First Contact Migraine in Pediatrics

BY THE AMERICAN HEADACHE SOCIETY®

AMERICAN HEADACHE SOCIETY®

Reena Gogia Rastogi, MD, FAHS
Barrow Neurological Institute at
Phoenix Children's

Disclosure Statement

- No disclosures

Learning Objectives

- Identify migraine as a prevalent and disabling neurological condition in children and adolescents
- Differentiate primary and secondary headache disorders to drive diagnosis in patients with presumed migraine
- Identify patients in need of imaging or subspecialist involvement
- Develop a plan for treating migraine acutely and reducing attack frequency through preventive measures

Migraine in Pediatrics

1. What is Migraine?
2. Migraine Epidemiology
3. Migraine Diagnosis
4. Education & Lifestyle Modification
5. Acute Treatment
6. Migraine Prevention
7. Migraine and Contraception

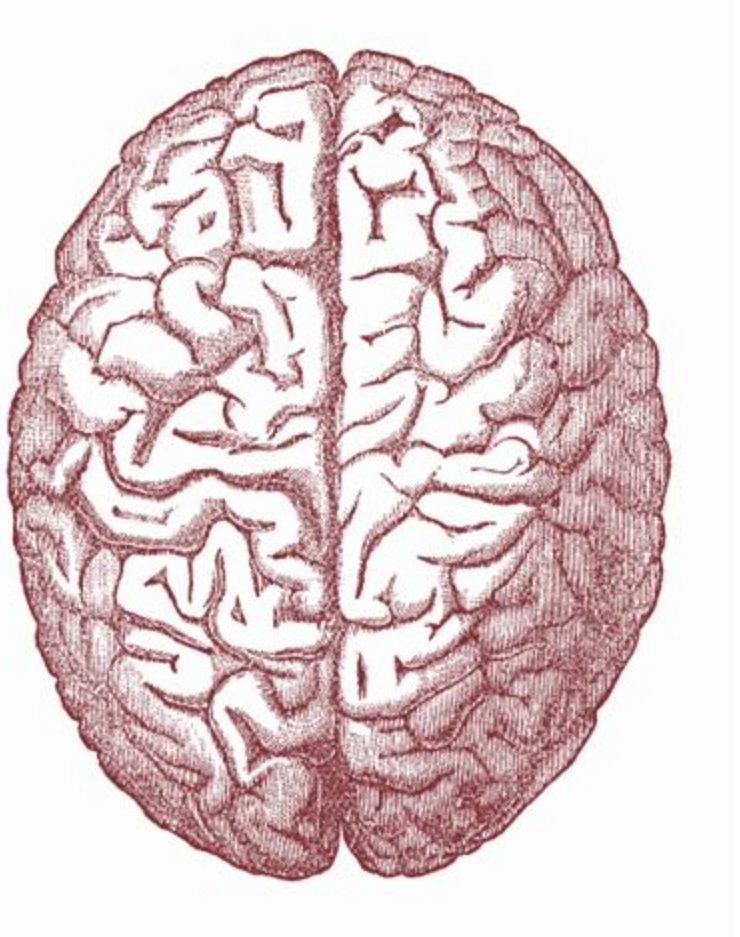
Migraine in Pediatrics

1. What is Migraine?

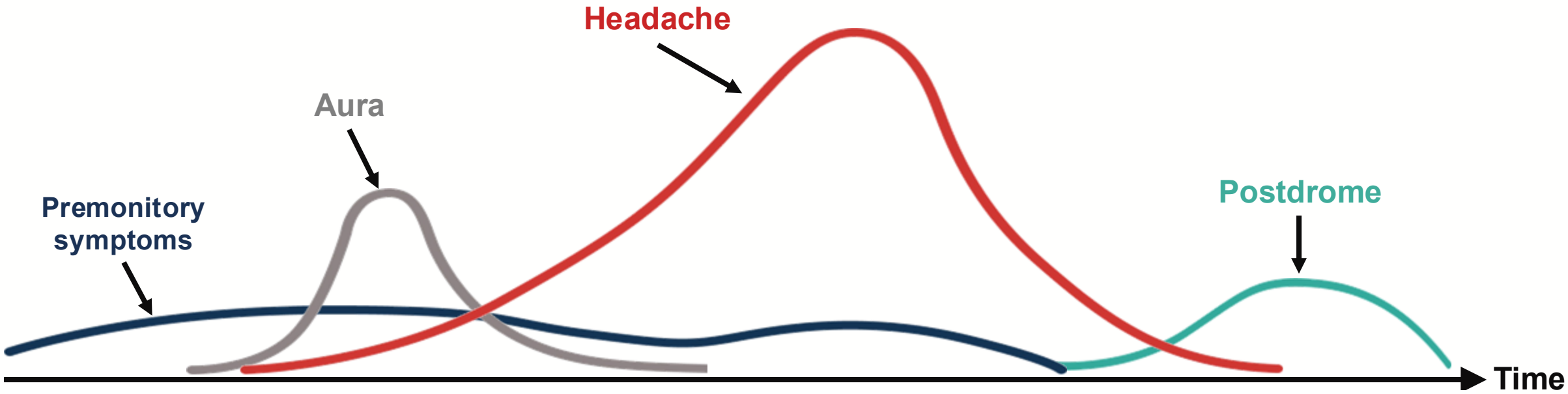
Migraine Definition

An **inherited disorder** characterized by attacks including a variety of **neurological** and **gastrointestinal** symptoms with or without severe headache.

Neurological symptoms may include sensory, vestibular, and cognitive disturbances.



