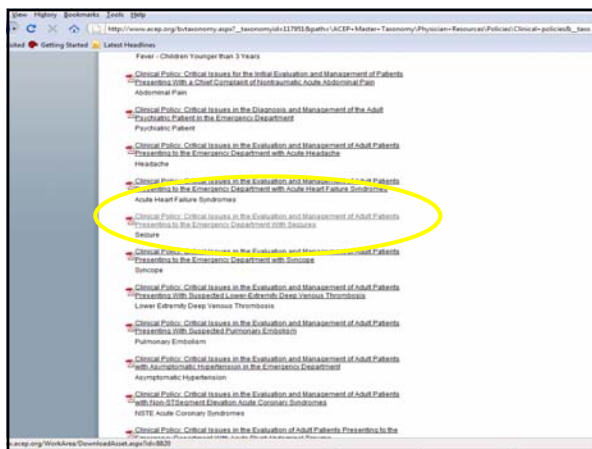
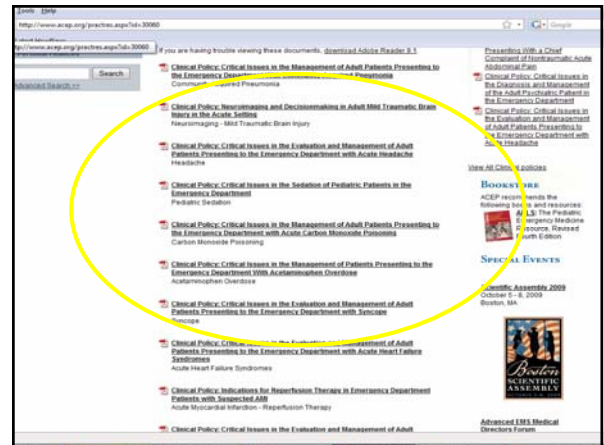
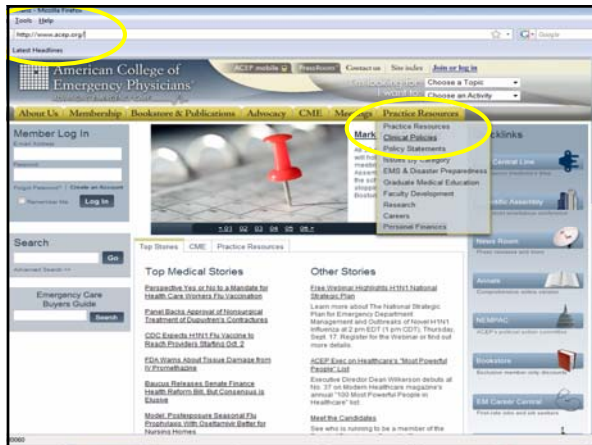
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ACEP Website

- Evidence based clinical policies are useful tools in clinical decision making
- Policy does not create a "standard of care"
- Provides a foundation for clinical practice at a national level


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ACEP Summary


- The current literature does not support the creation of any “level A” recommendations
 - 2 of the 6 clinical questions have sufficient evidence to support “level B” recommendations
 - 4 of 6 recommendations are “level C”

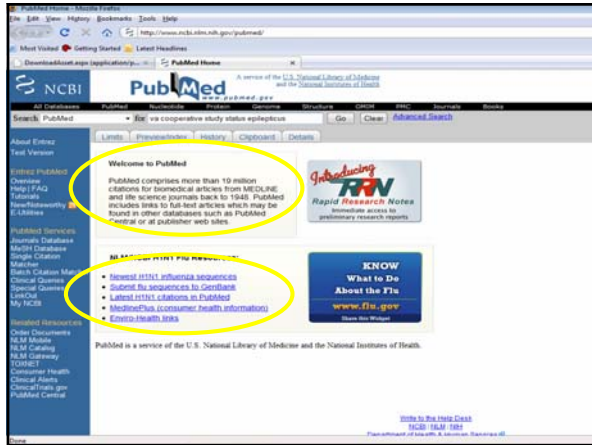
“Options”

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Subsequent Policies

- 1993 EFA SE Guidelines in JAMA
- ~2000 attempt to revise
- Use only class I data, from RCTs
- Only one publication
 - VA cooperative study (NEJM, 1998)
- Proposes benzodiazepines
- Then it’s dealer’s choice (+ / -)
- No revision to date

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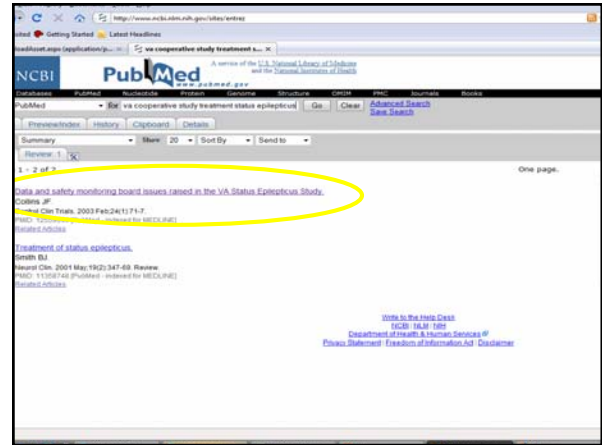


