I. Migraine management in the Emergency Department

II. Purpose: The purpose of this guideline is to provide evidence-based guidance for the evaluation and management of pediatric patients presenting with migraine in the Comer Pediatric Emergency Department.

A. Selection of Patients

1. Inclusion Criteria:
   a. Age 7 to 18
   b. Meets diagnostic criteria of a migraine headache as stated in section V.A.

2. Exclusion Criteria:
   a. Allergy or contraindication to medications included in guideline
   b. Temperature of 38°C or higher
   c. Inability to perform pain score scale

3. If patient has CNS hardware, such as a VP shunt, please rule out hardware malfunction prior to proceeding with migraine treatment

III. Definitions

A. Auras are a complex of reversible neurological symptoms that can accompany migraine headaches. Types of auras include: visual (scintillating scotoma - white/flashing light in zig-zag pattern, leaving a blind spot, or scotoma, in its place) - most common, sensory (unilateral pins and needles or numbness), speech disturbance (usually aphasia). An aura of motor weakness raises concern for hemiplegic migraine.

B. Numeric pain rating scale (NPRS): a numeric pain score that assess patient’s pain; conducted by asking patients what their pain is on a scale from 0 to 10, with 0 being no pain and 10 being the worst possible pain. Record the pain score before treatment, during assessments and prior to discharge.

IV. Background

A. Migraine headaches are common in children, occurring in up to 23% of children by age 15, with mean age of onset being 7.2 years for boys and 10.9 years for girls.

B. Mean age of pediatric migraineurs presenting to emergency rooms ranged from 12.1 to 13.6 years.\(^1\)
V. Process Map

- Meets diagnosis of migraine
- Physical exam with fundoscopy
- Pain score

**Sections V.A – V.C**

- Abnormal physical exam?
  - NO
  - Female of childbearing age?
    - NO
    - YES
      - IV: 20 ml/kg NS bolus (max 1L)
      - IV: prochlorperazine 0.15 mg/kg (max 10 mg) run over 10 minutes (If unavailable, give IV metoclopramine 0.1 mg/kg (max 50 mg)
      - IV: ketorolac 0.5 mg/kg (max 15 mg) run over 2 min
      - Reassess in 45 minutes, repeat pain score
      - **Section V.F.b**

- YES
  - Urine pregnancy test
    - NEGATIVE
      - Discharge
      - YES
        - Counseling regarding pregnancy
        - Consider OB consult
        - Avoid NSAIDs
        - IV: 20 ml/kg NS bolus (max 1L)
        - PO: Acetaminophen
    - **Section V.F.a**

- NO
  - Pain ≤ 2 or significantly improved?
    - NO
      - Consult Neurology DHE protocol
    - YES
      - Repeat prochlorperazine (or metoclopramide) dose
      - Reassess in 45 minutes, repeat pain score
      - **Section V.F.b.iv**

- 45 min
- POSITIVE

Reference sections in guideline for further details.
VI. Procedure

A. Diagnostic Criteria

1. Definition of Migraine without aura² (fulfills the following):
   a. Headache lasting 1-72 hours,
   b. AND has at least two of the following: unilateral or bilateral location, pulsating quality, moderate or severe pain, aggravated by routine physical activity
   c. AND has at least one of the following: nausea/vomiting or photophobia/phonophobia

2. Definition of Migraine with typical aura² (fulfills the following):
   a. At least one of these reversible aura symptoms: visual, sensory, speech/language
   b. AND at least two of the following:
      1. Homonymous visual symptoms and/or unilateral sensory symptoms
      2. At least one aura spreads gradually over ≥ 5 minutes, and/or two or more aura symptoms occur in succession over ≥ 5 minutes
      3. Each aura lasts 5-60 minutes
   c. AND the aura is accompanied or followed within 60 minutes by headache
   d. AND transient ischemic attack, simple partial seizures have been excluded and other acute lesions have been ruled out by history/exam/imaging

3. Reference the International Headache Society’s headache classification for diagnosis of other less common migraine types if your patient does not meet diagnostic criteria above: International Headache Classification - IIb

B. Key History

1. Previous headache history, what management typically works
2. Family history of migraines – usually present
3. Red flag history: headache worse when lying down, previous CNS surgery, existing CNS hardware