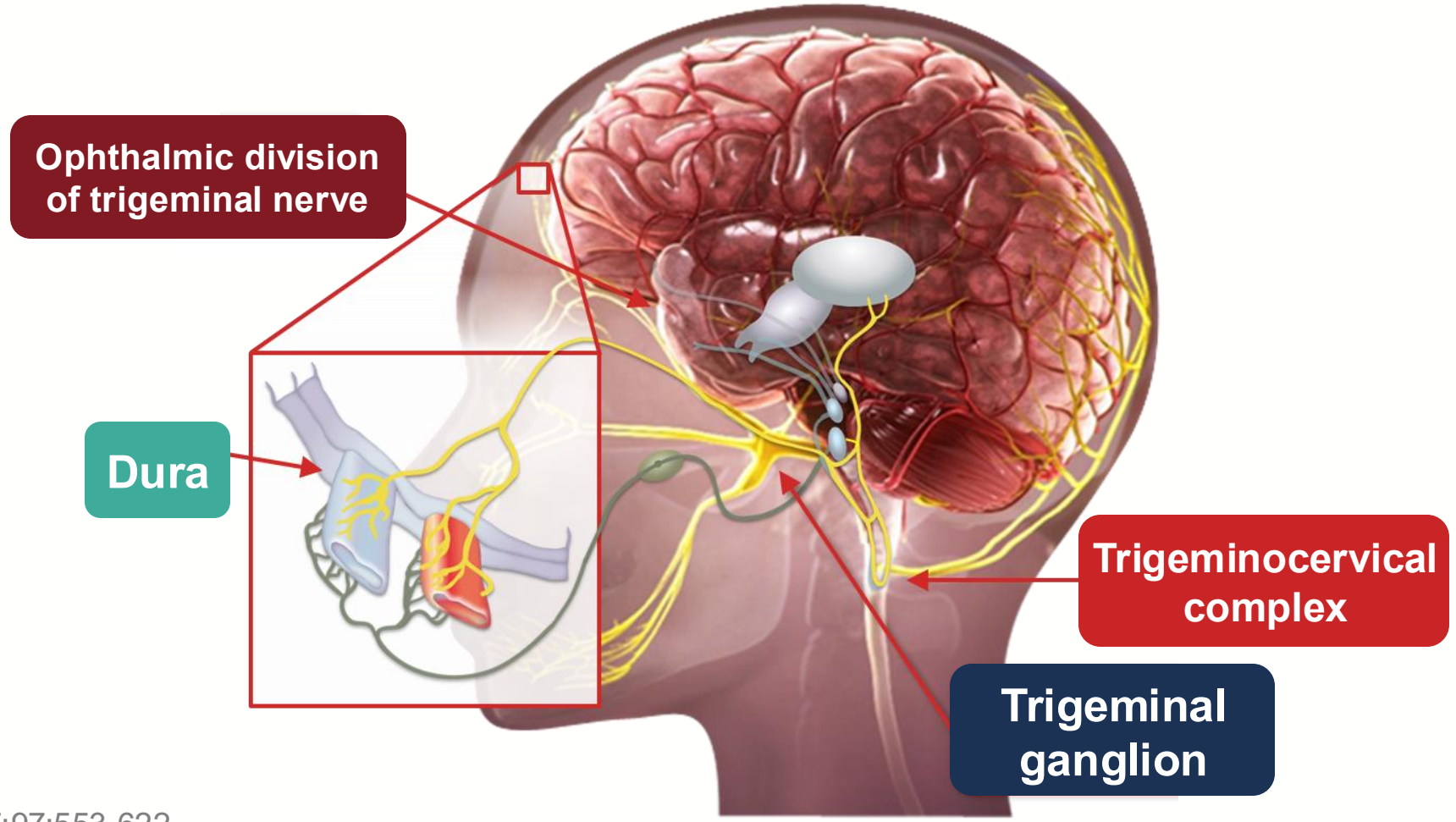
Phases of a Migraine Attack



Premonitory symptoms		Aura	Headache		Postdrome
Hours to days		*5 to 60 mins*	*2 to 72 hours*		*24 to 48 hours*
Fatigue	Yawning	Fully reversible	Throbbing pain	Phonophobia	Fatigue
Cognitive changes	Mood changes	neurological symptoms	Nausea	Osmophobia	Cognitive changes
Neck stiffness	Food cravings		Photophobia	Mood changes	Neck stiffness

Adapted from Drugs. 2018;78:411-437.

Pathophysiology of Migraine



Physiol Revs 2017;97:553-622.

Migraine in Pediatrics

2. Migraine Epidemiology

Epidemiology

1 billion worldwide

Affects 1 in 11 Children

1 in 5 women

1 in 16 men

Headache. 2021;61:1021-1039; Lancet Neurol. 2018;17:954-976; Neurology. 2007;68:343-349; Curr Pain Headache Rep. 2013;17:341.