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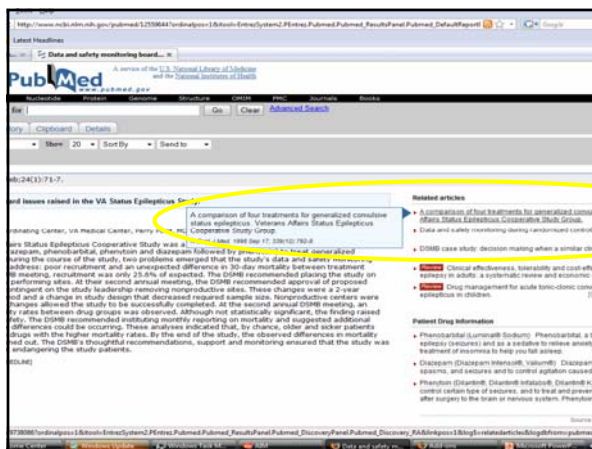
Summary: 1 - 2 of 3

1. [Review. 1998.](#)

2. [Data and safety monitoring board issues raised in the VA Status Epilepticus Study. Collins JF. N Engl J Med. 2003 Feb 24;34\(8\):717-7.](#)

3. [Treatment of status epilepticus. Smith BJ. N Engl J Med. 2004 May 19;351\(20\):1947-50. Review. PMID: 15108748. Published: 1998/05/01. Indexed: 06/04/01.](#)

Web to the Info Desk
ICD9 ICD10
Description of ICD9 & ICD10 Services
Privacy Statement / Freedom of Information Act / Disclaimer



Data and safety monitoring board...

and issues raised in the VA Status Epilepticus Study


A comparison of four treatments for generalized convulsive status epilepticus. Veterans Affairs Status Epilepticus Cooperative Study Group.

Related articles

- A comparison of four treatments for generalized convulsive status epilepticus. Veterans Affairs Status Epilepticus Cooperative Study Group.
- Data and safety monitoring during randomized clinical trials.
- DDMB case study: decision-making when a similar site is not available.
- Clinical effectiveness, tolerability and cost effectiveness in adults: a systematic review and economic evaluation.
- Drug management for acute tonic-clonic convulsion in children.

Patient Drug Information

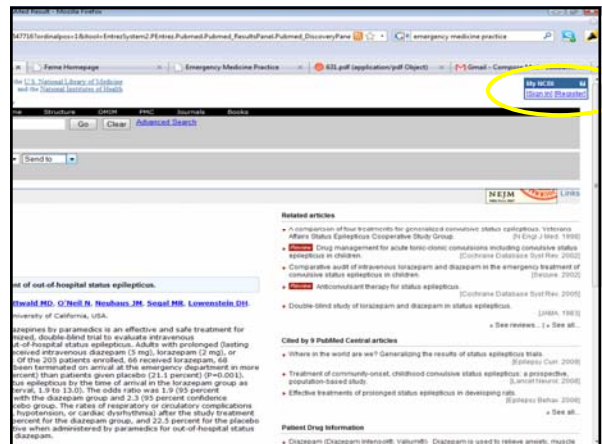
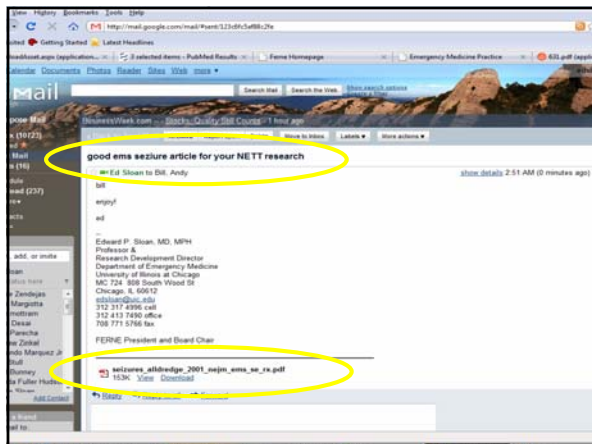
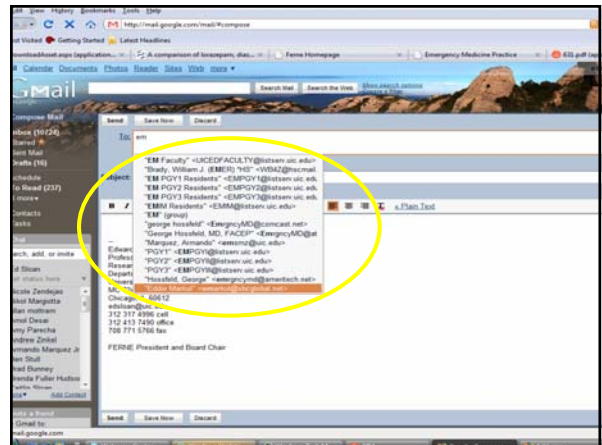
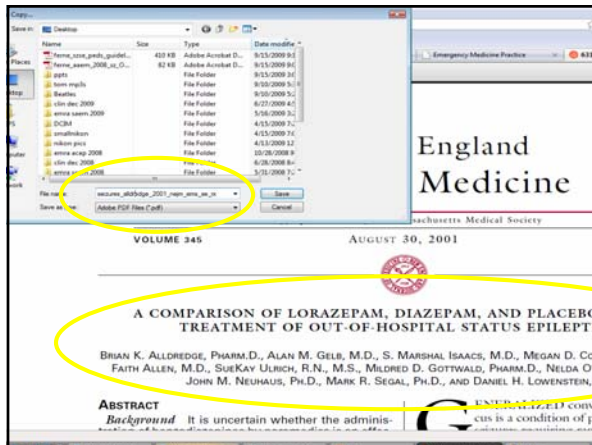
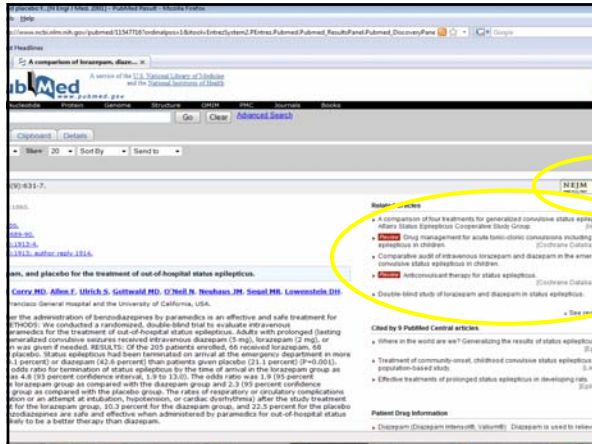
- Phenytoin (Lamictal Tablets): Phenytoin is a seizure (convulsion) and as a sedative to relieve anxiety.
- Phenytoin (Dilantin, Dilantin capsules, Dilantin suspension, Dilantin tablets): Dilantin is used to control certain types of seizures, and to treat and prevent other seizures in the brain or nervous system. Phenytoin

