From Prevention to Treatment: A Paradigm Shift in Food Allergy Management Is Upon Us

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Disclosures

- President-Elect – American College of Allergy, Asthma and Immunology
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- Royalties – Springer Publishing

None of these disclosures are relevant to anything that will be discussed during this CME activity.





Learning Objectives

Delineate clinical differences between various types of food allergy

Utilize appropriate testing, when indicated, in the evaluation of food allergy

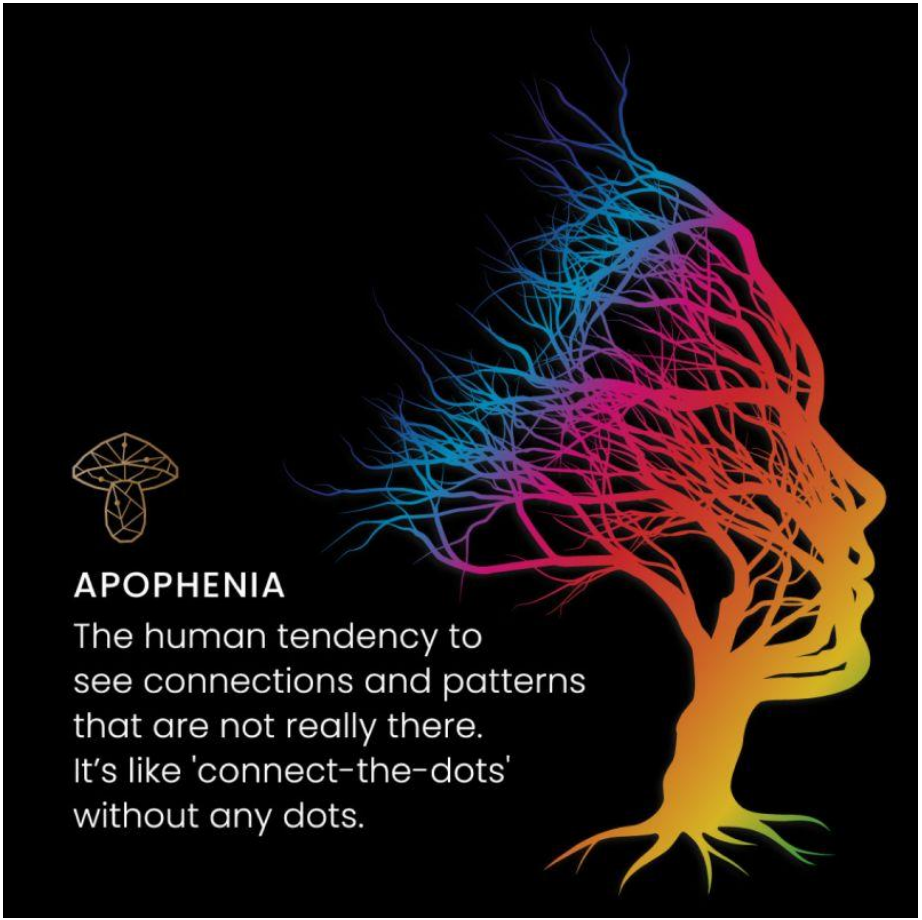
Provide anticipatory guidance for prevention & management of food allergy

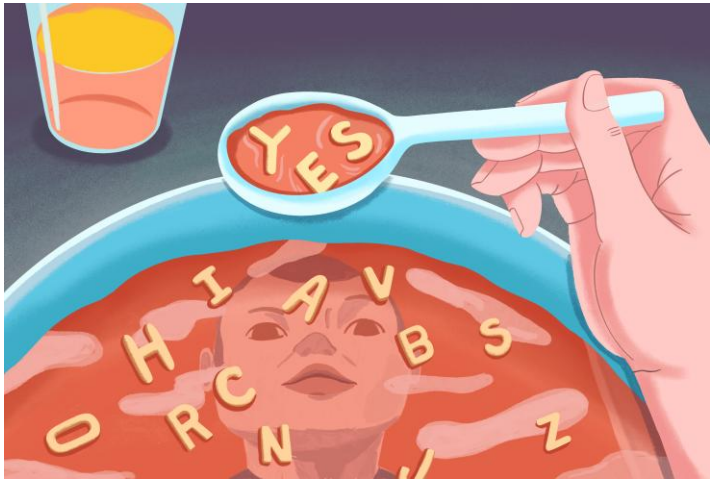


why is my baby's poop

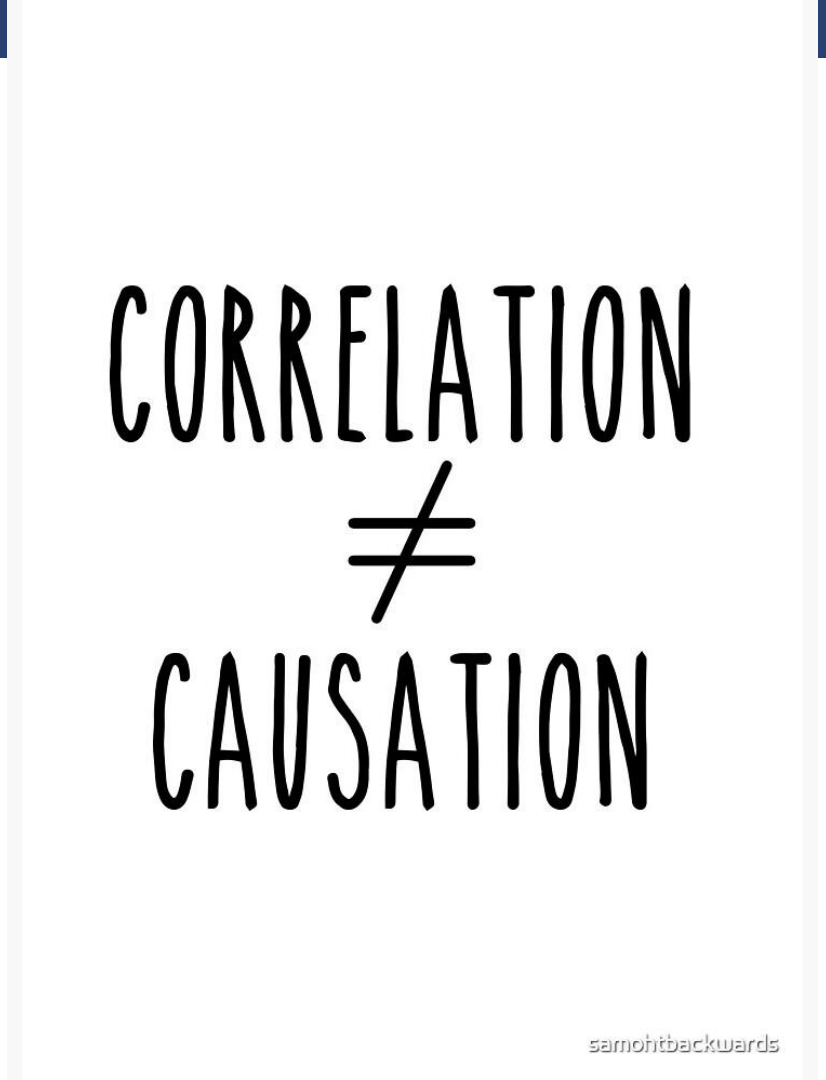
why is my baby's poop - Google Search
why is my baby's poop **yellow**
why is my baby's poop **green**
why is my baby's poop **blue**
why is my baby's poop **dark green**
why is my baby's poop **dark grey**
why is my baby's poop **purple**
why is my baby's poop **lime green**

Assume EVERY parent has already diagnosed their child with something terrible


APOPHENIA
The human tendency to see connections and patterns that are not really there. It's like 'connect-the-dots' without any dots.

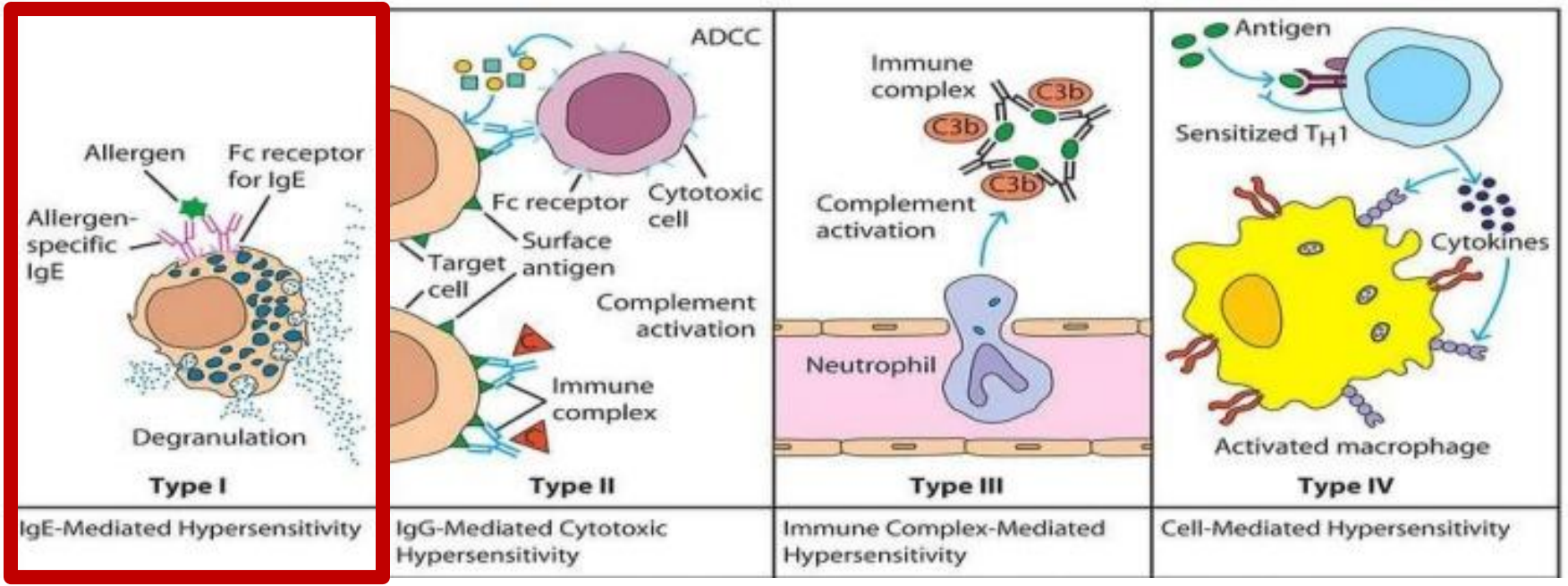

YES
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CORRELATION
≠
CAUSATION
samohtbackwards

Gel and Coombs Classification

Hypersensitivity Reactions



IgE Mediated Food Allergies

- Reactions are objective, immediate onset and reproducible with every exposure to the offending food, no matter what form

- Typical symptoms:
  - Hives
  - Swelling
  - Vomiting
  - Runny nose/congestion
  - Wheezing
  - Hypotension
  - Anaphylaxis

Ingestion almost always required



JAMA Pediatrics | Original Investigation

Risk Factors for the Development of Food Allergy in Infants and Children

A Systematic Review and Meta-Analysis

190 studies

2.8 million children

342 risk factors

JAMA Pediatr. Published online February 09, 2026. doi:10.1001/jamapediatrics.2025.6105

KEY FINDING

Food allergy risks with HIGH certainty

(2-3 times increase in odds)



Having **eczema**, seasonal allergies, or wheezing early in life



Delaying **peanut** introduction into diet



Having a **mom** or sibling with food allergy



aafa Asthma and Allergy Foundation of America

KFA Kids with Food Allergies

Here's What Does NOT Cause Food Allergy



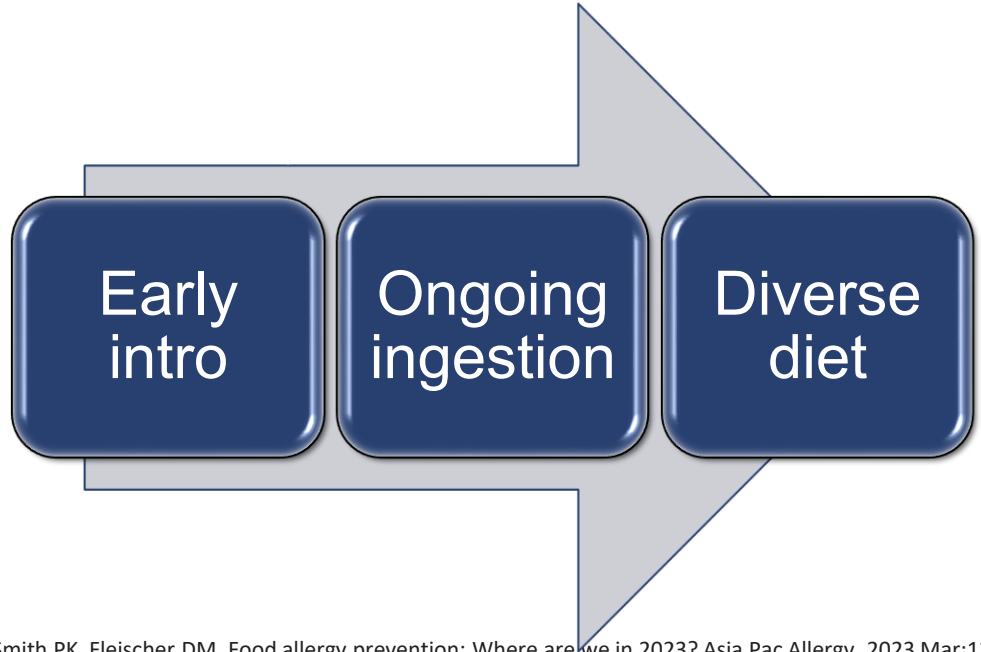
A Common Scenario…





Messaging	Science
Babies are at risk for more severe reactions	Rash/hives & vomiting are the most common presentation
One new food every 5, 7, 21 days	Zero evidence to support spacing out foods
Rub some on their skin 1st to see if they're allergic	Dual exposure hypothesis Nonallergic irritant dermatitis
Food allergies can occur in anyone at any time	92-95% of children will NEVER develop a food allergy
Eczema is caused by allergies	Current guidelines: Remove or restrict food as a last resort

Let's Pause to Agree on Some Things



Best path* towards primary prevention of food allergy

*Nothing we do in medicine is 100% effective

1. Venter C, Smith PK, Fleischer DM. Food allergy prevention: Where are we in 2023? Asia Pac Allergy. 2023 Mar;13(1):15-27.
2. Abrams EM, Shaker M, Stukus D, Mack DP, Greenhawt M. Updates in Food Allergy Prevention in Children. Pediatrics. 2023 Nov 1;152(5):e2023062836.
3. Fleischer DM, Chan ES, Venter C, Spergel JM, Abrams EM, Stukus D, Groetch M, Shaker M, Greenhawt M. A Consensus Approach to the Primary Prevention of Food Allergy Through Nutrition: Guidance from the American Academy of Allergy, Asthma, and Immunology; American College of Allergy, Asthma, and Immunology; and the Canadian Society for Allergy and Clinical Immunology. J Allergy Clin Immunol Pract. 2021 Jan;9(1):22-43.e4.
4. de Silva D, Halken S, Singh C, Muraro A, Angier E, Arasi S, Arshad H, Beyer K, Boyle R, du Toit G, Eigenmann P, Grimshaw K, Hoest A, Jones C, Khaleva E, Lack G, Szajewska H, Venter C, Verhasselt V, Roberts G; European Academy of Allergy, Clinical Immunology Food Allergy, Anaphylaxis Guidelines Group. Preventing food allergy in infancy and childhood: Systematic review of randomised controlled trials. Pediatr Allergy Immunol. 2020 Oct;31(7):813-826.

ORIGINAL ARTICLE | VOLUME 10, ISSUE 5, P1312-1324.E8, MAY 2022 Download Full Issue

Food Proteins in Human Breast Milk and Probability of IgE-Mediated Allergic Reaction in Children During Breastfeeding: A Systematic Review

Aysylu Gamirova, BSc * • Anna Berbenyuk, BSc * • Daria Levina, MD * • ...
Debra J. Palmer, BSc, BND, PhD • Robert J. Boyle, MB, ChB, PhD • Daniel Munblit, MD, PhD * •
Show all authors • Show footnotes

Published: February 01, 2022 • DOI: https://doi.org/10.1016/j.jaip.2022.01.028 • Check for updates

Results

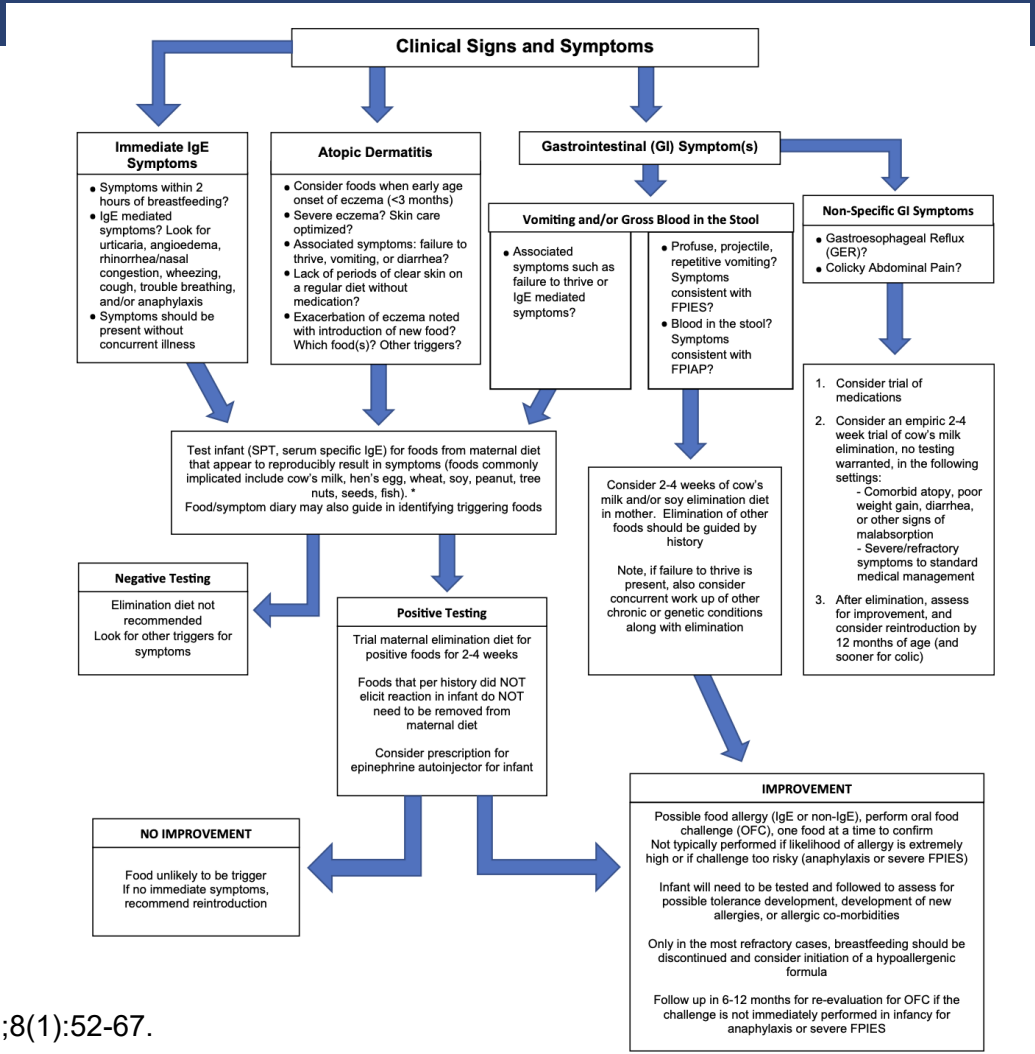
A total of 32 studies were identified. Fourteen studies assessed excretion of cow's milk proteins into HM, 9 egg, 4 peanut, and 2 wheat; 3 measured levels of cow's milk and egg proteins simultaneously. We found that levels of all food proteins across the studies were much lower than the eliciting dose for 1% of allergic individuals (ED01) in most of the samples. The probability of an IgE-mediated allergic reaction in a food-allergic infant breastfed by a woman consuming the relevant food can be estimated as ≤1:1000 for cow's milk, egg, peanut, and wheat.

In Defense of Breast Feeding Mothers

CONCLUSIONS AND FUTURE IMPLICATIONS

Given the accumulating evidence, reactions to proteins in the maternal diet delivered via human milk may be less rare than once thought; however, most reports are small and come from referral centers, resulting in uncertain prevalence estimates. A thoughtful approach is necessary in evaluation of infants presenting with concern for possible food allergy—triggered symptoms, which may vary from IgE-mediated allergic symptoms, to atopic dermatitis, to severe gastrointestinal symptoms. The goal should be to minimize unnecessary elimination diets and approach should always be guided by the stability and growth of the infant.

Rajani PS, et al. JACI:In Pract. 2020;8(1):52-67.



Rajani PS, et al. JACI:In Pract. 2020;8(1):52-67.

Who Doesn't Love a Good Conspiracy?

JAMA Pediatrics

Issues Multimedia

Special Communication

Assessment of Evidence About Common Infant Symptoms and Cow's Milk Allergy

Daniel Munblit, MD, PhD[1,2]; Michael R. Perkin, MB, ChB, PhD[3]; Debra J. Palmer, BSc, BND, PhD[4]; et al

Munblit D, et al. JAMA Pediatr. 2020;174(6):599–608.

Prior (outdated) recommendations

Symptom? Cow's milk allergy!

