Pediatric Headache Management
First Steps to Success

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Duke Pediatric CME-Hilton Head, SC
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Disclosures

- Speaker’s Bureau for Amgen

- We will be discussing medication usage that is considered off-label
Objectives

After listening to this presentation, participants should be able to:

- Select appropriate “First Steps” in the assessment and differential of headache complaints
- Initiate “First Steps” in management plan
- Educate parents on “First Steps” of ED treatment
- Identify “First Steps” in collaboration with school and community
Challenges in Providing Headache Care

- **Challenges:**
  - PCP Visit duration (time);
  - Long wait times for neurology appts (access)
  - ? diagnosis of primary HA disorders
  - ? initial HA treatment

- **Current Approaches:**
  - Evidence-Based guidelines & diagnostic criteria
  - Use of Algorithm/pathway to standardize HA diagnosis and treatment
    - Correct diagnosis
    - Appropriate imaging and labs
    - Home/School management
ICHDI-3 Diagnostic Criteria
Primary & Secondary Headache

**Migraine**
- Migraine with/wo aura
- Tension-type
- Chronic Daily HA & NDPH

**Attributable to another cause**

Vestibular migraine
- Patients with history of migraine headaches
- Episodes of vertigo +/- typical migraine symptoms
- Duration of seconds to minutes
- Nystagmus typically present during episode
- MRI and MRA; audiometry if hearing loss, aural fullness, or tinnitus

Retinal migraine
- Sudden loss of vision or perception of bright light or scintillations in one eye
- Gradual spread lasting 5-60 minutes
- Typically precedes ipsilateral periorbital headache
- Ophthalmology and MRI

Less Common Primary Headaches:

Vestibular Migraine

Retinal Migraine
3-11% school-aged children 5-12y

Chronic health problem resulting in disability

8% of children with CMH miss at +6 days/year
Migraine Headache - The BIG Picture

Prodrome
- Irritability
- Depression
- Yawning
- Increased need to urinate
- Food cravings
- Sensitivity to light / sounds
- Problems in concentrating
- Fatigue and muscle stiffness
- Difficulty in speaking & reading
- Nausea
- Difficulty in sleeping

Aura
- Visual disturbances
- Temporary loss of sight
- Numbness and tingling on part of the body

Migraine Attack
- Throbbing
- Drilling
- Ice pick in the head
- Burning
- Nausea
- Vomiting
- Giddiness
- Insomnia
- Nasal Congestion
- Anxiety
- Depressed mood
- Sensitivity to light, smell, sound
- Neck pain and stiffness

Postdrome
- Inability to concentrate
- Fatigue
- Depressed mood
- Euphoric mood
- Lack of comprehension

Time

Severity

Few hours to days
5 to 60 minutes
4 to 72 hours
24 to 48 hours
Pediatric Migraine Variants

- Cyclic vomiting
- Abdominal migraine
- Benign paroxysmal vertigo of childhood
- Benign torticollis
- Confusional migraine

Case #1-
First Steps in Kid's Headache Care

- History & Exam
- Diagnostic testing
- Differential & Diagnosis
- Home
- School
- Management
- ED
First Steps in Assessment
Pre-visit Information:

Headache disability

Headache Tracking

Lifestyle History

PedMIDAS

Headache Disability

The following questions try to assess how much the headaches are affecting day-to-day activity. Your responses should be based on the last three months. There are no “right” or “wrong” answers so please put down your best guess.

1. How many full-school days of school were missed in the last 3 months due to headaches?

2. How many partial days of school were missed in the last 3 months due to headaches (do not include full days counted in the first question)?

3. How many days in the last 3 months did you function at less than half your ability at school because of a headache (do not include days counted in the first two questions)?

4. How many days were you not able to do things at home (i.e., chores, homework, etc.) due to a headache?

5. How many days did you not participate in other activities due to headaches (i.e., play, go out, sports, etc.)?

6. How many days did you participate in those activities, but functioned at less than half your ability (do not include days counted in the 5th question)?