Episodic Syndromes that May be Associated with Migraine

Colic

Benign paroxysmal torticollis

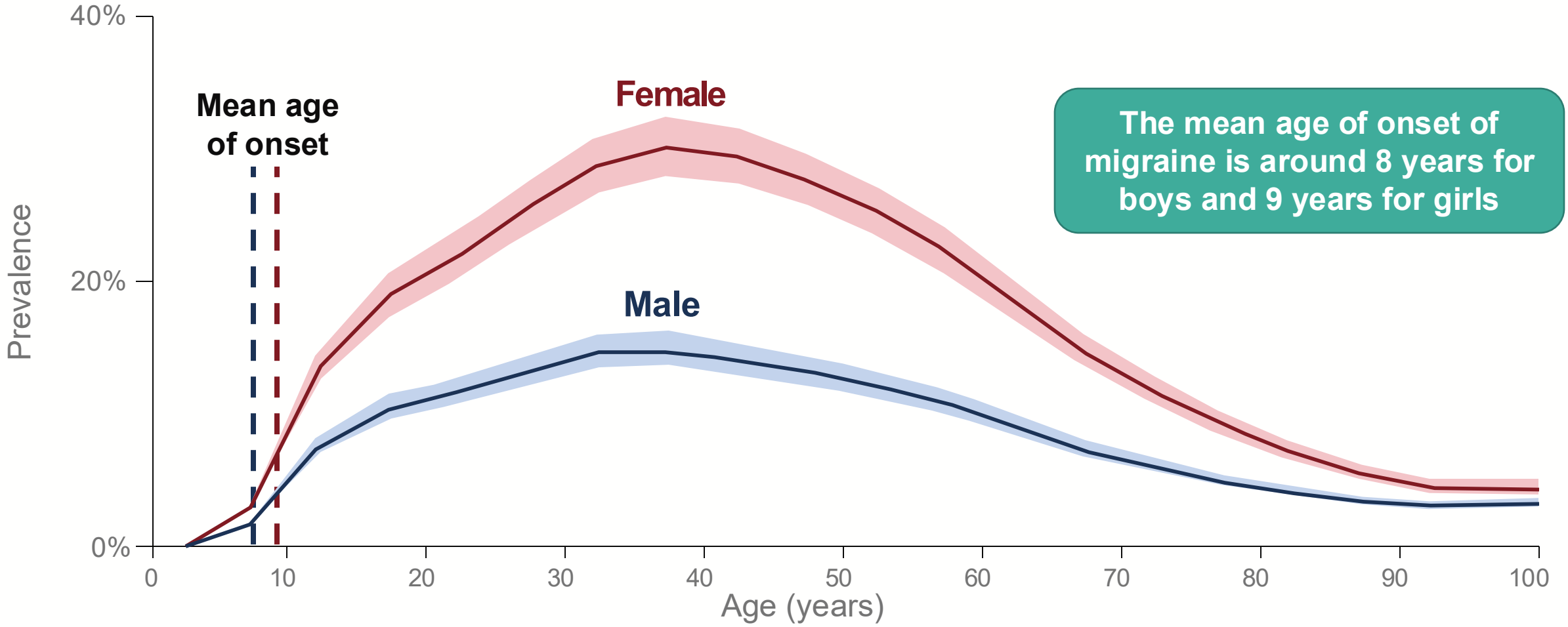
Benign paroxysmal vertigo

Cyclic vomiting syndrome

Abdominal migraine

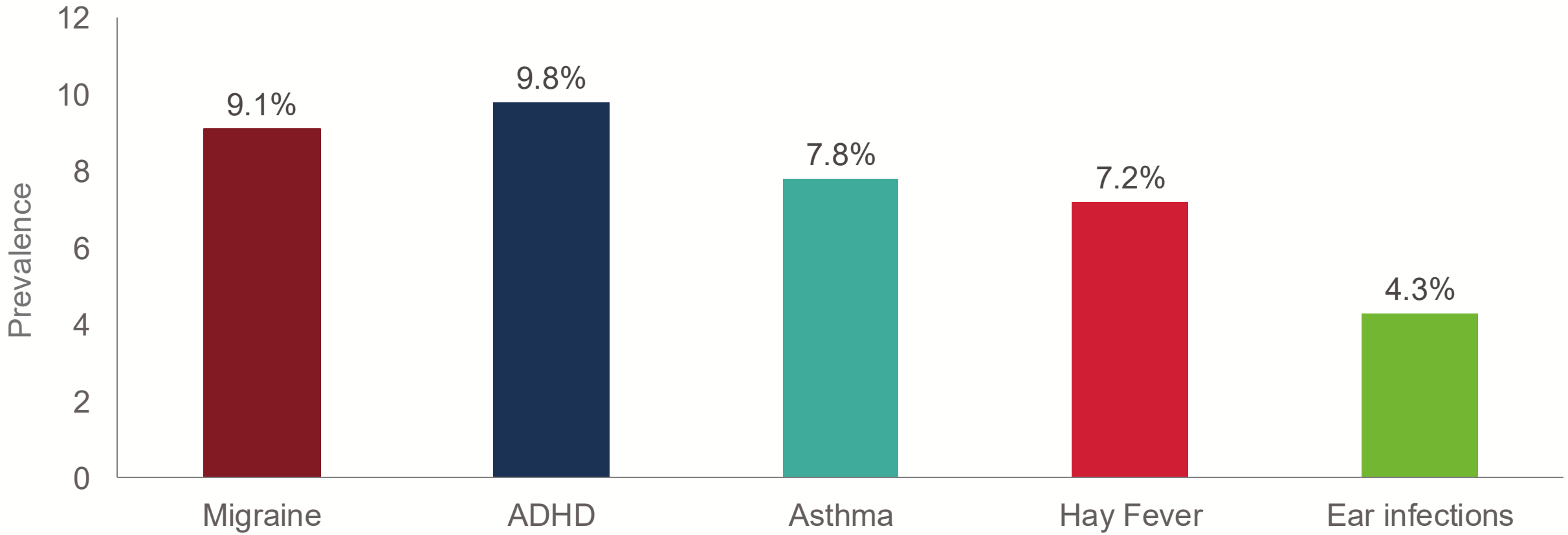
JAMA. 2013;309:1607-1612; Headache. 2019;59:988-1001; Neurology. 2012;79:1392-1396; Cephalalgia. 2018;38:1-211. Headache. 2021;61:231-243; Curr Opin Neurol. 2018;31:281-285. Pediatr Res. 2021;90:1044-1051.

Prevalence of Migraine Over Time



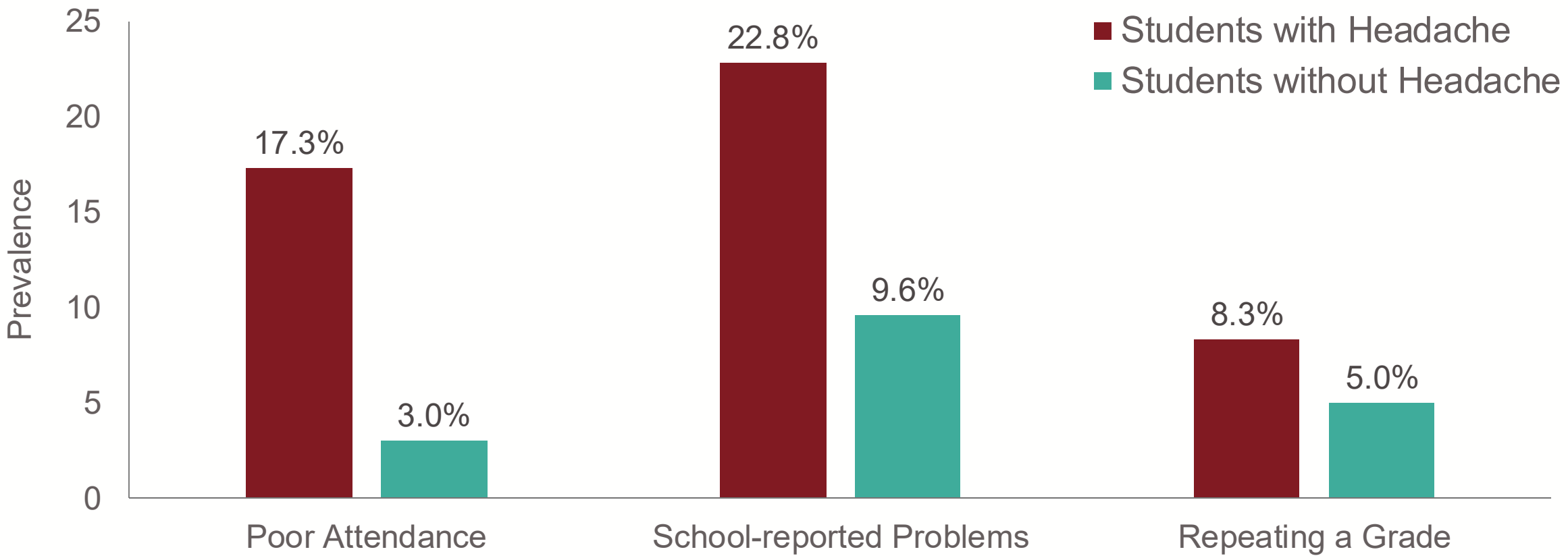
Neurol. 2019;93:487; Cephalalgia. 2009;29:969-973; Headache Pain. 2017;18:80.

