# MIGRAINE CLINICAL PATHWAY

EXECUTIVE SUMMARY

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## Primary Objective

The primary objective of the Pediatric Headache Clinical Pathway is to provide clinicians with a tool to assist in the diagnosis and management of headaches in otherwise healthy pediatric patients. This pathway is intended to help direct patient care from the Emergency Department to either inpatient management or discharge.

## Recommendations

**Inclusion Criteria**

- Age 6 or older with primary headache (tension or migraine)

**Exclusion Criteria**

- Less than 6 years
- Secondary headache (i.e. HTN crisis, meningoencephalitis)
- Positive pregnancy test

### Diagnosis

- The appropriate care of a patient with headaches requires establishing a correct diagnosis. The correct diagnosis affects the diagnostic approach, treatment, and prognosis.
- Patients with signs and symptoms of secondary headache, such as sudden change in headache, papilledema, focal deficits, and the additional presence of seizures, require further evaluation beyond a thorough history and physical examination.
- When migraine is diagnosed, tailored treatments may be considered that can result in improved outcomes. (Ross et. al., 2015)
- Diagnostic criteria for pediatric migraine include at least 5 headaches over the last year that last 2–72 hours when untreated, with 2 of 4 additional features (pulsatile quality, unilateral, worsening with activity or limiting activity, moderate to severe in intensity), and association with at least nausea, vomiting, photophobia, or phonophobia. These associated symptoms can be inferred by family reports of the child's activities. The time a child sleeps can be considered part of the headache duration. Auras typically occur in about one third of older children and adolescents and precede the headache by 5–60 minutes. (Ross et. al., 2015)

### Medications

#### Triptans

The American Academy of Neurology recommends that for adolescents with migraine, clinicians should prescribe sumatriptan/naproxen OT (10/60, 30/180, 85/500 mg), zolmitriptan NS (5 mg), sumatriptan NS (20 mg) or, rizatriptan ODT (5 or 10 mg), or almotriptan OT (6.25 or 12.5 mg) to reduce headache pain (Level B). (AAN & AAP, 2019). Formulary options at Children's include rizatriptan ODT and sumatriptan subcutaneous. Clinicians must not prescribe triptans to those with a history of ischemic vascular disease or accessory conduction pathway disorders to avoid the morbidity and mortality associated with aggravating these conditions (Level A). (AAN & AAP, 2019) In adolescents whose migraine is incompletely responsive to a triptan, clinicians should offer ibuprofen or

naproxen in addition to a triptan to improve migraine relief (Level B) (AAN & AAP, 2019). Incomplete responses to triptans will be addressed with ketorolac, which will be included in the migraine cocktail to be given if patient's migraine does not respond to triptan. Clinicians may consider referral of children and adolescents with hemiplegic migraine or migraine with brainstem aura who do not respond to other treatments to a headache specialist to find effective treatment (Level C). Children with hemiplegic migraine or migraine with brainstem aura should not receive a triptan or dihydroergotamine. They may receive the migraine cocktail and other supplemental migraine abortive treatments. (Kumar, Samanta, Emmady, 2023)

**Anti-emetics**

For children and adolescents with migraine who experience prominent nausea or vomiting, clinicians should offer additional antiemetic treatments (Level B). Anti-emetic treatment is also included in 'migraine cocktail.' Preference should be given to prochlorperazine for those who would be with this. (AAN & AAP, 2019)

Studies have found prochlorperazine works very well for acute management of pediatric headache. (84.8 % patients reported headache resolution in 1 hour compared to 55% who received ketorolac). However, keep in mind despite pretreatment with diphenhydramine, dystonia and akathisia remain a concern and one study reported at least 5% of treated pediatric patients experienced this side effect. If a patient does develop this side effect it should be listed as an allergy and not given again. (Brosseau, et al., 2004).

**Magnesium**

Magnesium has been associated with the function of serotonin and regulation of vascular tone, which are both mechanisms that may explain its role in the treatment of migraine. A single center RCT in 157 adult patients showed IV magnesium was comparable to prochlorperazine and metoclopramide in the reduction of pain scores at 30 minutes. (Kandil et al, 2021) A retrospective chart review of 20 adolescent patients showed IV magnesium at a dose of 30mg/kg (max 2g) over 30 minutes led to a favorable pain response in 35% of patients. (Gertsch et al, 2014)

**Valproic acid (VPA)**

Evidence for the use of IV VPA in pediatric migraines in the ED is limited to small retrospective studies. In one single-center study 45/58 patients experienced desired pain relief following a VPA infusion (Reiter, et al 2005). A second retrospective case series of 16 patients with refractory migraine showed an additional 40% mean pain score reduction following IV VPA. (Sheridan et al 2015). Valproic acid, at 15 mg/kg (a max dose of 1g) may provide additional migraine relief when first-line therapies aren't sufficient.

