

Emergency Management of Migraines in Children

Guideline developed and finalized 06/08/17 by Nicholas W. Porter, DO, and Erin Willis, MD, in collaboration with the ANGELS Team.

Key Points

- Most pediatric headaches do not require emergent neuroimaging if a detailed history and physical examination are not otherwise suspicious for an underlying neurologic pathology.
- There is no diagnostic test for migraine headaches.
- Opiates are generally contraindicated in the treatment of headaches.
- A reasonable initial approach to treating a migraine headache that has failed home management includes a normal saline bolus IV + prochlorperazine IV + ketorolac IV + diphenhydramine IV.
- Overuse of nonsteroidal antiinflammatory drugs (NSAIDs) can lead to rebound headache.
- Patients with >1 migraine per week may benefit from subspecialty consultation and preventative medication.

Definitions

Classification of Migraines

The International Headache Society publishes a classification system for headaches. Migraines are classified as either *migraine without aura* ([Table 1](#)) or *migraine with aura* ([Table 2](#)).

Table 1. Diagnostic Criteria for Migraine Without Aura

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Table 1. Diagnostic Criteria for Migraine Without Aura

A	At least 5 attacks fulfilling criteria B to D
B	Headache attacks lasting 4 to 72 hours in adults or 2 to 72 hours in children (untreated or unsuccessfully treated)
C	Headache has at least 2 of the following 4 characteristics: <ul style="list-style-type: none"> • Unilateral location • Pulsating quality • Moderate or severe pain intensity • Aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs)
D	During headache, at least one of the following: <ul style="list-style-type: none"> • Nausea and/or vomiting • Photophobia and phonophobia
E	Not better accounted for by another ICHD-3 diagnosis

Source: Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition (beta version). *Cephalalgia*. 2013;33(9):629-808.

Table 2. Diagnostic Criteria for Migraine with Aura

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Table 2. Diagnostic Criteria for Migraine with Aura

A	At least 2 attacks fulfilling criteria B and C
B	One or more of the following fully reversible aura symptoms: <ul style="list-style-type: none"> • Visual • Sensory (hemiparaesthetic) • Speech and/or language (aphasia) • Motor (hemiplegia) • Brainstem (dysarthria, vertigo, tinnitus, hypacusis, diplopia, ataxia, altered mental status) • Retinal (monocular scintillation, scotoma, or blindness)
C	At least 2 of the following characteristics: <ul style="list-style-type: none"> • At least 1 aura symptom spreads gradually over >5 minutes and/or 2 or more symptoms occur in succession • Each individual aura symptom lasts 5 to 60 minutes • At least 1 aura symptom is unilateral • The aura is accompanied, or followed within 60 minutes, by headache
D	Not better accounted for by another ICHD-3 diagnosis, and transient ischemic attack has been excluded

Source: Headache Classification Committee of the International Headache Society (IHS). The International Classification of Headache Disorders, 3rd edition (beta version). *Cephalalgia*. 2013;33(9):629-808.

Aura Characteristics

- Aura is the complex of neurologic symptoms that typically precedes the headache although it may occur after the start of headache or persist during the headache.

- Visual aura is the most common type of aura and occurs in over 90% of patients who have this type of migraine.
- Aura that includes motor weakness also is known as *hemiplegic migraine*.
- Migraine with aura increases the risk of stroke.

Migraine Presentation

- Migraine headaches in children and adolescents are more often bilateral/frontotemporal, rather than unilateral, which predominates in adults.
- Pediatric migraines may lack throbbing character and be of shorter duration when compared with adults.
- Occipital headache in children is rare and calls for further diagnostic evaluation.

Medication-Overuse Headache

- Medication overuse is a common cause of chronic headache in patients with previously diagnosed headache disorder. About 50% of chronic migraines are associated with medication overuse.
- Regular overuse for >3 months of 1 or more medications that are indicated for treatment of acute and/or symptomatic headache can cause chronic migraines.
 - Patients who take NSAIDs >15 days per month or triptan medications >4 days per month are at increased risk for medication-overuse headache.
- Opioid use is a common cause of rebound headache; opioids are not indicated for treating migraines.

