Headaches in Children and Adolescents

Nationwide Children's®
When your child needs a hospital, everything matters.

Approximately 60% of children experience occasional headaches. Most of these children never present to a physician. Up to 18% of females and 6% of males under the age of 20 have migraines and may need medical management.

Headache vs. Migraine: Making the Right Diagnosis

In adults, migraines usually last at least four hours and are typically unilateral, but the duration may be much shorter in the pediatric population and present bilaterally. Only about 10% of pediatric migraineurs will have an aura, and younger patients may not notice or be able to describe an aura if it is present.

Migraine Without Aura Diagnostic Criteria:

- History of at least 5 headaches that last 2-72 hours when untreated (include time if falls asleep)
  - With 2 of 4 additional features:
    - Pulsatile quality
    - Unilateral (can be bilateral in younger children)
    - Worsening with activity or limiting activity
    - Moderate to severe in intensity
- Associated with photophobia and phonophobia and/or nausea/vomiting.

Migraine With Aura Diagnostic Criteria:

- Recurrent attacks of unilateral (may be bilateral in children) fully reversible visual, sensory or other neurologic symptoms that develop gradually and followed by headache with migraine symptoms
- >2 headaches over the past year that last 2-72 hours when untreated (include time if falls asleep)
  - With 3 of 6 of features:
    - Aura symptom spreads gradually over ≥5 minutes
    - Two or more aura occur in succession
    - Individual aura lasts 5-60 minutes
    - At least one unilateral aura
    - At least one positive aura (flashes of light in visual fields, pins-and-needles sensory symptoms)
    - Headache follows aura within 60 minutes

Tension Headache Diagnostic Criteria:

- History of 10 headaches lasting 30 minutes to 7 days
  - With 2 of 4 additional features:
    - Pressure or tightening (non-pulsatile) quality
    - Bilateral (usually temporal) location
    - Not worsened with activity or limiting activity
    - Mild to moderate in intensity
- No nausea/vomiting and no more than one of photophobia and phonophobia

Is it a Brain Tumor?

Despite parents' common concern, it is exceedingly rare for headache to be the presenting complaint of a brain tumor. However, the following "red flags" should increase your level of suspicion of a serious underlying cause:

History Red Flags:

- Sudden onset
- Worst headache of child's life
- No family history of headaches
- Progressive headache
- Headache that awakens a child or teen from a sound sleep and is associated with nausea and vomiting
- Headaches in the back of the head
- Worse when laying down, upon awakening or with Valsalva

Physical Exam Red Flags:

- Focal deficits on your exam
- Papilledema, cranial nerve palsy
- Evidence of recent head trauma
- Meningeal signs or fevers
- Altered mental status
- Neurocutaneous findings

If any of these red flags exist, further workup for a serious underlying issue or a referral to a pediatric neurologist may be indicated. Patients without red flags generally do not need CT scans, MRIs or EEGs for their headaches or migraines.

TREATMENT: PREVENTION

Lifestyle management: Recent studies have shown that lifestyle factors can greatly contribute to headache management in children and adolescents.

Diet: Migraine sufferers must eat three meals a day (no skipped meals). Healthy nutrition habits, such as eating adequate fruits and vegetables and avoiding excessive added sugars, can be particularly helpful. Breakfast is a common meal to remind teenagers about.

Some patients can have specific food triggers that can be identified by keeping a headache journal and noting the foods eaten on days when headaches occur. Some common food triggers include citrus, aged cheeses, processed meats, especially those cured with nitrates, bread baked with yeast, red food coloring, nuts, yogurt/sour cream, artificial sweeteners, MSG and vinegar.

Sleep: Adequate sleep is vital for health and wellbeing, particularly for headache sufferers. Consistent sleep and wake times — including on weekends — is important.

- 3-5 years: 10-12 hours of sleep per 24 hours (including naps)
- 6-12 years: 9-12 hours of sleep
- 13-18 years: 8-10 hours of sleep

Hydration: Poor hydration is often the cause of migraines, especially in hot weather. It is helpful to give families a fluid goal in ounces as this can be one of the most powerful interventions. An easy rule of thumb is to have the child drink their weight in kilograms, in ounces (e.g., a 50 kg child should drink 50 ounces of water per day). Another way to phrase it is that aside from first morning void, urine should be clear.