Go straight to special formula

Maternal avoidance

Consider reintroduction at 12 months of age

Treat every child like every other child

Current recommendations

Most symptoms not due to "allergy"

Assume improvement with minimal intervention

Dietary avoidance should not be first line for most infants

Consider 2-4 week elimination THEN reintroduction

DRACMA Guidelines

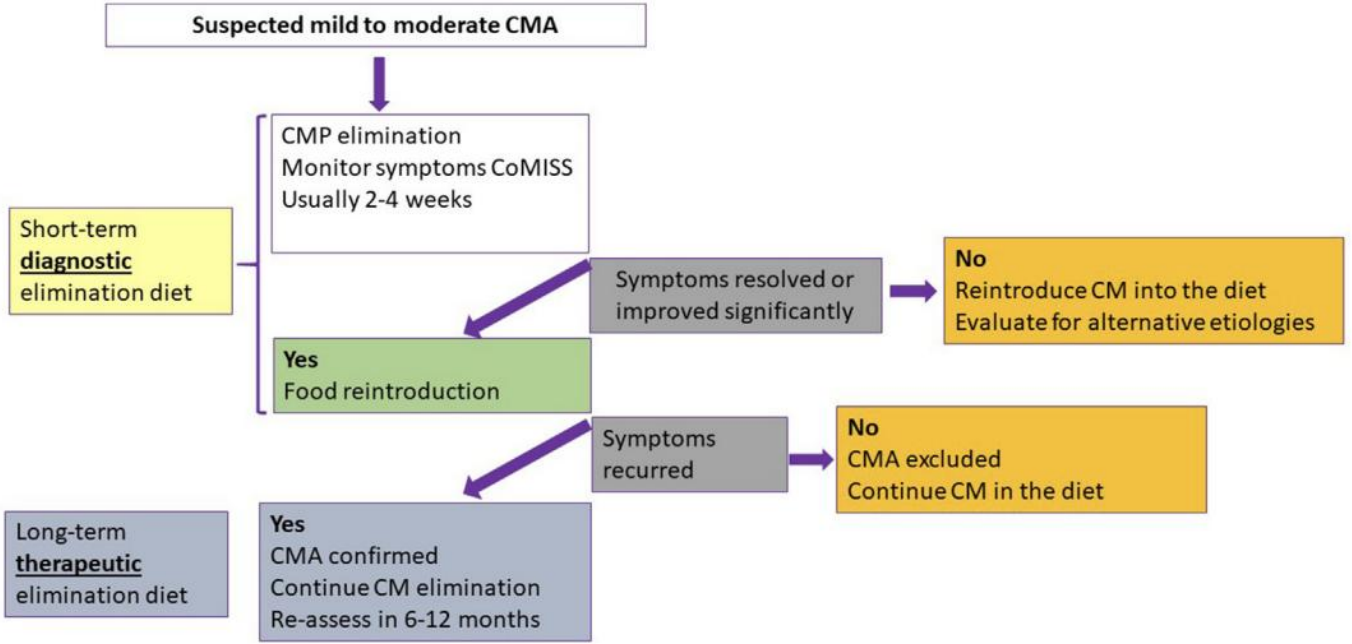


Fig. 1 Recommended management in infants with cow's milk allergy. Schematic diagnostic and therapeutic elimination diet.

World Allergy Organ J. 2023 Jul 24;16(7):100785.

Formula Choices for CMPA



Must discuss: Cost, taste, poop…and exit strategy

Pediatr Gastroenterol Hepatol Nutr. 2014 Mar;17(1):1-5.

FPIES – Diagnosis and Management

No diagnostic test available
Need 2 or more episodes
Delayed emesis 1-3 hrs later
NO hives, anaphylaxis



Don’t need to over avoid
Majority tolerate 6-12 months later
Epinephrine not indicated
Odansetron for everyone

FPIES – Common Foods

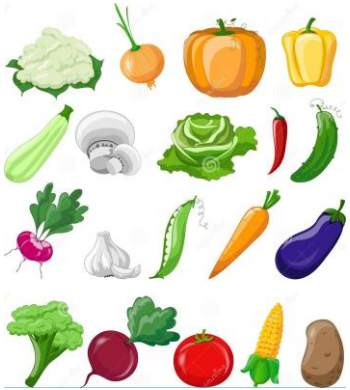








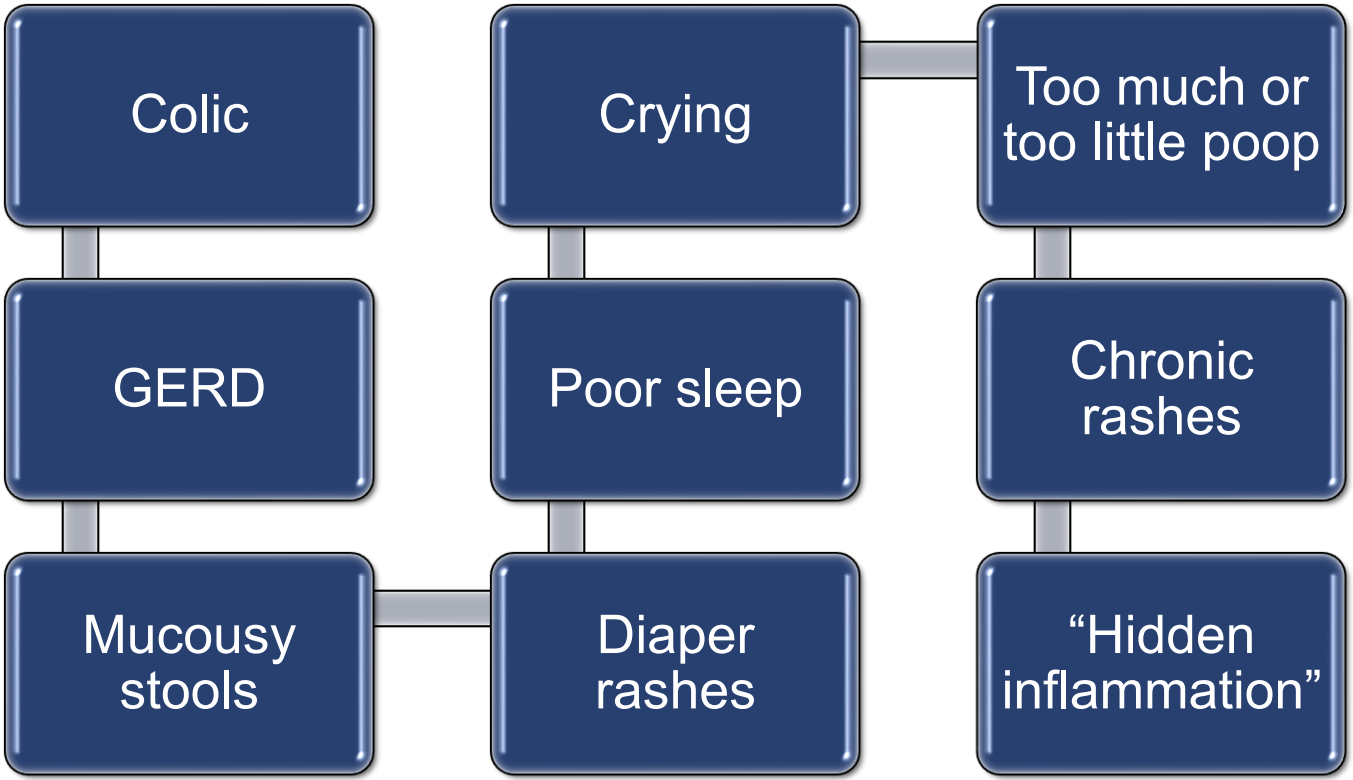


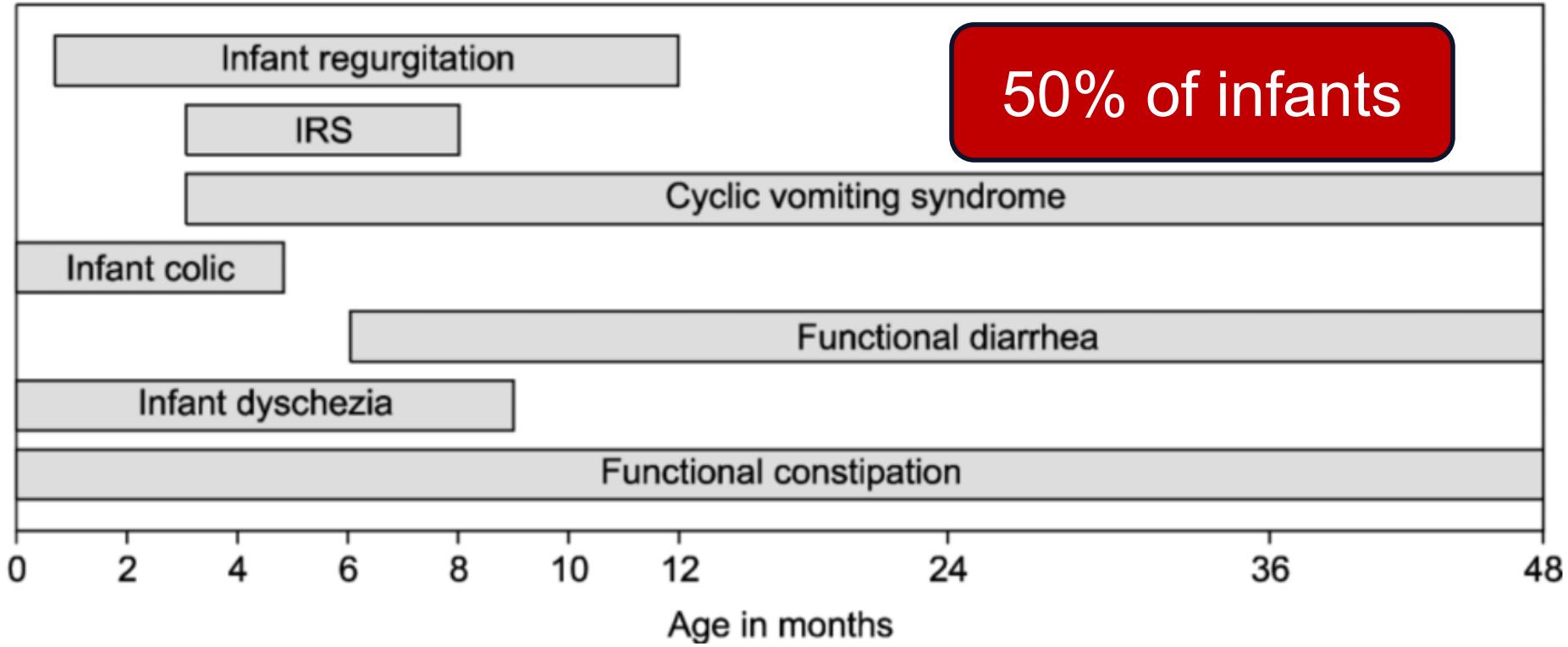


- Majority of children (65-80%) only have symptoms with one food
  - U.S. ~30-50% react to both cow's milk and soy
  - <10% react to more than 3 foods

- Exclusively breast fed infants are RARELY symptomatic

Dietary Elimination Should NOT Be the Primary Choice:



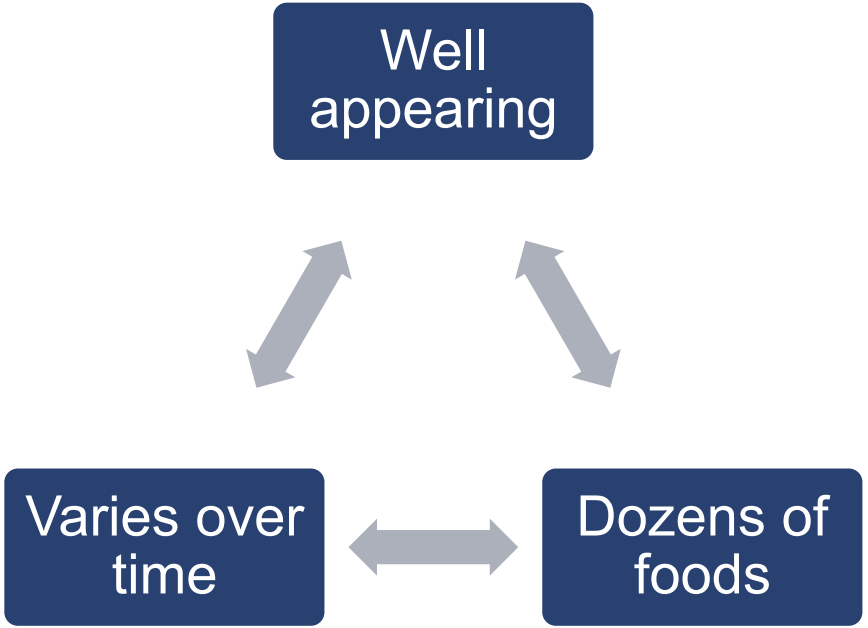


Rome IV diagnoses in infants and toddlers and the age at which they may occur. IRS: infant rumination syndrome.

Pediatr Gastroenterol Hepatol Nutr. 2017 Mar;20(1):1-13.

L24.6 - Irritant contact dermatitis due to food in contact with the skin



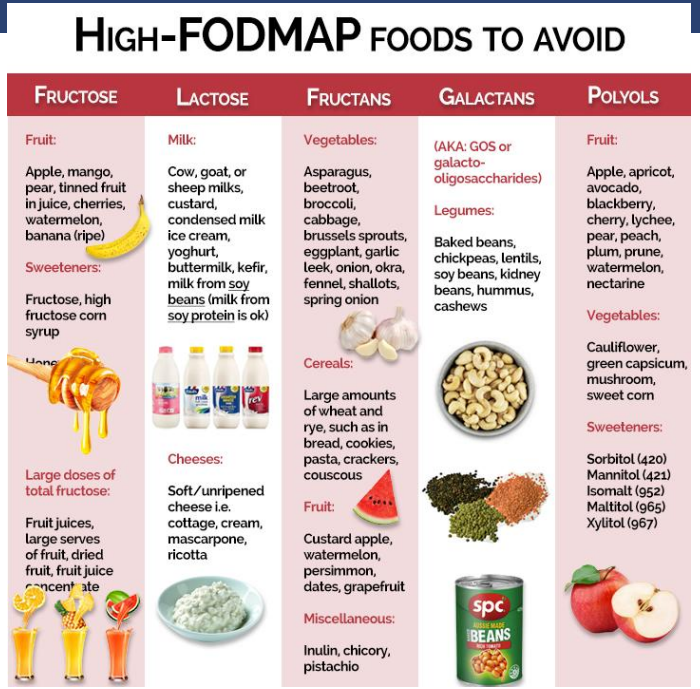


Novak-Bilić G, et al. Acta Clin Croat. 2018 Dec;57(4):713-720.

Food Intolerance

- Difficulty with digestion
- Can be temporary or chronic

- Lactose intolerance
- FODMAPs



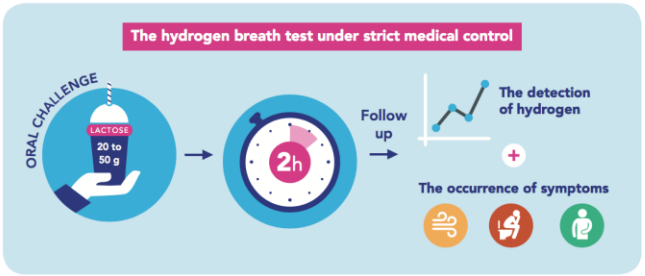


Figure 5. The diagnosis of lactose intolerance.

https://www.yogurtinnutrition.com/lactose-intolerance-diagnostic/

https://www.wellworks.co.nz/author/ray/

Food Sensitivity

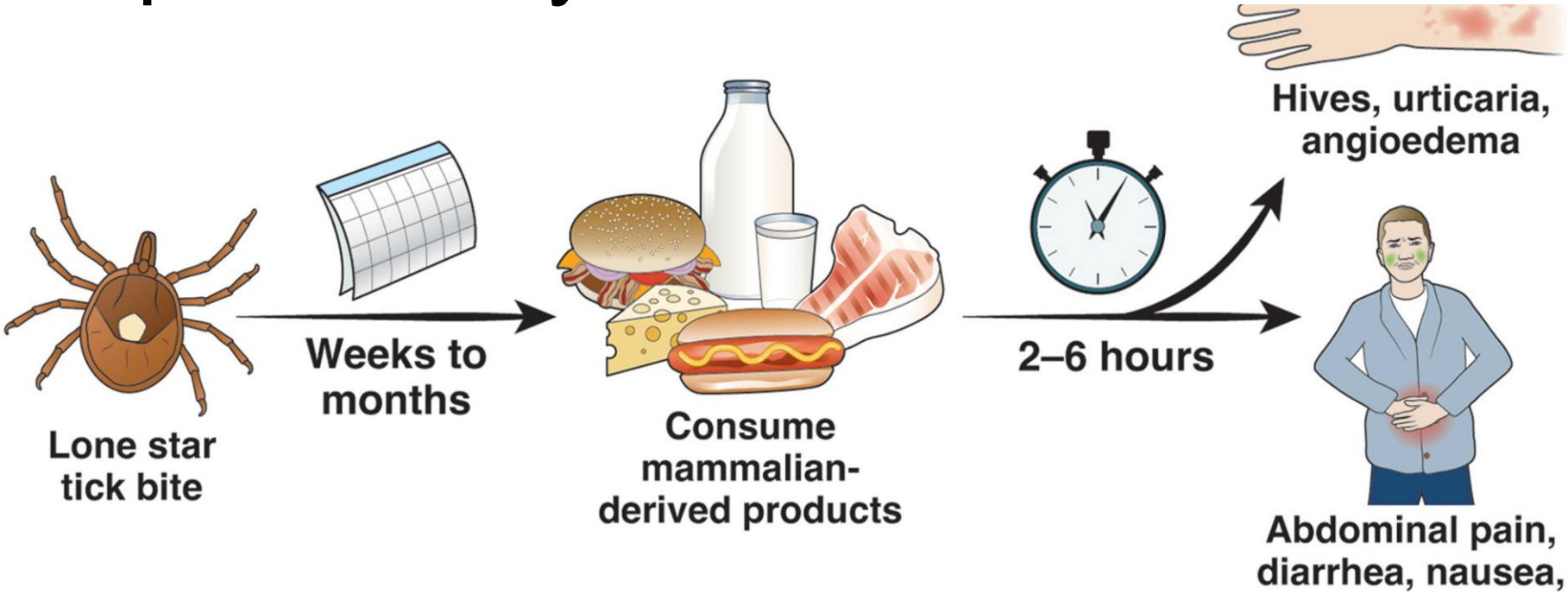
No consensus diagnostic criteria

Any symptom imaginable attributed to “sensitivity”

Marketing for unvalidated tests

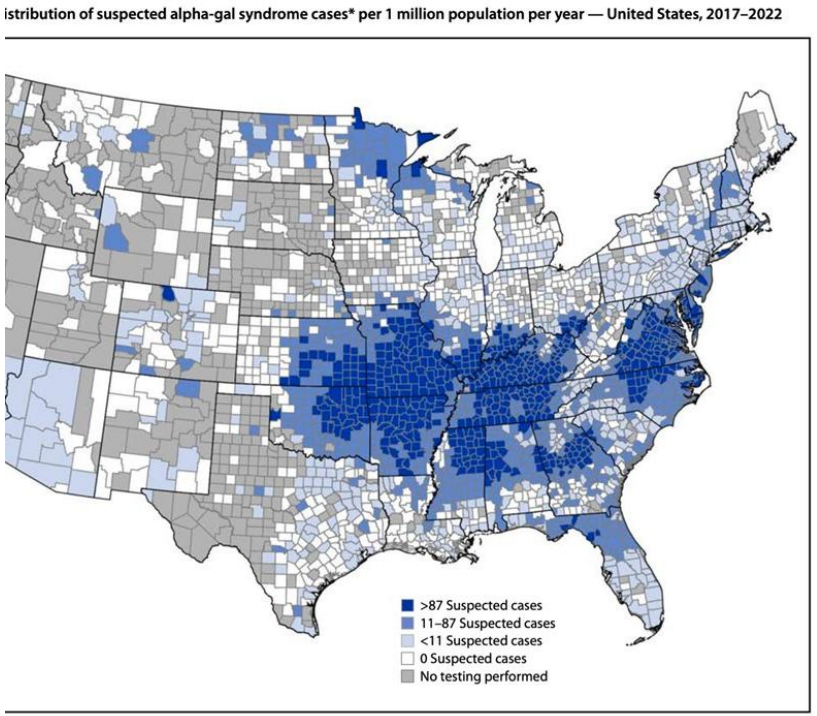


Alpha Gal Syndrome



All of Your Patients Do NOT Have Alpha Gal

- Not all tick bites cause alpha gal
- IgE is never a screening test
- Do not diagnose based upon testing alone
- Do not randomly test everyone who has been bitten by a tick



ARE FRUITS AND VEGGIES MAKING YOUR MOUTH ITCHY?

You may have oral allergy syndrome (OAS).