Prevalence of Migraine Compared to Other Common Pediatric Disorders



Curr Pain Headache Rep. 2013;17:341; health.gov. Accessed March 24, 2023; www.cdc.gov. Accessed March 24, 2023.

School-related Disability



JAMA Pediatr. 2021;175:522-524; JAMA Netw Open. 2021;4(7):e2114712.

Migraine in Pediatrics

3. Migraine Diagnosis

Migraine Diagnosis

ICHD-3 Criteria	Adult Specific	Peds Specific
Number of attacks	≥ 5	
Duration	4-72 hours	2-72
Location	Unilateral	Unilateral or bilateral
Description of pain	Pulsating	
Pain intensity	Moderate-severe	
Effect of routine physical activity	Aggravated by	
Nausea or vomiting	Yes	
Photophobia or phonophobia	Both	Inferred by behavior
Attributable	Not attributable to another disorder	

Cephalalgia. 2018;38:1-211.

Aura in Pediatric Patients with Migraine

- Prevalence is estimated at 15% to 30%
- Typically lasts 5 to 60 minutes
- May occur before or during the headache phase of migraine, or in isolation (without headache)
- Visual aura is most common
- **Generalized blurry vision is common in migraine and often does meet criteria for aura**

ICHD-3 Criteria for aura

Neurologic Clinics. 2009;27:481-501; https://youtu.be/qVFIcF9Iyk8. Accessed March 31, 2023

Headache Red Flags

History and **Examination**

Assess for worrisome signs/symptoms; refer as needed

"SNOOPY" Mnemonic

Systemic symptoms (*fever, myalgias, weight loss*)

Secondary risk factors (*immune deficiency, cancer, pregnancy*)

Neurologic signs (*papilledema, focal deficit, confusion, seizures*)

Onset (*sudden/thunderclap*)

Older (*new or progressive headache, especially over 50 years*)

Pattern change (*new symptoms in previously stable pattern*)

Precipitants (*Valsalva, position change, sexual activity*)

Adapted from Adv Stud Med. 2003;3:550–555.

Clinical Pearls

RED FLAGS: Emergency Department

- Thunderclap headache (*peak intensity in 60 seconds or less*)
- Worst headache ever (*but we've all had our worst headache ever*)
- New onset intractable vomiting upon awakening
- Abnormal neurological (*including fundoscopic*) examination
- Provider concern (*fever in immunocompromised patient, etc.*)

YELLOW FLAGS: Close follow-up, consider imaging/referral

- Patient younger than 6 years
- New onset or change in headache pattern (*eg, new daily persistent headache*)
- Side-locked Headache (*eg, cluster headache*)
- Headache consistently wakes patient up from sleep
- Valsalva-induced or positional headache

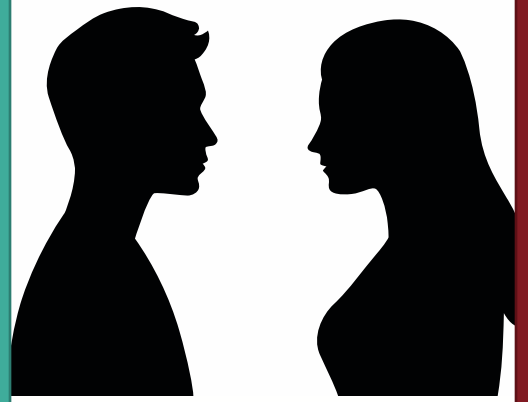
NDPH, new daily persistent headache

Adapted from Adv Stud Med. 2003;3:550–555.

Pediatric Headache Imaging: The Debate

Yes!

- Concern for brain tumor
  - Second most common childhood malignancy
  - Incidence 2.8 - 4.5/100,000
- In youth with headache:
  - 2.5% had a CNS lesion requiring a change in management
  - 0.1% had completely normal exams
- Provides peace of mind



No!

- CT exposes children to radiation
- MRI is $$$/exposure to gadolinium
- May require sedation/anesthesia

- Incidental findings are common (16.4%)
- Clinically meaningful findings required follow-up in 2.6% of healthy children

- In kids with > 6 months of headaches and a normal exam, risk for brain tumor is extremely low (0.01%)

Pedatr Radiol 2013;43:777-784; Headache. 2017;57:1601-1609; J Neuroradiol. 2019;40:1818.

Imaging in Headache Disorders

There is **no necessity** to do neuroimaging in patients with **headaches consistent with migraine** with a **normal neurologic examination** and **no atypical features** or **red flags**

Don’t perform neuroimaging studies in patients with **stable headaches** that meet criteria for **migraine**

Don’t perform **CT imaging** for headache when **MRI is available**, except in **emergency settings** (e.g., acute bleed)

Appropriateness Criteria® Headache — good resource for image selection in **specific clinical scenarios** (e.g., patients with known cancer)