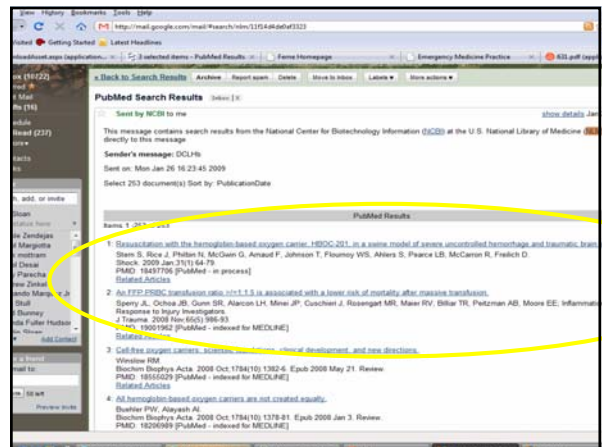
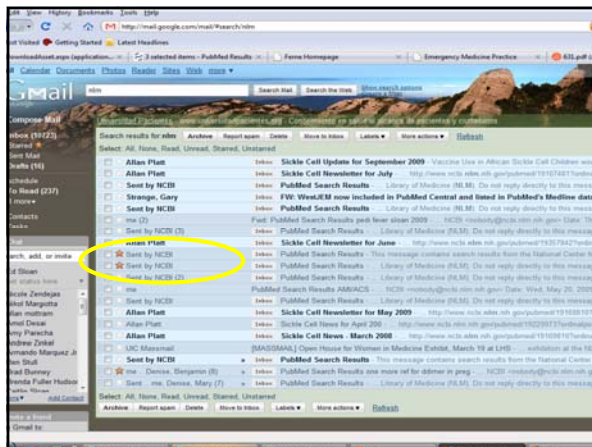
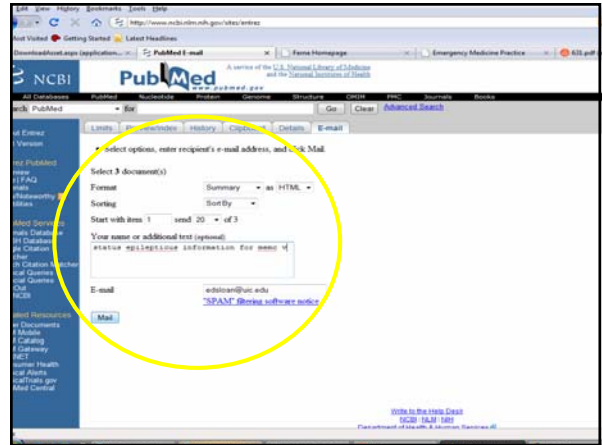
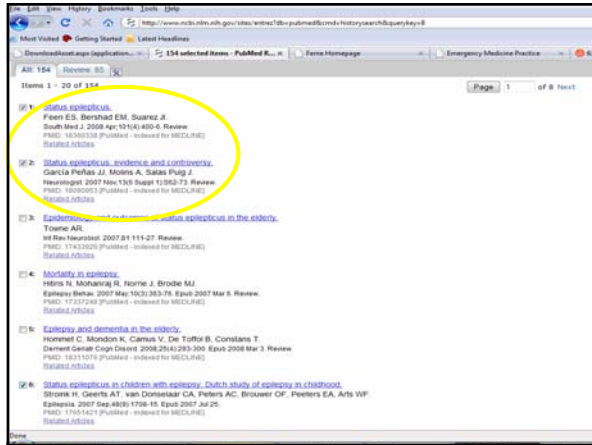
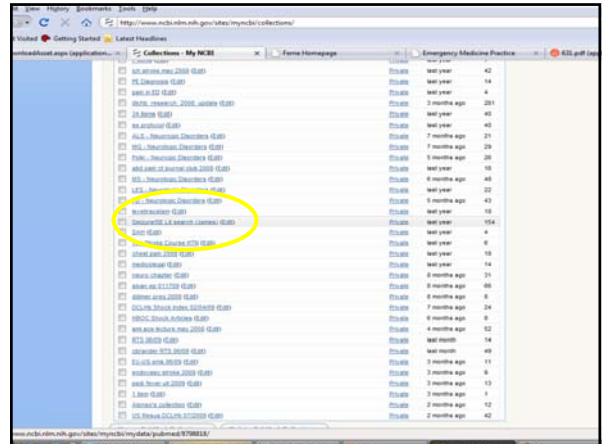
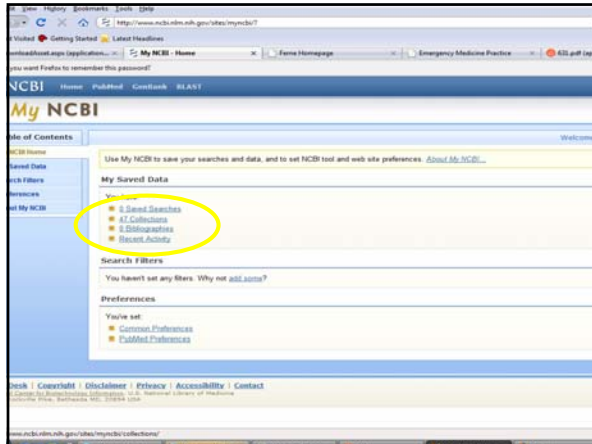