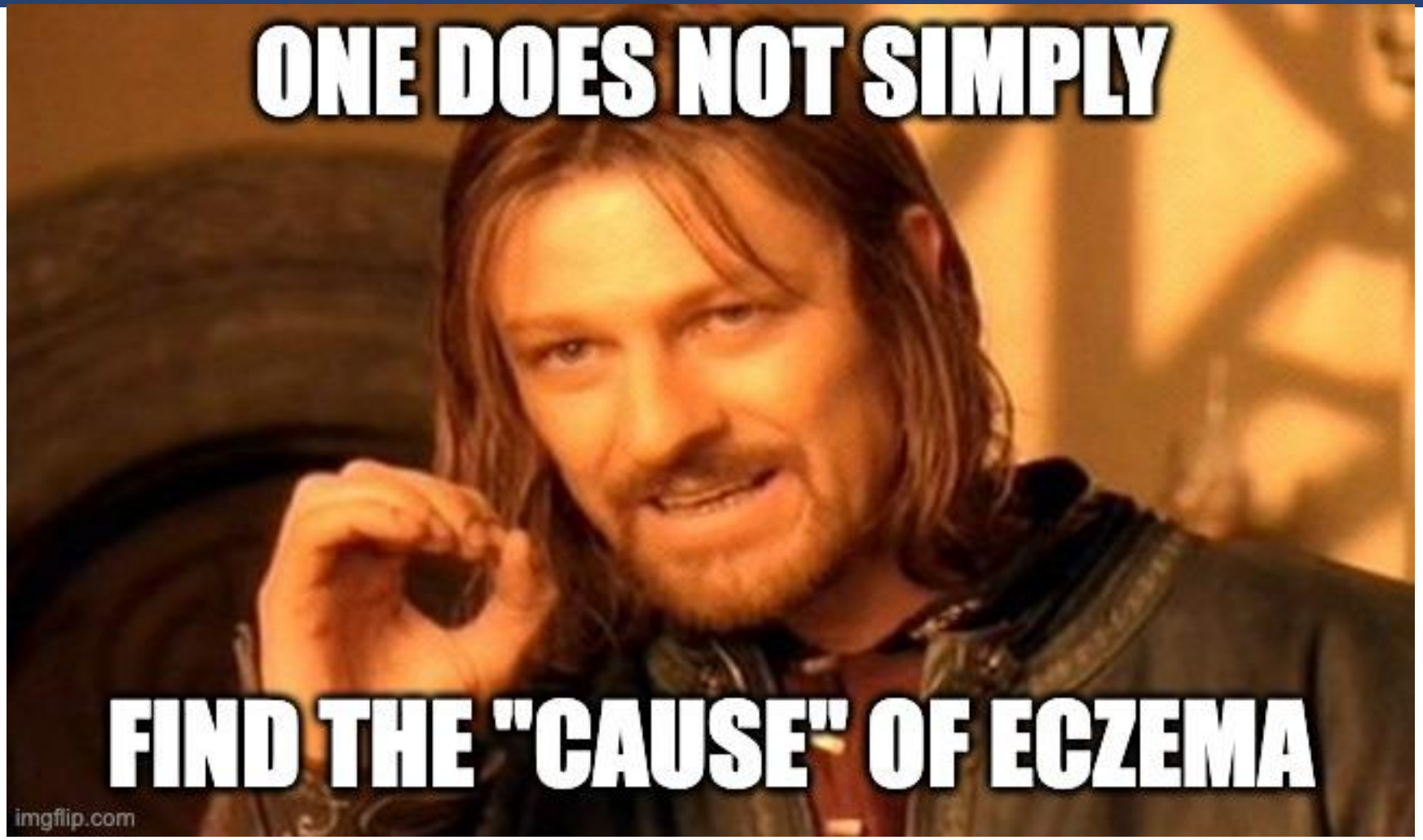


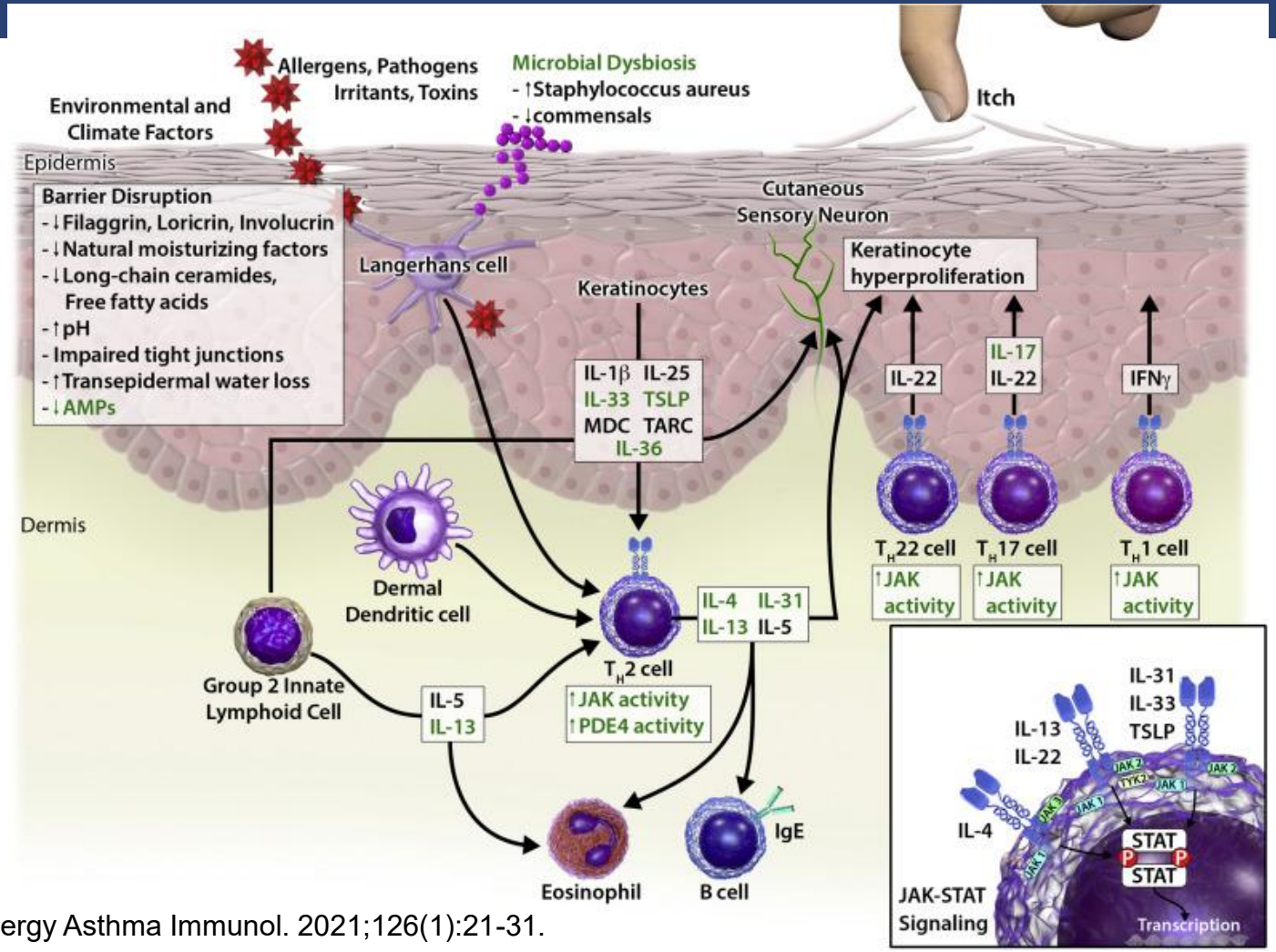






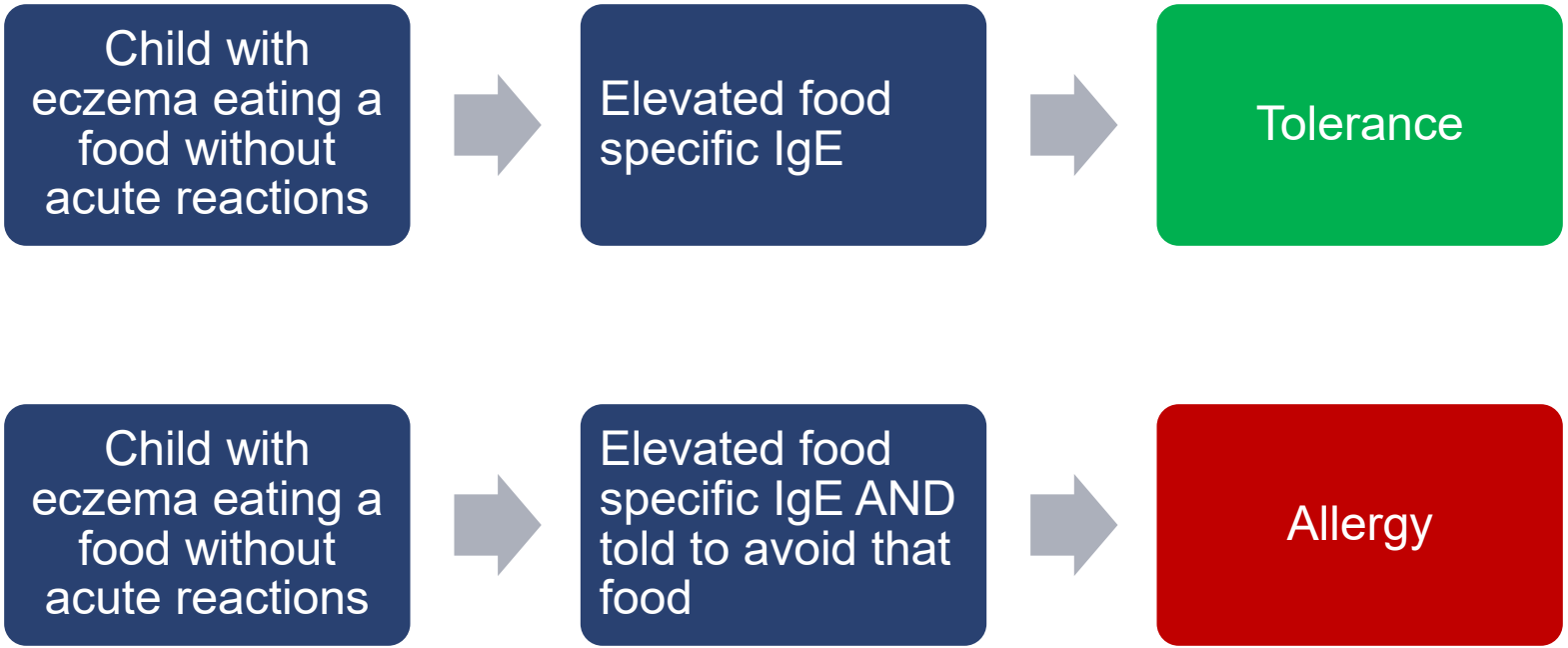

2:30
FUJIFILM


ONE DOES NOT SIMPLY
FIND THE "CAUSE" OF ECZEMA
imgflip.com



Puar N, et al. Ann Allergy Asthma Immunol. 2021;126(1):21-31.

Primum non nocere
(First, do no harm)



Spergel J, et al. Pediatrics 2015;136(6):e1530-e1538

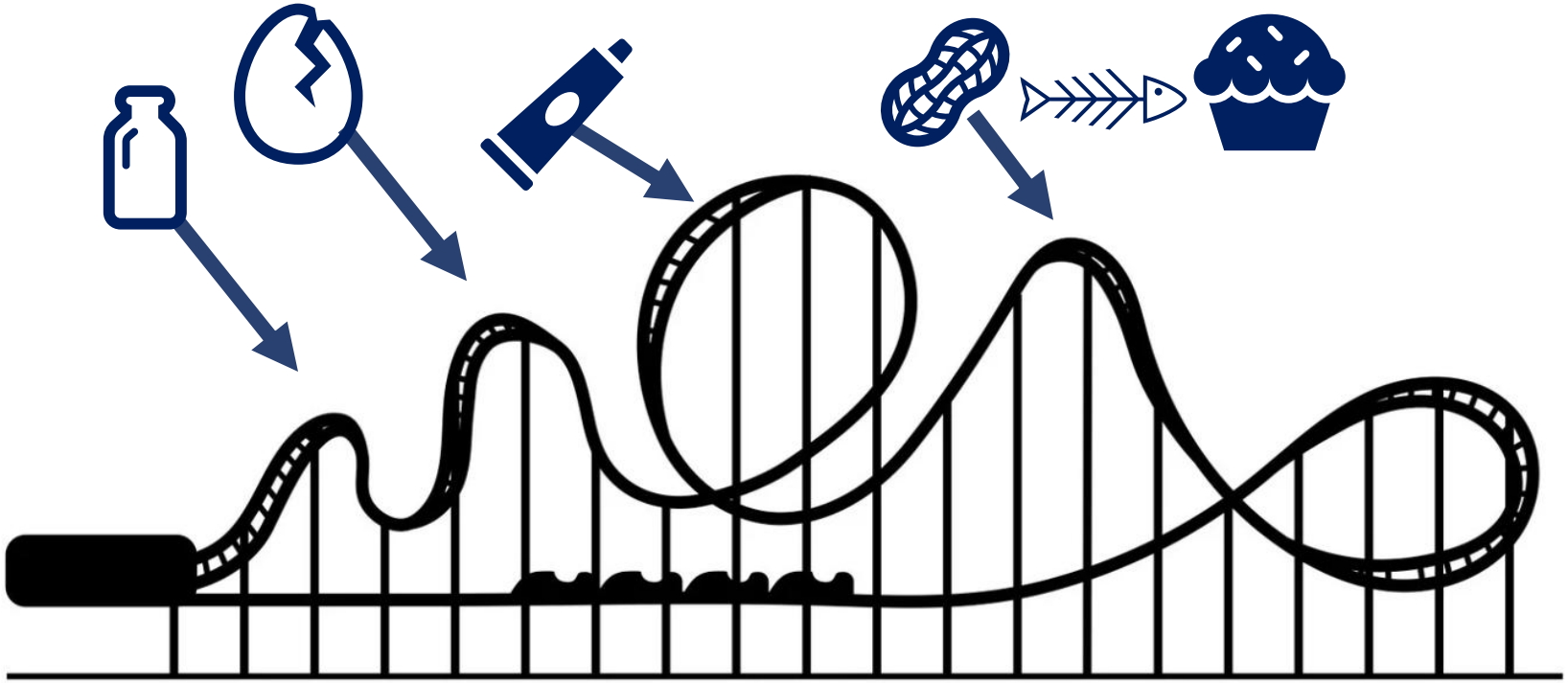
Practice Parameters

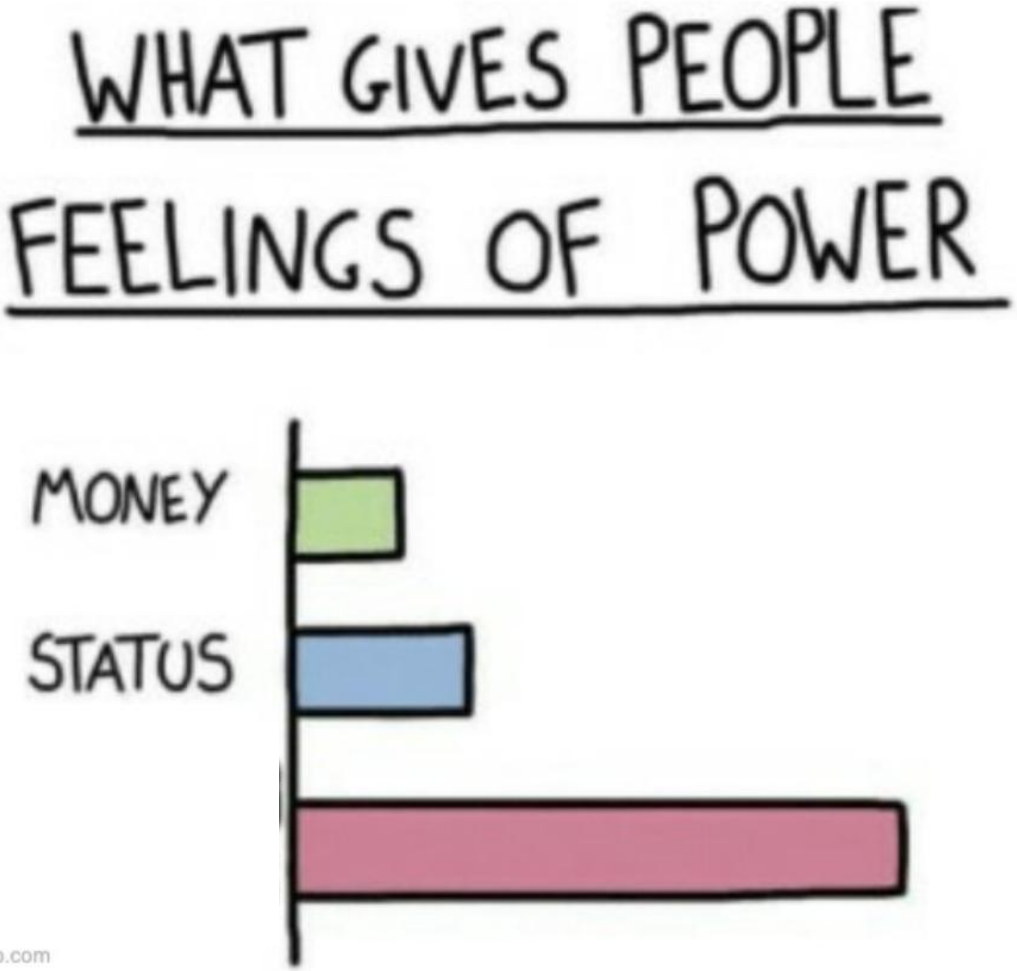
Atopic dermatitis (eczema) guidelines: 2023 American Academy of Allergy, Asthma and Immunology/American College of Allergy, Asthma and Immunology Joint Task Force on Practice Parameters GRADE– and Institute of Medicine–based recommendations



Ann Allergy Asthma Immunol. 2023 Dec 18:S1081-1206(23)01455-2

Context and Natural History Matter




WHAT GIVES PEOPLE
FEELINGS OF POWER
MONEY
STATUS
imgflip.com

Volume 138, Issue 6
December 2016

PEDIATRICS
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS
www.pediatrics.org

ARTICLE | DECEMBER 01 2016

Use of Food Allergy Panels by Pediatric Care Providers Compared With Allergists

David R. Stukus, MD ✉; Erin Kempe, DO; Amy Leber, PhD; David Thornton, PhD; Rebecca Scherzer, MD

Conclusions: Review of food allergen IgE testing through a high volume outpatient laboratory revealed PCPs order significantly more food allergen panels, tests for uncommon causes of food allergy, and generate higher cost per patient compared with allergists. These results suggest a need for increased education of PCPs regarding proper use of food IgE tests.

You Shall Properly Diagnose IgE Mediated Food Allergies

Is the history consistent with IgE mediated food allergy?

Skin prick & serum IgE tests (including components) only help determine *likelihood* of allergy

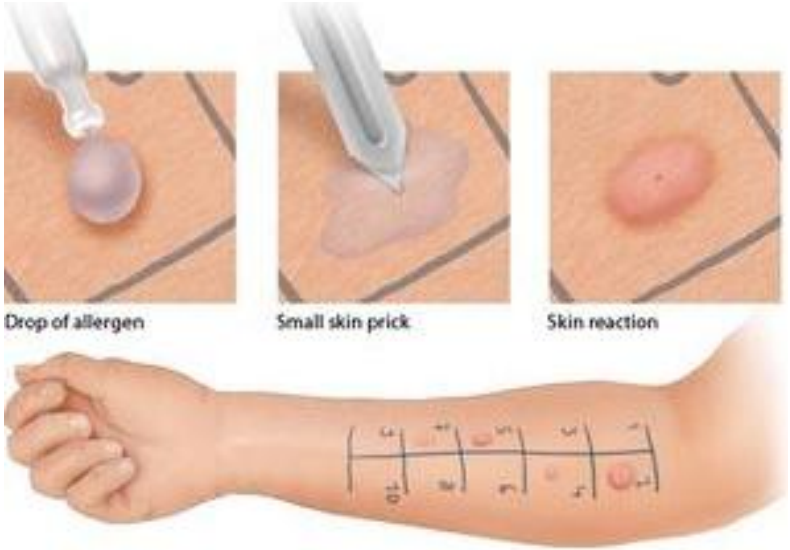
There are exactly ZERO indications to ever order a random panel of food allergy tests

There are no 100% accurate “cut off” values. Do NOT become fixated on inherently flawed test results. Treat the patient, not the number.

Before We Go Any Further…



Diagnostic Testing



ALLERGEN(S) INTERP...	...	
ALLERGEN: CAT DAND...	<0.10	
ALLERGEN: COCKROAC...	<0.10	
ALLERGEN: DOG DAND...	1.34	!
ALLERGEN: MITE FAR...	<0.10	
ALLERGEN: MITE PTE...	<0.10	
ALLERGEN: ALMONDS IGE	0.22	
ALLERGEN: APPLE IGE		
ALLERGEN: BANANA IGE	2.62	!
ALLERGEN: CASHEWS IGE	0.17	
ALLERGEN: COD IGE	0.48	!
ALLERGEN: CRAB IGE	<0.10	
ALLERGEN: EGG WHIT...	4.97	!
ALLERGEN: LOBSTER IGE	<0.10	
ALLERGEN: MILK (CO...	1.06	!
ALLERGEN: PEANUT IGE	0.48	!
ALLERGEN: PECAN NU...	<0.10	
ALLERGEN: PISTACHI...	0.19	
ALLERGEN: SALMON IGE	0.27	
ALLERGEN: SCALLOP IGE	<0.10	
ALLERGEN: SHRIMP IGE	<0.10	
ALLERGEN: TUNA IGE	0.20	

ALLERGEN(S) INTERPRETATION (NOTE)

Comment: REFERENCE INTERVAL: Allergen, Interpretation

<0.35 kU/L	No significant level detected
0.35 -0.70 kU/L	Low
0.71 -3.50 kU/L	Moderate
3.51 -17.50 kU/L	High
17.51 kU/L or Greater:	Very High

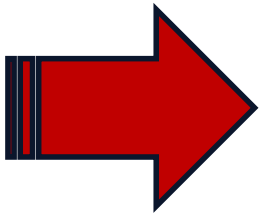
This is all completely:
- **Arbitrary**
- **Incorrect**
- **Misleading**
- **Fabricated**

Values above 0.35 kU/L denote the presence of allergic sensitization. Clinical relevance of any level above 0.35 needs to be established by further history relating symptoms to exposure. A negative test may not rule out clinical allergy or even anaphylaxis.

Perils of Misdiagnosing Food Allergy

IgE tests have the power to fundamentally alter (ruin) people's lives

Instead of doing everything we can to make sure we don't "miss anything", i.e. ritualistic testing



We should be doing everything we can to make sure we get food into the diet

Where We Started…



https://www.deadlyfoodallergies.com/#why-food-allergies-matter


Due to Severe Allergies,
Our Playgrounds are a
Nut Free Environment.
PLEASE DO NOT BRING
NUTS OF ANY KIND
ONTO THE PROPERTY.
Thank you for Helping us
Keep our Children Safe.
alamy
Image ID: 2AGJBEX
www.alamy.com


PEANUT/NUT REDUCED GAMES


ATTENTION:
NO
PEANUTS
THIS SCHOOL IS
PEANUT FREE
THANK YOU

Where We're Going…

The Washington Post
Democracy Dies in Darkness

Column Michael J. Coren

Schools should stop banning peanuts. Here's what really keeps kids safe.

