



AT THE FOREFRONT OF **KIDS** MEDICINE™  
**UChicago Medicine**  
**Comer Children's**

# Headaches & Seizures

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 Comer School Nurse Continuing Education Day  
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1

**Disclosure Information:**

Comer School Nurse Continuing Education Day  
 Emily Doll

I have no relevant financial relationships to disclose.



2

**Objectives:**

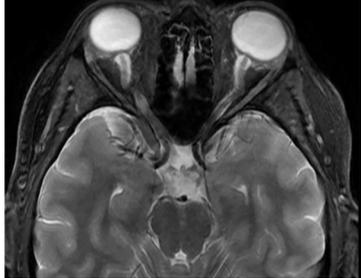
1. Become familiar with concerning features of headaches/seizures and initial management
2. Understand when a patient with headaches/seizures should be referred to a subspecialist and what information will be helpful to us in our assessment
3. Gain an awareness of abortive headache/seizure treatments that may be used in the school setting
4. Become familiar with new headache/seizure medications, devices and therapies and potential adverse effects



3

**Initial Headache Assessment:**

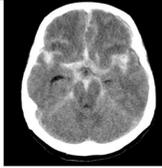
- Questions to ask:
  - Headache history
  - Acuity
  - Family history
  - Migrainous features
  - Tension features
  - Vision
  - Postural component
  - Worst headache of your life
  - Refractory emesis
  - Altered mental status
  - Focal neurologic deficits
  - Papilledema




4

### Headache evaluation:

1. Do we need head imaging and how urgently?
2. Do these headaches fit into a typical classification?
3. Is there concern for medication overuse headache?
4. What lifestyle changes have we identified?
  - Water intake, caffeine, diet, exercise, mood, skipping meals, sleep
5. Is an abortive medication warranted?
6. Is a prophylactic medication warranted?



### The CHAMP trial:

## The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JANUARY 12, 2017 VOL. 376 NO. 2

### Trial of Amitriptyline, Topiramate, and Placebo for Pediatric Migraine

Scott W. Powers, Ph.D., Christopher S. Coffey, Ph.D., Leigh A. Chamberlin, R.D., M.Ed.,  
Dixie J. Ecklund, R.N., M.S.N., Elizabeth A. Klingner, M.S., Jon W. Yankey, M.S., Leslie L. Korbee, B.S.,  
Linda L. Porter, Ph.D., and Andrew D. Hershey, M.D., Ph.D., for the CHAMP Investigators\*

### PRN medications and side effects:

- Give as early as possible
- Triptans: Sumatriptan, Rizatriptan, Zolmitriptan, Naratriptan, Frovatriptan, Eletriptan
  - Serotonin agonists – vasoconstrict cranial arteries, prevent release of vasoactive peptides, block pain signal transmission
  - Contraindicated in hemiplegic migraine, basilar migraine, CAD/MI, ischemic stroke, PVD, uncontrolled HTN, pregnancy (other than sumatriptan)
- Inanasal, oral or injectable
  - Inanasal: don't "sniff," breathe in gently x10-20 seconds; can give peppermint or candy to mask taste
- Predisposes to MOH when used > 2-3 times per week
- 5% of patients:
  - Achiness/tightness in shoulders, trunk, jaw, chest, neck
  - Paresthesias, flushing, tingling
  - Temporarily decreased peristalsis with difficulty swallowing
- NSAIDs/acetaminophen:
  - Use no more than 2-3 times per week
  - Naproxen longer-acting and less likely to cause MOH

### Cefaly:

- External trigeminal nerve stimulation device
- Electrical impulses sent through an electrode positioned on the forehead to modify pain transmission and processing in the trigeminal nerve
- Costly (\$350-\$500) and must be paid out of pocket
- Acute/abortive setting:
  - 60 minutes at the onset of headaches
- Preventative:
  - 20 minutes daily
- Adverse effects (all mild):
  - intolerance to the buzzing sensation or pain (32 participants)
  - tension-type headache (12 participants)
  - sleepiness during device use (12 participants)
  - insomnia (4 participants)
  - skin irritation (4 participants)
  - allergic reaction at electrode site (2 participants)



## Seizures:



9

## First time seizure assessment:

1. Was this a seizure?
2. Why did he/she have the seizure?

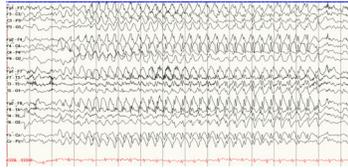
- Semiology
- Provoking factors
- Developmental delays
- Birth History
- Comorbidities
- Other risk factors (h/o head trauma, febrile seizures/status, meningitis)
- Family history



10

## Seizure/epilepsy evaluation:

- EEG
  1. Seizures
  2. Epileptiform discharges
    - Generalized
    - Focal
    - Benign-appearing or not (pleomorphic or stereotyped)
  3. Abnormal background/encephalopathy
- Consider MRI
- Consider genetics evaluation