C. Physical Exam

1. General appearance (including vital signs and pulse oximetry on room air)
2. Rapid cardiopulmonary assessment (including evaluation of perfusion)
3. Evaluate for signs of meningitis: bulging fontanelle, nuchal rigidity, Kernig/Brudzinski sign
4. Assess for lethargy, degree of irritability, presence of high-pitched cry
5. Detailed neurological examination for focal deficits or abnormalities (specifically mental status, asymmetry in exam, gait abnormality, nuchal rigidity, optic disc, or any change from baseline neuro exam)

D. Investigations

1. Imaging: presence of one or more of the following criteria are indications for imaging³:
   a. Sleep-related headache (headache awakens child repeatedly from sleep or occur immediately on awakening)
   b. Persistent headache with absence of family history of migraine
c. Persistent headaches of less than 6 months duration that does not respond to medical treatment

d. Persistent headache associated with substantial episodes of confusion, disorientation, or emesis

e. Headache associated with abnormal neurologic exam, especially papilledema, nystagmus or gait/motor abnormality

2. Lumbar puncture: Occurrence of a new type of headache, presence of focal neurological signs and/or altered mental state, a general feeling of illness and/or fever should direct attention towards an intracranial infection, even in the absence of neck stiffness, or other intracranial process.

3. General consideration: <3% of children with headache and a brain tumor had a normal neurological exam

4. Occipital headache calls for diagnostic caution, as many can be due to structural lesions

E. Management

1. General considerations:
   a. Triage nurse to only give acetaminophen (avoid NSAID use early to allow for administration of ketorolac)
   b. If female of childbearing age and risk for pregnancy - urine pregnancy test prior to NSAID use
   c. Avoid opioids, unless patient is pregnant or other contraindication to listed medications
   d. Determine frequency and last dose of home medications, allergies to medicines, history of medications that have and haven’t worked
   e. Sleep should be encouraged, recommend dimmed lights and no use of electronics in ED room

2. Treatment

   a. If tolerating PO, triage nurse to give acetaminophen 15mg/kg per dose
   b. 20 ml/kg IV NS bolus – max 1L (low threshold to give bolus as patients often with emesis, poor oral intake secondary to nausea; also renal protective in setting of NSAID use, reduces postural hypotension associated with phenothiazines)

      1. Migraine cocktail: Prochlorperazine 0.15 mg/kg IV, max 10 mg, run over 10 minutes
         i. Side effects to be aware of: Can prolong QT interval, extrapyramidal signs (dystonia, akathisia)
         ii. If Prochlorperazine shortage, may give metoclopramide 0.1 mg/kg IV, max 10 mg, run over 10 minutes
      2. Administer concomitantly: Benadryl: 1.0 mg/kg IV, max 50 mg
      3. Ketorolac 0.5 mg/kg (max 15 mg) IV run over 2 minutes (patient must not have taken ibuprofen within 6 hours or naproxen within 8 hours)
d. Reassess after 45 minutes; if NPRS < 2 or headache significantly improved, may discharge home; if headache continues, can repeat prochlorperazine dose

e. After second dose of prochlorperazine then again reassess after 45 minutes; if NPRS < 2 or headache significantly improved, may discharge home; if headache continues, consult neurology.

F. Discharge

1. Discharge medications:
   a. If migraines mild to moderate or migraines ≤ 3 per month: ibuprofen or naproxen, and/or acetaminophen
   b. If patient has been refractory to ibuprofen/naproxen and acetaminophen, it is vital to prescribe migraine specific medications
   c. If moderate to severe migraines or >3 migraines per month
      AND
      1. Age ≥ 12: Prescribe intranasal sumatriptan:
         i. 20-39kg: 10mg intranasal sumatriptan
         ii. >40kg: 20 mg intranasal sumatriptan
         iii. Contraindications to triptan use: history/risk of stroke, CV disease, uncontrolled HTN, hemiplegic migraine, pregnancy
         iv. Dispense 10 doses, no refills; Patient should not use sumatriptan >2 times per week
         v. Refer patient to outpatient neurology for further follow-up
      2. Age <12: Consider referral to neurology as outpatient