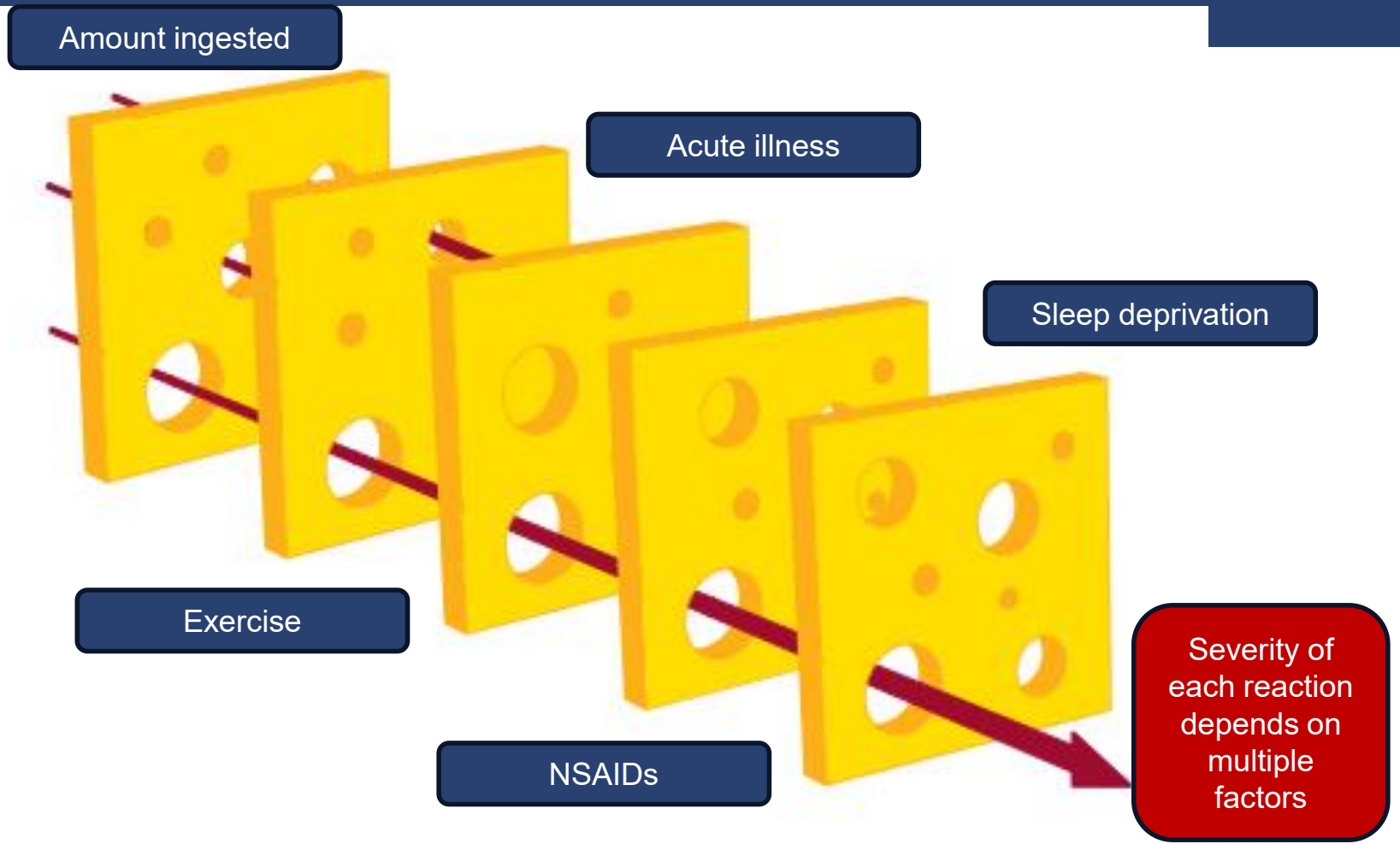
Everyone wants to keep kids with food allergies safe, but the evidence suggests bans don't do that. There's a better way.

September 8, 2026



Our Words Matter




Amount ingested
Acute illness
Sleep deprivation
Exercise
NSAIDs
Severity of each reaction depends on multiple factors

Key Messages to Reassure Parents & Patients

Offer perspective:
Food allergy fatalities are extremely rare, impacting less than 20 *people* a year

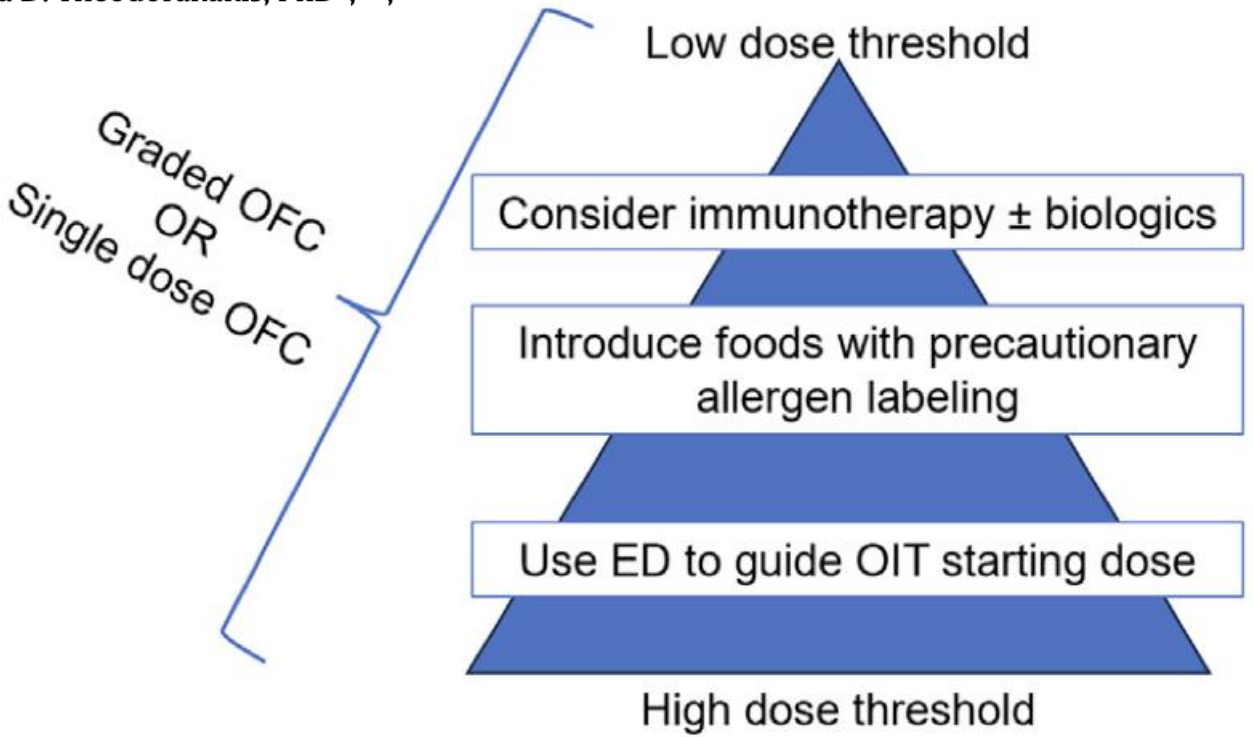
Offer context:
It's almost unheard of for infants and young children to die from food allergy

Help them focus:
Anaphylaxis requires ingestion; it doesn't happen from airborne exposure or touching the food

Empower them:
Epinephrine is EXTREMELY effective, especially when used early; it significantly reduces risk for a life-threatening reaction

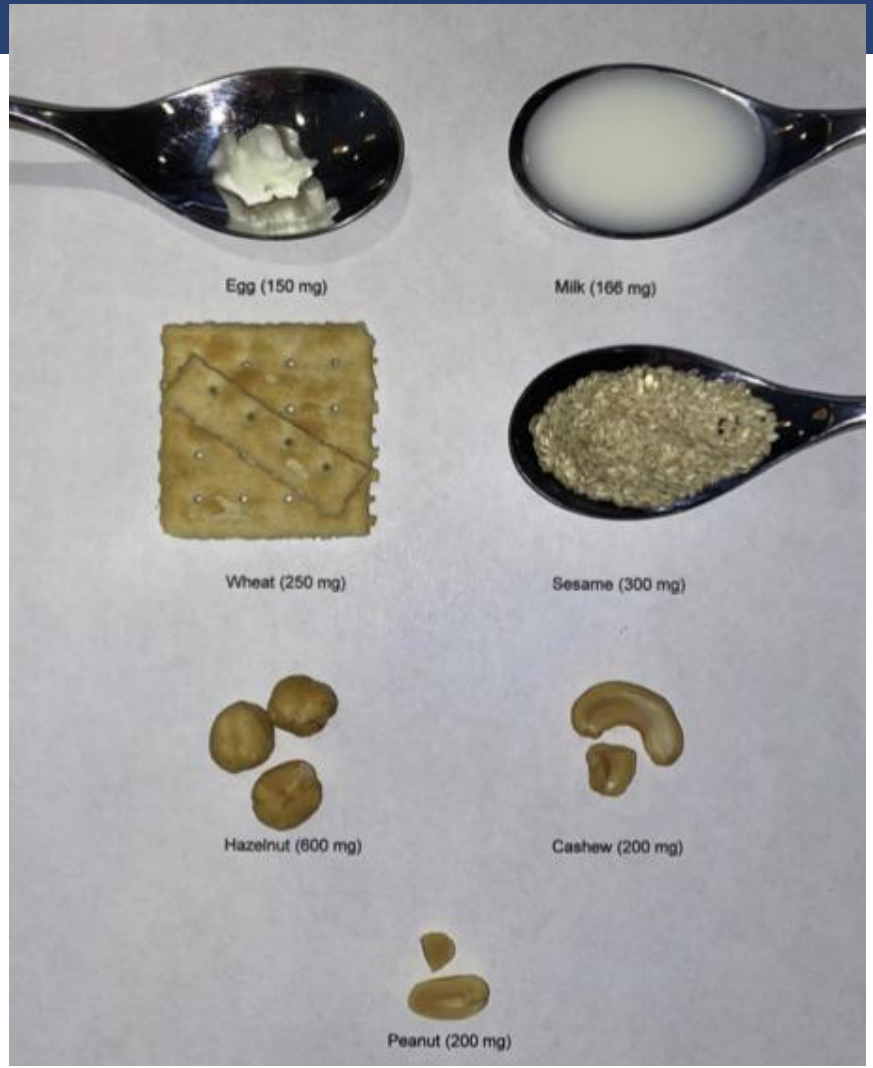
Utility of food allergy thresholds

Jennifer C. Li, MD*,†,‡,§; Nancy S. Rotter, PhD*,†,||; Elisabeth S. Stieb, RN*,†;
Jennifer L. Stockbridge, CNP*,†; Maria D. Theodorakakis, PhD*,†,||;
Wayne G. Shreffler, MD, PhD*,†,‡,§



Li JC, et al. Ann Allergy Asthma Immunol. 2024 Mar;132(3):321-327.

Eliciting Dose for 50% of the population with each food allergy



J Allergy Clin Immunol Pract 2022;10:46-55

Shared equipment

May Contain

Processed in the same facility

May contain traces of ___

Packed in an environment where __ may be present

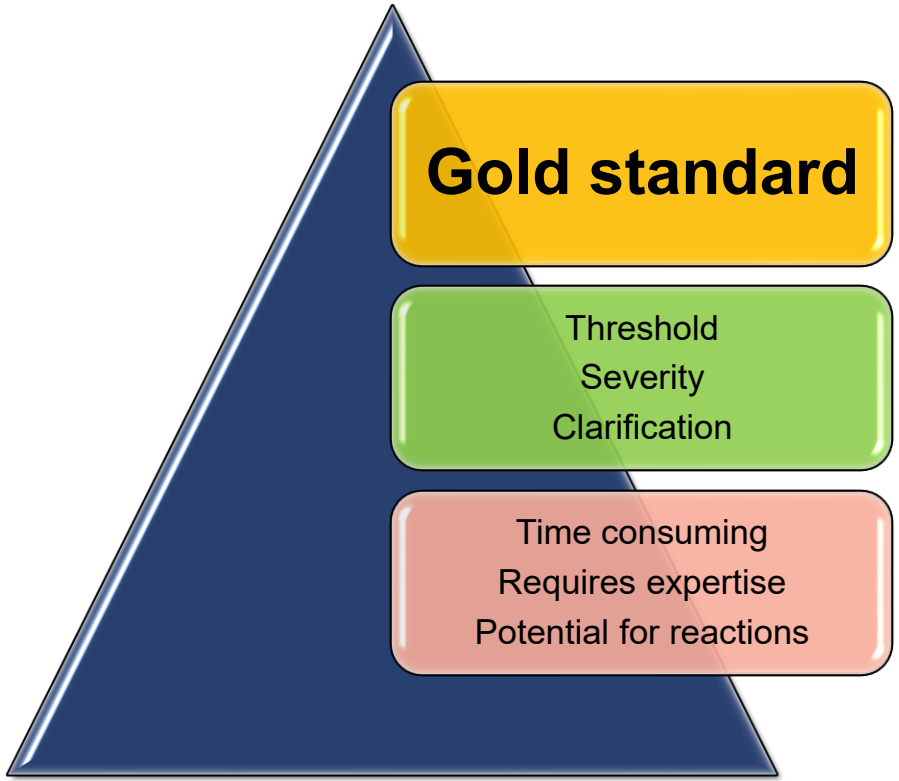
Not suitable for ___ allergy sufferers

___ may be present

Due to methods used in manufacturing, this product occasionally contains ___

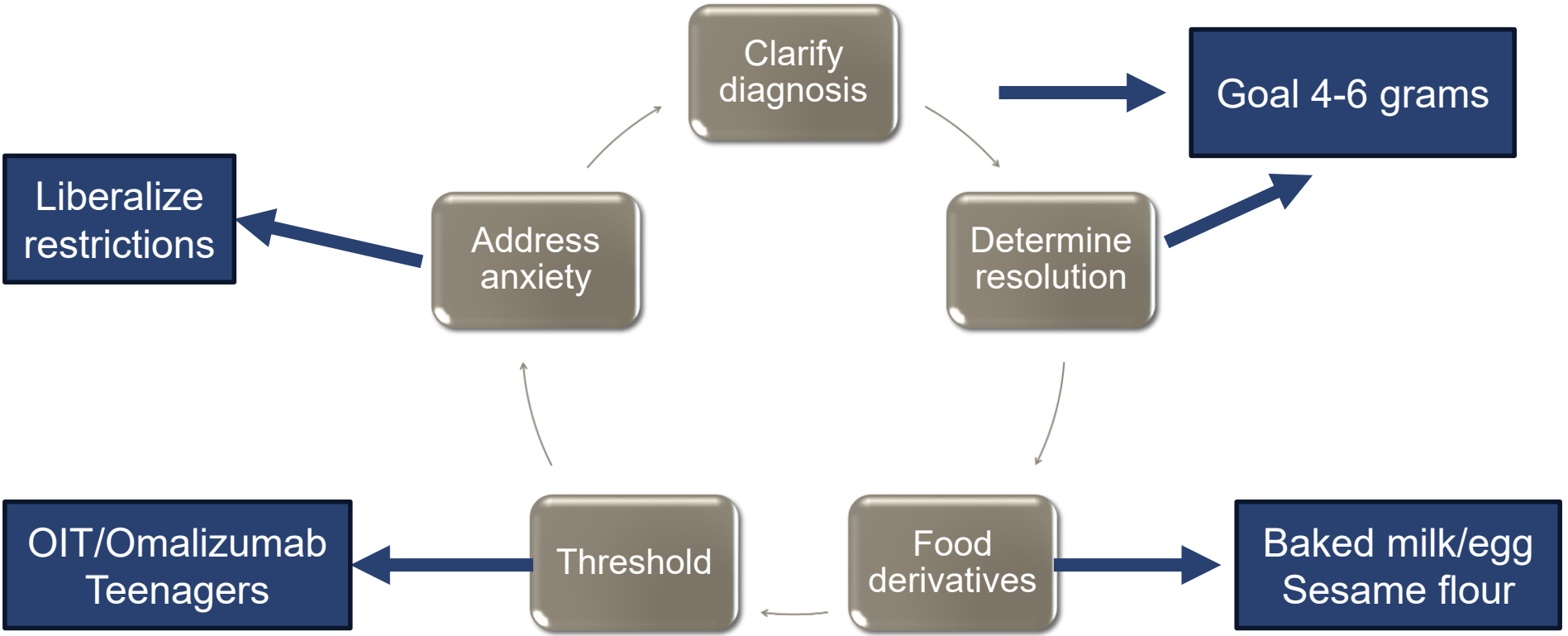
Good manufacturing practices used to segregate ingredients in a facility that also processes allergens

Oral Food Challenges



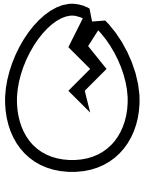
Upton JE, Bird JD. Ann Allergy Asthma Immunol. 2020;124(5):451-458.

Different Challenges for Different Scenarios

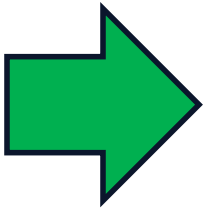


Dramatic Changes in Management



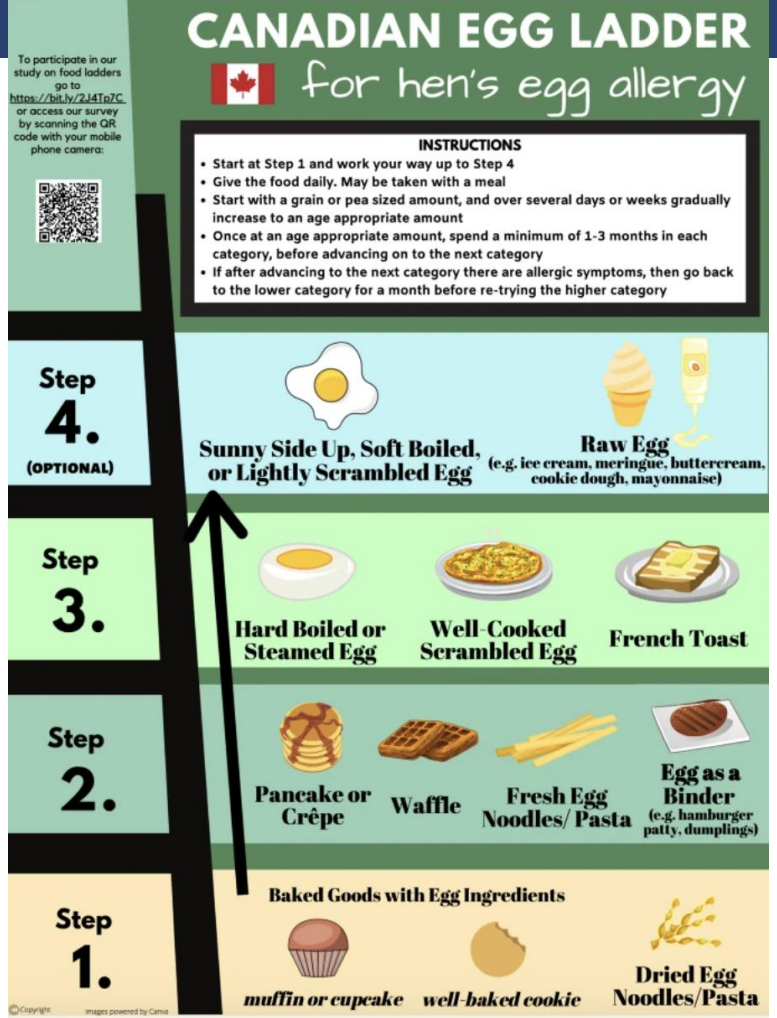


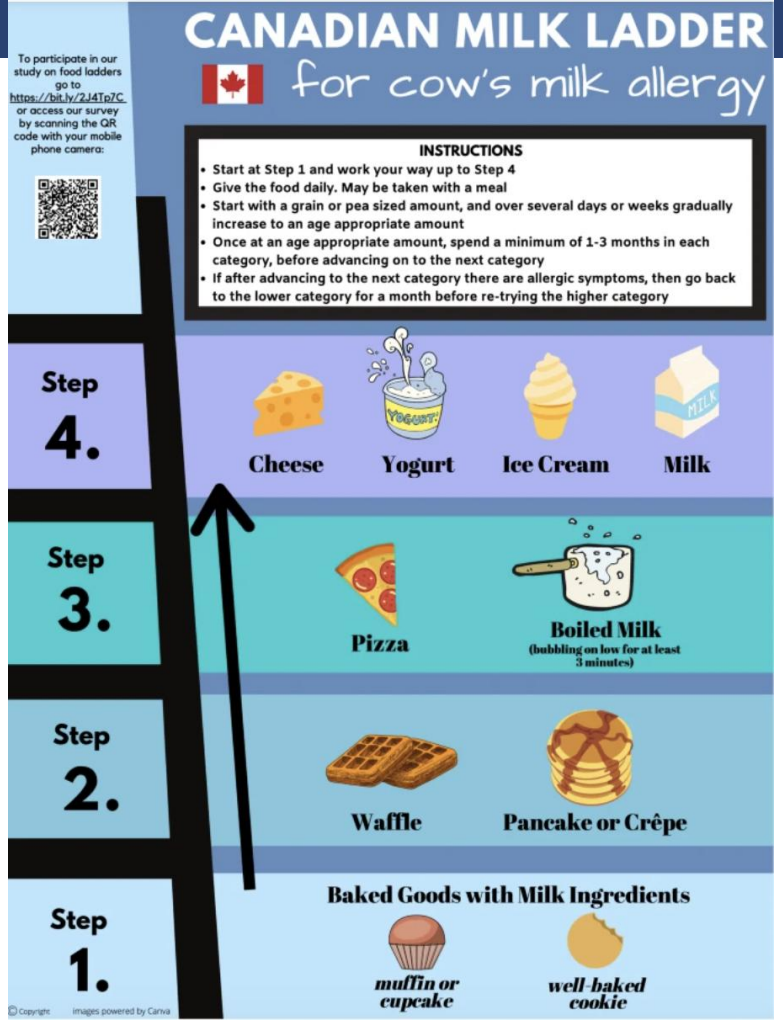




75% tolerate baked milk or egg

This identifies a milder phenotype
Makes management easier
Does NOT help induce tolerance to nonbaked forms





Chomyn, A., Chan, E.S., Yeung, J. *et al. Allergy Asthma Clin Immunol* **17**, 83 (2021).