Total PedMIDAS Score

Headache Frequency

Headache Severity

PedMIDAS Score Range | Disability Grade
--- | ---
0 to 10 | Little to none
11 to 30 | Mild
31 to 50 | Moderate
Greater than 50 | Severe

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iHeadache
## Headache History

<table>
<thead>
<tr>
<th>Onset/Chronicity</th>
<th>Timing</th>
<th>Quality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Duration</td>
<td>Triggers</td>
</tr>
<tr>
<td>Associated Symptoms</td>
<td>Aggravating Factors</td>
<td>Alleviating Factors</td>
</tr>
<tr>
<td>Medication History</td>
<td>Psychosocial Factors</td>
<td>PMH/FMH</td>
</tr>
</tbody>
</table>
Red Flags: History

- Worst headache of their life
- First-morning or positional headaches, especially with vomiting
- During sleep, especially with vomiting
- Occipital location
- Atypical or change in pattern (without obvious stressors)
- Accelerating course (increasing frequency or severity)
- Recurrent severe headaches refractory to treatment
- Worse with exertion, especially in post-pubertal children
Red Flags: History

- Associated neurological deficits (hemiparesis, ophthalmoparesis, seizures)
- Confusion/alterned consciousness
- Sudden, complete loss of vision
- Diplopia
- Focal weakness
- New onset seizures
- Personality changes
- Abrupt decline in school performance
- Paresthesias/tingling
Idiopathic intracranial Hypertension
  - Medications: doxycycline, growth hormone, OCP, steroids

(ENT) Chronic sinusitis

(ENT) OSA
  - Snoring, nighttime waking
  - Obesity
  - First-morning HA that improves throughout the day
Depression and anxiety
- Use screening tools for psychiatric comorbidities (PSC, PHQ, GAD-7)

Autonomic dysfunction (POTS, EDS)
- Orthostatic VS

Nutritional deficiencies
- Ferritin, vitamin D

Dental
- Bruxism
- TMD
Dull, lingering low-grade daily or near daily headache

When rescue medication becomes part of the problem instead of the solution

- Triptans ≤10 days/month
- NSAIDs ≤ 15 days/month
First Steps in Diagnostics
Practice parameter: Evaluation of children and adolescents with recurrent headaches

Report of the Quality Standards Subcommittee of the American Academy of Neurology and the Practice Committee of the Child Neurology Society

D.W. Lewis, MD; S. Ashwal, MD; G. Dahl, BS; D. Dorbad, MD; D. Hirtz, MD; A. Prensky, MD; and I. Jarjour, MD
To Image or Not to Image?
That is the Question

Case #2-
First Steps in Management
First Steps: Rescue Treatment

- Early
- Specific
- Comprehensive
- Appropriate

Dizzy, nauseas, very upset.
Nonspecific Treatment

- Ibuprofen
- diphenhydramine
- ondansetron
- caffeinated beverage
- extra water

Ok for migraine or non-migrainous headache
# Rescue Treatment: Triptans

<table>
<thead>
<tr>
<th>Formulation</th>
<th>ODT</th>
<th>Tablets</th>
<th>Intranasal</th>
<th>SQ Injection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Rizatriptan (Maxalt)</td>
<td>Sumatriptan (Imitrex)</td>
<td>Sumatriptan (Imitrex)</td>
<td>Sumatriptan (Imitrex)</td>
</tr>
<tr>
<td></td>
<td>Zolmitriptan (Zomig)</td>
<td>Zolmitriptan (Zomig)</td>
<td>Zolmitriptan (Zomig)</td>
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</tr>
</tbody>
</table>

*Sumatriptan (Imitrex)  
Zolmitriptan (Zomig)  
Naratriptan (Amerge)  
*Rizatriptan (Maxalt)  
*Almotriptan (Axert)  
Eletriptan (Relpax)  
Frovatriptan (Frova)

**SUMATRIPTAN/NAPROXEN SODIUM:** 12-17y (10mg/60mg tablet)
**Rescue Treatment: Antiemetics**

- **Promethazine (Phenergan)**
  - Tablet, rectal suppository, oral solution; can be compounded into gel

- **Prochlorperazine (Compazine)**
  - Tablet, rectal suppository
  - Give with diphenhydramine (Benadryl) to avoid dystonic reaction and induce sleep

- **Ondansetron (Zofran)**
  - Tablet, ODT

- **Metoclopramide (Reglan)**
  - Tablet, oral solution, ODT

- **Hydroxyzine (Vistaril, Atarax)**
  - Tablet, capsule, oral solution
Consider Prophylactic Medications When...