2. Providing discharge instructions to patients:
   a. Import instructions into the Discharge Instruction tab in Epic using the dotphrase: .migrainedc (pages 6 through 8 below)
   b. Encourage patients to maintain a headache diary or a headache diary app:
      1. Headache diary apps: ‘Migraine Buddy’ app available on Android and Apple products
   c. Provide patient education: avoid headache triggers, stay hydrated, no missed meals, stress relief
   d. Recommend follow-up appointment with pcp; consider referral to neurology if migraines are causing significant disability or diminished quality of life, refractory to acute therapy, or child has adverse reactions to acute therapies
**Key Practice Points**

- Use the dot phrase “.migrainehpi” in the HPI section of your note to facilitate quicker note writing and to ensure vital information is collected
- Use the order set: “PER: IP Migraine” to access pertinent orders
- Use the dot phrase “.migrainedc” to import discharge instructions in your Discharge Instructions tab in Epic

VII. Cross Reference to the Following Hospital Policies: n/a

VIII. Corresponding order set:
Use the following order set: PER: IP Migraine. It is currently active and ready to use.

IX. Interpretation, Implementation, and Revision: Afsaneh Talai

X. Created by (November 17, 2016): Afsaneh Talai
XI. Reviewed by:
Michele McKee, Pediatric Emergency Medicine
Charles Marcuccilli, Pediatric Neurology
Afsaneh Talai, Resident, Pediatric Neurology

XII. Approved on (date):

___________________________ ______________
Chair, Pediatric Guidelines Review Committee                  Date

XIII. Revision history: None
XIV. References


Appendix A:

Managing Your Headaches (use dot phrase “.migrainedc”)

Treatment of Headaches:
- Treatment is most likely to work if you take medication at the first sign of an attack.
- For children, acetaminophen and ibuprofen can be used to treat headaches. Follow directions on the bottle for dosing.
- If your child has been given a prescription for migraine treatment, follow directions as listed on the bottle.
- Limit screen time (phones, tv, tablets) during migraines and let child sleep.
- See your primary care physician if your child is taking medications more than twice per week for headaches, if he/she is missing school due to headaches, or if his/her headaches are not improving with medications.

Seek emergent medical help if your child has a headache and any of the following:
- Headache starts after a head injury.
- Wakes him/her up from sleep.
- Is sudden and severe with other symptoms such as:
  - Vomiting
  - Neck pain or stiffness
  - Double vision or changes in vision
  - Confusion
  - Loss of balance
  - Fever of 100.4 F or higher.
Appendix B:

Headache Hygiene Tips

Headache may be triggered or worsened with certain types of foods, activities, medications, or stress. Below is a list of possible ways to make a few modifications to your lifestyle that may significantly impact the frequency of headaches.

<table>
<thead>
<tr>
<th>Category</th>
<th>Tips</th>
</tr>
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<tbody>
<tr>
<td>Get Regular Sleep</td>
<td>Go to bed and wake up at regular times each day, including weekends and school breaks. Do not sleep excessively on the weekends and too little on the weekdays.</td>
</tr>
<tr>
<td>Eat Regular Meals</td>
<td>Low blood sugar can trigger a headache. Eat regular meals three times each day including protein, fruits, vegetables and carbohydrates. Too much sugar may lead to a rapid increase in blood sugar followed by a rapid decline in blood sugar, which can trigger a headache.</td>
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<tr>
<td>Get Moderate Amounts of Routine Exercise</td>
<td>Moderate exercise three to five times each week will help reduce stress and keep you physically fit. Too much exercise or inconsistent patterns of exercise may trigger headache.</td>
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<tr>
<td>Drink Plenty of Water</td>
<td>Dehydration may cause headaches.</td>
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<tr>
<td>Limit Caffeine</td>
<td>Caffeine is a stimulant and caffeine withdrawal may cause headaches when blood levels of caffeine taper.</td>
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<tr>
<td>Reduce Stress</td>
<td>Stress may lead to an increase in headache. Relaxation and stress management may help reduce headaches.</td>
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Appendix C:

Headache Diary\(^{10}\) (use dot phrase “.migrainedc”)

<table>
<thead>
<tr>
<th>Date</th>
<th>Time (start/finish)</th>
<th>Intensity (1-10)</th>
<th>Symptoms before headache</th>
<th>Triggers (what were you doing, eating, or drinking)</th>
<th>Medications taken (and dose)</th>
<th>Relief (did it work?)</th>
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Alternatively: download a headache diary app such as ‘Migraine Buddy’. Bring printed diary or phone to next doctor’s appointment for review