Outdated Blanket Approaches











Clinical and Experimental Allergy. 2017;47(6):719-739.

Food Allergy Prognosis

- Milk, egg, wheat, soy: Majority develop tolerance by 5-10 years of age
- Peanut, sesame: ~20% develop tolerance
- Tree nuts: ~9% develop tolerance
- Adult onset food allergy: Peanut, tree nut, seafood - ???

Follow IgE levels over time to help predict tolerance
Severity of prior reactions is NOT a predictor

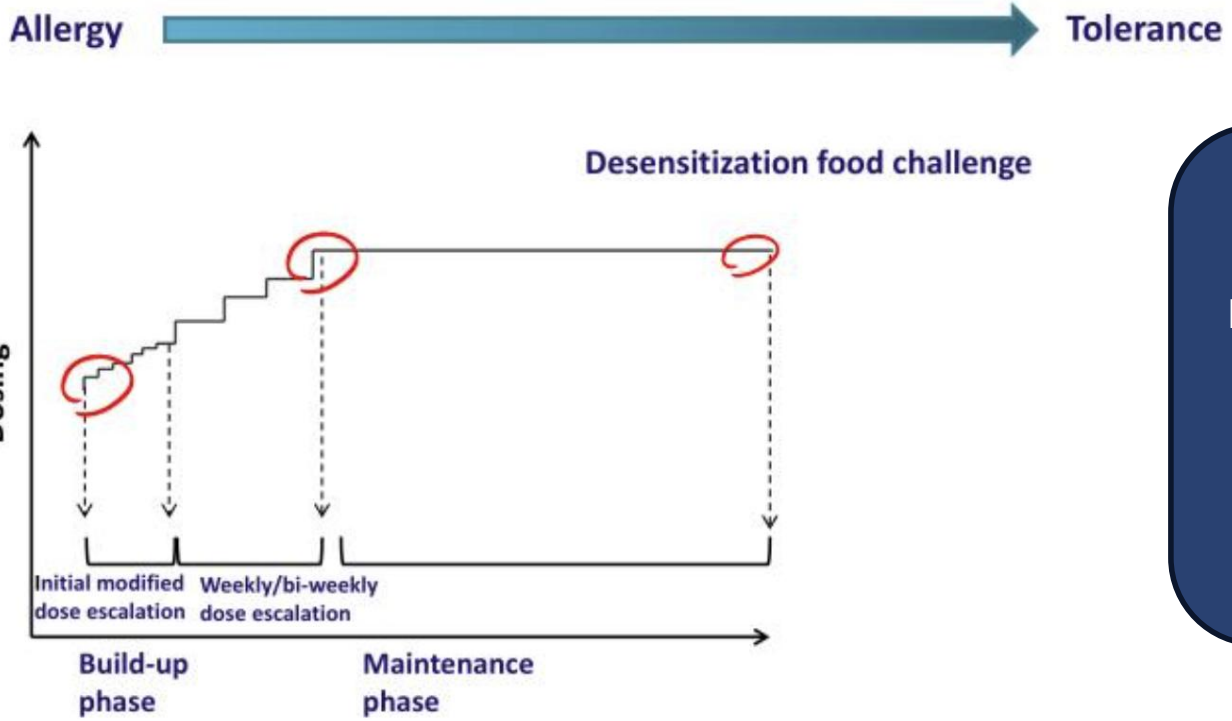
Evolution of Food Allergy Treatment







Desensitization Principles → OIT



It's not a race!

Longer treatment = enhanced efficacy

There is no one size fits all dose or duration

Age Matters for OIT Outcomes

Clinical Commentary Review

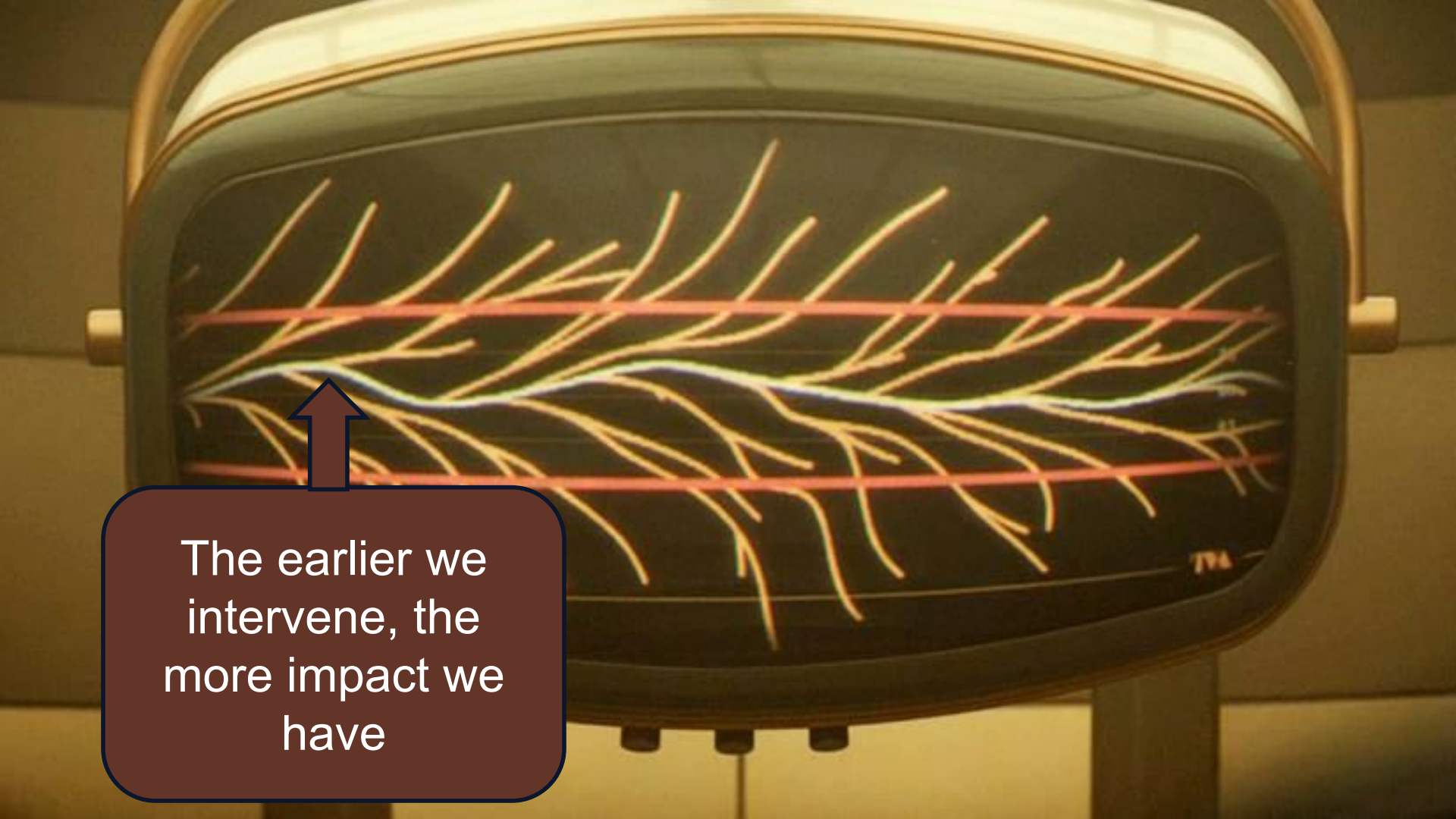
Food Allergen Immunotherapy in Preschool Children: Do We Have the Evidence?

Paxton Loke, PhD[a,b,c,d], Brian P. Vickery, MD[e], Stacie M. Jones, MD[f], Rachel L. Peters, PhD[a,b], Graham Roberts, DM[g,h,i], and Jennifer J. Koplin, PhD[a,j] *Melbourne, Australia; Southampton and Isle of Wight, United Kingdom; Atlanta, Ga; and Little Rock, Ark*

Starting OIT before 24 months of age is:

- Safe
- Well tolerated
- Increased likelihood of promoting sustained unresponsiveness

Loke P, et al. J Allergy Clin Immunol Pract. 2023 Apr;11(4):1028-1035.


The earlier we intervene, the more impact we have

Original Article

Food Sublingual Immunotherapy: Safety and Simplicity of a Real Food Updosing Protocol

Reed R. Windom[a], Samantha Seitz[b], Jean B. Ly, MD[c], Neha Dunn, MD[c], Jennifer Fergeson, DO[c], and Hugh H. Windom, MD[c] *Philadelphia, Pa; Omaha, Neb; and Sarasota, Fla*

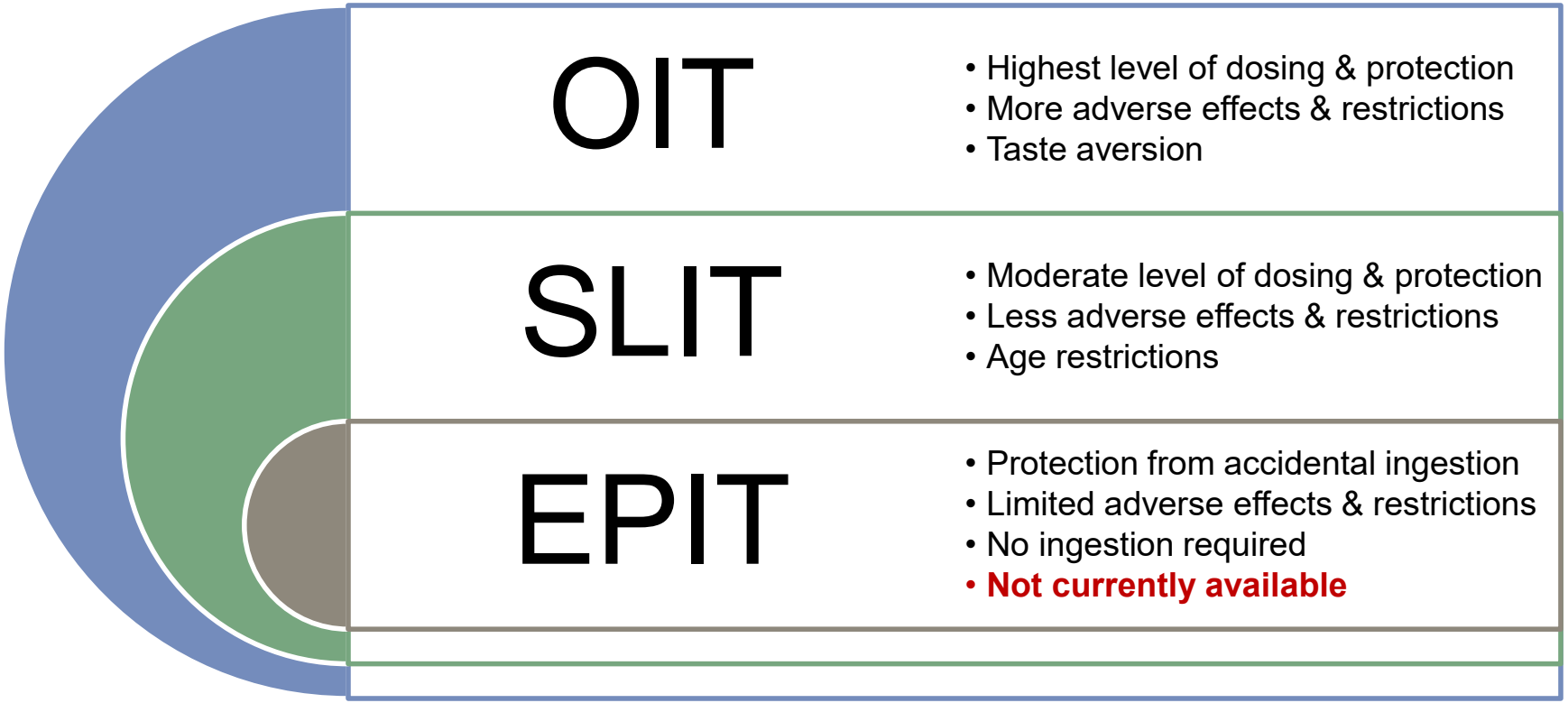
Much smaller doses

Hold under tongue 1-2 minutes

No restrictions & much less risk

Not feasible until ~4 years old

Comparisons & Future Approaches



Omalizumab for Treatment

FDA NEWS RELEASE

FDA Approves First Medication to Help Reduce Allergic Reactions to Multiple Foods After Accidental Exposure

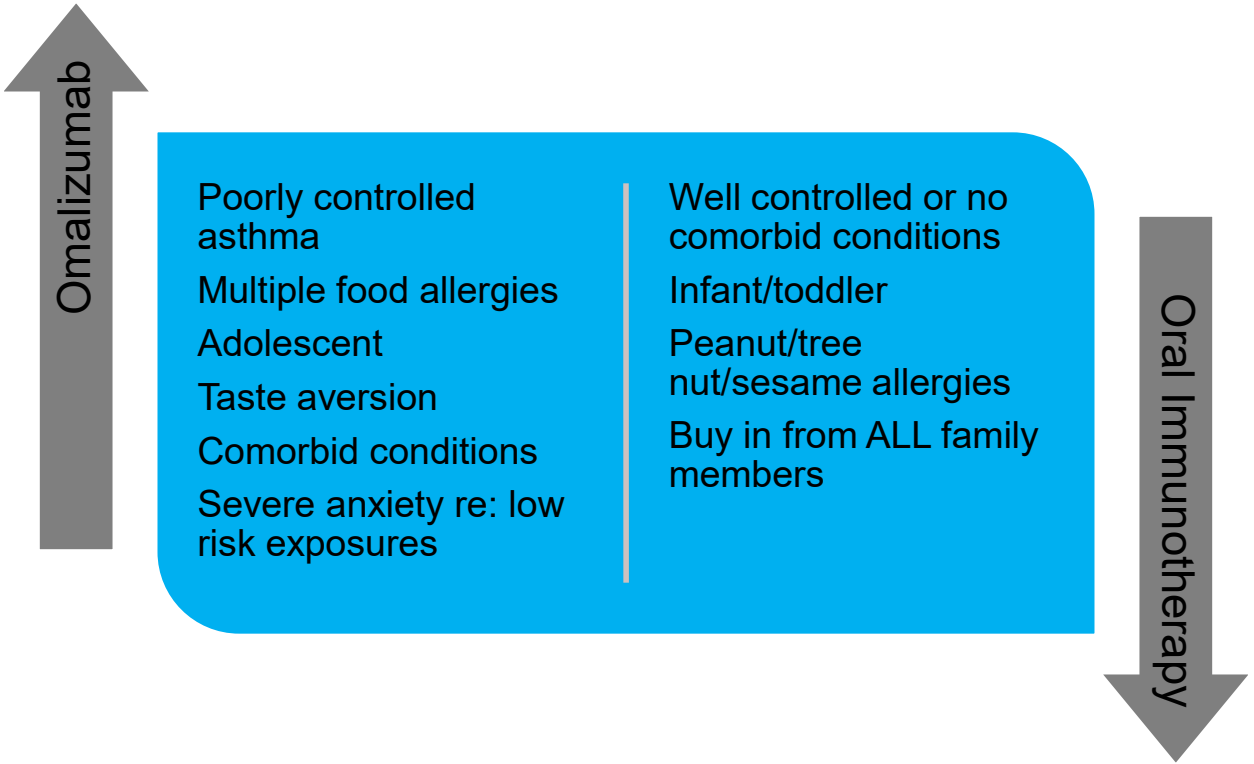
Share | Post | Linkedin | Email | Print

s

For Immediate Release: February 16, 2024

https://www.fda.gov/news-events/press-announcements/fda-approves-first-medication-help-reduce-allergic-reactions-multiple-foods-after-accidental

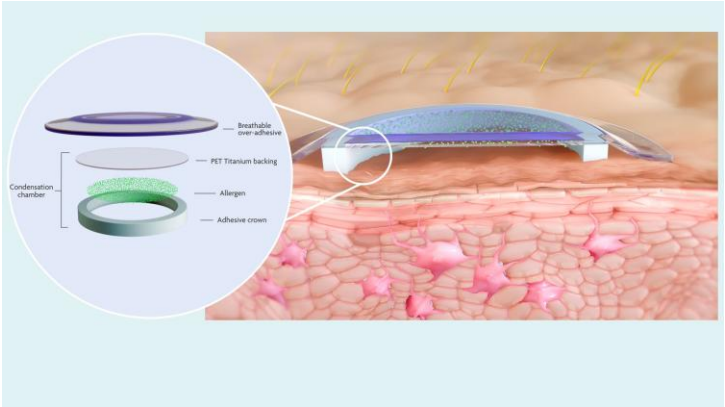
Identify Ideal Candidates for Each Option

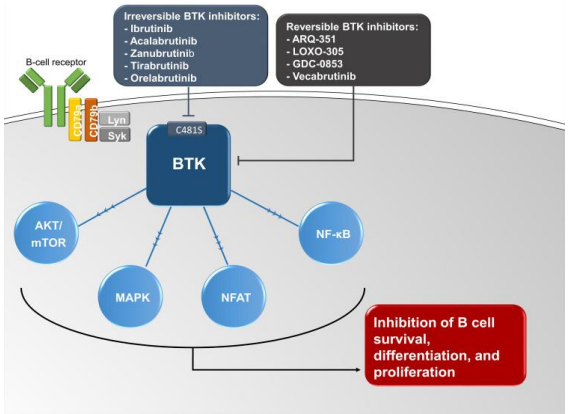


Stay Tuned…






Breathable over-adhesive
PET Titanium backing
Condensation chamber
Allergen
Adhesive crown

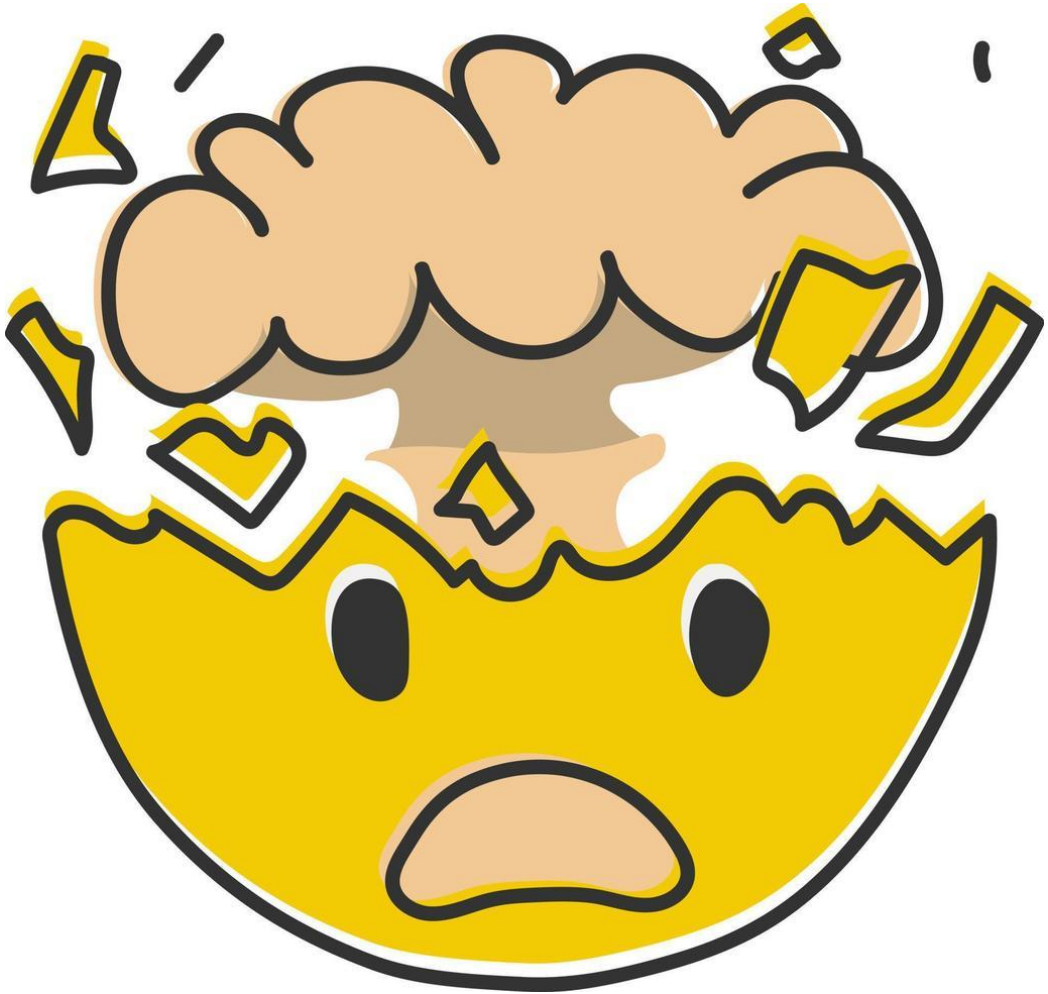

Irreversible BTK inhibitors:
- Ibrutinib
- Acalabrutinib
- Zanubrutinib
- Tirabrutinib
- Orelabrutinib
Reversible BTK inhibitors:
- ARQ-351
- LOXO-305
- GDC-0853
- Vecabrutinib
B-cell receptor
CD79a
CD79b
Lyn
Syk
C481S
BTK
AKT/ mTOR
NF-κB
MAPK
NFAT
Inhibition of B cell survival, differentiation, and proliferation