Assessment

Medical History and Physical Examination

- The goal of assessing the patient with headache is to differentiate between primary headache (migraine) and causes of secondary headache (eg, intracranial mass, ischemic stroke, meningitis).
- For all children who present with features typical of a migraine headache, assessment should consist of a full medical history and physical examination, including vital signs and complete neurologic examination.
- Medical history that may be helpful in diagnosis includes
 - **Family history.** Migraine disorders are frequently inherited.
 - **Medication use.** Frequent use of NSAIDs, opiates, or triptans may result in medication-overuse or “rebound” headache.
 - **Headache diary.** Patient logs of headache information can aid in further characterization of migraine type, triggers, and effective treatments.
- Fundoscopic examination to diagnose papilledema is helpful in evaluation of intracranial causes of secondary headache.
- In some cases, a headache may be a sign of a serious underlying condition; be alert for “diagnostic red flags” ([Table 3](#)). The patient may require immediate treatment or further evaluation.
- Abnormal vital signs or neurologic examination are concerning for secondary headache and warrant further workup.

Table 3. Diagnostic Red Flags for Secondary Headache

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Table 3. Diagnostic Red Flags for Secondary Headache

Diagnostic Red Flags for Secondary Headache
<ul style="list-style-type: none"> • Preschool age • Occipital location • First/worst headache with “thunderclap” onset • Progressively increasing frequency or severity • Sharp change in headache character • Sleep arousal from headache/exclusive nighttime or early morning occurrence • Association with severe vomiting, especially early morning • Association with straining/Valsalva maneuver • Poor response to ongoing therapy • Abrupt altered mental status • Papilledema • Focal neurologic deficit • High-risk population (eg, sickle cell disease, history of stroke, history of arteriovenous malformation, immunodeficiency, malignancy, coagulopathy, pregnancy, neurocutaneous syndrome, congenital heart disease, hydrocephalus or ventriculoperitoneal shunt status) • Fever and/or nuchal rigidity • Recent head trauma • Seizure

Diagnostic Testing

- Neuroimaging (including computed tomography [CT] scan) *is not useful* in diagnosis of primary migraine headaches.
- The American Academy of Neurologists makes the following recommendations regarding use of neuroimaging in the evaluation of migraine headaches ([Table 4](#)).

Table 4. American Academy of Neurologists Recommendations on Neuroimaging

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Table 4. American Academy of Neurologists Recommendations on Neuroimaging

Recommendations	
1	Obtaining a neuroimaging study on a routine basis is not indicated in children with recurrent headaches and a normal neurologic examination.
2	Consider neuroimaging for children with abnormal neurologic examination (eg, focal findings, signs of increased intracranial pressure, significant alteration of consciousness), coexistence of seizures, or both.
3	Consider neuroimaging for children in whom there are historical features to suggest the recent onset of severe headache, change in the type of headache, or if there are associated features that suggest neurologic dysfunction.

