

Acute Migraine: ED Management

This guideline is intended to be used for **patients in the ED** who meet the below inclusion criteria

Inclusion Criteria for this Guideline

- 6 years or older presenting to the NCH/NCMC/NWC ED with headache and meets [acute migraine definition](#) and does NOT meet any exclusion criteria. Guideline may also be used for patients meeting probable migraine definition.

Exclusion Criteria for this Guideline

- Age less than 6 yr old
- [No SNOPY criteria](#) present
- [Chronic daily headache](#)
- [Hemiplegic migraine](#)
- [Retinal migraine](#)
- Secondary headache: another disorder scientifically documented to be able to cause headache has been diagnosed
- No previous diagnosis of migraine with brainstem aura, hemiplegic migraine or retinal migraine
- Pregnant
- Progressive severity in the ED and despite admission after medication interventions

Key to using guideline

- ***This is a guideline, not a policy.*** Patient variation and other factors may impact management decisions.
- While it could be appropriate for the guideline user to use some of the treatment recommendations in patients who don't yet meet criteria for diagnosis of migraine with/without aura, patients should meet inclusion criteria and not meet any exclusion criteria for all aspects of the guideline to have relevance and its application to be supported by the literature.
- "Jump to" boxes contain hyperlinks to other pages of the guidelines. Clicking on the underlined word or phrase will take you to the page.
- Green boxes represent steps in an algorithm
- Yellow shapes represent decision branch points or key points of concern/caution
- Red stop sign means exit guideline as it no longer is appropriate for investigating and treating the patient's signs and symptoms.

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To make a referral

Norton Children's providers: Go to Epic Ambulatory

Community providers: Scan the **QR code** or call **(833) 559-7337 (PEDS)**

Last updated: October 2023

Migraine Definitions

Acute migraine without aura	Acute migraine with aura
At least 5 attacks AND	At least 2 attacks AND
Duration 2 – 72 hours AND	Duration 2-72 hours or NA AND
2 or more of the following AND - Unilateral location (frequently bilateral in children less than 18 yo) - Pulsating quality - Moderate to severe pain intensity - Aggravation by or causing avoidance of routine physical activity	1 or more fully reversible of the following (at the beginning of treatment, how do you know if it will be reversible) AND - Visual - Sensory - Speech and/or language - Motor - Brainstem - Retinal (these are excluded from guideline. Exit if present)
1 or more of the following - Nausea and/or vomiting - Photophobia or phonophobia	Any 3 of the following - At least 1 aura symptom spreads gradually over 5 or more minutes (while in ED or as part of history) 2 or more aura symptoms occur in succession - Each individual aura symptom lasts 5 – 60 minutes - At least 1 aura symptom is unilateral - At least 1 aura symptom is positive (positive what?) - The aura is accompanied or followed with 60 minutes by headache

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Acute Migraine Treatment: ED