This is What Food Allergy Management in 2026 SHOULD Look Like for EVERY Patient…



What it should NOT look like:

Not providing education
Unnecessary avoidance
No discussion re: prognosis
Telling patients what they should do



Over the past 10 years…this is where we find ourselves

Early introduction
Food Allergy Prevention

If early intro is unsuccessful

OIT to likely develop tolerance

Dave's Top 3 Tips

Diagnose food allergy by the clinical history, not random testing

Reconsider food avoidance recommendations for just about everything

Make families aware of treatment options

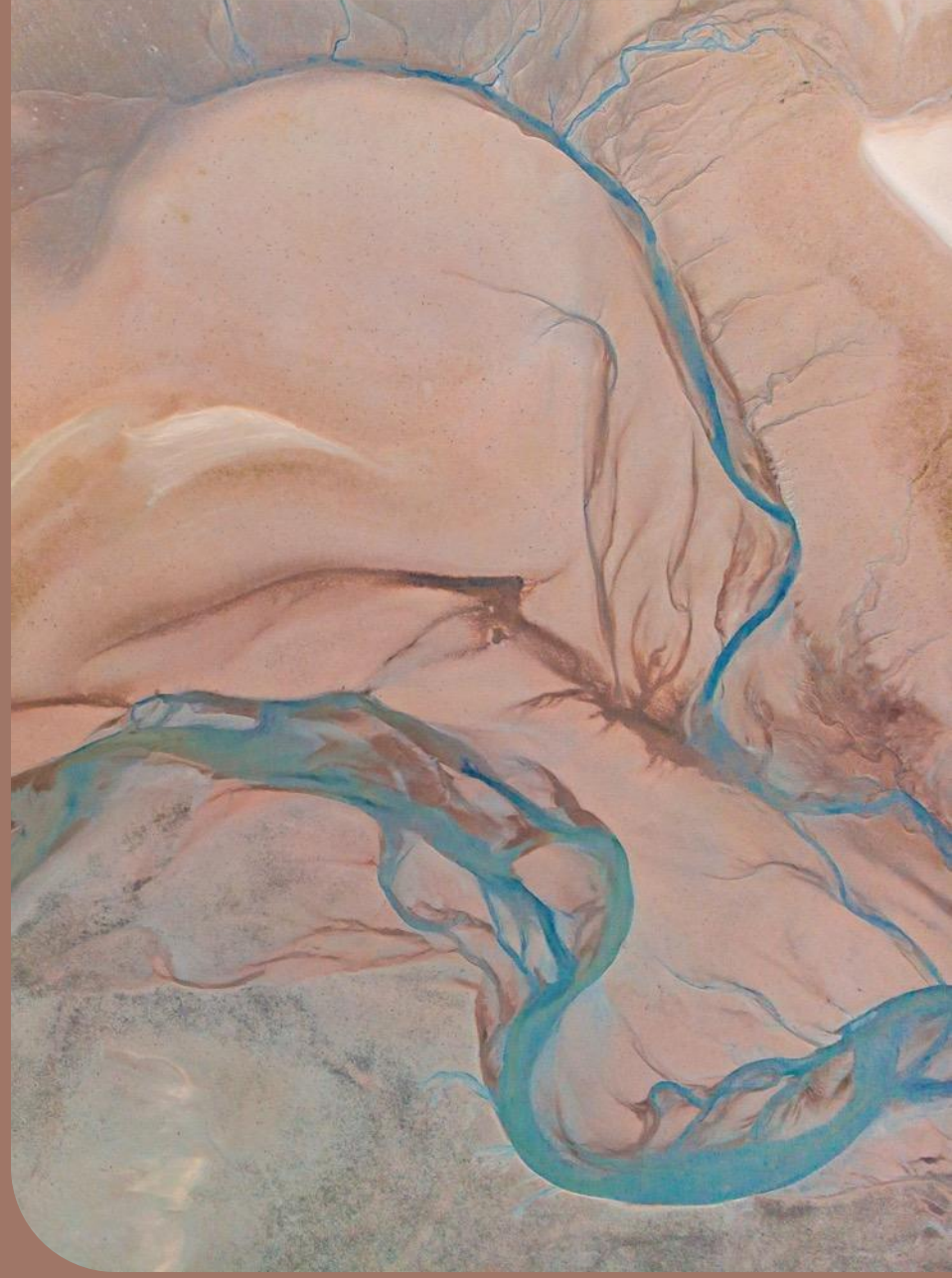
Updates in Autism Services and Science

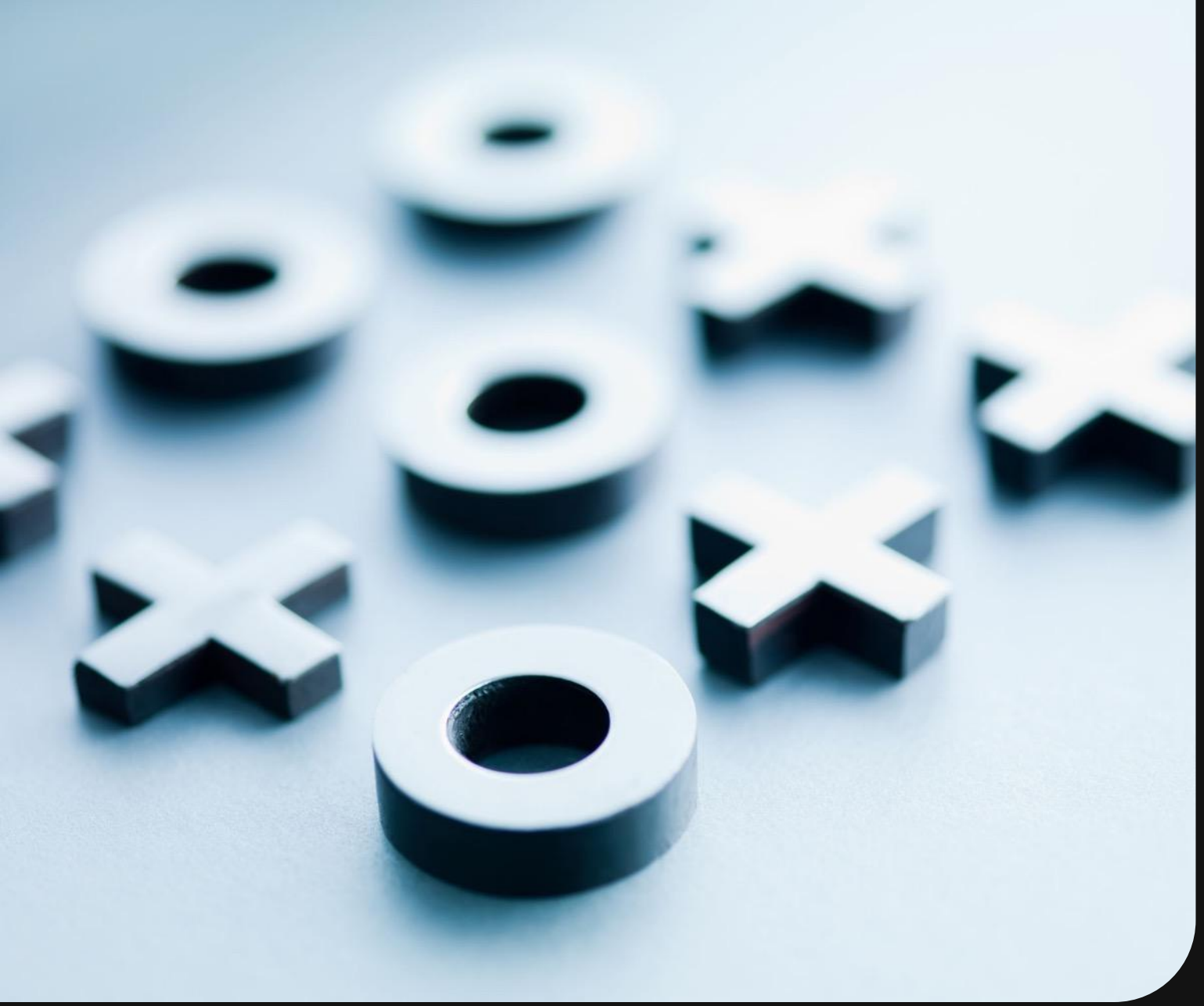
Rebecca McNally Keehn PhD, HSPP

Mary R Ciccarelli, MD

Indiana University School of Medicine

INAAP September 2026





DISCLOSURES

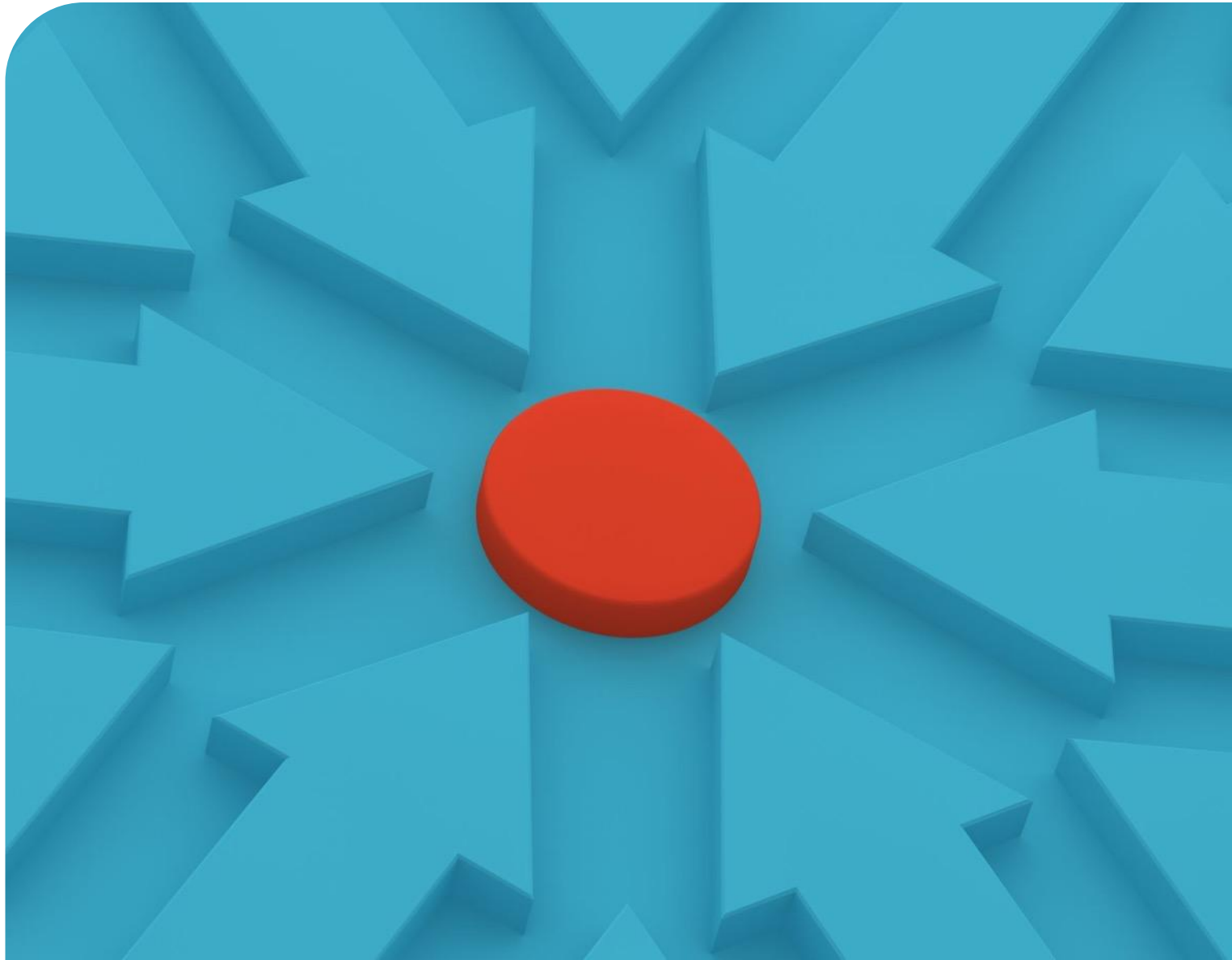
Dr Ciccarelli has no disclosures

Dr McNally has a patent pending for autism diagnosis technology and receives compensation as a consultant to Icahn School of Medicine at Mount Sinai.

OBJECTIVES

Partcipants will:

- Understand current evidence and controversies about applied behavior analysis interventions for children with autism
- Build skills to help families navigate their use of services across school, therapies and waiver supports for children with autism



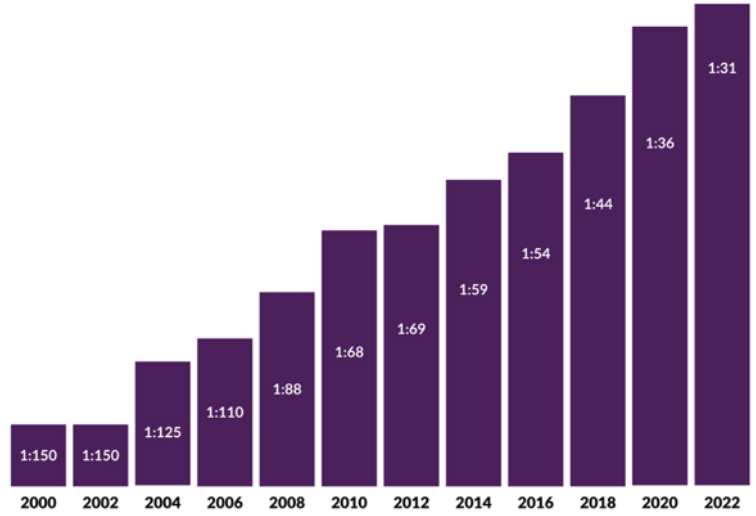
DEVELOPMENTAL DIFFERENCES AND NEURODIVERGENCE

- **Developmental delay or disability**
  - A delay or difference in physical, learning, language, or behavior
    - Begins in early childhood
    - Affects daily life
    - May or may not persist beyond childhood
    - Each child has own unique path
  - 1 in 6 US children ages 3-17 years have a developmental delay (Zablotsky et al. Pediatrics 2019)

Condition	Age 3-5 yo	Total %
Any DD	**10.55**	16.93
ADHD	**2.13**	9.04
Autism	**1.68**	1.74
Cerebral Palsy	**0.28**	0.31
Learning Disability	**3.30**	7.74
Intellectual Disability	**0.63**	1.1
Hearing loss	**0.45**	0.63

AUTISM: A NEURODEVELOPMENTAL DISABILITY

- Neurodevelopmental disability that persists across the lifespan
- Differences in social communication and behavior
  - Can be associated with:
    - Cognitive and language delay/disability
    - Challenging behavior
    - Strengths in different areas such as visual processing



1 in 31

8-year-old children were identified with autism

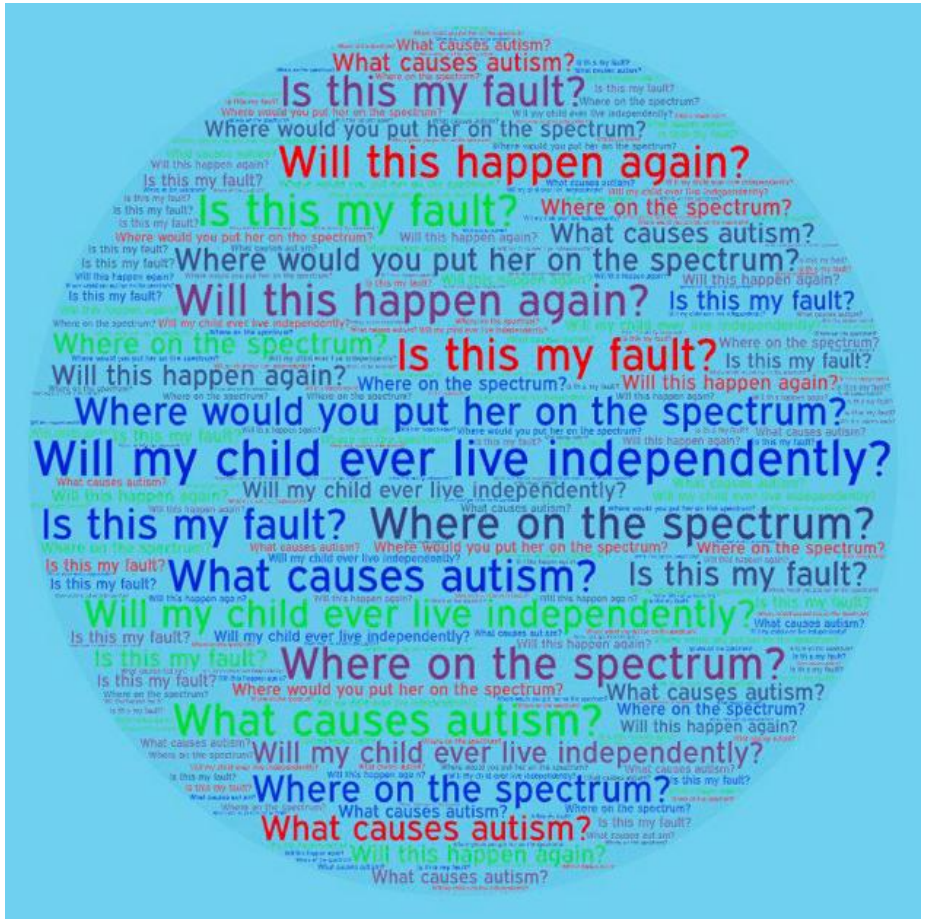
Based on 2022 autism tracking data collected by the ADDM Network's 16 sites.



NEURODEVELOPMENTAL DIAGNOSIS: FAMILY PERSPECTIVE

- A critical moment in the child/family's diagnostic journey
- Never forgotten by caregivers
- A time for the family to understand and ask questions
- A time for creating an action plan

- Five tips from parents:
  - Create a team for your child
  - Practice self-care
  - Find joy
  - Celebrate small victories
  - Build a community



A Clinician's Guide to Providing Effective Feedback to Families Affected by Autism: An Autism Speaks ATN/AIR-P Guide for Providers

A REMINDER: ⏰

- *“Your child still has all the strengths and positive attributes that he or she had before this diagnosis was given.”*



INTRO TO DIAGNOSIS: RESOURCES FOR FAMILIES

- **VIDEO** 4-minute - What is Autism? https://www.youtube.com/playlist?list=PL0uaGz81U--67kIZuyaH5BZIfjKq8yOMG 4-minute multi-language Videos from Vermont Language Justice Project include Arabic, Burmese, Haitian Creole, Spanish
- Autism spectrum disorder (ASD) | Autism Speaks, also Spanish
- About Autism - Autistic Self Advocacy Network "in our own words"

- **VIDEO** 3-minute Understanding Global Developmental Delay https://www.youtube.com/watch?v=vVEVc5S-RLQ from Ideas Afresh Education Limited special education
- Global Developmental Delay (GDD) | KidsCare Home Health

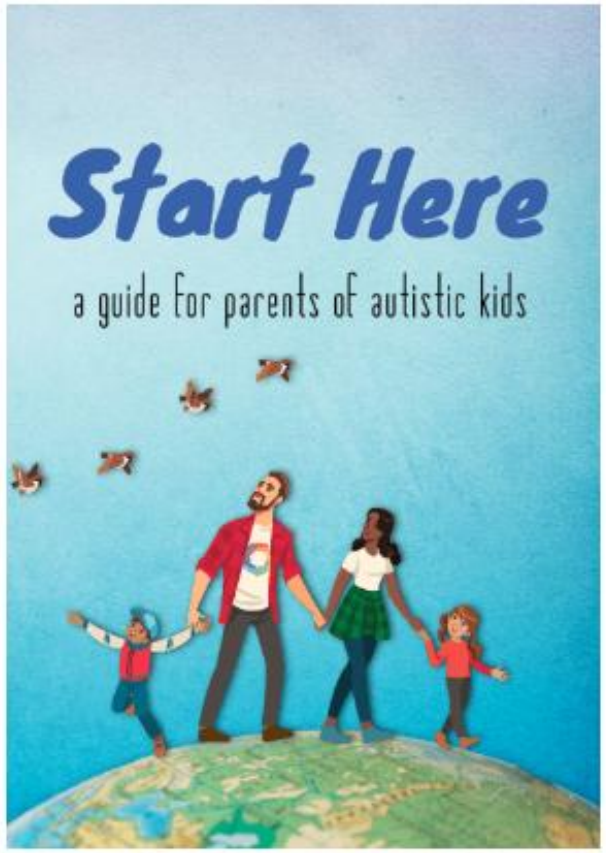
- **VIDEO** 1.5-minute -What is an intellectual disability? https://www.youtube.com/watch?v=3Hqws_ON3rY from Transition Abilities by Laine Shields Med
- What is Intellectual Disability? from Special Olympics

- **VIDEO** 3-minute Eye to Eye: Learning Disabilities become Strengths https://www.youtube.com/watch?v=OEqd3IAdTRY from Eye to Eye: The Neurodiversity Alliance https://thendalliance.org/
- Learning Disabilities & Disorders: What To Know from Cleveland Clinic

NEW DIAGNOSIS WORKBOOKS

- 100 Day Kit for Young Children | Autism - Autism Speaks, also Spanish – includes 14 week schedule of suggested steps
- Home - 100 Day Kit School Age Children - Autism Speaks
- Start Here: a guide for parents of autistic kids - Autistic Self Advocacy Network
- Young-Athletes-New-Family-Resource-English.pdf - Realizing the Bright Future of your Child with ID from Special Olympics







NEXT STEP CLINICAL RECOMMENDATIONS

1. Developmental-Behavioral Interventions (Applied Behavior Analysis)
2. First Steps Early Intervention Part C
3. Private therapies
4. Developmental Preschool
5. Genetic testing
6. Audiology
7. ADL’s - nutrition, sleep, toileting
8. Safety and behavior
9. Complementary and Alternative Therapie
10. Home and community waivers
11. Supplemental security income
12. Sources of family support

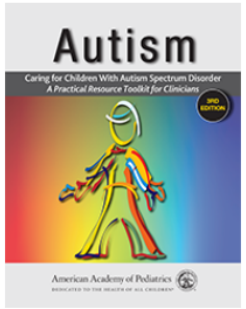


AMERICAN ACADEMY OF PEDIATRICS GUIDING PRINCIPLES

- **Prescribing Autism Supports and Services:**
- All supports and services for children on the autism spectrum should:
    - Have clear goals
    - Be individualized (every child and family is unique)
    - Be developmentally appropriate
    - Be person and family centered with shared decision-making of goals and priorities
    - Be administered in a natural/least restrictive environment when possible
    - Never utilize aversive punishment or be traumatic
    - Be strength-based (supportive of an Autistic “way of being”).

https://www.aap.org/en/patient-care/autism/considerations-for-prescribing-recommending-common-supports-and-services-for-children-on-the-autism-spectrum/

Caring for Children With Autism Spectrum Disorder: A Practical Resource Toolkit for Clinicians, 3rd edition



Carolyn Bridgemohan, MD, FAAP; Benjamin Kaufman, MSW; Donna M. Johnson, MHS; Lisa H. Shulman, MD, FAAP; Katharine E. Zuckerman, MD, MPH, FAAP

Primary care providers play an important role in helping children on the autism spectrum get the assistance and services they need.