Migraine in Pediatrics

4. Education & Lifestyle Modification

S.M.A.R.T. Habits for Migraine Management

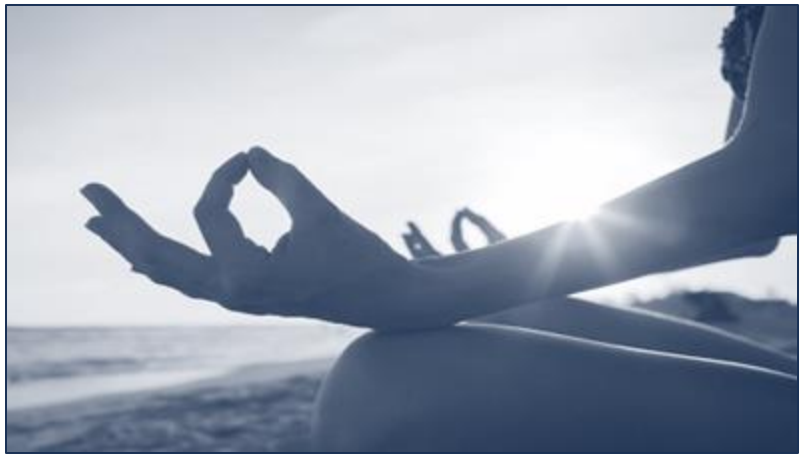
Sleep	• Give specific sleep duration goals depending on age • Keep sleep and waketimes consistent and limit screen time before bed • **Screen for insomnia and sleep apnea**
Meals and Hydration	• Eat at least 3 meals a day and snack as needed • Give specific hydration goals • Hydrate with every meal
Activity	• Limit unnecessary screen time • Aim for 30 minutes of physical activity 3-5 days per week • **Screen/address obesity**
Relaxation	• Consider biofeedback programs, mindfulness apps • Use deep breathing techniques • Practice yoga • **Screen for depression/anxiety**
Triggers	• Keep a headache log and track response • Modify behavior as appropriate • Limit or avoid caffeine/alcohol/tobacco use

Behavioral Therapies for Migraine

Biofeedback

CBT

Relaxation Training



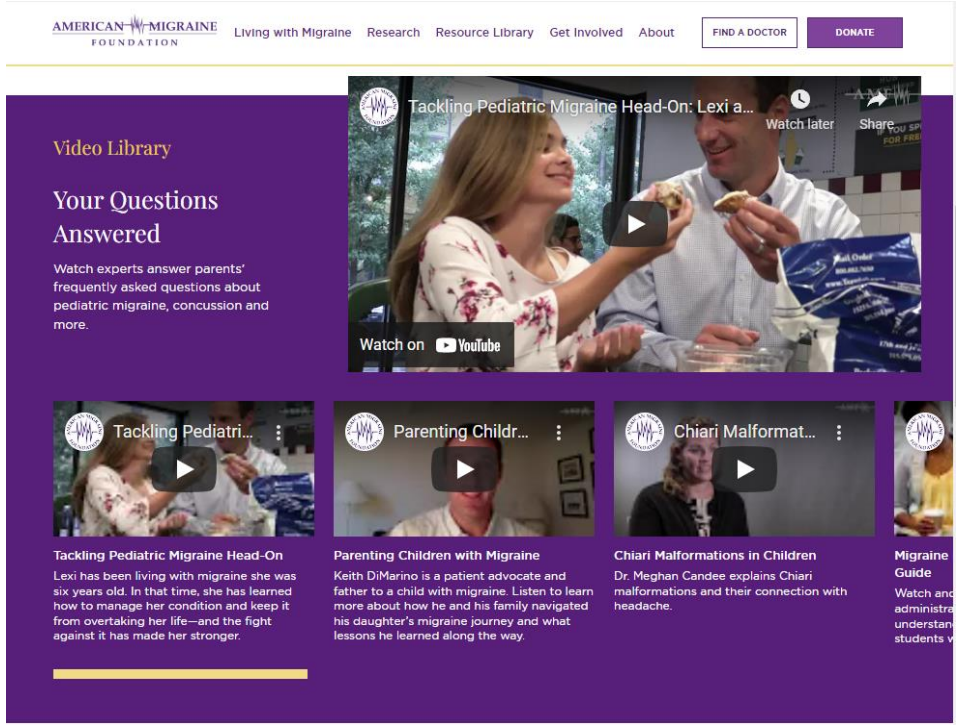
- Supported by data
- Endorsed in US Headache Consortium guidelines
- Have long-lasting benefits
- Effective at all life stages
- Can be stand alone or combined with other therapies

Headache. 2021:1021-1039. Neurology. 2000;55:754-762.

Resources For Families

Headache Relief Guide

American Migraine Foundation



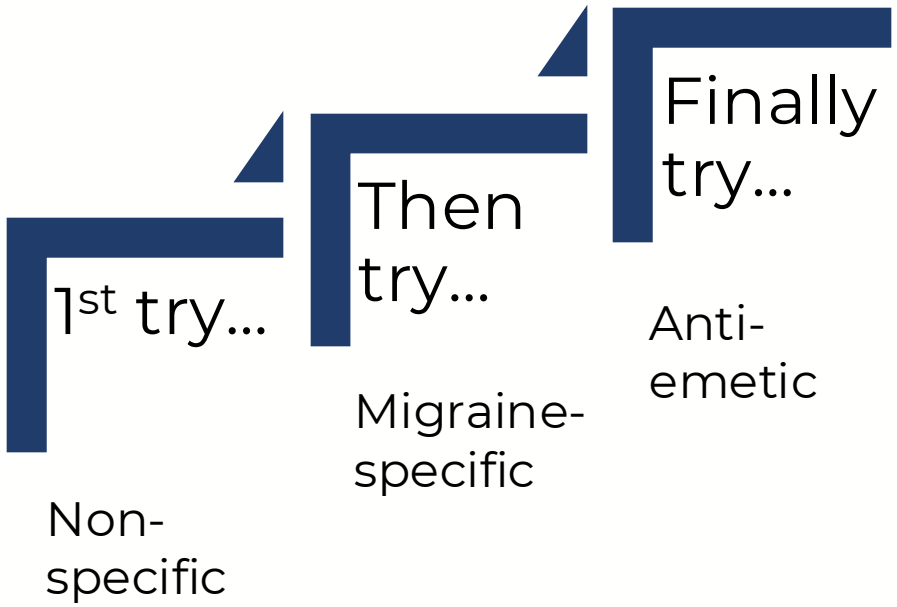
HeadacheReliefGuide.com. Accessed Mar 21, 2023. https://americanmigrainefoundation.org/. Accessed Mar 21, 2023.

Migraine in Pediatrics

5. Acute Treatment

Step vs Stratified Care

STEP
within or across attacks



STRATIFIED
by disease severity

Mild	N/A
Moderate	Non-specific + Anti-emetic
Severe	Migraine-specific

JAMA. 2000;284:2599-605.