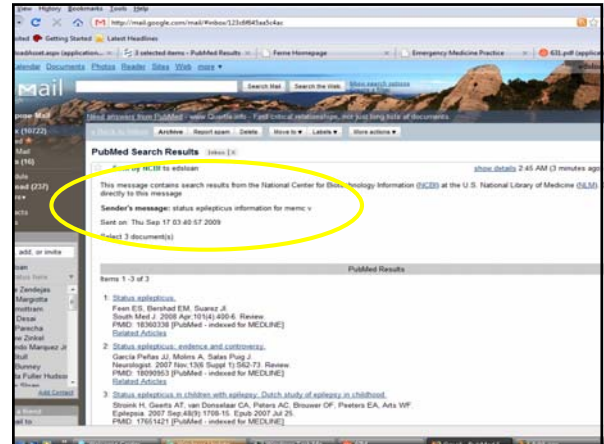
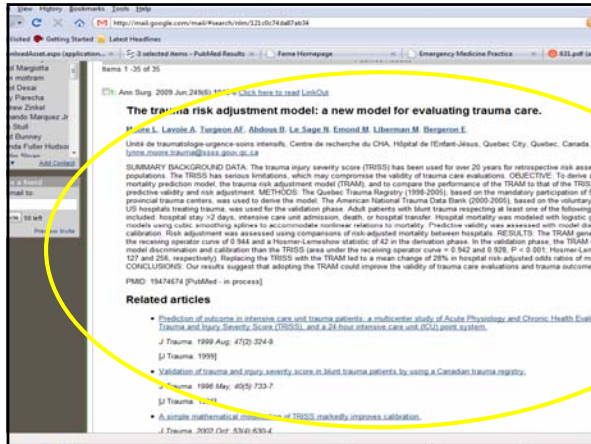
A comparison of four treatments for generalized convulsive status epilepticus. Veterans Affairs Status Epilepticus Cooperative Study Group.