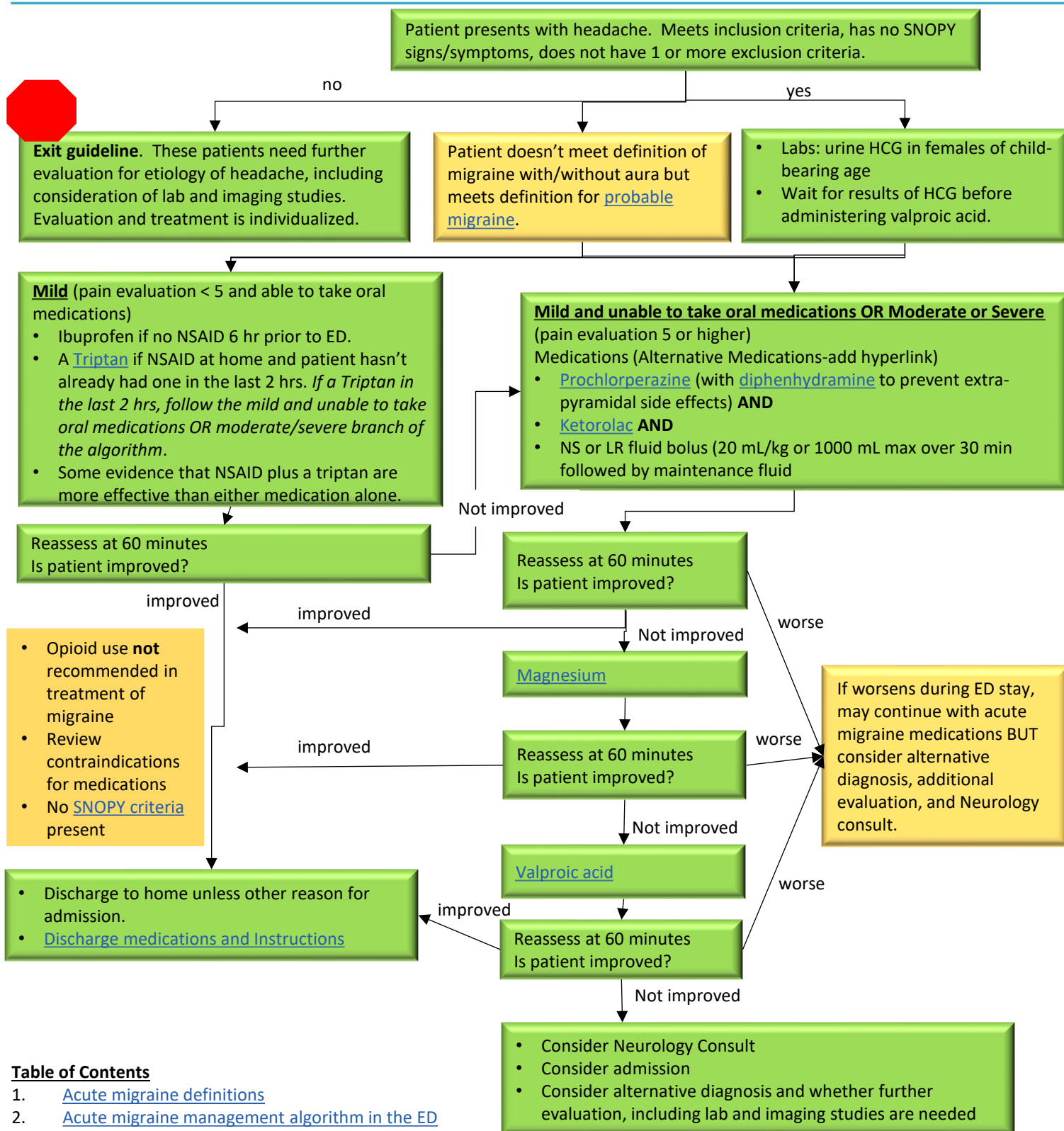


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Additional Migraine Types

Probable Migraine

- Migraine-like attacks missing one of the features required to fulfill all criteria for a type or subtype of migraine.
- While the guideline may be used to guide ED management, be aware that additional history, physical exam (especially neurologic si/sx), and diagnostic evaluation may be warranted than recommended for migraine management.
 - Deeper dive into SNOPY criteria
 - Encourage funduscopic exam, other si/sx of increased ICP
 - Si/sx of secondary headache
 - Diplopia, EOM, ophthalmoplegia, visual field defects
 - No specific recommendations for imaging unless H and P suggest otherwise

Migraine with Brainstem aura

- Migraine with aura symptoms clearly originating from the brainstem but no motor weakness or retinal symptoms
 - At least 2 of the following: dysarthria, vertigo, tinnitus, hyperacusis, diplopia, ataxia not attributable to sensory deficit, decreased level of consciousness (GCS < 13)

Hemiplegic migraine:

- Migraine with aura including motor weakness AND
- Attacks fulfilling criteria for Migraine with aura
 - Aura with both of the following:
 - Fully reversible motor weakness
 - Fully reversible visual, sensory and/or speech/language symptoms

Retinal migraine

- Repeated attacks of monocular visual disturbance, including scintillations, scotomata or blindness, associated with migraine headache.
- Attacks fulfilling criteria for Migraine with aura AND
 - Aura with both of the following:
 - Fully reversible, monocular, positive and/or negative visual phenomena (scintillations, scotomata or blindness) confirmed during an attack by either or both of the following:
 - Clinical visual field examination
 - Patient's drawing of a monocular field defect after given clear instruction
 - At least 2 of the following:
 - Spreading gradually over 5 or more minutes
 - Symptoms last 5 – 60 minutes
 - Accompanied, or followed within 60 minutes, by headache
- Not better accounted for by another ICHD-3 diagnosis, and other causes of amaurosis fugax have been excluded.

Chronic daily headache

- Mild to moderate headache with or without migrainous features that are daily or constant without acute changes in severity of character of the headaches.
 - It is possible that patients with chronic daily headache have acute exacerbations consisting of headaches typical of migraine with or without aura on top of their daily headaches.