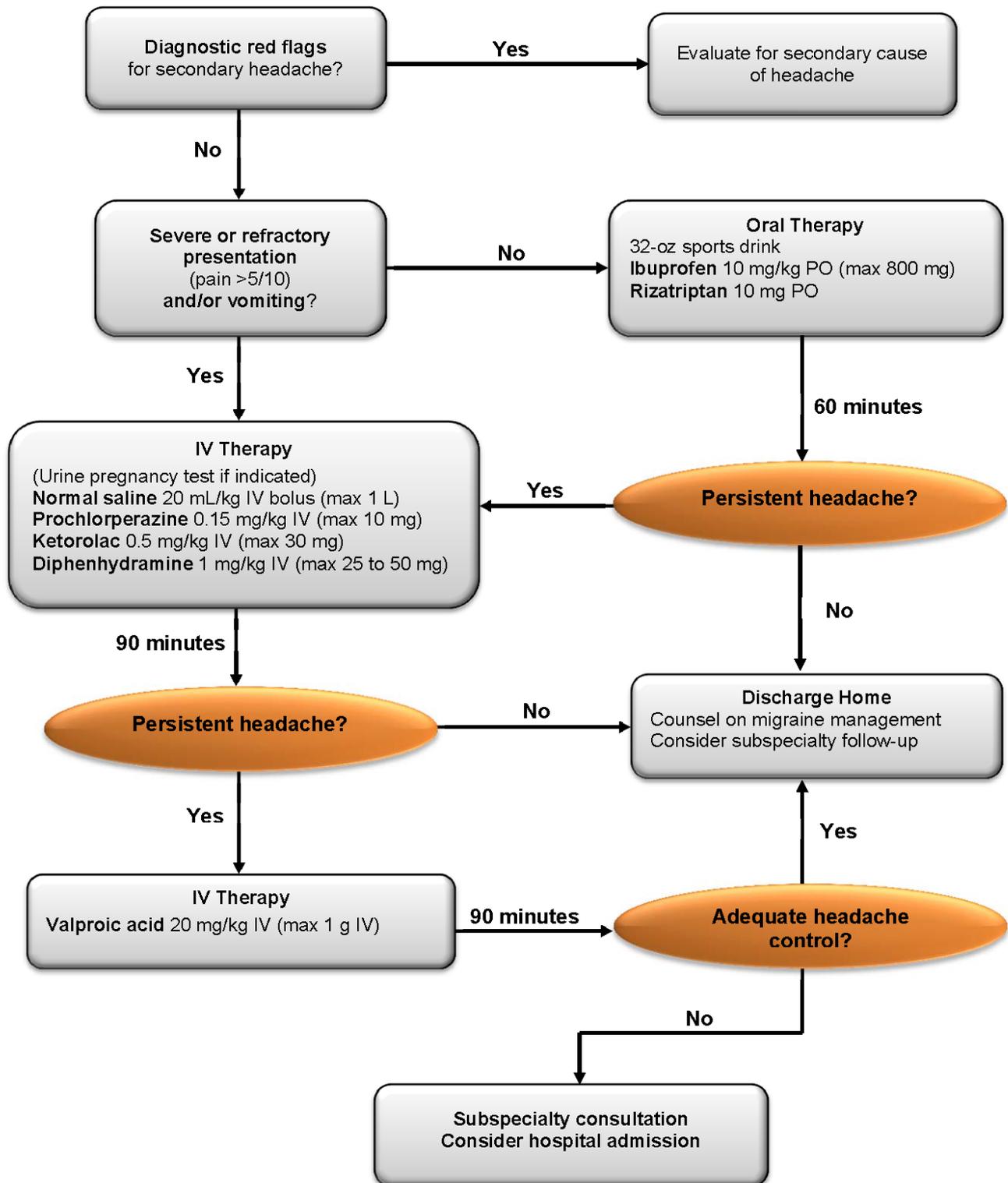
Management

See the [Figure](#) below for a summary of migraine headache management in the emergency department.

Figure. Suggested algorithm for emergency department treatment of migraine headaches.

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Figure. Suggested algorithm for emergency department treatment of migraine headaches.



Initial Management

- Foster a low-stimulation environment (eg, dark, quiet examination room; minimize disruptions, such as TV, cell phones/tablets, visitors).
- Outline treatment goals with patient and family.
- Assess risk factors for secondary causes of headache (Table 3), including complete neurologic and fundoscopic examination if possible.

- Patients with risk factors or abnormal physical examinations require further workup, including possible neuroimaging, lumbar puncture, and specialty consultation.
- Consider urine pregnancy test in postmenarchal females.
- Quantify pain level by using a pain scale or [FACES pain rating scale](#).
 - Mild presentation is pain intensity <5 on a numeric scale of 1 to 10.
 - Severe or refractory presentation is pain intensity >5 on a numeric scale of 1 to 10.