Related articles

- A comparison of four treatments for generalized convulsive status epilepticus. Veterans Affairs Status Epilepticus Cooperative Study Group.
- Drug management for an epileptic in children.
- Comparative study of intravenous convulsive status epilepticus in an emergency department.
- Randomized trial of benzodiazepines.
- Double-blind trial to evaluate intravenous propofol administered by paramedics for the treatment of out-of-hospital status epilepticus. Adults with prolonged (lasting 5 minutes or more) or recurrent generalized convulsive seizures received intravenous diazepam 5 mg, lorazepam 2 mg, or midazolam 10 mg. An identical second injection was given if needed. RESULTS: Of the 205 patients enrolled, 65 received lorazepam, 65 received diazepam, and 71 received midazolam. Status epilepticus had been terminated on arrival at the emergency department in more than 50% of patients in the lorazepam (59.1 percent) or diazepam (42.6 percent) than patients given placebo (21.1 percent) (P=0.001). In addition, the only ratio for termination of status epilepticus by the time of arrival in the emergency department was 4.8 (95 percent confidence interval, 1.9 to 13.5). The odds ratio was 1.9 (95 percent confidence interval, 0.8 to 4.4) in the lorazepam group as compared with the diazepam group and 3.3 (95 percent confidence interval, 1.0 to 9.9) in the diazepam group as compared with the placebo group. The rates of respiratory or circulatory complications related to the drug were made ventilation or an airway at intubation, hypoxemia, or cardiac dysrhythmias) after the study treatment, administered were 10.6 percent for the lorazepam group, 10.3 percent for the diazepam group, and 23.3 percent for the placebo group (P=0.06). CONCLUSIONS: Benzodiazepines are safe and effective when administered by paramedics for out-of-hospital status epilepticus in adults. Lorazepam is likely to be a better therapy than diazepam.







What Should You Do?

- Learn and know more
- Know your clinical options
- Treat efficiently and effectively
- Document well

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Learn and Know More

- Read the ACEP clinical policy
- Learn at the *FERNE.org* website
- Read relevant clinical review articles
- Go to *Guidelines.gov*
- Read a clinical policy summary

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Clinical Policy: Critical Issues in the Evaluation and Management of Adult Patients Presenting to the Emergency Department With Seizures

This clinical policy focuses on critical issues in the evaluation and management of adult patients with seizures. The medical literature was reviewed for articles that pertained to the critical questions posed. Subcommittee members and expert peer reviewers also supplied articles with direct bearing on this policy. This clinical policy focuses on 6 critical questions:

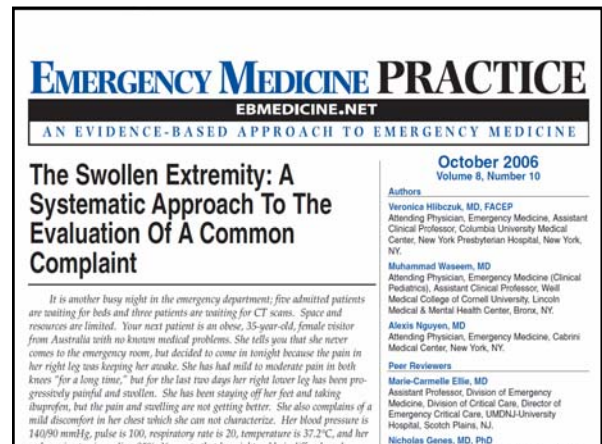
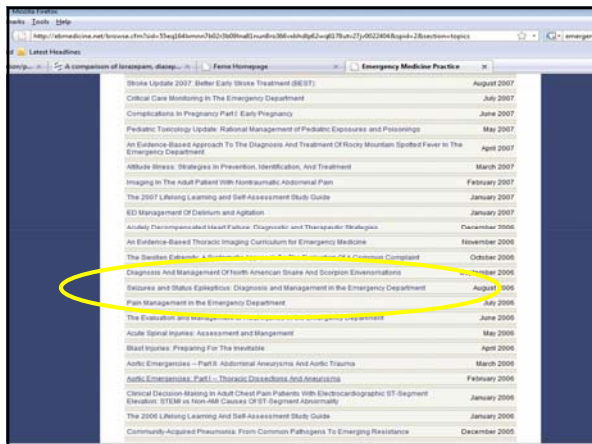
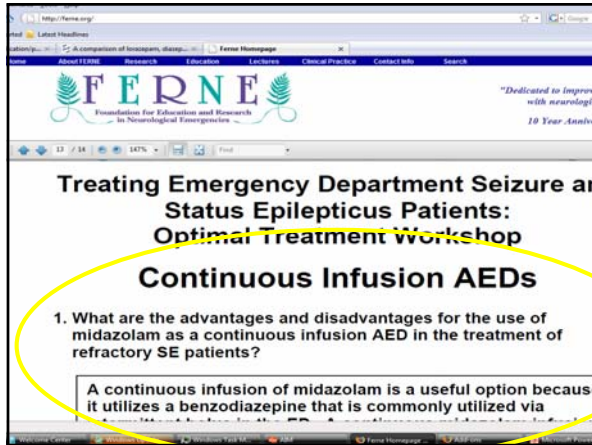
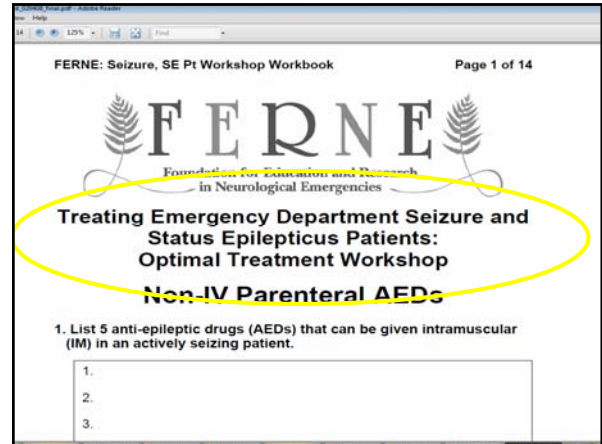
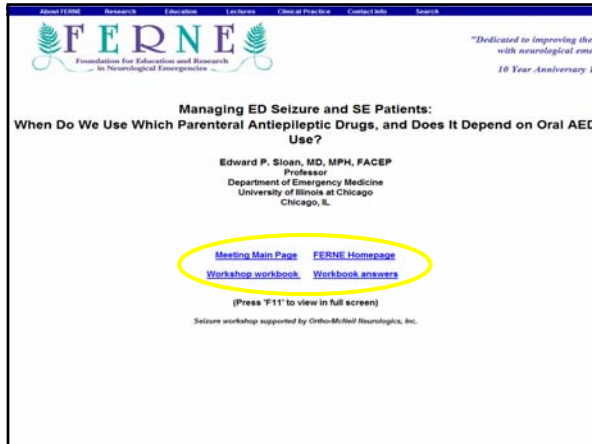
- I. What laboratory tests are indicated in the otherwise healthy adult patient with a new-onset seizure who has returned to a baseline normal neurologic status?
- II. Which new-onset seizure patients who have returned to a normal baseline require a head computed tomography (CT) scan in the emergency department (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 subtherapeutic serum phenytoin level?