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SNOPY Criteria

SNOPY Criteria
No Systemic signs or disorders
No Neurologic exam findings (cognition, mentation, personality changes or deficits in one or more areas of the body)
Rapid (thunderclap) Onset of headache
Change from Prior headache history
Younger age (less than 6 year old)

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Medication Dosing and Information

Medication	Dose	Comments and relevant side effects
Ibuprofen	10 mg/kg Max dose = 800 mg Enteral	Recommend against prescribing if patient has had any NSAID within last 4 hours OR has had repeated NSAID dosing during the last 24 hours.
Ketorolac	0.5 mg/kg IV Maximum dose = 30 mg	Recommend against prescribing if patient has had any NSAID within last 4 hours OR has had repeated NSAID dosing during the last 24 hours.
Prochlorperazine: central cholinergic analgesic effect	0.15 mg/kg IV Maximum dose = 10 mg	- Consider even is no nausea or vomiting - Combination of ketorolac and prochlorperazine may be more effective than each drug alone - Extrapyramidal symptoms - Pre-treat with diphenhydramine - Has the potential to prolong QTc
Magnesium sulfate	30 mg/kg IV Maximum dose of 2000 mg	- May cause hypotension, flushing, and burning - Magnesium level not required prior to 1st dose
Valproic acid: mechanism of action possibly related to increasing availability of gamma-aminobutyric acid, thus suppressing migraine-related events in the cortex	20 mg/kg IV Maximum 1000 mg	- Contraindicated is - Pregnant, clinically significant thrombocytopenia, hepatic dysfunction
Ondansetron	0.15 mg/kg IV Maximum 8 mg	Has the potential to prolong QTc
Diphenhydramine	1 mg/kg IV Maximum 25 mg	Administer 15 – 30 min prior to prochlorperazine to decrease risk of dystonic reactions.

- Opioid use not recommended
- Review contraindications for medications
- No [SNOPY criteria](#) present

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Triptans: Dosing and Information

Triptans

- Triptans are serotonin 5-HT₁ receptor agonists. Triptans combined with NSAID better than either drug given alone.
- **Rizatriptan** = Preferred triptan in ED.
 - Don't administer a triptan if patient has a triptan within the past 2 hours.
 - Formulation – dispersible tablet
 - Dosing
 - Less than 40 kg = 5 mg total dose
 - 40 kg or more = 10 mg total dose
 - Maximum dose = 10 mg/dose, 20 mg/day
 - If discharged on rescue Triptan – Rizatriptan, 2 doses, same dosing, no refills
- Produce vasoconstriction
- Contraindicated in patients with
 - Hemiplegic migraine
 - Migraine with brainstem aura
 - History of organ transplant
 - Stroke
 - CV disease or peripheral vascular syndromes such as JTIA, ischemic bowel disease
 - Severe hepatic impairment
 - Signs/or symptoms of ischemic heart disease
 - Myocardial infarction
 - Uncontrolled hypertension
 - Use of ergotamine derivatives in the last 24 ours
 - Concomitant use of vasoconstrictive drugs, methysergide, MAO inhibitors (within last 2 weeks)
- New class called **ditans** (lasmiditan, 5HT_{1F} agonist) effective in adults. Trials underway in children. PIONEER PEDS-1 and PEDS-2.

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Discharge Instructions

Discharging a patient treated for acute migraine from the Emergency Department

There is little guidance in the literature and, to some degree, instructions for children with migraine are patient-dependent.

The writing team offers the following guidance:

- **Lifestyle choices** impact frequency and severity of migraine headaches. Thus, parent and patient education about lifestyle choices that impact migraine headaches is important. Current discharge instructions in the After Visit Summary (AVS) include the following:
 1. Adequate hydration: Making sure you are drinking enough fluids every day is important in preventing headaches. The general recommendation is to drink 8 cups of water per day (64 fluid ounces per day).
 2. Regular sleep: Having regular sleep schedule with good quality sleep is important in preventing headaches. It is recommended children aged 6 to 12 years of age get 9 to 12 hours of sleep per night and adolescents aged 13-18 years get 8 to 10 hours of sleep per night. Too little sleep, restless sleep, and daytime sleepiness are all associated with headaches. Practicing good sleep hygiene is also important to getting restful, quality sleep.
 3. Regular meals: Eating regular, well-balanced meals is important in preventing headaches. Skipping meals has been shown to be associated with more frequent and severe headaches. Eating high sugar foods has also been shown to trigger headaches.
 4. Caffeine consumption: Making sure you are not consuming too much caffeine is important in preventing headache. Overconsumption of caffeine (soda, coffee, tea) is associated with more frequent headaches, especially in teenagers.
 5. Physical activity: Getting enough physical activity is important in preventing headaches. Lower physical activity, a sedentary lifestyle, higher BMI are all associated with a higher risk of headaches and more frequent headaches. Also, aerobic exercise has been shown to reduce the number of headaches. The CDC recommends the children and adolescents aged 6 to 17 years of age to 60 minutes of moderate to vigorous physical activity daily.
 6. Stress: Managing stress is important in preventing headaches. Stress can both trigger a migraine attack and lead to the development of chronic cardiac disease. School related stress is one of the primary stressors associated with headaches in children and adolescents. Relaxation therapy and biofeedback have been shown to reduce frequency of headaches. Frequently, referral to a behavioral health specialist is helpful for stress management.
 7. Provide parent and child migraine educational materials.
- **Patients with migraine medications at home** should be advised to continue their home regimen, including use of rescue medications.
- **Patients with no migraine medications at home:** consider prescribing rizatriptan as a rescue medication while patients await further evaluation by their primary care provider or Neurologist.
- **Follow up :**
 - Patients **without** a Neurologist should follow up with their primary care provider for further evaluation and decision-making regarding referral to a Neurologist. If there is concern that the migraine diagnosis may not completely explain the child's symptoms, a referral may be made to Neurology at the time of discharge.
 - Patients **with** a Neurologist should be advised to call their Neurologist to determine if any medication changes are needed or an appointment should be made.