11

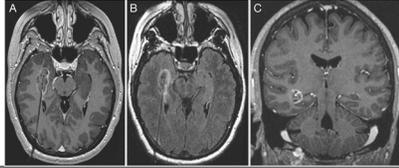
## Helpful information if you witness a seizure:

- Semiology
  - Loss of consciousness?
  - Eyes: open or closed? Gaze deviation (and which direction)?
  - Hands and legs: asymmetry? Stiffening, jerking, automatisms?
  - Urinary incontinence? Bowel incontinence? Tongue biting?
  - Respiratory pattern during and after
- Onset
- Duration
- Post-ictal state
- Staring spells
  - Attempt tactile stimulation

12

## When and why to refer to an epileptologist:

- Refractory (medication-resistant) epilepsy
  - AAN quality measure: "Percent of all patients with a diagnosis of treatment resistant (intractable) epilepsy who were referred for consultation to a comprehensive epilepsy center for additional management of epilepsy."
- Concern for underlying genetic etiology with dysmorphisms, comorbidities, developmental delays
- Our secondary work-up/treatment:
  - Less commonly used and/or more specific ASDs (felbamate, vigabatrin)
  - Dietary treatment
    - Classic Ketogenic Diet
    - Modified Atkins
    - Medium Chain Triglycerides
    - Low Glycemic Index
  - Surgical treatments
    - VNS
    - RNS
    - Ablation
    - Disconnection
    - Lesionectomy
    - Hemispherectomy



## Diastat (Rectal Diazepam):

2 - 5 Years 0.5 mg/kg		6 - 11 Years 0.3 mg/kg		12+ Years 0.2 mg/kg	
Weight (kg)	Dose (mg)	Weight (kg)	Dose (mg)	Weight (kg)	Dose (mg)
6 to 11	5	10 to 18	5	14 to 27	5
12 to 22	10	19 to 37	10	28 to 50	10
23 to 33	15	38 to 55	15	51 to 75	15
34 to 44	20	56 to 74	20	76 to 111	20



## Nayzilam (Intranasal Midazolam):

- FDA approved for children/adults  $\geq 12y$  and  $\geq 40kg$
- 5mg/0.1mL



## Valtoco (Intranasal Diazepam):

- Diazepam nasal spray
- Dosing equivalent to rectal dosing
- Comes in 5, 10, 15, 20mg
- One blister pack per dose
- FDA approval for 6y+

**Individualized dosing based on age and weight\***

6-11 years (0.2 mg/kg) (560 mg/lb)			
Weight (kg)	Weight (lb)	Dose (mg)	Given as
10-16	22.0-35.3	5	One 5 mg nasal spray device in one nostril
16-37	35.3-81.6	10	One 10 mg nasal spray device in one nostril
38-55	83.8-121.3	15	Two 7.5 mg nasal spray devices, one in each nostril
56-74	123.5-163.1	20	Two 10 mg nasal spray devices, one in each nostril

12+ years (0.2 mg/kg) (0.44 mg/lb)			
Weight (kg)	Weight (lb)	Dose (mg)	Given as
16-27	35.3-59.5	5	One 5 mg nasal spray device in one nostril
28-50	61.7-110.2	10	One 10 mg nasal spray device in one nostril
51-75	112.4-165.2	15	Two 7.5 mg nasal spray devices, one in each nostril
76 and up	167.6 and up	20	Two 10 mg nasal spray devices, one in each nostril

### Brivaracetam (Briviact):

- Structurally related to levetiracetam with similar MOA
- Tablet, solution, IV
- 20-fold higher affinity and greater selectivity
- Higher brain permeability
- Recommended dosing: 1-5 mg/kg/day divided BID
- Adverse Effects: somnolence, dizziness, fatigue, nausea, vomiting
  - No serious idiosyncratic side effects; no lab monitoring
  - Irritability only in 3.2% compared to 1.1% placebo
  - One small open-label study suggested behavioral adverse effects from LEV may improve after switching to BRIV

### Cannabidiol (Epidiolex):

- MOA not fully known; may enhance GABA through modulation of GABA-A receptors
- Bioavailability increased with a high fat meal
- Interacts with several ASDs (most notably clobazam)
- FDA approved for treatment of seizures a/w Lennox-Gastaut syndrome, Dravet or Tuberous Sclerosis in patients 2 and older
- Open label trials have shown efficacy for other forms of epilepsy
- Artisanal CBD formulations frequently used without prescription
- Recommended dosing: 10-25 mg/kg/day
- Adverse effects: sedation/somnolence, fatigue, decreased appetite, diarrhea, emesis, elevated transaminases/hepatitis particularly if used with valproate +/- clobazam
  - Obtain liver enzymes and bilirubin before treatment and at 1, 3, 6 months