Mild Presentation (Pain <5/10)

- Optimize oral fluid intake.
- Oral NSAIDs, including ibuprofen and naproxen, are safe in children and appropriate for acute care and home management. Some patients with mild presentations can be managed with NSAIDs alone.
- Currently, the best evidence supports the use of intranasal sumatriptan, oral almotriptan, and oral rizatriptan for acute treatment of migraines in children ([Table 5](#)).

Table 5. 5-HT₁ Receptor Agonists (Triptans)

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Table 5. 5-HT₁ Receptor Agonists (Triptans)

Drug	Age	Dose	Max Dose	Other Information
Almotriptan ^a	>12 yrs	6.25 or 12.5 mg tablet	2 doses in 24 hrs* <small>*Note: Can be redosed once, 2 hours after initial dose if migraine persists</small>	<ul style="list-style-type: none"> • Consider if patient can tolerate oral medication and symptoms are not severe • Most effective if given early in headache • Available in oral, subcutaneous, and intranasal forms • If migraine persists, triptan medications can be redosed once, 2 hours after the initial dose • Contraindications include <ul style="list-style-type: none"> • Concomitant administration with MAO inhibitors • Patient history of stroke, uncontrolled hypertension, cardiovascular disease, basilar or hemiplegic migraine • Patient considering therapy with DHE
Eletriptan	>12 yrs	40 mg tablet		
Rizatriptan ^a	>6 yrs	10 mg tablet or ODT		
Sumatriptan ^a	>12 yrs	5 to 20 mg intranasal; 6 mg subcutaneous		
Zolmitriptan	>12 yrs	2.5 or 5 mg tablet or ODT 5 mg intranasal		

Abbreviations: DHE, dihydroergotamine; MAO, monoamine oxidase; ODT, oral disintegrating tablet.

^aCurrently, the best evidence supports the use of intranasal sumatriptan, oral almotriptan, and oral rizatriptan in children.

Severe or Refractory Presentation (Pain >5/10)

- For management of severe or refractory presentation, IV hydration and medication ([Table 6](#)) is indicated.
- Ketorolac and a dopamine receptor antagonist may be used for initial medication management.
- Patients who don't respond to initial medication management may be treated with IV valproic

acid, IV dexamethasone or methylprednisolone, and magnesium sulfate.

- Refractory headaches may require admission for dihydroergotamine (DHE) therapy if other medical management fails.

Table 6. Dopamine Receptor Antagonists and Other Medications Used to Treat Migraines

To view a larger image on your device, please click or touch the image.

Table 6. Dopamine Receptor Antagonists and Other Medications Used to Treat Migraines

Drug	Age	Dose	Max Dose	Other Information
Dopamine Receptor Antagonists				
				<ul style="list-style-type: none"> • Commonly cause extrapyramidal side effects; treat or consider pretreatment with diphenhydramine • Associated with prolonged QTc interval; consider ECG prior to treatment
Metoclopramide		0.1 to 0.2 mg/kg IV	10 mg	
Prochlorperazine		0.1 to 0.15 mg/kg IV	10 mg	Shown to be more effective than metoclopramide in at least one study
Other				
Ketorolac		0.5 to 1 mg/kg IV 1 to 2 mg/kg IM	30 mg IV 60 mg IM	<ul style="list-style-type: none"> • Parenteral NSAID • New research indicates it may be just as effective in 10 mg dosing
Dexamethasone		0.6 mg/kg IV	20 mg	<ul style="list-style-type: none"> • Shown to decrease migraine relapse rate after successful headache abortive therapy • Most useful for patients with migraines duration >72 hours • Good data for use in adults; few pediatric trials supporting use in children
Diphenhydramine		1 mg/kg IV	25 to 50 mg	<ul style="list-style-type: none"> • Commonly used to prevent extrapyramidal symptoms of dopamine receptor antagonists • Newer studies implicate its use with higher rates of return to the emergency department
DHE	<25 kg or <9 yrs ≥25 kg or ≥9 yrs	5 mg IV every 8 hrs 0.5 to 1 mg IV every 8 hrs	20 doses	<ul style="list-style-type: none"> • Typically administered in inpatient setting because of need for repeated doses • Usually requires multiple doses to be effective; give one final dose after migraine resolution, then discontinue use • Causes severe nausea/vomiting; give concurrently with IV fluid hydration and pretreat with antiemetic (eg, ondansetron, metoclopramide) 10 to 30 minutes prior to infusion • Contraindicated in patients with uncontrolled hypertension, history of stroke or cardiovascular disease, use of MAO inhibitors, use of triptan in last 24 hours, and pregnancy
Magnesium sulfate		50 mg/kg IV	2 g	<ul style="list-style-type: none"> • Limited data to support use • Consider cardiopulmonary monitoring during infusion
Opiates				<ul style="list-style-type: none"> • No studies evaluating use of opioids for treatment of pediatric migraines • Found to have high rate of headache relapse • Implicated in progression of episodic to chronic migraines in adults
Valproic acid		10 to 20 mg/kg IV	1 g	<ul style="list-style-type: none"> • Teratogenic; patient must have negative pregnancy screen before use