Acute Treatment: AAN/AHS Guideline

Classification	Agent	Dose
NSAIDs	Ibuprofen OS*	7.5-10mg/kg
Triptans	Sumatriptan/naproxen OT*	10/60 mg, 30/180 mg, 85/500 mg
	Zolmitriptan NS*	5 mg
	Sumatriptan NS*	20 mg
	Rizatriptan ODT†	5 mg or 10 mg
	Almotriptan OT†	12.5 mg
Dopamine antagonists	Prochlorperazine	0.15 mg/kg
	Promethazine	0.25-1 mg/kg
	Metoclopramide	0.13-0.15 mg/kg

*Recommendations with high or moderate confidence in evidence; †Recommendations with low confidence in evidence.
NS, nasal spray; NSAID, non-steroidal anti-inflammatory drugs; ODT, oral dissolving table; OS, oral solution; OT, oral tablet
Neurology. 2019;93:487-499; Pediatr Emer Care. 2018;34:165–168; Maedica (Bucur). 2016;11:136–143.

Tips for Prescribing Triptans

Rule of 2

- Can take a 2nd dose after 2 hours
- No more than 2 doses in 24 hours
- Aim for 2 days per week or less

Serotonin Toxicity

- AHS position statement: currently available evidence does not support limiting the use of triptans with SSRIs or SNRIs

Warn about potential side effects

- Tightness of face, neck, and chest
- Feeling hot, tingling
- Flu-like symptoms, fatigue, myalgias

Cautions and Contraindications

- Cardiac disease (eg, coronary artery disease, ischemic heart disease)
- Cerebrovascular disease (eg, stroke, TIA)
- Rare migraine subtypes (eg, hemiplegic migraine, migraine with brainstem aura)
- Uncontrolled HTN, severe hepatic impairment

TIA, transient ischemic attack

Headache. 2010;50:1089-1099.

Triptan Selection

Triptan	FDA Status	Formulation(s)	Comments
Rizatriptan	≥ 6 years old	Oral tablet/ODT	Use half dose in patients taking propranolol
Almotriptan	≥ 12 years old	Oral tablet	
Sumatriptan/ Naproxen	≥ 12 years old	Oral tablet	Max dosage is 1 tablet/24h
Zolmitriptan	≥ 12 years old	Oral tablet, ODT, NS	Only triptan nasal spray approved for use in pediatric patients
Sumatriptan	Not approved	Oral tablet, NS, NP, SC	Preferred during lactation
Eletriptan	Not approved	Oral tablet	Safest in lactation
Naratriptan	Not approved	Oral tablet	Longer half-life (6 hours)
Frovatriptan	Not approved	Oral tablet	Longer half-life (26h)

NP, nasal powder; NS, nasal spray; ODT, orally dissolving tablet; SC, subcutaneous

Lancet Neurol. 2010;9:190-204; Headache. 2021;61:1021-1039; Medication specific package inserts.

Pediatric Migraine Management Plan

Tips for using the PedMAP include ensuring

- Teachers know about the plan
- Students know how to activate plan including when and where to go
- School staff understand who will give the medication and when

Headache. 2019;59:1871-1873.

Green Zone – Prevent more headaches

Do or take this every day to help prevent YOUR headaches:

It may take 4-6 weeks to see a big change, so stick with it!
Visit *www.headachereliefguide.com* to manage your headaches

- Get enough sleep; keep a regular schedule
- Eat healthy foods; don't skip meals
- Drink enough water; avoid caffeine
- Get regular exercise; manage your weight
- Learn ways to relax; manage your stress

Directions to provider: Set 1-2 healthy lifestyle goals. Consider a daily medicine or vitamin/ supplement if > 1 headache per week. Consider Cognitive Behavior Therapy (CBT) if PedMIDAS > 10. To download PedMIDAS, visit https://www.cincinnatichildrens.org/service/h/headache-center/pedmidas

Yellow Zone – Don't wait. Act fast to treat your headaches

☐ Go to school nurse or health office right away. Take your **quick-relief** medicine as soon as your headache starts:

Take _____ Dose _____
Route _____ May repeat after _____ hours.

Take _____ Dose _____
Route _____ May repeat after _____ hours.

Let your provider know if you need to take your quick relief medicines 3 or more days a week or if this plan isn't working.

- Drink some water or sports drink if you can
- Rest in a dark, quiet place for 30 minutes and practice your relaxation exercises (e.g., deep breathing, guided imagery), if you can
- You may need a different PE activity, dark glasses, or a quiet place to work for a while

Directions to provider: Goal is pain-free within 1-2 hours for intermittent headaches and back to baseline for constant headaches.
Consider NSAID +/- antiemetic, a triptan or a combination of medications.

☐

Directions to provider: Optional section for other scenarios, step 2 or a "backup" plan.
Home "backup" plan: Consider dopamine blocker +/- diphenhydramine +/- NSAID.

Red Zone – Time to get more help

Contact your **provider's office** if:
- Your headache is much worse, lasting much longer than usual

Go to the **Emergency Room** if:
- You have new and very different symptoms like loss of vision, unable to move one side of your face or body, trouble walking or talking, very confused or unable to respond

- Call 9-1-1 if child loses consciousness or has stroke-like symptoms

Directions to provider: Avoid giving aspirin to children < 16 years old. Avoid giving opioids or butalbital for pain.

I authorize the quick-relief medication(s) listed in the Yellow Zone:

Provider's Signature _____ Date _____
Parent/Guardian's Signature _____ Date _____

☐ *to be administered by school personnel*
☐ *to be self-administered by student*
☐ *to be administered only by parent*