- Frequent Disabling attacks > 4/month
- Acute medications - insufficient or ineffective
- Contraindication for using abortive medication
- Overuse of acute medication
First Steps - Prophylactic Medications

- **cyproheptadine (Periactin)**; max dose 16 mg/24 hr
- **amitriptyline (Elavil)**; max 2 mg/kg or 75 mg daily. Obtain EKG
- **topiramate (Topamax)**; max dose 400 mg/24 hours
- **propanolol (Inderal)**; max 16 mg/kg/24 hr
- **divalproex (Depakote)**; max dose 1000 mg/day

Pearls for Prophylaxis

- No guarantees
- Start low, go slow
- 8-12 weeks minimum
- Communication essential
Headache Prophylaxis: General Principles

- Low and slow
- Adequate trial of 3 months necessary to determine efficacy
- Set realistic goals
  - 50% change over 3 months
  - Reduction in frequency, severity, and/or duration
  - Improved response to rescue treatment
  - Migraine: ≤4/month, functional within about an hour
  - NOT complete headache freedom, but improved QOL

Headache Prophylaxis: OnabotulinumtoxinA Botox

- **Indicated for chronic migraine**
  - >15 headache days/month, >8 migraine, for >3 months
  - 31 injections, need at least 2 rounds (separated by 90 days)
  - Have to fail > 2 preventive medications
  - 100-unit dose
  - > 11 years old
  - Retrospective data

Ahmed et al 2010; Kabbouche et al 2012
**Integrative Medicine in Headache Care**

- **HA= Biopsychosocial phenomenon**
  - Best addressed with holistic approach & multidisciplinary strategies (EBP)
- Examples
  - Acupuncture
  - Biofeedback
  - Relaxation & Stress coping skills
  - Nutraceuticals/supplements
- Use of CAM & integrative therapies as high as 76% in some populations
- Integrative medicine may prevent MOH & Chronification of HA
- Increase patient self-care & empowerment to improve own health

Riboflavin (vitamin B2)
- AE: bright yellow urine, frequent urination, diarrhea (rare)
- Dosing: 200-400mg/day with best evidence (divided or as single dose)

Magnesium
- AE: diarrhea
- Dosing: 100-400mg BID
- Chelated preparations are better absorbed

Feverfew
- Not recommended in children or adolescents

Butterbur in purified form (Petasites)
- Petadolex brand is the only one with demonstrated safety-now concerns for hepatotoxicity

Coenzyme Q10
- AE: GI upset, rash (AE are rare)
- Dosing: 100mg/day
- Expensive
CAM therapies

- CBT
- Biofeedback
- Mindfulness
- Acupuncture
- Vitamins & Supplements
- Proprietary-Migravent; Migralief
- Yoga
Lifestyle Behaviors

- Hydration - goal in oz/day = weight (lbs) to a max of 100 oz/day (NO caffeine/artificial sweeteners)
- Night time sleep:
  - 10 to 12 hours (elementary)
  - 9 hours (teenagers)
  - No more than 2 hours variability in sleep or wake pattern (AAP guidelines)
- Eat regular meals
- Recognize trigger foods - caffeine, cheddar cheese, chocolate, red meat, dairy products, vinegar, foods with sodium nitrate; MSG
- Recognize other triggers - over-exertion, stress, loud noise, intense emotion/anger, excitement, weather changes, strong odors, secondhand smoke, chemical fumes, motion or travel, medication, hormone changes & menstrual cycles
- MOH
- SCREEN TIME
Case #3-
Trigger Avoidance

- Stress
- Smells
- Noise
- Lack of sleep
- Exercise
- Being too hot
- Excitement
- Too much sleep
- Weather
- Specific foods
- Smoke
- Flickering light
- Not eating
- Minor head injury
First Steps at School
Promote school attendance
  “It's ok to feel ok.”
Write Rx for rescue medications so they have a labeled container at school
Team approach with PCP, school nurse, parents
School Letters for water, bathroom and medication
504 plan for school modifications
Avoid homebound
# The MAP (MAESTRO=.map)

## Migraine Action Plan (MAP) for:

Ask the following questions: If all answers are "NO" follow the directions for "Headache (NOT a Migraine)". Otherwise follow the directions for "MIGRAINE".

- Does your headache get worse when you move?
- Does your headache make you very sensitive to sounds or light?
- Since your headache started do you have nausea (feel like you might throw up)?
- Since your headache started have you vomited (thrown up)?

### MIGRAINE

1. Record on Headache Record
2. Give Medications Right Away
   - a) For Pain:
   - b) For Nausea and/or Vomiting:
   - c) Additional:
3. Offer a non-caffeine drink.
4. Allow to rest in a quiet dark place 30-60 minutes.
5. Other Comfort Measures:
   - a) Contact Parent to inform about migraine & care given.
   - b) After 60 minutes, if migraine is resolved, can return to activities. If not, needs to go home.

### HEADACHE (NOT a Migraine)

1. Record on Headache Record
2. Give Medication
   - a) For Pain:
   - b) For Nausea and/or Vomiting:
   - c) Additional:
3. Take Temperature.
4. Call Parent to discuss next step (home or return to activities).