**Dexamethasone**

A strong recommendation with moderate quality evidence exists that a one-time dose of IV dexamethasone at 0.6 mg/kg (max 16 mg) should be administered to pediatric patients with migraines or headaches prior to discharge from the emergency center. (July 2018 Evidence-Based Outcomes Center 3 Texas Children's Hospital Remarks) Dexamethasone is contraindicated if given within the last seven days or if the patient has a hypersensitivity to dexamethasone. Three meta-analyses were found that reported

findings on the use of dexamethasone to prevent headache recurrence. Coleman (2008) listed a significant reduction in the recurrence rates of headaches in the patients treated with dexamethasone compared to those that received usual treatment. Dexamethasone was found to benefit patients when added to standard treatment for migraines in the emergency department for moderate to severe headache in 24-to72 hours. (Singh, 2008) A 2015 meta-analysis reported that there was a reduction in headache occurrence (56%) and acute migraine attacks (68%) in most patients with the use of corticosteroids. (Woldeamanuel) A 2013 Best Evidence Report on this topic recommended to consider a single dose of intravenous dexamethasone prior to discharge in adults who received treatment for migraines in the emergency center. (Best Evidence Report).

**Labs**

No initial laboratory testing or imaging is necessary for the evaluation of patients with primary headache disorder who are otherwise well (Sheridan et al., 2013, Hasein et al., 2023). Laboratory testing is generally only necessary if unexplained abnormal findings on neurologic examination (ClinicalKey, 2023) Primary diagnostic tools are the history of physical examination, including a thorough neurologic examination.

**Non-Pharmacologic Measures**

Non-pharmacologic measures are not as well studied as pharmacologic measures. While non-pharmacologic interventions are sometimes considered alternative or complementary, they should be used as first-line interventions in the pediatric population (Andraski, 2018).
The following interventions are effective in reducing headaches within the pediatric population in the acute setting of a primary headache (Andraski, 2018).

- Lie down and rest
- Dim lights or keep space as dark as possible but still function
- Limit sounds or noise as much as possible
- Oral or IV hydration as tolerated
- No electronics while having a severe headache in the emergency room except as might be used to help relax or meditate
- Acute stress relieving techniques or biofeedback should be advised as much as the patient is aware of how to perform
    - Examples: slow deep breathing in and out for 10 breaths.
    - Apps: breathe2Relax, headspace, square breathing, 54321

**Indications for Imaging**

The American Academy of Neurology practice parameter does not recommend routine neuroimaging in patients with recurrent headaches, in a child with no red flags, and a normal neurologic examination. (Lewis et al, 2002).

Red flags include:

- Recent or sudden onset of headache (“first or worst”)
- Change in headache pattern
- History of neurologic dysfunction
- Worsening of headache with cough or valsalva

- Seizures or fever
- Nocturnal or early morning headache
- Occipital headache
- Age <6 years
- Papilledema or visual field defects
- Cranial nerve dysfunction
- Abnormal ocular movements or pathologic pupillary responses
- Focal neurologic deficits or meningismus
- Asymmetric motor function
- Abnormal cerebellar function
- Systemic symptoms or illness (SLE, SCD, substance abuse)

MRI is “usually appropriate” for most of the “red flags” above; CT of head without contrast is “usually appropriate” only for sudden severe headache. (Hayes et al 2018)

**Avoidance of Opioids**

There is no evidence to support the use of opioids in children with migraine, and use is not recommended by the AAN (Oskoui et al, 2019). Opioids are associated with adverse physiological effects and the potential for dependence, especially among adolescents. Opioid use may prevent reversal of the migraine process and there is evidence that they can sensitize the central nervous system to pain and increase the risk of medication-overuse headache. (Tepper SJ, 2012; Bigal et al, 2008)

**Discharge Recommendations**

Prior to discharge Clinicians should counsel patients and families to use no more than 14 days of ibuprofen or acetaminophen per month, no more than 9 days of triptans per month, and no more than 9 days per month of any combination of triptans, analgesics, or opioids for more than 3 months to avoid medication overuse headache (Level B). (There is no evidence to support the use of opioids in children with migraine. Opioids are included in this statement to be consistent with the International Classification of Headache Disorders (ISH, 2013) regarding medication overuse.)

At discharge:

- Prescribe at least 1 rescue treatment option for their level of headache severity
- Give the patient a plan of care including a headache log
- If given valproic acid, send home with Depakote 7.5 mg/kg/dose BID PO for 2 weeks.
- Follow up with their PCP or Neurology, as necessary

## Rationale

- Safety: Will be improved by reducing use of unnecessary barbiturates or opioid medications, thereby reducing potential rebound headache or drug dependence.
- Quality: Care will improve by ensuring effective evaluation and management of primary headache in accordance with published evidence-based guidelines. Quality will also be improved by instituting consistent terminology, dosing, and care between providers.
- Cost: Will be improved by eliminating the use of inappropriate laboratory testing, radiologic imaging, medication usage, and unnecessary hospitalizations.

- Delivery: Will be improved by streamlining the care of patients with primary headaches and expediting flow through the Emergency Department to discharge or to the Inpatient unit as necessary.
- Engagement: Will be created and supported by the involvement of a multi-disciplinary team in the development and maintenance of the pathway which includes Children's Emergency Department, Information Technology team, Neurology, Pharmacy, ED Educator, and Data Analyst.
- Patient/Family Satisfaction: Will be improved by providing the highest quality of care based on established guidelines and the latest evidence available in the literature.

## Metrics

### Outcome

- Reduce ED revisits/readmissions for headaches within 72 hours
- Maintain the proportion of patients receiving opioids
- Increase the amount of admitted patients who receive magnesium, valproate acid, and/or dexamethasone in the ED prior to admission

### Process

- Increase use of triptans for patients who meet criteria (moderate to severe headache with photophobia and nausea)

### Balancing

- Monitor length of stay in ED
- Monitor admission rate for migraine/headache

## Team Members

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## Evidence

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