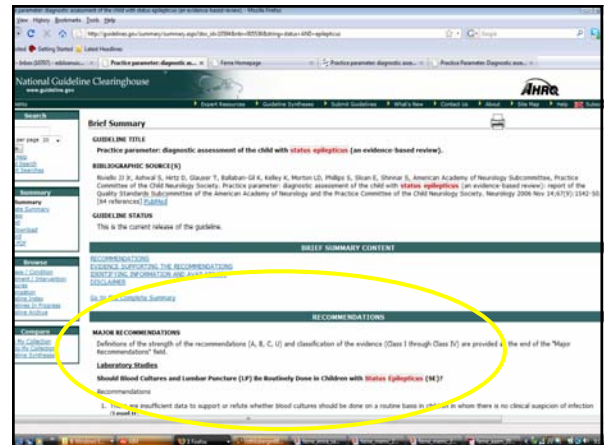
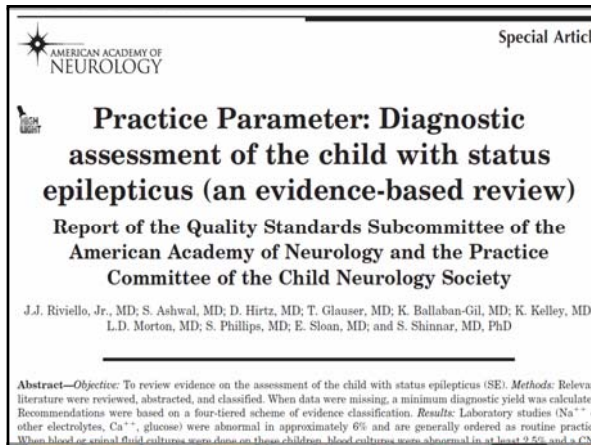
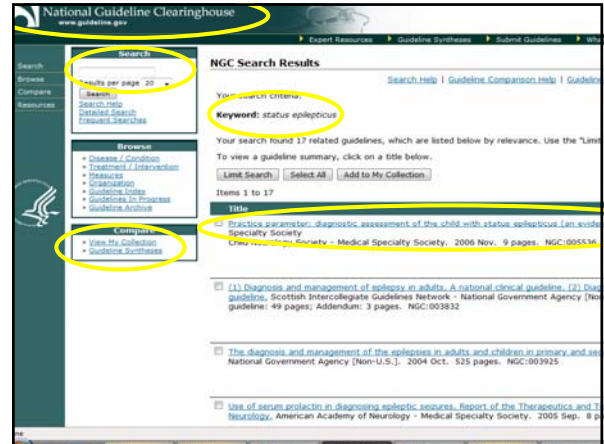
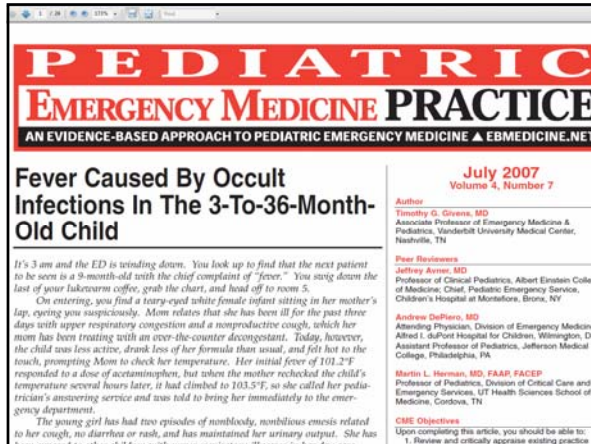
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Education Web-based Learning: Website

