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First Contact
Migraine in Pediatrics
BY THE AMERICAN HEADACHE SOCIETY™

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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

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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

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Migraine in Pediatrics

1. What is Migraine?

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Migraine Definition

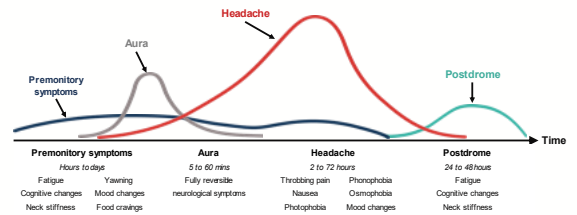
An **inherited disorder** characterized by attacks including a variety of **neurological** and **gastrointestinal** symptoms with or without severe headache.

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



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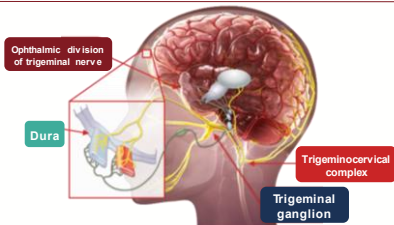
Phases of a Migraine Attack



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

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Pathophysiology of Migraine



Physiol Revs. 2017;97:553-622.

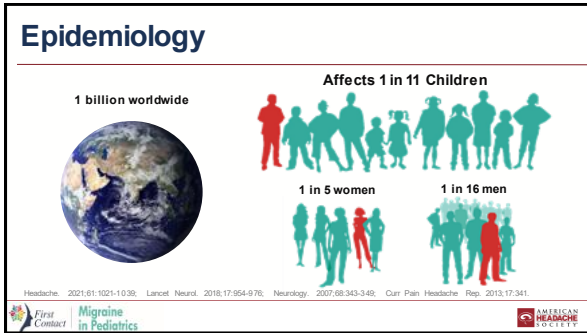
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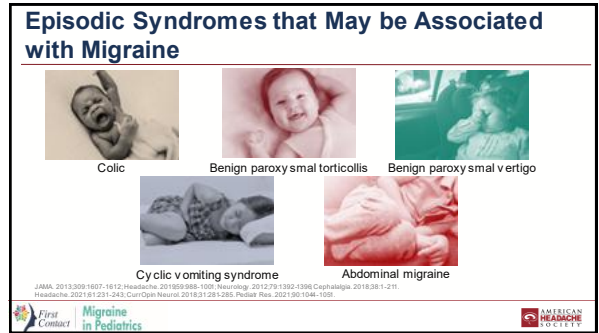
2. Migraine Epidemiology



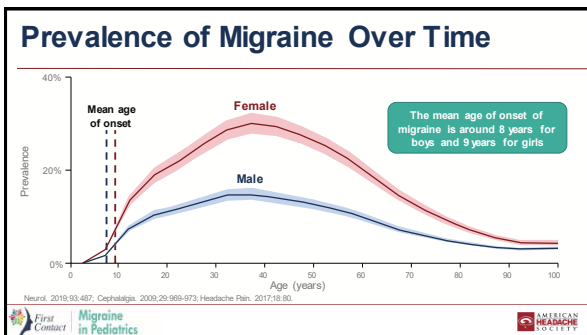
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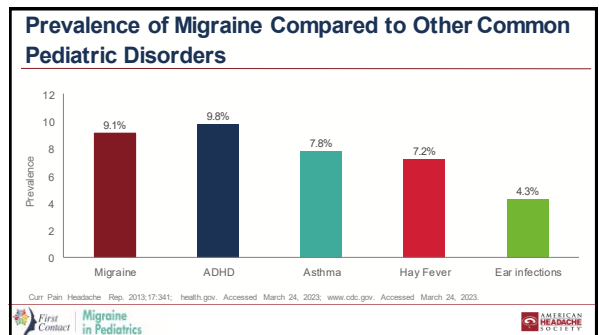
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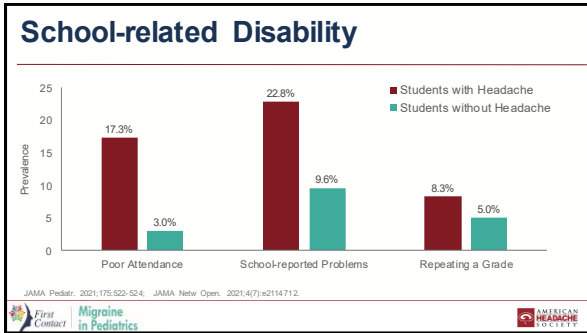
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3. Migraine Diagnosis

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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.

