

The Pediatric Headache Handbook

For the Primary Care Physician

Brought to you by the
Division of Pediatric Neurology

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Classification of headache patterns in children

Acute onset of “worst headache of my life” (sometimes referred to as thunderclap headache)

This can be the patient’s first headache or a headache significantly worse or of much more sudden onset than prior headaches.

This can be particularly worrisome if the onset is after some type of straining or valsalva-like maneuver, or if associated with sudden syncope.

This patient should be approached as a potential neurologic emergency, with subarachnoid or other intracranial hemorrhage a possibility (emergency room evaluation including CT scan of the brain and possible lumbar puncture may be indicated).

In reality, most of these patients are having their first severe migraine, though this is a diagnosis of exclusion with the first severe headache.



Recurrent, intermittent headaches

These are periodic events separated by pain-free intervals of varying severity.

Many of these will meet criteria for a “primary headache disorder.” The two most common, by far, are:

- Migraine
- Tension headache

If patients meet classic diagnostic criteria for either based on history and a normal general and neurologic examination, then very little other evaluation (including imaging) is needed. This must include a fundoscopic evaluation (either by the primary care practitioner or eye specialist). There is no other way to exclude a subtle cause of increased intracranial pressure like pseudotumor cerebri.

Pediatric Migraine – International Classification of Headache Disorders (ICHD-2) Diagnostic Criteria (at least 5 attacks fulfilling criteria 2-4 below)

1. Attacks lasting 1-72 hours
2. Headache has at least two of the following characteristics:
 - unilateral or bilateral location, frontotemporally located (not occipital)
 - pulsing quality
 - moderate or severe pain intensity
 - aggravation by or causing avoidance of routine physical activity
3. During the headache, at least one of the following:
 - nausea or vomiting
 - photophobia and phonophobia, which may be inferred from a child’s behavior
4. Not attributed to another disorder

Special points on pediatric migraine

This is not just a disorder of older children, many present prior to the ages of 5-8, though at younger ages it may be challenging to get enough history to meet full criteria. Parents may also use words like “pale” or “exhausted” to describe their children during a migraine. Headaches severe enough to make a younger child scream or cry are often suggestive of migraine

Migraine may often be associated with menstrual cycle, or clearly worsen around menarche. OC’s containing estrogen have an unpredictable effect on patients with migraine, making them either better or worse, at times even provoking the first migraine. In general, lower dose estrogen formulations are recommended.

Only 20 percent or so of children with migraine will have an aura. This aura is quite helpful in suggesting migraine as the cause, though due to the low frequency, is not part of the diagnostic criteria.



Treatment of pediatric migraine

Abortive treatments – We typically consider medications effective if they allow headache relief to the point the patient can return to normal functioning within two hours. It is crucial that patients with migraine have the ability to take this medication immediately at the onset of their headache (or aura) to increase effectiveness. For this reason, they will often need to keep a supply at school, which usually requires a note from the physician.

- » **Acetaminophen** and **Ibuprofen** can often be very effective for both tension and migraine headache in children. These certainly can be tried first.
- » **Naproxyn** is sometimes more effective for migraine than ibuprofen and may be less likely to lead to medication overuse symptoms. For children under 50 kg, we often use 250-375 mg per dose (repeat every 12 hours as needed). Children over 50 kg can use 375-550 mg per dose.
- » **Excedrin® Migraine** (or generic equivalent) is commonly used by teenage and adult patients for migraine. Each tablet or gelcap typically contains 250 mg of acetaminophen, 250 mg of aspirin and 65 mg of caffeine. Typical dosing is 1-2 tablets at the onset. Clearly this should be avoided in children who are felt to be in the midst of a varicella or influenza infection due to the rare possibility of producing Reye syndrome.
- » **Triptan** medications can be safely used in most patients over the age of 10. Most (other than Axert and Maxalt) are not FDA approved for children. Axert is approved for ages 12 and up. Maxalt for ages 6 and up. However, there is no indication that children younger than 12 are at any increased risk of side effects. It is certainly up to the particular provider to determine the patient age they feel comfortable prescribing triptans.