The screenshot shows the FERNE website with a yellow circle highlighting the "FERNE Educational Meetings" section. The website includes navigation menus, a search bar, and several featured articles or announcements.

www.ferne.org Edward P. Sloan, MD, MPH, FACEP





Know Your Clinical Options

- Know if your institution has a policy or guideline that directs your care
- Know what meds are available to you, and how to get them to the pt
- Know your consultants, and how to get a hold of them
- Know when & how to get an EEG done

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A Proposed Protocol

- 0-20 min: Initial evaluation and benzos
- 20-40 min: Fosphenytoin infusions
- 40-60 min: Phenobarbital or valproate infusions (levetiracetam?)
- 60-90 min: Continuous infusion AEDs
- 90-120 min: CT, neuro consult
- 120-150 min: ICU, EEG monitoring

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Treat Efficiently & Effectively


- Look at the clock, watch time go by
- Know what therapies you will use
- Use therapies serially
- Order and plan therapies in parallel
- Make the seizure stop


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Education
Handheld Software: SeizureStat®

SeizureStat® Available free from www.ferne.org

- Written at University of Illinois, Chicago
- Funded by FERNE
- Written materials
- Urgent SE protocol
- Information on 10 urgent meds



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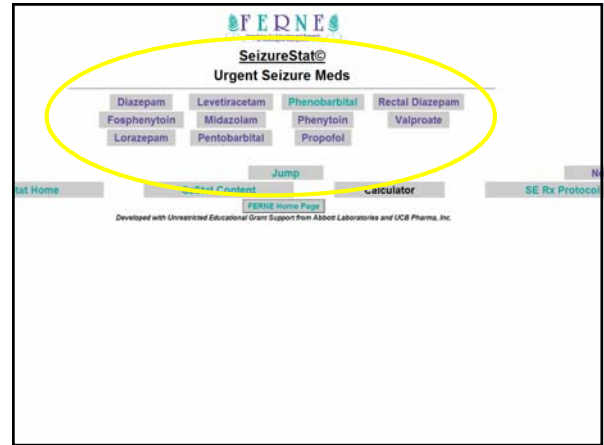


SeizureStat®
SeizureStat Content

Written Information ACEP Clinical Policy
 Urgent Seizure Meds Stat SE Rx Protocol
 Seizure Therapeutics

Back Jump Next
 SeizureStat Home FERNE Home Page SE Rx Protocol

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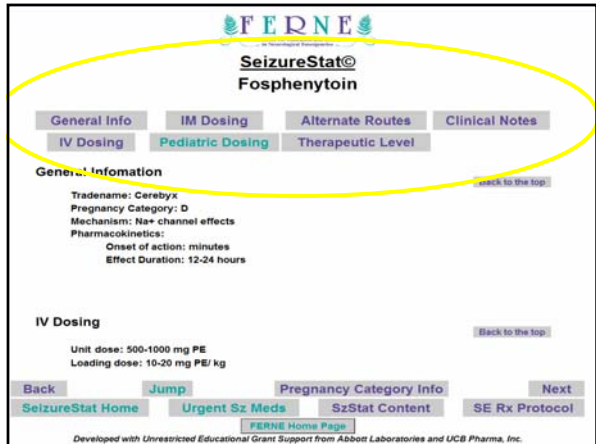
SeizureStat®
Urgent Seizure Meds

Diazepam Levetiracetam Phenobarbital Rectal Diazepam
 Fosphenytoin Midazolam Phenytoin Valproate
 Lorazepam Pentobarbital Propofol

Jump

Back Home SeizureStat Content FERNE Home Page Calculator SE Rx Protocol

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SeizureStat®
Fosphenytoin

General Info IM Dosing Alternate Routes Clinical Notes
 IV Dosing Pediatric Dosing Therapeutic Level