First Contact | Migraine in Pediatrics

AMERICAN HEADACHE SOCIETY

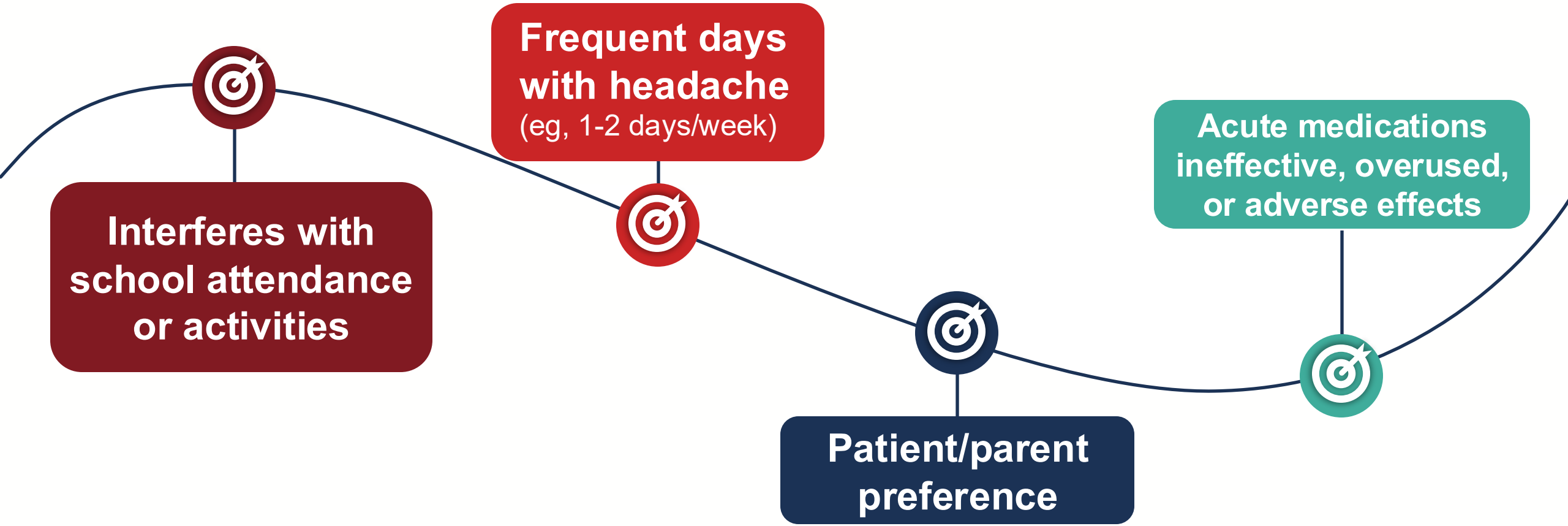
Pearls: Acute Treatment

Nausea/vomiting	Combine with anti-nausea medication, or pursue non-oral route of administration (eg, nasal, subcutaneous)
NSAID not effective	Ensure a sufficient dose is taken at onset **OR** try a triptan
Triptan not effective	Try a different triptan, add an NSAID, and/or dopamine antagonist
Headache recurs after treatment	Add an NSAID and/or dopamine antagonist **OR** consider switching to a triptan with a long half-life (eg, naratriptan)
Excessive use	Start migraine prevention, discuss medication overuse
Failed therapy	Refer to Headache Specialist

Migraine in Pediatrics

6. Migraine Prevention

When to Prescribe Preventive Therapy



Continuum (Minneap Minn), 2021;27:613-632..

Nutraceuticals

Agent	Daily Dose	Notes
Riboflavin (vitamin B2)	50-200mg BID	Urine discoloration
Magnesium	9mg/kg/day BID	Diarrhea; chelated forms better tolerated
Coenzyme Q10	1-3 mg/kg/day or 100 mg BID	Generally well tolerated
Melatonin	0.3 mg/kg (up to 6mg)	Conflicting evidence

Petasites (butterbur) not currently recommended due to concerns about liver toxicity

Continuum (Minneap Minn). 2021;27:613-632. Medicine (Baltimore). 2019;98:e14099.

Pharmaceuticals: AAN/AHS Guidelines

Agent	Daily Dose	Notes
Topiramate*	2 mg/kg divided BID	Reproductive risk; folic acid supplement and contraception in patients of child-bearing potential
Amitriptyline*	1 mg/kg 2-4 hrs before bed	Black box warning for suicidality
Propranolol†	20-40 mg, TID	Contraindicated in asthma
Valproate†	40 mg/kg divided BID	Reproductive risk; folic acid supplement and contraception in patients of child-bearing potential
Cyproheptadine‡	0.2 – 0.4 mg/kg divided BID	Available in liquid form

***Recommendations with high or moderate confidence in evidence; †Recommendations with low confidence in evidence; ‡while not mentioned in the AAN/AHS guidelines, some studies have noted potential efficacy; interventional clinical trials are needed to make appropriate recommendations.**

Neurology. 2019;93:500-509; Pediatrics. 2021;147(6):e2020042101. Cochrane Review. 2017. Issue 3. CD010973.
Sci Rep. 2021;11:452. J Pediatr Pharmacol Ther. 2008;13:17-24.

Childhood and Adolescent Migraine Prevention (CHAMP)

Neither topiramate nor amitriptyline demonstrated significant improvements vs placebo over 24 weeks in headache days or disability

CHAMP results support incorporating a multidisciplinary model including acute treatment, healthy lifestyle practices, and headache education

Some clinicians may use topiramate, amitriptyline, or nutraceuticals especially when treatment can provide additional benefit to comorbidities

N Engl J Med. 2017;376:115-124.

Tips for Use of Preventive Medication

Set Appropriate Expectations

- Goals: decrease attack frequency/disability, and improve response to acute treatment
- Minimum of **2 months at target dose** is common to see effect

Mitigate Side Effects and Address Comorbidities

- Start at a low dose
- **Titrate slowly**
- Consider which comorbidities can be co-treated

Preventive Medication Use is Not Forever

- Wean **3-6 months** after treatment goals met
- Discuss treatment course at initiation of preventive therapies

Headache. 2021;61:1021-1039.

Potential Treatment Options with a Headache Specialist

If treatment with nutraceuticals and pharmaceuticals fail, consider referral to a headache specialist

Novel Therapeutics and Procedures

- Research studies
- CGRP
- OnabotulinumtoxinA
- Nerve Blocks

Neuromodulation Devices (≥12 years)

- Remote electrical neuromodulation
- Non-invasive vagus nerve stimulation
- Single-pulse transcrainial magnetic stimulation

Migraine in Pediatrics

7. Migraine and Contraception

Recommendations on CHCs Are Not Uniform in Migraine with Aura

World Health Organization

Avoid CHCs in migraine with aura

ACOG
The American College of Obstetricians and Gynecologists

US MEC
US Medical Eligibility Criteria for Contraceptive Use, 2016

CHCs contraindicated in migraine with aura

International Headache Society

Low-dose estrogen may be prescribed in migraine with simple visual aura

CHC, combined hormonal contraception.

MMWR Recomm Rep. 2016;65(RR-3):1-104; Cephalalgia. 2000;20:155-6; Obstet Gynecol. 2019:133(2):396-9.