Also, it is important to know Illinois and Missouri Medicaid often approve only certain triptans (this changes periodically, but may restrict which type you can prescribe) In general, there is not one triptan that

is clearly better than any other. We suggest you become comfortable with one or two, and use these when possible. The most commonly used include:

Imitrex® (sumatriptan) comes in three forms: intranasal, oral and injectable. Younger children should be started on the smallest dose: oral - 25 mg, intranasal - 5 mg. This dose can be titrated over time. Maximum initial dose of the oral form in 100 mg. The dose may be repeated every two hours if not improved, up to a maximum of 200 mg in 24 hours. Adult sized children need adult doses. If over 50 kg, start with 50 mg, and if that is not effective, give 100 mg at the onset.

Axert® (almotriptan) comes as 6.25 mg and 12.5 mg tablets. Take 6.25-12.5 mg at onset, may repeat every 2 hours as needed up to daily maximum of 25 mg.

Zomig (zolmitriptan) comes in three forms: oral tablets, orally dissolvable tablets (Zomig-ZMT) and nasal spray. Initial dose 2.5-5 mg, may repeat every two hours up to max of 10 mg in 24 hours. Nasal spray dose is 5 mg at onset.

Maxalt® (rizatriptan), comes in tablets and orally disintegrating tablets (Maxalt-MLT). Initial dose 5 or 10 mg, may repeat every two hours up to max of 30 mg in 24 hours.

The following side effects occur, not uncommonly, and parents and patients should be advised these are usually quite short-lived, but occasionally distressing enough that patients avoid further use of the medication if: tingling or numb sensation in the head; sensation of warmth, heat, burning or cold; pressure sensations in the throat or chest to include tightness or heaviness; anxiety, agitation or even sedation.

» **CONTRAINDICATIONS TO TRIPTAN USE INCLUDE:**

- uncontrolled hypertension
- history of coronal artery disease
- cardiac arrhythmias (consult your cardiologist if needed)
- hemiplegic migraine
- prior allergic reaction



Treatment of pediatric migraine (continued)

- » Although there are several patients with migraine who experience more success with the following agents, they should be used with caution by the primary care provider as there is a fairly high incidence of an associated medication overuse headache syndrome:
 - Fioricet
 - Fiorinal
 - Midrin
- » Also, it is quite rare that a patient with migraine requires narcotics. In fact, migraines are often refractory to this mechanism of pain relief.

Preventative medications for migraine headaches

These are indicated, in general, when a patient is unable to maintain normal functioning secondary to their migraine headaches for 4 or more days per month.

Continue to have the patient use his or her abortive medication.

Ensure you have also addressed the headache hygiene factors (see page 7 of the handbook).

Patients and families need to be counseled that these do not work immediately, often taking 4-8 weeks to have an effect. Patience is key.

A positive response is typically achieved if disabling headaches are decreased down to 1-3 per month (although often the response is even better). Most patients will respond to one of the first two agents tried. Failure to respond to 2 or more different agents should prompt referral to a neurologist for either further treatment or reconsideration of the diagnosis.

These medications do not need to be continued indefinitely. Typically, if a patient cannot recall a severe headache for the prior 3-4 months, we usually advocate an attempted taper off the preventer medication.



The following five medications can be considered quite safe to use as a primary care manager:

» Cyproheptadine (Periactin)

- antihistamine medication, very safe especially useful for younger children with migraine (ages 5-10)
- major side effects are sedation (rare) and increased appetite (more common)
- use cautiously in children with obesity
- comes in 4 mg tablets (can break in 1/2) or suspension (2 mg/ 5mL)
- we typically begin with 2 mg nightly, and increase by 2 mg every 2-4 weeks, up to daily max of 8-10 mg
- higher than 4-6 mg may need to be divided b.i.d.
- no absolute contraindications, but counsel if already on a daily antihistamine for asthma or allergic rhinitis, may have additive sedating effect