General Information Back to the top

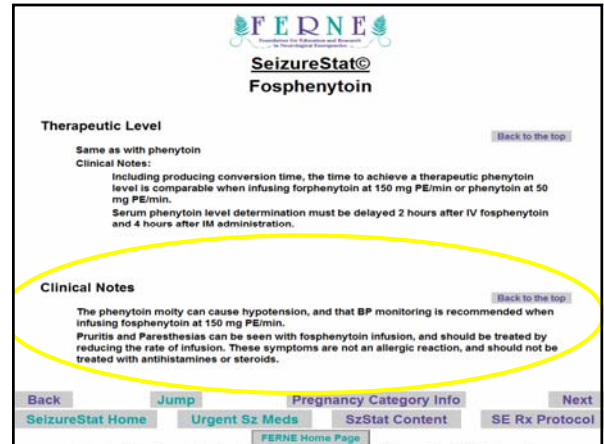
Tradename: Cerebyx
 Pregnancy Category: D
 Mechanism: Na⁺ channel effects
 Pharmacokinetics:
 Onset of action: minutes
 Effect Duration: 12-24 hours

IV Dosing Back to the top

Unit dose: 500-1000 mg PE
 Loading dose: 10-20 mg PE/ kg

Back Jump Pregnancy Category Info Next
 SeizureStat Home Urgent Sz Meds SzStat Content SE Rx Protocol

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SeizureStat®
Fosphenytoin

Therapeutic Level Back to the top

Same as with phenytoin
 Clinical Notes:
 Including producing conversion time, the time to achieve a therapeutic phenytoin level is comparable when infusing fosphenytoin at 150 mg PE/min or phenytoin at 50 mg PE/min.
 Serum phenytoin level determination must be delayed 2 hours after IV fosphenytoin and 4 hours after IM administration.

Clinical Notes Back to the top

The phenytoin moiety can cause hypotension, and that BP monitoring is recommended when infusing fosphenytoin at 150 mg PE/min.
 Pruritis and Paresthesias can be seen with fosphenytoin infusion, and should be treated by reducing the rate of infusion. These symptoms are not an allergic reaction, and should not be treated with antihistamines or steroids.

Back Jump Pregnancy Category Info Next
 SeizureStat Home Urgent Sz Meds SzStat Content SE Rx Protocol

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Therapy Administration

- Order one medication
- Deliver the medication
- Order the next medication while administering the first one
- Repeat
- Make the seizure stop



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Document Well: Medical

- Seizure history? Medical History?
- Partial seizure onset (aura)?
- Generalized seizure activity?
- AMS, post-ictal?
- Trauma? Toxins? Pregnancy?
- Neurological exam? Repeat exam?
- Family, PMD, EMS?

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Document Well: Systems

- How was secondary injury prevented?
- How did your consultants assist you?
- How did you get your medications?
- How was AMS / coma addressed?
- How were CT, EEG quickly obtained?
- How was disposition optimized?

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ED Patient Outcome

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ED Patient Management

- Lorazepam 2 mg IVP x 5 over 10 minutes
- Persistent facial and R shoulder activity
- AMS: generalized seizure continues
- Fosphenytoin 1 gram PE over 10 min x 2
- Seizure ended, pt remained obtunded
- Intubation immediately followed
- Lidocaine, sux, rocuronium

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ED Diagnostic Evaluation

- Non-contrast CT: Prior strokes, atrophy
- Metabolic tests normal
- Toxicology screening negative
- Phenytoin level cancelled
- Diagnoses:
 - AMS
 - Status Epilepticus
 - Respiratory Failure

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Family Arrives, Pt History

- Pt with history refractory seizures
- Hx carotid artery occlusion R
- Due for carotid endarterectomy
- Phenobarbital & dilantin, compliant
- Prior history of SE treated at UIC
- No recent illness, trauma, EtOH
- No medic alert bracelet

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Patient Outcome

- EEG in ED, within 150 minutes
- Neuro consultation, no subtle SE
- Admit to Neuro ICU
- Repeated doses of rocuronium
- Final disposition for carotid Rx

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Other Neurological Emergencies

- Ischemic Stroke
- Hemorrhagic Stroke
- TBI
- CNS Infections
- Subarachnoid Hemorrhage/Headache
- Pediatric Neurological Emergencies

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Ischemic Stroke

- Calculating the NIHSS
- Neuro-protection
- Blood pressure management
- Skills needed for giving tPA
- Using a 3-4.5 hour tPA window
- Documentation

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Conclusions

- Status epilepticus: medical emergency
- Take a surgeon's approach to Rx
- Know the disease and your options
- Guidelines exist that facilitate practice
- Utilize a treatment protocol
- Address the medical, systems issues
- Optimize SE patient outcomes
- Use the Internet to make it happen

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Conclusions

- The Internet has information...
- Harness it
- Distill it
- Simplify it
- Use it real-time
- Disseminate it
- Educate others
- Improve patient care

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By the Way...

- Getting Internet screen images into a PowerPoint presentation...
- Shift & Prnt Scrn
- Edit Paste into a text box
- Adjust the size
- Circle the relevant items
- Educate
- Improve patient care

Edward P. Sloan, MD, MPH



Questions?

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