Caffeine: Though caffeine is present in a number of over-the-counter medications for migraines, we recommend caffeine avoidance because the frequent intake of caffeinated products is one of the most common causes of rebound headache. Excessive caffeine intake can be dehydrating and interfere with sleep. It is important to discuss sources of caffeine, such as coffee, soda and tea that can go unrecognized.

Analgesic overuse: Review home medication use. Recommend caution in OTC analgesic medications. Patients should be advised not to take any combination of over-the-counter abortive medications more than two days a week and no more than twice daily. Two common features of analgesic-overuse is progression of headaches to daily over time and reports from the patient and/or family that these medications no longer seem to help headache.

Exercise: Studies have shown that good exercise habits can decrease migraine frequency and intensity.

Psychological support: Many of these patients are under stress from school, work, family or other relationships. These stressors should be addressed for optimal treatment. Oftentimes, psychiatric comorbidities go unrecognized by patients and families. In some instances, treatments such as biofeedback and relaxation therapy may be helpful.

Preventive Medical Therapy for Frequent Headaches (Migraine or Tension)

For patients who suffer from migraines averaging at least once a week or who have migraines that last for long periods of time, preventive therapy may be indicated. Educate patients that the full effect of a preventive therapy for migraines may take 6-8 weeks after reaching full dose to have an effect and must be taken consistently. Consider starting one of these preventive therapies, which have been shown to be helpful in preventing migraines in children and adolescents. If limited response to below medications, consider referral to a headache specialist.

Consider for patients with:

- Frequent headaches with severe debilitation
- Severe debilitation even if less frequent
- No improvement with lifestyle modifications

Typical initial therapy options:

- Magnesium oxide 400 mg QDAY
  OR
- Riboflavin 100 mg QDAY

Additional considerations:

- Consider magnesium oxide or riboflavin first, given fewer adverse effects compared to other options (see Appendix)
- Cyproheptadine works best in those <7 years of age
- Amitriptyline and topiramate are equally as effective, and which to prescribe is up to patients and possible side effects
- Consider co-morbidities when selecting preventive treatment
  - Caution with amitriptyline in patients with obesity
  - Caution with topiramate in patients with low BMI
- Over-the-counter and nutraceutical coverage may depend on the manufacturer a specific pharmacy has available

TREATMENT: ACUTE MEDICAL MANAGEMENT

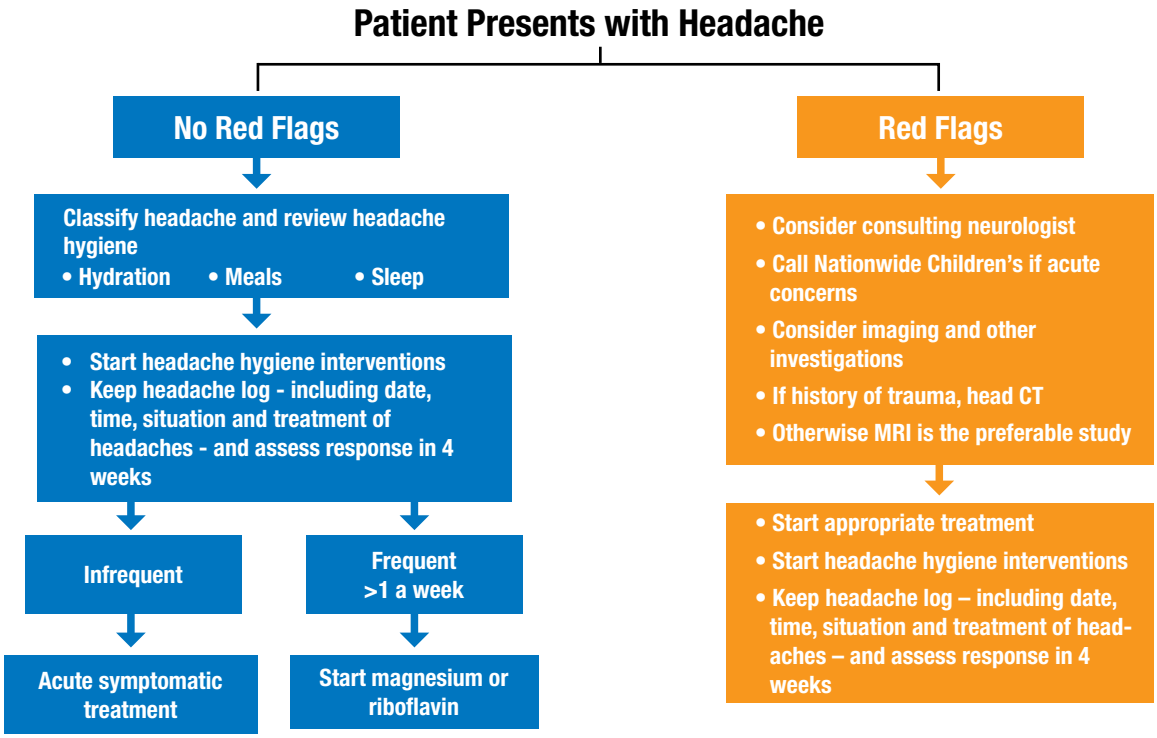
Please counsel patients and caregivers that it is critical that the patient take the medication as soon as possible after the onset of the headache (less than one hour). The longer the delay, the less effective the treatment will be. Caregivers should communicate this to the patient's school as well.