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Migraine Overview

Introduction

Migraines are a disabling type of headache common in the pediatric population. The overall prevalence of migraines in childhood is estimated at 7.7%, and migraines are considered to be in the top ten of most disabling diseases by the World Health Organization. Migraines are the most common diagnosis for referral to child neurology, but also in the top ten for visits to PCP and urgent care or emergency department. Therefore, a familiar understanding of migraine headaches is important not just for neurologists but also pediatricians and emergency medicine specialists.

Migraines are deemed a primary headache disorder, meaning that there is no underlying metabolic or structural causes. Our understanding of migraine pathophysiology has changed over the last several years and involves disordered sensory processing with both intracranial and extracranial contributions. Headaches constitute up to 2.6% of visits to pediatric emergency departments, so it is important to develop evidence-based protocols to reduce the severity and duration of acute migraine. Additionally, these interventions can have important downstream consequences with regard to school attendance and performance, involvement in extracurricular activities, and the mental health of children and adolescents.

Prevalence

- 1 – 3% in 3 – 7 yr olds
- 4 – 11% in 7 – 11 yr olds
- 8 – 23% by age 15 years

Pathophysiology

Advances are being made in understanding the pathophysiology of migraine headaches. The notion that they are vascular headaches is misleading. Migraines are a disorder of sensory processing with periodic incapacitating headache. There is genetic susceptibility.

CGRP Release of CGRP from the brain as a pain signal activates a host of effects including vasodilation and other inflammatory responses. Monoclonal antibodies against JCGRP and its receptor and CGRP=-receptor antagonists, known as GPANTS

Childhood migraine syndrome: infantile colic, benign paroxysmal torticollis, benign paroxysmal vertigo of childhood, migraine and cyclical vomiting

- Mental status
- Ophthalmological exam
- Cranial nerve exam
- Symmetry of muscle tone, strength and jDTR
- Sensation
- Plantar response
- Gait, arm, leg coordination

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Migraine Overview

International Classification of Headache Disorders 3rd edition (ICHD-3) Descriptions

Migraine without aura:

- Recurrent headache disorder manifesting in attacks lasting 4-72 hours; 2 – 72 hr in children and adolescents.
- Typical characteristics of the headache are unilateral location or bilateral in children and adolescents, pulsating quality, moderate or severe intensity, aggravation by routine physical activity and association with nausea and/or photophobia and phonophobia.
- Diagnostic Criteria:
 1. At least five attacks fulfilling criteria 2-4
 2. Headache attacks lasting 4-72 hr (untreated or unsuccessfully treated)
 3. Headache has at least two of the following four characteristics:
 - unilateral or bilateral (especially in children and adolescents) location
 - pulsating quality
 - moderate or severe pain intensity
 - aggravation by or causing avoidance of routine physical activity (eg, walking or climbing stairs)
 4. During headache at least one of the following:
 - nausea and/or vomiting
 - photophobia and phonophobia
 5. Not better accounted for by another ICHD-3 diagnosis.