» Topiramate (Topamax)

- anticonvulsant medication, lower dose used for migraine prevention
- comes in tablets (25 mg, 50 mg, 100 mg) and sprinkle capsules that can be opened and sprinkled in applesauce (15 mg and 25 mg)
- most common limiting side effects include sedation and word-finding difficulties, anorexia and paresthesias (face and hands). These are rare at the doses we use in migraine, but do occur. They are all reversible with discontinuation of the medication.
- very rare side effects include development of kidney stones or angle closure glaucoma in predisposed individuals (contraindication in both groups of patients) and hyperthermia secondary to impairment of sweating.
- use with caution in children who are struggling in school (for whatever reason) or have poor appetite or a formal eating disorder
- typical starting dose is 25 mg q.h.s. or 25 mg b.i.d. with increases every 2-6 weeks by 25-50 mg/d. The risk for cognitive and sedating side effects increases with higher doses, but it is not unusual for our teenage age patients to require 75-100 mg b.i.d. As a primary care manager, you should feel comfortable increasing the dose to 50 mg b.i.d. (or 100 mg q.h.s.). Lower doses can be used in patients under 25-30 kg; realistic target dose is about 1-3 mg/kg/d



» **Amitriptyline (Elavil®) or Nortriptyline (Pamelor™)**

- tricyclic antidepressants, very similar medications with similar dosing guidelines and side effects
- both come in 10 mg and 25 mg tablets, nortriptyline comes in a 10 mg/ 5mL suspension as well
- common side effects include mild sedation while adjusting to the medication (typically 7-10 days), dry mouth, occasional weight gain, less commonly can cause irritability or paradoxical depressed mood (this is rare in our experience)
- contraindicated in children with congenital heart disease or cardiac arrhythmia, or concomitant MAO inhibitor use (these are almost never used in children anyway)
- we would also not advocate using in a patient on a serotonin reuptake inhibitor (SSRI) for depression or anxiety, as there is a possibility of inducing a serotonin syndrome
- a screening EKG is not typically needed if dose is less than 1 mg/kg/d, nor do we follow drug levels at this dose
- typical starting dose is 10 mg qhs (5 mg qhs for patients under 20 kg would also be reasonable)
- the dose can be advanced by 10-20 mg every 2-6 weeks up to a max of 75 mg or 1 mg/kg/d (we occasionally use higher doses, but this is a reasonable target range as the primary care manager)
- typically, if a patient does not respond to one TCA, we usually do not try the other as they are quite similar, would move on to another class of medication
- TCAs can often be helpful in the setting of protracted post-concussive headaches consistent with migraine as well

» **Propranolol (Inderal®)**

- we, in general, find this a little less effective than the first three medications noted, but can be particularly useful in patients with migraine headaches and frequent syncope or near syncope and/or associated hypertension

- you MUST document there is no current or remote history of asthma or reactive airway disease. There have been case reports of fatalities in patients with these diagnoses who are prescribed beta-blockers.
- other relative contraindications include depression, cardiac arrhythmia (consult your cardiologist) and diabetes
- sedation and exercise intolerance are fairly common side effects
- starting dose is usually around 40-60 mg daily (long acting preparation may be better tolerated), with dosing up to 120-180 mg daily depending on age and weight

» **Gabapentin (Neurontin™)**

- fairly safe anticonvulsant, again used at much lower doses in the treatment of migraine headaches
- sedation tends to be the most common limiting side effect, this can be minimized by starting low and working up the dose slowly
- dosing often starts at 100-300 mg q.h.s. (depending on size), and can be increased every 2-4 weeks as needed up to 400-600 mg t.i.d (higher dosing commonly leads to sedation)

Other preventers used in our clinic, both with more potential side effects or less track record of success in children include:

» **Valproic acid (Depakote®)**

This anticonvulsant can be highly effective for migraine, but carries a much lengthier list of side effects (both common and uncommon). These include (from common to rare): weight gain, tremor, alopecia, abdominal pain, polycystic ovarian syndrome, hepatotoxicity, pancreatitis and teratogenic birth defects.