This guideline is meant as a starting point for headache treatment in the general pediatrician's office. Many times, lifestyle factors are significantly contributing to the headache and can be addressed. If patients are continuing to experience headaches beyond the above steps, consider referral to a headache specialist.

1. First-line therapy: Acetaminophen 15 mg/kg/dose (max 1,000 mg), or NSAID medications such as ibuprofen 10 mg/kg (max 800 mg) or naproxen 5-7 mg/kg (max 500 mg) may resolve symptoms. This should be given with 24-32 ounces of fluids (supposing significant nausea is not present).
2. For children and adolescents who do not respond to OTC analgesics, a triptan may be prescribed. (Triptans are contraindicated in patients with a history of migraines accompanied by focal neurological deficits or loss of consciousness, cardiovascular disease, stroke, TIA, MI, severe peripheral vascular disease, or cardiac accessory conduction pathway disorders. Triptans are also contraindicated in use within 24 hours of another 5-HT1 agonist or ergotamine derivatives, and concurrent administration or within 2 weeks of discontinuing an MAOI.)
   - Weight <40 kg: Rizatriptan (oral or ODT) 5 mg
   - Weight >40 kg: Rizatriptan (oral or ODT) 10 mg
3. See Appendix for additional acute medical management options.

Headache Clinic at Nationwide Children's Hospital

In the Headache Clinic at Nationwide Children's Hospital, patients are evaluated by physicians and nurse practitioners with unique expertise in headache management for children and adolescents. Clinical psychologists are also available to provide expertise in biofeedback and relaxation therapy for families that are interested in these non-medication treatments. These approaches may be particularly helpful for older children and teens who suffer from other conditions that may be contributing to frequent headaches, such as depression or anxiety. Clinic appointments may be made at the Nationwide Children's main campus, or at locations surrounding Columbus in Dublin, Westerville and New Albany.