Migraine with aura:

- Approximately 10-20% of children.
 - 90% are visual
 - Remaining 10% are sensory symptoms, or even speech/language, brainstem, unilateral retinal, or motor symptoms
- Recurrent attacks, lasting minutes, of unilateral fully-reversible visual, sensory or other central nervous system symptoms that usually develop gradually and are usually followed by headache and associated migraine symptoms.
- Diagnostic Criteria:
 1. At least two attacks fulfilling criteria 2 and 3
 2. One or more of the following fully reversible aura symptoms:
 - visual
 - sensory
 - speech and/or language
 - motor
 - brainstem
 - retinal
 3. At least three of the following six characteristics
 - at least one aura symptom spreads gradually over ≥ 5 minutes
 - two or more aura symptoms occur in succession
 - each individual aura symptom lasts 5-60 minutes
 - at least one aura symptom is unilateral
 - at least one aura symptom is positive
 - the aura is accompanied, or followed within 60 minutes, by headache
 4. Not better accounted for by another ICHD-3 diagnosis.

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Migraine Overview

International Classification of Headache Disorders 3rd edition (ICHD-3) Descriptions

Migraine in Pediatrics:

- In children and adolescents, migraine headaches are more often bilateral than in adults.
- Migraine headache location is usually frontotemporal.
- Occipital location not rare.
- Attacks may be as short as 2 hours (compared to 4 hours in adults).
- In young children, photophobia and phonophobia may be inferred from behavior.

Chronic Migraine:

- Prevalence in adolescents estimated to be around 0.79% - 1.75%
- Socioeconomically disadvantaged children and adolescents have a higher risk of chronic migraine
- Children with migraine miss more days of school and have poorer performance than children without migraine.

Treatment:

- Treatment usually consists of medications, non-medication options, and lifestyle modifications.
- Abortive therapy focused on reducing symptoms for acute attacks.
- Preventative therapy focused to reduced frequency, severity, and duration of future attacks.
- Preventative medications considered for frequent attacks (4 or more per month) or severe attacks.

Abortive Medications:

- Analgesics (Ibuprofen, Acetaminophen, Naproxen)
- Ibuprofen likely better than acetaminophen
- 4 Triptans approved for pediatrics
 - Rizatriptan (6 -17 years old): 5 mg (<40 kg) or 10 mg (>40 kg)
 - Sumatriptan/naproxen (12 – 17 years old): 10/60 mg up to 85/500 mg
 - Zolmitriptan (12 -17 years old): intranasal, 2.5 or 5 mg
 - Almotriptan (12- 17 years old): 6.25 or 12.5 mg
- Antiemetics (Metoclopramide, Promethazine, Prochlorperazine)

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Migraine: Preventative Treatment

Preventative Treatment:

- No preventative medications labeled for <12 years old
- Topiramate approved for migraine prevention in 12-17 years of age
- Preventative medications include:
 - Nutraceuticals (Magnesium Oxide, Riboflavin, Coenzyme Q10)
 - Cyproheptadine
 - Beta-blockers (Propanolol)
 - Tricyclic Antidepressants (Amitriptyline)
 - Antiseizure Medications (Topiramate)
- Treatment for chronic migraine mostly focuses on lifestyle modifications and preventative therapy.
- Non-medication options for preventative therapy includes the following:
 - Behavioral therapy (cognitive-behavioral therapy, biofeedback, relaxation training)
 - Neurostimulation (Nerivio, Cephaly)
 - Botulinum toxin injections (off-label use in children)
 - CGRP antagonists (not yet FDA approved under 18 years of age)
- Lifestyle Modifications:
 - Adequate Hydration: 64 ounces of water per day
 - Regular Sleep:
 - Children aged 6-12 years of age recommended to get 9-12 hours of sleep per night
 - Adolescents aged 13-18 recommended to get 8-10 hours of sleep per night
 - Regular Meals:
 - Skipping meals (particularly breakfast) associated with more frequent and severe headaches
 - Eating high-sugar foods has also been shown to trigger headaches.
 - Caffeine Consumption: Overconsumption of caffeine (soda, coffee, tea) is associated with more frequent headaches, especially in teenagers.
 - Physical Activity: Aerobic exercise has been shown to reduce the number of headaches
- Stress Management:
 - School-related stress is one the primary stressors associated with headaches in children and adolescents.
 - Relaxation therapy and biofeedback have been shown to reduce frequency of headaches.

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Version History

Version	Date	Guideline Owner	Summary of Edits	Next Revision Due
1	8/3/2023	Adam Isacoff Elizabeth Doll	NA	8/3/2026

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Approvals

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Disclaimers and Restrictions

- **Disclaimer:**
 - These Guidelines are based upon a review of current medical literature, but do not mandate a course of treatment or set the standard for medical care. Departures from the Guidelines may be appropriate in the management of a particular patient or in response to changes in medical science. Individuals providing healthcare are expected to use their education, training and experience to determine what is in the best interests of the patient under the circumstances existing at the time. The clinical literature cited is not an endorsement of any article or text as authoritative.
- **Restrictions:**
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