**EM Basic- Seizures**

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**Chart-** read triage note, check vital signs, get full history from triage note/paramedics

**Patients who are not actively seizing**

-Get a thorough history of the incident

-Any preceding headache, vision changes, aura?

-History of seizure disorder or seizure medications?

-History of preceding trauma or fever?

-Ask bystanders what they witnessed

 -Loose and floppy with shaking or tense all over?

 -Eyes open or eyes tightly shut?

 -How long did it last?

 -Shaking all over or just one extremity?

 -Bowel or bladder incontinence?

 -Confusion after the seizure (post-ictal period)?

**PEARL-** Patients with syncope can have a few non-sustained myoclonic jerks that aren’t seizures. On the flip side- make sure this “seizure” wasn’t syncope. Syncope is a rapid loss of consciousness and postural tone with a rapid return to baseline. Have a low threshold for an EKG.

**Medical history**

**-**Full past medical and surgical history, med list, allergies, etc.

-Pay attention to the medication list

-Ask specifically about illicit drug use

-Previous workup

 -Previous seizures, previous neuro workup or CT/MRI

**Physical exam**- Full head to toe exam for trauma and complete neuro exam (listen to neuro exam supplement for refresher if needed)

**Categories of seizures**

**Primary or Secondary**

-**Primary**- seizure disorder (epilepsy)

-**Secondary**- caused by another process (meningitis, tumor, etc)

**Generalized or Partial (Focal) Seizure**

**-Generalized**- involves both cerebral hemispheres and the entire body

-**Tonic/Clonic-** most common (alternating contraction and relaxation)

 -**Absence**- pediatric disorder- staring off into space for 5 to 30

seconds at a time

-**Partial (Focal)**- involves one hemisphere

 -**Simple**- no loss of consciousness

 -**Complex**- Loss of consciousness

**Causes of secondary seizures-** AMS differential- AEIOU TIPS

**A**lcohols/acidosis **T**rauma/Toxins

**E**lectrolytes **I**nfection

**I**nsulin (too much)/Ischemia **P**sychiatric/polypharmacy

**O**xygen (hypoxia/hypercapnea) **S**troke, SAH, space occupying lesion

**U**remia (renal failure)

Condensed differential- TINE or NETTI

**T**rauma/toxins **N**eurologic

**I**nfection **E**lectrolytes

**N**eurologic **T**rauma

**E**lectrolytes **T**oxins

 **I**nfection

**PEARL­-** Remember Todd’s Paralysis. Some patients can have focal neuro deficits after a seizure that can be mistaken for a stroke. Make sure that your stroke patients don’t have a history of preceding seizure- it may make them ineligible for thrombolytics.

**Pseudoseizures-** new term is Psychogenic Non-Epileptic Seizures (PNES) or Non-Epileptic Attack Disoder (NEAD)

-These are episodes that are a patient’s reaction to stress. They are NOT faking these episodes and can’t control them. This doesn’t represent a patient trying to get out of jail by faking a seizure.

-To a bystander, it will look like a seizure. Best sign of a pseudoseizure- eyes closed tightly instead of wide open. Generally patients are tense instead of loose and floppy.

-Also- no post-ictal confusion with pseudoseizure- patients will wake up awake and alert immediately after pseudoseizure stops

-Patients may take years to get diagnosed. It’s important to remain non-judgmental. It may take years for them to get a proper diagnosis.

**PEARL**- 10-30% of patients with pseudoseizures will also have a seizure disorder diagnosed by EEG so the two can co-exist

**Workup and Treatment-** Patient who isn’t seizing, awake and alert

-New onset seizure without other suspected cause like trauma/meningitis

 -Labs- CBC, Chem 10, urine HCG, +/- EKG (all low yield)

 -Urine drug screen- controversial whether needed, consider

 -Fingerstick glucose (low yield unless diabetic)

 -Non-contrast head CT- eval for mass

-**Patient with a known seizure disorder- no suspected secondary cause**

 -Shouldn’t need a lot of testing- urine HCG mandatory

 -Find out if any missed seizure med doses

 -Search for physiologic stresses that could have triggered it

 -No imagining needed unless they have NEVER had a CT/MRI

 -Can draw levels of seizure meds

-Dilantin (phenytoin) usually available on a STAT basis but others such as Keppra (levitrecam) are send outs