Use these fact sheets and family handouts to enhance your comfort with applying new diagnostic criteria, addressing common issues, and incorporating culturally appropriate care into your workflow.

Answers About Complementary & Integrative Medicine
Behavior Challenges
Discussing Diagnosis of ASD with your Child
Early Intervention Services
Financial Assistance
Gastrointestinal Problems
Inclusion in School
Intervention Approaches Used for Children With ASD
Laboratory Tests
Medical Home for Child w. ASD
Nutrition and Eating Problems
School-Based Services
Seizures and Epilepsy
Sibling Support
Sleep Problems
Talking About Sexuality for Parents of Teens With ASD
Teaching Social Skills
Toilet Training
Vaccines
Visiting the Doctor
Wandering Off (Elopement)
Your Child and Medications



American Academy of Pediatrics

FAMILY HANDOUTS — Autism

Laboratory Tests

Why would my child need laboratory tests?

All children have some laboratory tests at birth and as part of regular checkups. Children with autism spectrum disorder (ASD) often need more tests. These tests can help find the cause of the condition or problems related to it that may not be obvious. This helps guide your child's doctor in treating your child best.

New genetic tests now make it possible to find a cause for ASD in many more children than before. Genetic testing can also give information about the chance of ASD in future children or for children of other family members.

What tests might my child's pediatrician request?

The tests your child's doctor asks for will depend on your child's situation. Often, children with ASD have vision, hearing, and blood tests including genetic testing. If your child has seizures, your child's doctor may ask for neurological tests, which are tests of the brain and nervous system. Your child's pediatrician may send your child to a specialist for tests for gastrointestinal or sleep symptoms.

How will my child's pediatrician decide which tests are needed?

Your child's pediatrician will look at how your child is developing and acting now and in the past. Also, she will look at whether your child's body or growth shows any differences. This will help her decide which tests to ask for. Only tests that provide useful information should be requested. For some children, very few tests will be needed. Some of the tests that may be asked for are discussed later on.

Why are hearing tests needed?

All children with ASD should have a hearing test to rule out hearing loss that could explain speech delays. Most infants have a hearing test near the time of birth, but another test is needed for any child with speech delays, even if the one at birth didn't show any hearing loss. The doctor should ask for a hearing test for any child with language delays or possible ASD.

There are many reasons why a child can lose some hearing during the first few years after birth. While hearing loss does not cause ASD, it affects how your child communicates. Rarely, children with severe hearing loss show behaviors like those of children with ASD.

Why are blood tests needed?

Your child's pediatrician may ask for blood tests to help understand the cause of your child's ASD, especially if your child has delays in many areas. Sometimes it is hard to tell whether children with ASD have some kinds of delays because they often have a hard time cooperating with testing. Blood tests are usually requested to look for a difference in your child's DNA that might cause ASD. As of now, DNA changes can be found in up to 10% to 20% of children with ASD. Tests could include a chromosomal microarray analysis to find small areas with extra or missing pieces of DNA and testing for fragile X syndrome.

Fragile X syndrome is found in about 1 out of 100 children with ASD.

Some children with ASD, mainly those with many delays, may have differences in the development of their facial features, hands, feet, and skin. If your child's pediatrician notices any of these things, more blood tests may be requested. This is to see if these findings are really clues for rare genetic syndromes associated with ASD. A *syndrome* is when a group of physical differences occur together.

Your child's doctor may also look at your child's birth records to make sure all the newborn screening test results were normal. If these cannot be found, new tests may be requested.

Why are neurological tests needed?

Some children with ASD may have seizures. Others may have movements of their face, hands, or arms that they cannot control that are not seizures. If your child's pediatrician thinks your child has seizures, he will likely refer your child to a *neurologist*—a specialist of medical problems that affect the brain. The neurologist may request *electroencephalography* (EEG) to study how your child's brain works.

Your child's head may be larger or smaller than average. Young children with ASD tend to have a larger than average sized head.

Your child's doctor or the specialist will decide whether a special radiology test called *magnetic resonance imaging* (MRI) should be done to look for any differences in the way your child's brain

https://www.aap.org/en/patient-care/autism/tools-and-resources-for-pediatricians/

The National Professional Development Center
on Autism Spectrum Disorder

WHAT ARE EVIDENCE-BASED PRACTICES?

An evidence-based practice is an instructional/intervention procedure or set of procedures for which researchers have provided an acceptable level of research that shows the practice produces positive outcomes for children, youth, and/or adults with ASD.



Evidence-Based Practices

- Antecedent-Based Interventions
- Augmentative and Alternative Communication
- Behavioral Momentum Intervention
- Cognitive Behavioral/Instructional Strategies
- Differential Reinforcement of Alternative, Incompatible, or Other Behavior
- Direct Instruction
- Discrete Trial Training
- Exercise and Movement
- Extinction
- Functional Behavioral Assessment
- Functional Communication Training
- Modeling
- Music-Mediated Intervention
- Naturalistic Intervention
- Parent-Implemented Intervention
- Peer-Based Instruction and Intervention
- Prompting
- Reinforcement
- Response Interruption/Redirection
- Self-Management
- Sensory Integration®
- Social Narratives
- Social Skills Training
- Task Analysis
- Technology-Aided Instruction and Intervention
- Time Delay
- Video Modeling
- Visual Supports

EFFICACY OF APPLIED BEHAVIOR ANALYSIS (ABA)

40 years of evidence

- National Professional Development Center on Autism
- National Autism Center National Standards Project
- National Clearinghouse on Autism Evidence and Practice Review Team
- Centers for Medicare and Medicaid Services
- Agency for Healthcare Research and Quality

APPLIED BEHAVIOR ANALYSIS

"...the process of systematically applying interventions based upon the principles of learning theory to improve socially significant behaviors to a meaningful degree, *and to demonstrate that the interventions employed are responsible for the improvement in behavior."* Baer, Wolf, & Risley (1968)

Therapy Services	Definition	Skills Supported	Pediatric Clinician Role
Applied Behavior Analysis (ABA)	ABA assesses and modifies behavior through teaching to increase communication, increase social and functional skills and reduce interfering behaviors	• Preacademic and academic skills • Communication skills • Safety skills • Play/social skills • Requesting • Following directions • Reducing self-harm • Reducing aggression	• Understand the basic differences in types of ABA therapy and have resources available for a family/caregiver to make informed decision about types of ABA therapy available • Prescribe ABA therapy to support appropriate skill development • Review evaluation/progress reports • Discuss progress toward goals with child/family

https://www.aap.org/en/patient-care/autism/tools-and-resources-for-pediatricians/

https://www.autismspeaks.org/what-autism/treatment/applied-behavior-analysis-aba

ABA: VIDEO/HANDOUT INTRO FOR FAMILIES

- Video 5.5-minutes What is ABA Therapy?" https://www.youtube.com/watch?v=LtTU0T1p0TY&t=44s from Easterseals (also Spanish)
- Applied Behavior Analysis (ABA) | Autism Speaks handout



ABA: WHAT & WHERE

- Behavioral/ developmental intervention
  - Center-based
  - Home-based
  - Community-based
- Short term behavior consultation
- Social skills intervention
- Behavior modification
- Parent training and education
- Peer-mediated intervention

- **Center-Based ABA:**
  - **May be best for:** Children who need more structure, social skills training, or more supervision by BCBAs.
  - **Pros:** Distraction-free environment, consistent routine, readily available peers, and specialized equip.
  - **Cons:** Requires transportation, less schedule flexibility, and potential anxiety during transitions.

- **Home-Based ABA:**
  - **May be best for:** Younger children, those with high anxiety, or focusing on daily living skills (e.g., toileting).
  - **Pros:** Comfortable, familiar environment, easier for parent observation and training.
  - **Cons:** Potential distractions (pets, siblings), requires a dedicated space, less peer interaction.

- **School-Based ABA:**
  - **May be best for:** Children who need socialization support, classroom rules, and academic tasks.
  - **Pros:** Direct support in a natural, school environment

HOW DO YOU QUALIFY FOR ABA IN INDIANA?

- Indiana Autism Insurance Mandate: IC 27-8-14.2
  - Requires most state-regulated health insurance plans to provide coverage for the diagnosis and treatment of autism, including ABA therapy when prescribed by a treating physician
- Medical Necessity
  - Demonstration of significant deficits in communication, social skills, adaptive functioning, safety, or behavior that interferes with daily functioning and development
- Documentation of diagnosis through Comprehensive Diagnostic Evaluation (CDE): FSSA Bulletin BT2024194
  - Completed by qualified health care provider and diagnosis documented DSM-5 criteria
  - Services prescribed and supported by a qualified healthcare provider and ABA treatment plan
  - Updated annual Statement of Medical Necessity for ABA Services

2025 IN GOVERNOR'S TASK FOR ON ABA

- In 2025, Governor Braun established ABA Working Group to address rising Medicaid costs
  - Emphasis that ABA remains an important evidence-based intervention but should be targeted to children with documented clinical need and measurable goals
- **Major Recommendations**
  - Align ABA utilization with clinical evidence and medical necessity
  - Increase focus on measurable outcomes and treatment effectiveness
  - Require caregiver training and coaching
  - Strengthen quality oversight and provider standards
  - Improve supervision requirements for Registered Behavior Technicians (RBTs)
  - Continue access to focused ABA after intensive treatment when clinically indicated

- FSSA Response: Bulletin BT202627





ABA CRITICISMS & CONTROVERSIES

- ABA can be harmful
  - ABA has a history of use of punishment
  - ABA is too repetitive and intensive
  - ABA focused on eliminating behaviors and not building skills
  - ABA attempts to make children confirm to neurotypical standards
  - ABA is delivered without enough training
- Too few well conducted RCT without biases (Project AIM; Sandbank et al., 2020)
  - Outcomes measured by clinicians or research conducted by those with COI
- Nonconfirmatory evidence that greater intensity produces better outcomes (Sandbank et al., 2024; Smith et al., 2021)

- https://childmind.org/article/controversy-around-applied-behavior-analysis/
- Schwartz & Kelly, 2021

Journal of Autism and Developmental Disorders (2022) 52:2838–2853
https://doi.org/10.1007/s10803-021-05137-y

COMMENTARY

Concerns About ABA-Based Intervention: An Evaluation and Recommendations

Justin B. Leaf[1] · Joseph H. Cihon[1] · Ronald Leaf[1] · John McEachin[1] · Nicholas Liu[2] · Noah Russell[1] · Lorri Unumb[3] · Sydney Shapiro[4] · Dara Khosrowshahi[4]

> "Based on our review of the concerns highlighted within this manuscript in light of the published literature, there is some validity to some of these expressed concerns (e.g., the collection of social validity measures in the published research) and limited to no validity to others (e.g., all ABA is abuse). Nonetheless, our field is not infallible, and we should continue to improve and progress our interventions. As Baer et al. (1968) so eloquently asserted, the continued examination of behavior analytic applications to solve problems of social significance will help assist in their refinement and, possibly, their replacement by better applications (p. 91).

ABA: YES, AND.

Great deal of evolution in ABA over decades

- ABA does not try to change thoughts and feelings
- Focus on what kids should do, not what they shouldn't
- Build strengths to develop functional skills to maximize participation and quality of life

https://childmind.org/article/controversy-around-applied-behavior-analysis/

Research and Practice for Persons with Severe Disabilities
2021, Vol. 46(3) 159–172
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DOI: 10.1177/15407969211033629
rpsd.sagepub.com
SAGE

Quality of Life for People with Disabilities: Why Applied Behavior Analysts Should Consider This a Primary Dependent Variable

Ilene S. Schwartz[1] and Elizabeth M. Kelly[1]

Table 1. QOL Domains.

QOL domain	Definition
Self-determination	A person's right to make decisions about their own lives
Emotional well-being	A person, regardless of ability or background, has the right to access safe and predictable environments, experience contentment at home and at work, and be free from stress or anxiety
Interpersonal relations	A person has the right to a supportive social network and interpersonal relationships with family and friends
Material well-being	A person has the right to financial security, employment, and safe housing
Personal development	A person has the right to opportunities for life-long learning, authentic participation in meaningful activities, and overall productivity
Physical well-being	A person has a right to health care, a healthy diet, and opportunities to engage in physical activity and other healthy pursuits
Rights and inclusion	A person has the right to be respected, afforded dignity, and be included in society regardless of race, ethnicity, sex, gender, religion, sexual orientation, or ability

What Can Families Look For In A “Good” ABA?

- Regular supervision by BCBA
- Well trained, experienced, staff & retention rates
- Family involvement and regular updates
- Plan uses individualized assessment and encourages real world skills.
- Functional goals defined to enhance quality of life
- Weekly schedule fits the person, not one size fits all.
- Incorporate caregiver education
- Family members should be trained to continue work on the skills at home.
- Data on progress of skills and behaviors should be recorded and reviewed.
- Team meeting should involve the therapists, supervisor, and family.
- Plan for transition out of ABA.

How To Prioritize Across Recommended Services?

- **Shared Decision-Making**
  - Family needs, wishes & preferences
  - Professional expertise



- **Priority parameters**
  - Impact & Urgency
    - What is critical and/or urgent? *e.g. hearing*
  - Desirability & Feasibility for family, Practicality in community
    - What matters most to family? *e.g. sleep*

FIRST STEPS– AGES 0-3

SFY 2025
Annual count with IFSP = 27,507 = 6.4% of children 0-3
New IFSP = 15,820
Children transition to spec ed = 6,301
Average referral age 14-17 mos.

Percent receiving service type SFY 25
46.4% Speech
42.5% OT
41.4% Dev therapy
30.6% PT

- Referral
- Evaluation
- Individualized Family Service Plan
- Service coordinator
- Services - home /daycare
- Transition at 36 mos.



- Fact Sheet Indiana Family to Family https://www.inf2f.org/fs_first-steps.html
- First steps referral form https://indianafirststeps.org/referrals/#referral-form
- First Step Cluster map https://www.in.gov/fssa/ddars/bcds/first-steps-offices/first-steps-map/

PRIVATE THERAPIES – 6.9% of Indiana children don't have insurance

SPEECH

- Understand and use language
- Children ages 3-4 with speech / language disorder = 10.3%
  - Non-White children and those with developmental delays or autism have higher odds of speech difficulties
    - NIHS, 2022
- ~ 50% receive speech therapy
  - Higher percent in boys, white race, private insurance

PHYSICAL / OCCUPATIONAL

- Build muscle strength, balance, coordination, core gross motor skills
  - Plasticity - ultra-early diagnosis & intervention significantly speed motor development of infants at high risk of CP.
    - Li M. Folia Neuropath 2023.
- Skills for daily living
- Reliant on intensity often dependent on caregiver involvement
  - Positive parenting practices during early years greatly influence developmental outcomes
    - Liu S. Front Peds 2025.

EARLY INTERVENTION EFFECTIVENESS

- 1964 **Head Start** statute include 10% w/disabilities (who are not dependent on parent income)
  - Early interventions prevent poor intellectual development in at-risk children whose families may not provide adequate early years stimulation
    - Improved school readiness, high school graduation rates
  - **Children with disabilities** likely to require specialized strategies
    - Theory that therapy can initiate neurotransmitter changes, synaptic pruning, gene activation
    - Anecdotal vs. rigorous evidence
- Developmental priming mechanisms:
  - 1) encourage to explore the environment, 2) mentor basic cognitive/social skills, 3) celebrate new skills, 4) rehearse/expand skills, 5) protect from ridicule, 6) stimulate language/symbolic communication
- Effectiveness depends on intervention **timing** (Abecedarian, Brookline, Milwaukee Projects in 1990's), **intensity** (Perry Preschool & Early Training Projects) and **methods** (direct from professionals vs. indirect by parents, direct service plus broad support).

- Ramey CT, Ramey SL. Am Psychol. 1998

SPECIAL EDUCATION – DEVELOPMENTAL PRESCHOOL AGES 3-5

- Public options – school district vs Headstart
  - Special Education, IEP – IDEA and Article 7
- Private daycare
  - IN Paths to Quality Level 4
- Early Childhood age 3-5 INF2F https://www.inf2f.org/uploads/1/4/0/1/140150446/fs_ecse-1.2024.pdf
- Request an Initial Evaluation for Special Education https://www.parentcenterhub.org/evaluation-2/ from from Center for Parent Info & Resources, NJ
- IN Dept of Education Special Education directory https://www.in.gov/tos/inesa/files/2023SpedDir37145.pdf



ELIGIBILITY CATEGORIES

- Autism Spectrum Disorder
- Cognitive Disability
- Deaf-Blind
- Developmental Delay to 9 yr
- Emotional Disability
- Language or Speech Impairment
- Intellectual Disability
- Multiple Disabilities
- Other Health Impairment
- Specific Learning Disability
- Traumatic Brain Injury



PROCESS

Request to evaluate 3-22

Evaluation by multidisciplinary evaluation team MET

Case Conference

Individualized Education Plan IEP

- Present levels of functioning
- Evaluation results
- Goals and objectives for learning
- Type, duration, frequency of services
- Methods to measure progress
- Related services
- Behavior plan
- Transition plan over age 14
- Attendees – Parent, Teacher of Record, child once age 14, etc.
- Copy to parent in 10 days of conference

GENETICS



SPARK

Simons Powering Autism Research

- Video 4-minute Should I get genetic testing after an autism diagnosis? from Autism Speaks https://www.youtube.com/watch?v=pY6yY6r3_EU
- Genetic testing for autism | Autism Speaks handout from Autism Speaks
- **Spark** 10 yr report to advance autism research – 9% known genetic cause, CMA>>WES >> WGS
  - Results reduced parents' feelings of self-blame
  - Techniques to recruit underrepresented populations
  - Studies on RRB, communication, anxiety and ARFID, etc., flexibility & employability, etc.

- Chung, W.

CAUSES or RISK FACTORS OF GDD or ASD

GLOBAL DEVELOPMENTAL DELAY / INTELLECTUAL DISABILITY

- ~30-50% unknown
- ~35% genetic
- ~10-20% perinatal injury
- ~5% inherited
- ~1-5% prenatal toxin exposures
- ~1-2% congenital infections

AUTISM

- 60-90% inheritance & de novo mutations with currently ~ 9% known causes
  - >700 ASD-risk gene variants - NR4A2, SHANK3, MECP2, etc.
  - ~10% specific syndrome - Fragile X, Prader Willi/Angelman, Cohen, 16p11.2 or 22q11 deletions, etc.
- 9-36% environmental
  - Prenatal exposures
  - Prematurity
  - Advanced parental age

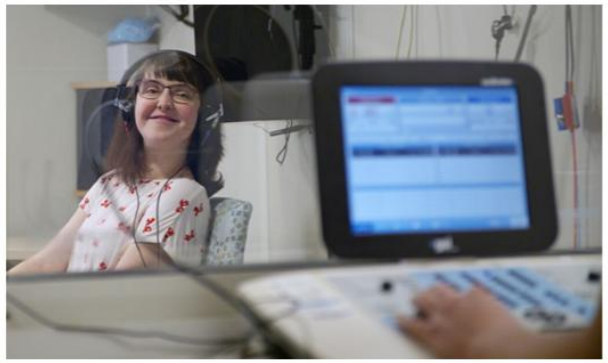
BASIC LANGUAGE ON GENETIC TESTING

- Genetic testing has been recommended for your child.
- Some children have a genetic cause for their autism or developmental delay.
- Finding a genetic cause can be important to your child and your family.
- A genetic result can give more info about your child's health, now and in the future.
- This allows your medical team to take better care of your child because we can know what to expect.
- Genetic testing can also answer questions about the chance other children in the family may have similar health issues.

- This testing cannot identify all genetic conditions.
- A negative ("normal") test does not mean there is no genetic cause of your child's delays.
- If more genetic testing is needed, you may be sent to a genetic doctor to discuss options.
- A negative ("normal") test does NOT change your child's diagnosis of Autism or Global Developmental Delay.
- Regardless of the results, your child needs to continue care with his/her medical team and therapists.

HEARING

Hearing Test Social Story



I have a visit for a hearing test today.



I can bring someone I trust.