---

I approve of the medications listed above in the treatment of [patient's name]'s headaches.

<table>
<thead>
<tr>
<th>Health Care Provider</th>
<th>Date</th>
</tr>
</thead>
</table>

I have read this page and understand that this form will be placed in the school notebook for health concerns and a copy will be given to my child's teachers.

<table>
<thead>
<tr>
<th>Signature of Parent(s)</th>
<th>Date</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Signature of Principal</th>
<th>Date</th>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Signature of School Nurse</th>
<th>Date</th>
</tr>
</thead>
</table>
First Steps in ED Referral

To the ED if:

- Worst HA ever (HA is different)
- HA episodic medications not effective (tried for 24 hours)
- HA associated with concerning symptoms
- Parental Concern
- ED plan should in place
ED Pediatric HA Clinical Pathway

Duke Pediatric Emergency Department Acute Migraine Treatment Clinical Pathway

Initial Evaluation:
1. Inclusion criteria: ages 6 - 18 years; meets ICHD-3 beta criteria for acute migraine; no indication for further diagnostic evaluation of headache
2. POCS qualitative beta-blockers (all post-menarcheal female patients)

Has patient used any of the following medication within the last 2 hours?
- Ibuprofen, naproxen, acetaminophen

Yes

No

Proceed to "Second-Line Abortive Treatment"
May also proceed to Second-Line at the preference of patient/parent

Phase 1: First-Line Abortive Treatment:
- Ibuprofen 10 mg/kg PO (max 600 mg)
- Acetaminophen 15 mg/kg PO (max 650 mg)
- Ondansetron 0.15 mg/kg PO (max 8 mg)

Reassess in 30 minutes

Patient is not pain free and patient/parent not comfortable with discharge

Patient is pain free (0 on FACES pain scale or 0-10 scale) or patient/parent comfortable with discharge

Discharge home
- Outpatient medication plan
  - First migraine: OTC analgesic
  - All others: narcotic plan
  - < 40 kg: 5 mg
  - > 40 kg: 10 mg
- Headache education
- Decision to refer to Pediatric Neurology

Phase 2: Second-Line Abortive Treatment:
- Prochlorperazine 0.15 mg/kg IV (max 10 mg)
- Diphenhydramine 1 mg/kg IV (max 25 mg)
- Ketorolac 0.5 mg/kg IV (max 15 mg)
- Normal saline 20 mL/kg IV (max 1 L)

Phase 3: Third-Line Abortive Treatment:
- Valproate 15 mg/kg IV (max 1 g)

Phase 4: Consult to Pediatric Neurology

Repeat reassessment every 30 minutes. If pain free or patient/parent ready for discharge, discharge home after discussion of outpatient medication, education, follow-up. If patient not pain free or patient/parent uncomfortable with discharge, proceed to next phase of pathway.

Version 2: 2017-05-20
Chief Complaint of Headache

Obtain Comprehensive HA History
Obtain neurological and physical exam

Consider secondary headache disorder

Order indicated diagnostic tests

Are findings consistent with secondary cause of HA?

Identify Secondary Headache Type

Develop treatment plan

Any Red Flags noted from history or exam?

Does HA meet Migraine with With And/Or without Aura Criteria?

YES

Diagnose with Migraine with and/or Without Aura

NO

Does Headache meet Tension-Type Headache Criteria?

YES

Diagnose with Tension-Type Headache

NO

Refer to HA Classification ICHD-3 for Additional Primary Headache Diagnostic Criteria

Also Diagnose With Medication Overuse Headache

Does Headache occur ≥ 15 days per month?

YES

Also Diagnose with Chronic headache Type

NO

Does Headache Meet Medication Overuse Criteria?

YES

Order Neutraceutical Level (B2,CoEQ10, Vitamin D)

NO

Develop Treatment Plan

For more HA diagnoses, consult http://ihs-classification.org/en
First Steps to Referral

- Red Flags in the History
- Red Flags in Physical Exam
- Significant Abnormality on Radiologic Evaluation
- Initial First Steps not effective
- Significant disability r/t Headaches
ED and Primary Care Pathways in Development

Goals:

- Standardized, Consistent Care
- Improved ED Utilization
- Increased access to specialty HA care
“For prevention, it is essential to prescribe a sound rhythm in life, for work and rest, mealtimes, and sleep.” Dr. Bo Bille
References

- Community Care of North Carolina, (2016). Pediatric Headache Treatment and Referral Guidelines (PDF)