For this reason, we would not advocate this medication as a first or second line agent for a primary care physician, though we do have several patients on this medication for this purpose.

• **Calcium channel blockers (i.e. Verapamil)**

Used in adults; benefits less clear in children.





Preventative medications for migraine headaches (continued)

Families often inquire about alternative or complimentary preventative treatment for migraine, either because of poor response to or fear of the other above agents. In general, these therapies have not been evaluated in rigorous placebo controlled studies and are not FD regulated, but may be right for a particular patient or family. Dosing can be found in many online references.

- magnesium
- riboflavin
- feverfew
- coenzyme Q-10
- acupuncture
- massage therapy
- biofeedback
- chiropractic therapy (must use caution, as there have been reports of vertebral artery dissection after overly aggressive manipulation of children)

Reasons to consider neuroimaging in migraineurs

- unusual, prolonged or persistent aura or aura without headache
- increasing frequency, severity or change in clinical features
- first or worst migraine
- basilar migraine (often associated with slurred speech, complete loss of vision or hearing, syncope or eye movement difficulties)
- hemiplegic migraine (unilateral motor or sensory loss prior to or during the headache)
- confusional migraine
- headaches always on the same side or exact same location (most migraines, even if unilateral, alternate sides or become bilateral in children)
- post-traumatic

In reality, all of these criteria would make a patient's migraine atypical (sometimes referred to as "complicated") and as such should be referred to neurology. The imaging can be done ahead of the consult if concerning enough.

Tension Headache (ICHD-2 Diagnostic Criteria)

Headaches lasting for 30 minutes to 7 days, with at least two of the following pain characteristics:

1. pressing or tightening (non-pulsating) quality
2. mild or moderate intensity (often not impairing functioning)
3. bilateral location
4. NO aggravation by walking, climbing stairs, or similar routine physical activity

Headaches with both of the following:

1. no nausea or vomiting
2. photophobia and phonophobia - both absent or only one present

Treatment is dictated by the degree of discomfort and impairment of functioning

- over-the-counter pain relievers
- cool compress
- rest
- stress reduction techniques



Subacute and chronic daily headaches

Ensure there are no RED FLAGS present from history or exam to suggest a potentially dangerous secondary disorder. **RED FLAGS include:**

- » Systemic symptoms (fever, weight loss, night sweats, nuchal pain)
- » Secondary headache risk factors by history (HIV, cancer, neurocutaneous disorder such as NF-1)
- » Neurologic symptoms or signs on exam to include:
 - brief dimming of vision
 - change in mentation (confusion, speech difficulty, impaired alertness)
 - loss of manual dexterity
 - progressive gait difficulty
 - behavior change (abruptly)
 - focal neurologic features or papilledema on exam

Please note the first five items can occur commonly for a short-lived period of time during the more severe headaches, but should not be progressive in nature or present in between headache episodes.

- » Onset: sudden, abrupt, split-second (described already above) or waking the child from sleep repeatedly
- » Older: absolute age under 3 (for our patients), or over 55 at higher risk
- » Previous headache history: first headache (see above) or different (change in attack frequency, severity or clinical features)

Once dangerous secondary causes have been excluded either by history or by normal neuroimaging, defining the exact cause or nature of the chronic daily headaches is essential.

Chronic daily headache is defined as: headaches occurring 15 or more days a month; can be primary (not related to a structural lesion or systemic illness)