Abbreviations: DHE, dihydroergotamine; ECG, electrocardiogram; IV, intravenous; MOA, monoamine oxidase; NSAID, nonsteroidal anti-inflammatory drugs.

Preventative Medication

- Consider prophylactic medication for patients with >1 migraine headache per week ([Table 7](#)).
- Prescribe in coordination with a neurologist or headache specialist.
- Other prophylactic medications not listed in [Table 7](#) include sodium valproate, verapamil,

propranolol, riboflavin, and magnesium supplementation.

Table 7. Prophylactic Medications for Chronic Migraines

To view a larger image on your device, please click or touch the image.

Table 7. Prophylactic Medications for Chronic Migraines

Drug	Dose	Max Dose	Other Information
Amitriptyline	0.25 mg to 1 mg/kg/day given at bedtime		Side effects include fatigue, dry mouth, altered mood
Cyproheptadine	2 to 16 mg once to twice daily (most commonly given at bedtime)		<ul style="list-style-type: none"> • For use in prepubertal children • Side effects include somnolence and appetite stimulation
Topiramate	25 mg at bedtime; increase in weekly intervals as needed by 25 mg/day	100 mg/day divided, twice daily	<ul style="list-style-type: none"> • Only medication with FDA approval for prevention of migraines • Side effects include paresthesias, cognitive slowing, decreasing sweating, kidney stones

Abbreviation: FDA, Food and Drug Administration.

Outpatient Strategies

- Advise patient or caregiver to keep a headache diary.
- Encourage a balanced diet and exercise.
- Advise patient to avoid stressors; encourage healthy coping methods.
- Address comorbidities, somatic and psychiatric.
- At onset of headache (or aura), advise patient to maximize hydration status and minimize aggravating stressors. This may include the following:
 - Drink a 32-ounce sports drink.
 - Take an NSAID.
 - Consider triptan medication at headache onset and repeat in 1 to 2 hours if needed.
 - Lie down in dark, quiet room.
- If initial treatment is not effective in 4 to 6 hours, advise the patient to seek further medical care.

Follow-up

- Successful treatment of headache depends upon goals of the patient and care team; the following may be candidates for discharge and successful home management:
 - Headache resolution

- Pain <3 on pain scale
- 50% reduction in severity of headache
- For treatment failure (≤50% reduction in pain), consult a headache specialist or neurologist for possible inpatient treatment options:
 - DHE
 - Continued valproate infusions
 - IV methylprednisolone or dexamethasone

Resources

For Healthcare Providers

- [Migraine in Children \(Medscape\)](#)
- [Acute Treatment of Migraine in Children \(UpToDate\)](#)

For Parents and Caregivers

- [Headaches \(KidsHealth.org\)](#)
- [Migraine \(Mayo Clinic\)](#)

This guideline was developed to improve health care access in Arkansas and to aid health care providers in making decisions about appropriate patient care. The needs of the individual patient, resources available, and limitations unique to the institution or type of practice may warrant variations.

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