### Fenfluramine (Fintepla):

- FDA-approved for patients 2 years and older with Dravet syndrome in June 2020
- Initially developed as an appetite suppressant
- Blocks serotonin reuptake
- Adverse effects:
  - Black box: valvular heart disease with a 7-fold increase in needing surgery for faulty heart valves and pulmonary arterial hypertension requiring an echo prior to starting treatment and q6 months during treatment
    - REMS (Risk Evaluation and Mitigation Strategy) restricted distribution
  - Decreased appetite/weight loss, drowsiness, sedation/lethargy, diarrhea, constipation, ataxia, hypertension, drooling, hypersalivation, emesis, headache, dizziness, dry mouth, erectile dysfunction, anxiety, irritability, emotional instability, depression, psychosis, sleep disturbances
  - Serotonin syndrome

### Cenobamate (Xcopri):

- FDA approved in 2019 for adults with focal-onset seizures
- Voltage-dependent sodium channel inhibition
- May enhance GABA modulation
- Adverse effects: somnolence, dizziness, headache, fatigue, diplopia, rare DRESS syndrome
- Contraindications: familial short QT syndrome

## RNS (NeuroPace):

### Responsive neurostimulator:

- Electrodes can be implanted or lay on the cortex and continually monitor electrographic activity
- Detect abnormal activity
- Deliver electrical stimulus when abnormal activity is detected for seizure abortion
  - Disrupts synchronous activity and evolution into generalized seizures potentially related to GABA hyperpolarization
- Two wires with four electrodes on each; ideal for two seizure onset zones or for unresectable/eloquent cortex
- Well tolerated with ~50% seizure reduction at 2 years
- Adverse effects:
  - Implant site pain, dyesthesias, headaches, mechanical failure, hemorrhage or infarction, infection



## Some reminders during COVID:

- It's as important as ever to have rescue medications and seizure action plans for prolonged seizures!
- Telemedicine appointments are available, even first time visits & consults.
- It is safe to come to the hospital if necessary – patients should not stay at home if they need care!

Ayesha Akhtar  
 Director of Education  
[www.epilepsyuchicago.org](http://www.epilepsyuchicago.org)

Seizure Action Plan		Effective Date												
<p><b>UIC MEDICINE</b></p> <p>This document is being provided for a patient's education. This document cannot be used as a substitute for medical advice from your physician.</p>														
Patient Name	Age or Sex													
Parent/Guardian	Phone	Cell												
Child Emergency Contact	Phone	Cell												
Trusting Physician	Phone													
<p><b>Seizure Medication History</b></p> <table border="1"> <thead> <tr> <th>Seizure Medication</th> <th>Dosage</th> <th>Frequency</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>			Seizure Medication	Dosage	Frequency	Description								
Seizure Medication	Dosage	Frequency	Description											
<p>Seizure triggers or warning signs: _____ Student's response after a seizure: _____</p>														
<p><b>Basic First Aid Care &amp; Caution</b></p> <p>Place student down for any convulsions.</p> <p>Does student need to have the seizure after a seizure? <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>If YES, describe steps by holding student's head down.</p>														
<p><b>Emergency Response</b></p> <p>A "Seizure Emergency" for the student is defined as:</p> <p><b>Seizure Emergency Protocol</b></p> <p>Check for airway and breathing.</p> <p><input type="checkbox"/> Contact school nurse or _____</p> <p><input type="checkbox"/> Call 911 for emergency help.</p> <p><input type="checkbox"/> Notify parent or emergency contact.</p> <p><input type="checkbox"/> Administer emergency medication as indicated below.</p> <p><input type="checkbox"/> Notify school _____</p> <p><input type="checkbox"/> Other _____</p>														
<p><b>When Seizure First Aid</b></p> <p>1. Do not touch the student.</p> <p>2. Do not restrain or hold the student.</p> <p>3. Do not put anything in mouth.</p> <p>4. Do not give the student any medication.</p> <p>5. Do not give the student any food or drink.</p> <p>6. Do not give the student any water.</p> <p>7. Do not give the student any medicine.</p> <p>8. Do not give the student any oxygen.</p> <p>9. Do not give the student any other treatment.</p>														
<p><b>Seizure Medication Administration</b></p> <p><b>Seizure Medication</b></p> <p>1. _____</p> <p>2. _____</p> <p>3. _____</p> <p>4. _____</p> <p>5. _____</p> <p>6. _____</p> <p>7. _____</p> <p>8. _____</p> <p>9. _____</p> <p>10. _____</p>														
<p><b>Special Considerations and Precautions (regarding school activities, sports, trips, etc.)</b></p> <p>Describe any special considerations or precautions.</p>														
<p>Does student have a Vagus Nerve Stimulator? <input type="checkbox"/> Yes <input type="checkbox"/> No. If YES, describe trigger on _____</p>														
<p><b>Special Considerations and Precautions (regarding school activities, sports, trips, etc.)</b></p> <p>Describe any special considerations or precautions.</p>														
Physician Signature	Date													
Parent/Guardian Signature	Date													