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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

Neurolog. Clinics. 2009;27:481-501. <https://pubs.lww.com/E1rC0k48> Accessed March 31, 2023.

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Headache Red Flags

History and Examination

Screen for Red Flags

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.

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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

NDSH, new daily persistent headache. Adapted from Adv Stud Med. 2003;3:550-555.






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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%)

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

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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)

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4. Education & Lifestyle Modification








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

Sleep	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Eat at least 3 meals a day and snack as needed • Give specific hydration goals • Hydrate with every meal
Activity	<ul style="list-style-type: none"> • Limit unnecessary screen time • Aim for 30 minutes of physical activity 3-5 days per week • Screen/address obesity
Relaxation	<ul style="list-style-type: none"> • Consider biofeedback programs, mindfulness apps • Use deep breathing techniques • Practice yoga • Screen for depression/anxiety
Triggers	<ul style="list-style-type: none"> • Keep a headache log and track response • Modify behavior as appropriate • Limit or avoid caffeine/alcohol/tobacco use

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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





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Resources For Families

Headache Relief Guide



American Migraine Foundation



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5. Acute Treatment







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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;284:2599-6105.






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Acute Treatment: AAN/AHS Guideline

Classification	Agent	Dose
NSAIDs	Ibuprofen OS*	7.5-10mg/kg
	Sumatriptan/haproxifen OT*	10/60 mg, 30/180 mg, 85/500 mg
	Zolmitriptan NS*	5 mg
Triptans	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 tablet; OS, oral solution; OT, oral tablet. Neurology. 2019;93:487-490; Pediatr Emer Care. 2018;34:165-169; Medica (Bucur). 2016;11:138-143.

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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

Warn about potential side effects

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



Serotonin Toxicity

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

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;50:1050-1059.

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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)

NS: nasal powder; NS: nasal spray; ODT: orally disintegrating tablet; SC: subcutaneous
 Lancet Neurol. 2010;9:190-204; Headache. 2021;61:1021-1039; Medication specific package inserts.

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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;59:1671-1873.

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Pearls: Acute Treatment

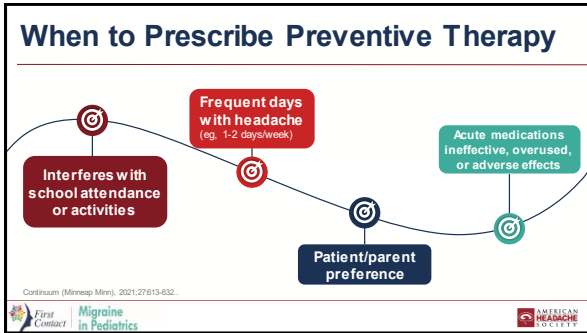
Nausea/vomiting	Combine with anti-nausea medication, or pursue non-oral route of administration (eg, nasal, subcutaneous)
NSAID not effective	Ensure a sufficient dose is taken at onset OR try a triptan
Triptan not effective	Try a different triptan, add an NSAID, and/or dopamine antagonist
Headache recurs 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

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6. Migraine Prevention

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

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Pharmaceuticals

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. Neurology. 2019;93:200-209; 59 Rep. 2021;11452. J Pediatr Pharmacol Ther. 2008;13:17-24.

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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.

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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
- Titrates 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;61:1021-1030.

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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 transcranial magnetic stimulation

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7. Migraine and Contraception

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Recommendations on CHCs Are Not Uniform in Migraine with Aura

Avoid CHCs in migraine with aura

CHCs contraindicated in migraine with aura

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

CHC, combined hormonal contraception. *Headache*. 2016;56(9):1-104. Cephalalgia. 2000;20:155-6. *Obstet Gynecol*. 2019;133(2):396-9.

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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.

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Contraception Options: Migraine With Aura

Progestin-Only

Pill
Taken daily without breaks

Intrauterine Device

Implant

Injectable Progestin

Non-Hormonal

Intrauterine System

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

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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. 2016;56:5-21.

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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

EE, ethinyl estradiol
Headache. 2016;56:5-21.

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Online Resource Library

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



The banner displays five categories of resources:

- Migraine Management Flowchart
- Quick Guides
- Patient Guide Library (highlighting new features in English and Spanish)
- Official Podcast
- Online First Contact Presentations

At the bottom, there is a URL: americanheadachesociety.org/resources/primary-care and a QR code with the text "Learn more and explore our resources here:".

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