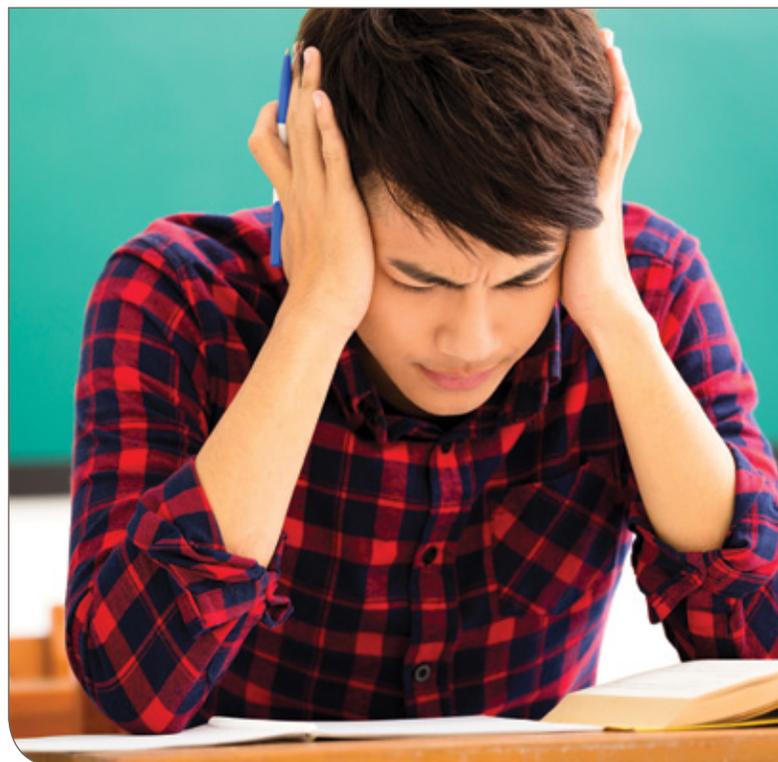
Not every one of the red flags calls for immediate further investigation, though one should consider the possibility of a secondary cause when one or several of the risk factors above are present in the patient.

These headaches may be progressive or non-progressive in nature and may contain a mixture of different primary headaches (tension and/or migraine).

In general, the longer the patient has a daily headache, without development of more concerning features from the history or exam to suggest a dangerous secondary cause, the more reassuring. Daily headaches of less than three months duration carry the highest risk. Once present for over 6-12 months, only rarely is there a dangerous cause (though often parents worry more about this duration).

It is imperative to focus on how often functioning is being impaired by headaches (i.e. missing school or work, faltering academic performance, curtailing athletic participation or affecting sleep) and what role, if any, migraine may be playing, as often use of preventative medication for migraines listed above can be very effective if the history suggests many of the impairing headaches have migrainous features.

It is also essential to ensure that poor lifestyle habits are not contributing to the chronic headaches. The following page of the handbook addresses these issues. Whether migraine or tension/stress related, these should be addressed at the initial (and every follow up) visit of the patient still suffering from chronic headaches.



Headache hygiene issues and more benign secondary causes of headaches

The following are common causes of chronic daily headache. The patient should be assessed for the possibility of any of these factors contributing to their headaches and offered suggestions to modify their life in a manner that will likely lead to fewer headaches. A separate parent/patient handout will be made available for the visit to address each issue.

» Poor sleep habits including:

- Not enough sleep (should have minimum of 8-10 hours of sleep per night)
- Poor quality of sleep secondary to snoring and sleep apnea
- Poor initiation of sleep due to anxiety, caffeine use, excessive stimulation from electronic devices late at night or restless legs phenomenon
- Daytime naps
- Weekend sleep habits that differ greatly from weekday habits

» Poor eating habits:

- skipping breakfast and lunch and not eating healthy foods
- Rarely, there are particular dietary triggers of migraine; a calendar may be helpful in tracking these

» Excessive caffeine intake: although caffeine can help treat acute migraine in a percentage of patients, daily caffeine intake can lead to poor sleep, or caffeine rebound headaches

» Medication overuse: just about every medication that is considered an “abortive medication” including acetaminophen, NSAIDs, triptans, fioricet and narcotics can lead to this condition if taken more than four days out of a week

» Lack of physical exercise

» Co-existing stressors in their life

- Can include a formal mental health disorder, make sure and inquire about the possibility of bullying at school, other emotional stressors at home and at school, and prior mental health diagnoses