Combined Hormonal Contraceptives for Preventive Treatment of Migraine Without Aura

Combined estrogen-progestin

- Pills: monophasic low-dose estrogen EE 10-20 mcg
  - Can be taken continuously, skipping inactive pills
- Vaginal Rings: EE 13-15 mcg released daily over 3 weeks

Changes in headache pattern

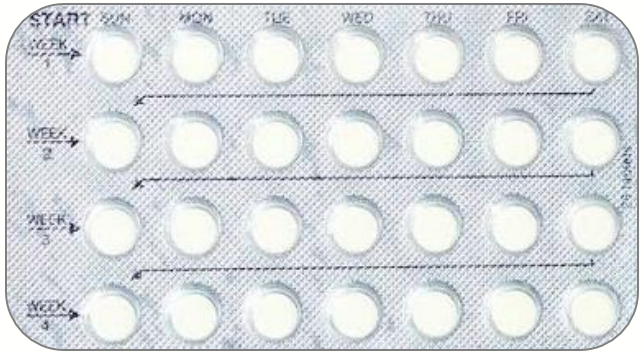
- New onset of aura, increased frequency/severity, consider
  - Nonhormonal contraception
  - Progestin-only contraceptives

EE, ethinyl estradiol

Headache. 2007;47:27-37; Headache. 2012;52:1246-53; CDC. 2016; 65:1-104.

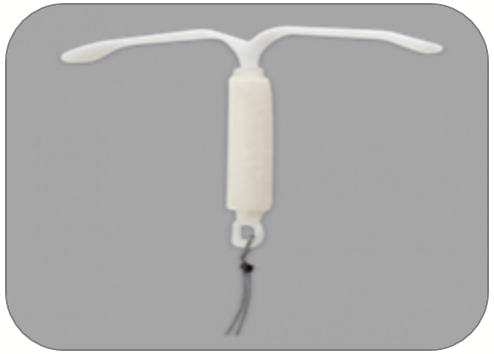
Contraception Options: Migraine With Aura

Progestin-Only

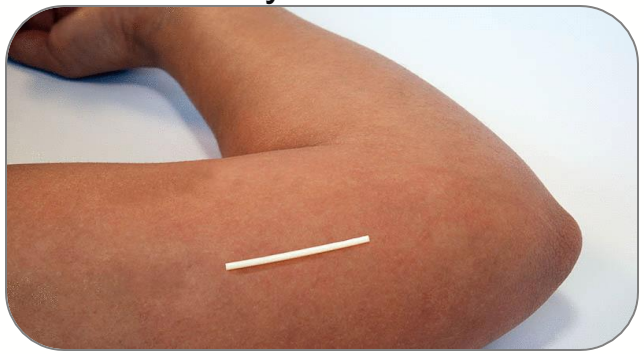


Pill

Taken daily without breaks



Intrauterine Device



Implant

Injectable Progestin

Non-Hormonal

Intrauterine System

Lower Doses of Estrogen are Associated with a Lower Risk of Ischemic Stroke

Dose	Odds Ratio for Ischemic Stroke
Progestin-only pills	0.9-1.0
EE 20 mcg	1.7
EE 30-40 mcg	1.6-2.7
EE 50 mcg	2.9-4.8

EE, ethinyl estradiol

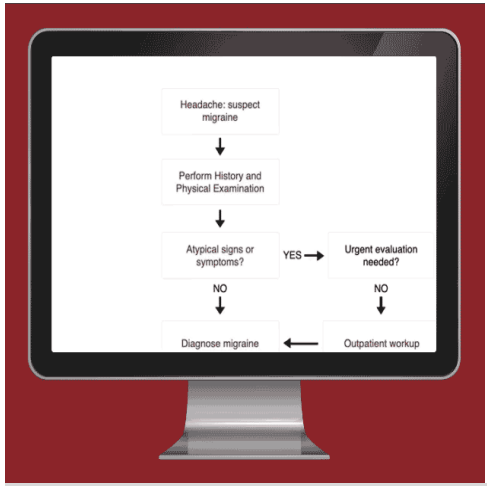
Headache. 2018;58:5-21.

In Summary

- Migraine is as prevalent as other common childhood conditions
- Diagnose early and rule out secondary headache
- Provide acute treatment and a plan for school with clear direction and specific goals
- Use behavioral, nutraceutical, or medical treatment to prevent headache and limit disability

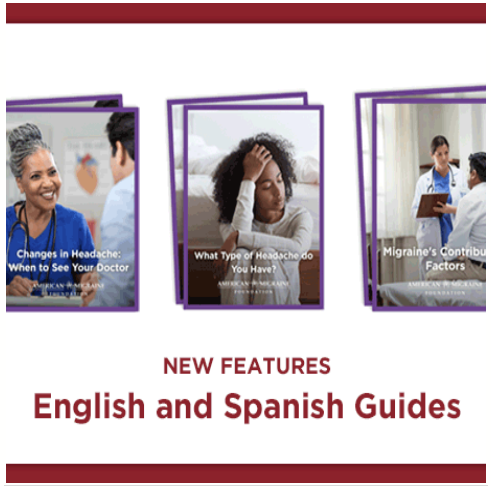
Online Resource Library

First Contact – Headache in Primary Care provides free educational resources to help you identify and treat migraine and other headache disorders.



Migraine Management Flowchart

Quick Guides



Patient Guide Library

Official Podcast

Online First Contact Presentations

americanheadachesociety.org/resources/primary-care

Learn more and explore our resources here:

First Contact | Migraine in Pediatrics

AMERICAN HEADACHE SOCIETY

Authors

The following American Headache Society members collaborated to produce the First Contact – Migraine in Pediatrics PowerPoint presentation:

- Lauren Doyle Strauss, DO, FAHS, Assistant Professor, Pediatric Neurology
- Jessica Gautreaux, MD, FAHS Associate Professor of Neurology and Pediatrics
- Hannah Shapiro, MD, Pediatric Neurologist
- Marielle Kabbouche Samaha, MD, Professor of Child Neurology & Headache Medicine
- Noam Lax, MD, Pediatric Neurologist/Headache Specialist
- Andrea Loeffert, DO, Assistant Professor of Pediatrics
- Sarah Robinson, MD, Clinical Adjunct Faculty, Pediatrics
- Adam Sprouse Blum, MD, PhD, Family Medicine Specialist
- Scott Turner, DNP, Assistant Professor Pediatric Neurology

Evaluation

Please share your feedback

Scan for
immediate access