-Can consider giving the patient a dose of seizure med in ED

 -Keppra (levitrecam)- 500mg IV

 -Dilantin (Phenytoin)- 20 mg/kg IV

 -There are rapid oral loading protocols for Dilantin

-Can refill patient’s seizure medication if needed but give limited amount (1 week or less) to ensure followup

**Disposition of patients not seizing**

-New onset seizure

 -Discharge with neurology or primary care followup

 -Usually won’t start a seizure medications until 2nd or 3rd seizure

**PEARL:** Make sure to give very specific discharge instructions to avoid dangerous activities that could result in bad thing if patient has another seizure like driving, operating heavy machinery, SCUBA diving, skydiving, etc. Also shower with a chair in the shower in of another seizure with someone nearby just in case, no baths. Check your state and local laws regarding notification of the Department of Motor Vehicles for license suspension. This may be a mandatory reporting in your state

**Treatment of active seizures**

**Rule #1 \*\*\* ALL PATIENTS WITH ALTERED MENTAL STATUS ARE HYPOGLYCEMIC UNTIL PROVEN OTHERWISE \*\*\***

**-**If you can’t get a fingerstick blood sugar, give one amp D50

**Rule #2- Patients with seizures die from hypoxia**

-Apply a non-rebreather at 15 LPM, can put nasal cannula under mask for extra oxygen and for apenic oxygenation if RSI needed

-Pulse ox readings may be inaccurate in seizing patients- if patient has signs of cyanosis, perform RSI

**Rule #3- Seizures are treated by benzos, benzos, and more benzos**

-Start with Ativan (lorazepam)- 2-4mg IV or double dose IM

-Versed (midazolam)- 10mg IM- shown effective in RAMPART trial

-Valium (diazepam)- can be given but short half life, not favored

-Give multiple rounds of benzos in increasing doses

**PEARL**- If you can’t secure an IV, don’t hesitate to insert an IO, all labs except potassium will be same as labs from an IV

**Differential-** after first round of benzos, consider possible secondary causes of seizures

**Labs-** CBC, chem 10, creatinine kinase, LFTs, acetimonphen, aspirin, and ethanol levels, UA, serum or urine HCG (females), urine drug screen

**EKG-** hard to get while seizing, TCA overdose can cause widened QRS

**Non-contrast CT head-** for new onset seizures

**Status Epilepticus**- continuous seizures for more than 5 minutes or multiple seizures without return to baseline

-Represents a much more severe seizure

**Second line medications**- rule of 20s

**Phenytoin (Dilantin)-** 20 mg/kg IV, don’t max out at 1 gram

 -Given at rate of 50 mg/min

**Fosphenytoin (Cerebryx)**- 20 mg/kg IV

 -Preferred agent- can be loaded 3 times faster (150 mg/min)

 -No harm if it extravasates like phenytoin

 -Won’t precipitate in IV line when combined with benzos

**Phenobarbital-**20 mg/kg IV

 -Will likely make the patient apenic, be prepared for RSI

**Keppra (levitraceam)- 500mg IV**

**-**Little evidence in status but can try it as part of “kitchen sink approach”

-Common outpatient medication, may be worth it to try

**RSI in status**

-Medications- etomidate fine, ketamine or propofol (diprivan) may be better in status- some evidence for benefit

-Paralytics- hotly debated

-Succhinylcholine- gets neuro exam back in 5-10 minutes, has downsides of hyperkalemia, malignant hyperthermia, etc.

-Rocuronium- no downsides of suxs but lose neuro exam for 30-45 minutes

-Some prefer to have neuro exam back with suxs, however in these patients will be getting stat EEG and admitting to ICU- rocuronium is ok to use as long as you continue aggressive treatment for status

Any patient in status should get a neurology consult for a stat EEG

**Third line medications-** versed drip, valproic acid, propofol drip- do this in consultation with neuro

**Seizures from hyponatremia**

-Will likely find this out when chemistry panel comes back

 -Suspect this in patients who have consumed a lot of water, GHB

ingestion, history of chronic hyponatremia

**3% Hypertonic saline**

-Only need to increase sodium by a few points to stop seizures

-Give 2-**3** mls/kg of **3**% hypertonic saline (notice the 3s) through a large bore, good IV/IO in rapid sequential boluses until seizures stop (150-200 mls in 70kg adult)

-After seizures stop, stop hypertonic saline, recheck sodium level, and slowly replace sodium over next few days as an inpatient.

**Contact-** **steve@embasic.org** **Twitter- @embasic**