APPENDIX

Preventive Medical Therapy Options for Medicaid Plans

Drug	Initial Daily Dose**	Max Daily Dose	Strengths Available*	Clinical Pearls
Nutraceuticals				
Magnesium Oxide	9 mg/kg/day divided QDAY or BID	800 mg	Tablet: 250, 400, 420 mg	Diarrhea
Riboflavin (Vitamin B2)	100-200 mg divided QDAY or BID	400 mg	Tablet: 50, 100 mg	GI upset, urine discoloration (yellow-orange)
Anti-Seizure Medications				
Topiramate (Topamax®, Qudexy XR®, Trokendi XR®, Eprontia®)	1 mg/kg/day (up to 50 mg) divided QDAY or BID	3 mg/kg/day divided BID (200 mg/day)	Tablet: 25, 50, 100, 200 mg Eprontia® (liquid): 25 mg/mL (patients over 12 require prior authorization)	Weight loss, fatigue, word-finding problems, nephrolithiasis, metabolic acidosis, hyperthermia Counseling recommendations: • Teratogenic effects if childbearing potential • Potential of this medication to decrease the efficacy of oral combined hormonal contraceptives
Antidepressants				
Amitriptyline (Elavil®)	0.25 mg/kg/day (up to 25 mg) QHS	1 mg/kg/day (100 mg/day) QHS	Tablet: 10, 25, 50, 75, 100, 150 mg 10 mg/mL compounded suspension available at NCH pharmacies	• Avoid co-administration with or within 14 days of MAO inhibitor • Weight gain, constipation, ataxia, sedation, tachycardia
Antihistamines				
Cyproheptadine (Periactin®)	0.2 mg/kg/day (up to 4 mg/day) divided BID	0.5 mg/kg/day (8 mg/day) divided BID	Syrup: 2 mg/ 5mL Tablet: 4 mg	Weight gain, fatigue, confusion, dizziness, urinary retention, tachycardia

*Medication strengths included here are available on the Ohio Department of Medicaid's preferred drug list. There may be other dosage forms of the medication available that are not readily available.

** Lower starting dose may be used if clinically indicated, or concerns regarding tolerability are present.

Acute Medical Therapy Options for Medicaid Plans

Medication*	Route	Weight <40 kg	Weight ≥40 kg	Side Effects
FDA approved in children aged ≥6 years				Chest pain, palpitations, drowsiness, dizziness, nausea, muscle weakness, flushing
Rizatriptan*	Oral	5 mg	10 mg	
	ODT	5 mg	10 mg	
FDA approved in children aged ≥12 years				
Almotriptan	Oral	6.25 mg	12.5 mg	
Sumatriptan/naproxen	Oral	N/A	85 mg/500 mg	
Zolmitriptan	Oral	N/A	N/A	
	Nasal	2.5	5 mg	
FDA approved in patients aged ≥18 years and up				
Eletriptan	Oral	20 mg	40-80 mg	
Sumatriptan*	Oral	25 mg	50-100 mg	
	Nasal	5 mg	20 mg	
Naratriptan*^	Oral	1 mg	2.5 mg	
Frovatriptan^^	Oral	1.25 mg	2.5 mg	

*Medications marked with an asterisk are available on the Ohio Department of Medicaid's preferred drug list.
^1 mg BID may be given short-term 2-3 days prior to anticipated onset of symptoms and continued for a total of 5-6 days to prevent menstrually associated migraines
^^May be given short-term for 6 days prior to anticipated start of menstruation to prevent menstrually associated migraines

- **Rizatriptan:** Safety and efficacy of multiple rizatriptan doses in a 24-hour period has not been established for pediatric patients
- **Almotriptan:** May repeat dose after 2 hours, maximum 2 doses/day; maximum daily dose: 25 mg/day; maximum monthly dose: 4 migraines/month
- **Zolmitriptan nasal spray:** May repeat in 2 hours-max 10 mg/day
- **Sumatriptan/naproxen:** May repeat dose after ≥2 hours, maximum 2 doses/day, limit use to <10 days/month
- **Sumatriptan nasal spray:** Not FDA approved in patients <18 years of age; could consider a single dose
  - 5-12 years old
    - 20-39 kg: 10 mg
    - >40 kg: 20 mg
  - >12 years old: 10 mg or 20 mg
- **Sumatriptam tablet:** Not FDA approved in patients <18 years of age; limited efficacy in children aged ≥6 years, however could consider 25-50 mg as a single dose within 30 minutes of headache onset

To avoid a medication-overuse headache, patients should be advised not to take any medications more than 2 days a week and no more than twice daily.

Referrals and Consultations

Online: NationwideChildrens.org/Neurology
Phone: (614) 722-6200 or (877) 722-6220 | Fax: (614) 722-4000
Physician Direct Connect Line for 24-hour urgent physician consultations:
(614) 355-0221 or (877) 355-0221

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