4ourhealth.org
Hearing Test - what to expect
https://www.youtube.com/watch?v=3ORwzufIERQ

- **Hearing loss** 1.3 per 1000
  - 77% children with HL have co-occurring ASD, CP, ID or VI
    - 5.8% have ASD
    - HL co-occurring with ASD - 0.08 per 1000
      - Kancherla, V. Dis Health J,201

Basic Language

- All children with ASD should have a hearing test to rule out hearing loss that could explain speech delays. Most infants have a hearing test near the time of birth, but another test is needed for any child with speech delays, even if the one at birth didn't show any hearing loss.
- There are many reasons why a child can lose some hearing during the first few years after birth. While hearing loss does not cause ASD, it affects how your child communicates.
- Rarely, children with severe hearing loss show behaviors like those of children with ASD.

RISKS OF HEARING LOSS

1. “Family history” of hearing loss in childhood
2. NICU care > 5 days
3. Aminoglycoside exposure > 5 days
4. Hyperbilirubinemia requiring exchange transfusion
5. Perinatal asphyxia/hypoxic ischemic encephalopathy
6. Extracorporeal membrane oxygenation (ECMO)
7. In-utero infections (i.e., herpes, rubella, syphilis, CMV, Zika, toxoplasmosis)
8. Craniofacial conditions & physical conditions assoc. with hearing loss
9. Known syndromes and genetic conditions
10. Confirmed bacterial and/or viral meningitis or encephalitis
11. Significant head trauma or chemotherapy
12. Family/caregiver concern re: hearing, speech, language, or development

AUDIOLOGY **AT A FULL-SERVICE FACILITY**

- **Pure-tone Air Conduction Hearing Test –** typical test for school age
  - Instructed tin primary care o raise hand, press a button, say yes when hearing the sound.
- **Visual Reinforcement Audiometry (VRA)**
  - Look towards the sound source
  - Give reward for correct response
- **Conditioned Play Audiometry (CPA)**
  - Patient instructed to perform a task every time a sound is heard, eg. placing a block in a container
- **Auditory Brainstem Response (ABR) -** commonly used for newborn screening
  - Measures patient's brainstem response to sound by using earphones and 4-5 electrodes on head
  - Picks up electrical activity of the hearing nerve fibers
- **Otoacoustic Emission Test (OAE)**
  - Measures the reaction produced by the inner ear or cochlea
  - Sounds placed in canal and another separate sound comes back to the ear canal.
  - Can't tell the difference between conductive and sensorineural loss.



ACTIVITIES OF DAILY LIVING – NUTRITION, SLEEP, TOILETING







Parent's Guide to Toilet Training Children with Autism







Toileting issues

- *It's a marathon, not a sprint.*
- Drivers - physical, language, dressing, fears, body cues, sameness, bathroom environments
- Strategies - timed voiding, visual schedule, rewards.

https://www.autismspeaks.org/tool-kit/atnair-p-toilet-training-guide

FEEDING

Parent's Guide to Feeding Behavior in Children with Autism



- What are feeding problems?
- Conditions that might affect feeding
- When to be concerned
- Tips to help with feeding issues at home
- Frequently asked questions

- Set a feeding schedule and routine.
- Avoid all day eating.
- Provide comfortable, supportive seating – sit upright, feet supported.
- Limit mealtime – 30 minutes.
- Minimize distractions – no screens.
- Get your child involved in selection, preparation.
- Practice pleasant and healthy eating behaviors as role models.
- Reward positive behaviors – praise, bubbles, sticker.
- Ignore negative behaviors
- Remember the rule of only 3 foods at a time with mix of liked and new or not yet liked.
- Present small amounts of new foods.

https://www.autismspeaks.org/tool-kit/exploring-feeding-behavior-autism

SLEEP

Sleep Strategies for Children with Autism



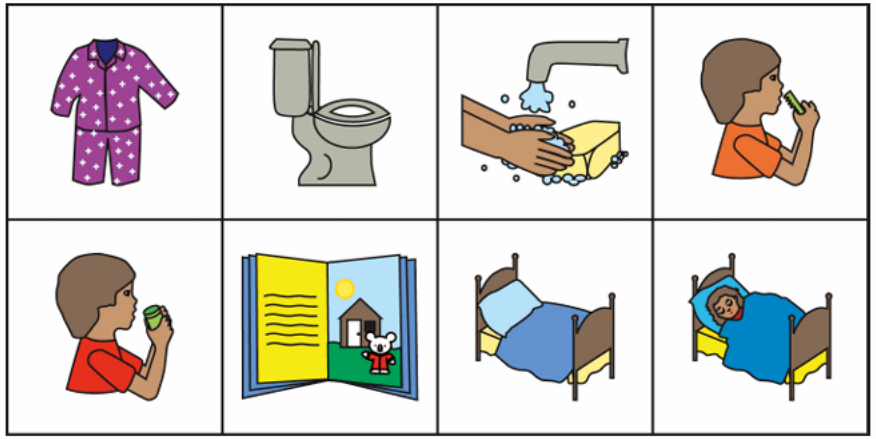
- https://www.autismspeaks.org/tool-kit/strategies-improve-sleep-children-autism

Sample Bedtime Checklist

TIME FOR BED

- ❑ Put on pajamas
- ❑ Use the bathroom
- ❑ Wash hands
- ❑ Brush teeth
- ❑ Get a drink
- ❑ Read a book
- ❑ Get in bed
- ❑ Go to sleep

Sample Visual Bedtime Routine



Sleep Hygiene

What is sleep hygiene?

- It is a group of health habits and rules that help a person sleep well and feel more awake during the day
-

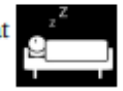


Who needs sleep hygiene?

- People with trouble getting the sleep they need
- People who work shifts
- People who simply cannot find the time for sleep
- …. and everyone else!

What are my Health Rules to have good sleep hygiene?

- ◊ I will only go to bed only when I am sleepy. I can try a relaxing bedtime routine (like soaking in a warm bath)
- ◊ I will make a good place to sleep that does not have distractions. It will be quiet, dark, and a good temperature for me to relax.



- ◊ I will not eat or drink any foods, beverages, or medications with stimulants close to bedtime
- ◊ I will not have any alcohol or nicotine before going to sleep
- ◊ I will not have caffeine after



- ◊ I will exercise regularly, but only around mid-day or early afternoon.
- ◊ I will try to use behavioral relaxation methods to help me relax physically and mentally.



- ◊ I will not take naps after



- ◊ I will not have a heavy meal close to bedtime
- ◊ I will only use my bed for sleep and intimacy
- ◊ I will not eat, read, or watch TV when I am in bed
- ◊ I will not have a lot of fluids before I go to sleep



- ◊ I will have a regular sleep schedule
- ◊ My bedtime is



- ◊ My wake-up time is



- ◊ If I cannot fall asleep after I am in bed for 20-30 minutes, I will get up and do a quiet activity outside my bed. Then I will try to go to sleep in my bed when I feel tired and ready to sleep.

SAFETY AND BEHAVIOR

Top Safety Risks

- Wandering or elopement
- Pica or eating non-food substances
- Drowning
- Household toxins
- Misunderstanding related to communication
- https://www.autismspeaks.org/safety-plans



- *What are you worried about?*
- *Does your child do anything that might be unsafe?*
- *What kind of trouble does your child get into?*

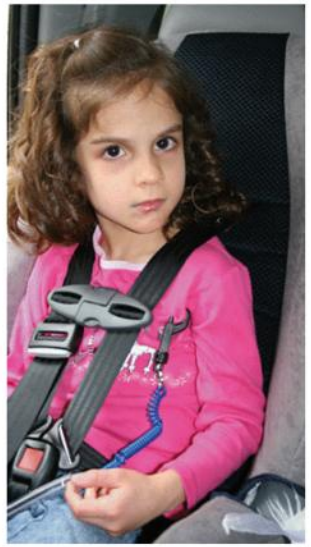
https://www.autismspeaks.org/sites/default/files/2018-09/safe_signals_project.pdf

Making Safety Plans For Each Environment

Environment	Safety Strategies	Additional Notes
Home	Install locks, alarms, social stories, role-playing, supervision	Tailored to sensory sensitivities and communication skills
Outdoors	Hand-holding, water supervision, GPS devices, safe outdoor boundaries	Teach safe crossing, recognize dangerous settings
Vehicles	Special needs car seats, safety restraints, transportation routines	Planning trips and practice routines
Community Areas	Educate about community helpers, safety rules, safety drills	Collaborate with local police and emergency services

Consider:

- In home, in car, in community
- Communication
- Behavior and Sensory supports



Car Safety for Your Child with Autism

autism speaks

We're here to help.
(888) AUTISM2 help@autismspeaks.org
En Español (888) 772-9050 ayuda@autismspeaks.com

Safety and Wandering Prevention Checklist

Help keep your loved one with autism safe by considering the following:

Safety in the Home

- ☐ **Use visual aids in the home** to set up boundaries for your child (suggested placement: doors, windows, kitchen appliances, etc.).
- ☐ **Secure your home and yard** (look into installing door and window exit alarms).
- ☐ **Monitor any changes** in home security or routines.

Safety in the Community

- ☐ **Alert your trusted neighbors** by informing them of your child's habits, triggers and potential to wander. *See Neighbor Alert form*
- ☐ **Provide a safety plan** to your child's school, camps and other community programs and alert them of wandering tendencies. *School Alert/IEP Letter*
- ☐ **Introduce your child** to law enforcement, fire, and EMS personnel in your community and provide more information on autism and wandering. *See Wandering Tips for First Responders*
- ☐ **Alert first responders** with a written document describing your child's wandering tendencies. *See Autism Elopement Alert Form*
- ☐ **Consider safety products** like wearable forms of ID with identifying information and alert of autism diagnosis.
- ☐ **Display autism alert window decal** to alert first responders your child has autism and may not respond to verbal commands.
- ☐ **Consider a locating device** or enrolling in emergency locating services like Project Lifesaver.

Teaching Safety

- ☐ **Work on a safety plan** with your child to teach them how to keep themselves out of harm's way. *See Family Wandering Emergency Plan*
- ☐ **Create teaching stories and visual aids.**
- ☐ **Keep identification** on your child *(wearable ID or information cards).*
- ☐ **Create a safety plan** and goals with your child's behavioral team.
- ☐ **Enroll** your child in swimming and water safety lessons.
- ☐ **Monitor and document** your child's progress and any challenges or changes you observed. *See Safety Log*

To access other Safety information referenced here, go to *autismspeaks.org/tool-kit/autism-safety-kit*

WANDERING PREVENTION & TRACKING

- https://www.commhealth.org/wp-content/uploads/Autism-Safety-and-Wandering-Prevention-Checklist.pdf
- **AngelSense**- real-time tracking, two-way communication, waiver funded device, family responsible for $50/mo subscription
  - https://www.angelsense.com/
- **Jiobit**- real-time tracking, no two-way communication, waiver funded device, family responsible for $15/mo fee
  - https://www.jiobit.com/
- **Project Lifesaver-** free where available, doesn't send an alert if child leaves safe area, relies on police/fire dept to locate missing person
  - https://projectlifesaver.org/about-us/where-we-are/







IUSM RESOURCE

Indiana Complex Care Coordination Collaborative

Home | Fitness and Healthy Habits | Living Your Best Life | Health Care Visits | Medical Home | Common Illnesses

Welcome to 4ourhealth.org

This is a website for persons with learning differences.
It is also for families and caregivers and healthcare teams.



4ourhealth.org
> Fitness & Healthy Habits
> Manage Stress:

> Challenging Behavior

Persons with IDD - Easy Read and Social Stories

1. Anger Easy Health UK
2. Challenging behavior story - Advocate Chicago
3. Managing emotions story - Advocate Chicago
4. Self-injury Easy Health UK
5. Things to calm down story - Advocate Chicago
6. Triggers for Anger story - Advocate Chicago
7. Triggers for Sadness story - Advocate Chicago
8. Triggers for Stress story - Advocate Chicago
9. Triggers for Happiness story - Advocate Chicago

Caregivers - Information and Ideas

1. Applied behavior analysis - All Star ABA
2. Augmentative communication - AAP Healthy Children
3. Behavior intervention plan - Pacer Center MN
4. Behavior treatments - Autism Research Inst Calif
5. Challenging behavior - Autism Research Inst Calif
6. Desensitization to wear a device - Autism Speaks
7. Elopement - Pathfinders for Autism MD
8. Elopement tracking devices - Pathfinders for Autism MD
9. First then - Vanderbilt Kenney Ctr TN
10. Functional behavioral assessment - Pacer Ctr MN
11. Inappropriate sexual behavior - Beyond Autism UK
12. Meltdowns - Reframing Autism Au
13. Motivate your child - LD Assoc of PEI Ca
14. Positive reinforcements - Special Ed Resource.com
15. Prevent challenging behaviors - Zero to Three
16. Self-injury - Autism Research Inst Calif
17. Sensory strategies - Pathfinders for Autism MD
18. Visual schedules - Children's Autism Services Ca



Healthcare Team

1. Behavior log, ABCs, Rx - UCF
2. Behavior log form – PBIS VT
3. Choice Board - Geneva Ctr Ca
4. Daily Schedule (simple) – Autism PA
5. Daily Schedule - Geneva Ctr Ca
6. First Then Template (simple) – Autism PA
7. Token Board – Monarch Center Cleveland

COMPLEMENTARY AND ALTERNATIVE TREATMENTS

- **Leucovorin** - AAP explicitly advises against routine use
  - Interim Guidance from the American Academy of Pediatrics: Use of Leucovorin in Autistic Pediatric Patients
- **Gluten free diet** – AAP does not endorse
  - 20- 30% of families report trying
  - Nutritional deficiencies
  - Multiple negative studies, one small nominal result study
- **Saffron** *Crocus sativus*
  - Possible effect ADHD sleep and hyperactivity
  - Theory - inhibition of neuroinflammatory signaling pathways, activation of antioxidant responses, restoring neurotransmission balance
  - No significant studies

- **Unsupported and harmful**
  - **Stem cell**
  - **Chelation**
  - **Hyperbaric oxygen**
  - **Vaccine avoidance**
    - Fact Checked: Vaccines: Safe and Effective, No Link to Autism

- **Potential needs - vitamin D, calcium, fiber**

HOME AND COMMUNITY BASED WAIVERS

access to traditional Medicaid plus ...

- Family Support Waiver – IN Bureau of Disabilities Services
- Level of Care - Intermediate Care Facility for Individuals with Intellectual Disabilities (ICF/IID)



- Family Support Handout from Indiana Dureau of Disabilities Services https://www.in.gov/fssa/ddars/files/FSW-BDS-Fact-Sheets-2024.pdf
- Video - Family Support Waiver Application INF2F https://www.youtube.com/watch?v=lc3MNYLHS1M
- BDS Family Application https://bddsgateway.fssa.in.gov/
- BDS Confirmation of Diagnosis for clinicians https://forms.in.gov/Download.aspx?id=10267
- BDS district office map https://www.in.gov/medicaid/members/files/BDDS-office-list-8.18.20.pdf

APPLICATION FOR DEVELOPMENTAL DISABILITY SERVICES

State Form 55068 (8-12)
Indiana Family and Social Services Administration (IFSSA)
Division of Disability and Rehabilitative Services
Bureau of Developmental Disability Services

*Note: An electronic version of this form may be found on the Division of Disability and Rehabilitative Services' website at www.IN.Gov/fssa/2328.htm. This document may be located at "**DDRS**" and then under "**APPLY FOR SERVICES**".*
Please complete the form, print, sign and return to the local BDDS office.

APPLICANT INFORMATION

Last Name Individual with disability **First Name**

Street Address

City **State**

1. Complete the following 3 forms found here: https://www.in.gov/fssa/ddrs/3349.htm
   - Confirmation of Diagnosis (State Form 54727) (completed by physician)
   - Application for Developmental Disability Services (State Form 55068)
   - Authorization for Disclosure of Personal and Health Information- DDRS
2. Gather supportive documentation: i.e. Shared Plan of Care, IEP, Psychoeducational or Neuropsychological Evaluations, etc.

CONFIRMATION OF DIAGNOSIS

State Form 54727 (R / 10-15)
INDIANA FAMILY AND SOCIAL SERVICES ADMINISTRATION (IFSSA)
DIVISION OF DISABILITY AND REHABILITATIVE SERVICES (BDDS)

CONFIDENTIAL

Physician Note: An electronic version of this form may be found on the Division of Disability and Rehabilitative Services' website at www.IN.Gov/fssa/q2328.htm.
This document may be located at "About DDRS" and then under "FORMS".
Please complete the form, print, sign and return to the consumer to take to his/her local BDDS office.

I – CONSUMER INFORMATION

Last name	First name	Middle initial
Individual with disability		

Street address *(number and street)*	City	State	ZIP code
		Indiana	

County of residence	Date of birth *(month, day, year)*	Sex	Telephone number	Last 4 digits of Social Security number
			( )	XXX – XX - last 4 digits req'd

II – DEVELOPMENTAL DISABILITY (DD) DIAGNOSIS

Federal and state regulations require a physician's confirmation that the individual's developmental disability / intellectual disability (DD/ID) condition manifested before the age of twenty-two (22).

Primary diagnosis	Date of primary diagnosis *(month, day, year)*
Needs to be a DD or ID dx, such as Autism, Intellectual Disability, Cerebral Palsy, Epilepsy. Need to include the ICD-10 code for each diagnosis	Date needs to be prior to age 22. If exact date of dx is unknown, can estimate time of onset, such as "from birth, if condition present at birth. Attempt to locate eval/dates of testing for autism and/or ID
Other conditions *(Excluding mental illness)* e.g. hearing or vision impairment, feeding intolerance, limited weight bearing, neurogenic bladder, etc	
Secondary diagnosis e.g. if pt has CP and ID, list one as primary dx and the other as secondary	Date of secondary diagnosis *(month, day, year)*
Tertiary diagnosis Can be left blank, but include another DD/ID dx if available	Date of tertiary diagnosis *(month, day, year)*
Signature of physician Needs to be signed by an MD or DO. Signature of a NP, PA, etc will not be accepted	Date signed *(month, day, year)*
Printed name of physician	Telephone number

Submit (fax, mail, or hand-deliver) all documents to the local BDDS office

DRAFT

SUPPLEMENTAL SECURITY INCOME



- Eligibility under age 18 – child disability plus family income
  - Listing of Impairments - Child Listings (Part B) | Disability | SSA
  - https://www.ssa.gov/apply/ssi

- Video 4.5-minute from Social Security Admin https://www.youtube.com/watch?v=Jdg6QtxQ2LI&t=15s
- SSI Handout INF2F https://www.inf2f.org/uploads/1/4/0/1/140150446/fs_guidessi-5.2021.pdf

FAMILY SUPPORT



- **Indiana Family to Family** www.inf2f.org
  - Social media, newsletter, phone consult, Heart to Heart conference, etc.
- **INsource** https://insource.org/
  - Family support re: special education
- **ARC of Indiana** https://www.arcind.org
- **Autism Society of Indiana** https://www.autismsocietyofindiana.org/
- **Indiana Institute on Disability and Community** (IIDC) https://www.iidc.indiana.edu
- **Autism Speaks** www.autismspeaks.org
- **Self-Advocacy** https://autisticadvocacy.org/

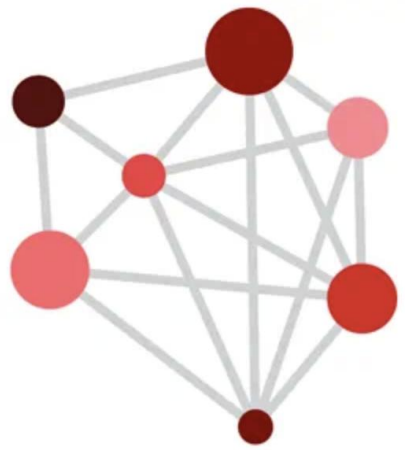
FINDER
INDIANA DISABILITY RESOURCE

- https://www.indianadisabilityresourcefinder.org/



WHAT'S NEXT

- Primary Care Diagnosis



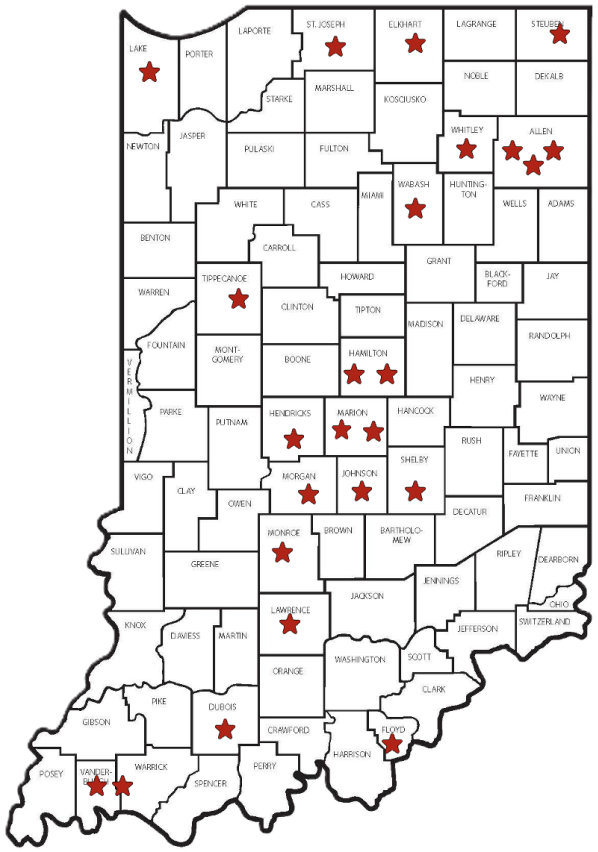
- Eye Tracking



IUSM EAE Hub Network

Build capacity of primary care to improve access to diagnostic autism evaluations for children 14-48 mos.

1. Primary care clinicians engage in ~30 hrs. training
2. Conduct ~ 4-8 evaluations per month, collect small amount of de-identified data from each visit
3. Participate in monthly learning collaborative
4. Advocate across systems of care for policies and insurance coverage



2025 Impact

1. > 1,200 evaluations by 26 clinicians in 23 practices across 14 health systems
2. ~60% dx'ed with autism and 99% dx'ed with neurodevelopmental condition
3. Average age = 33 months
4. Average wait from referral to evaluation = 3-4 months

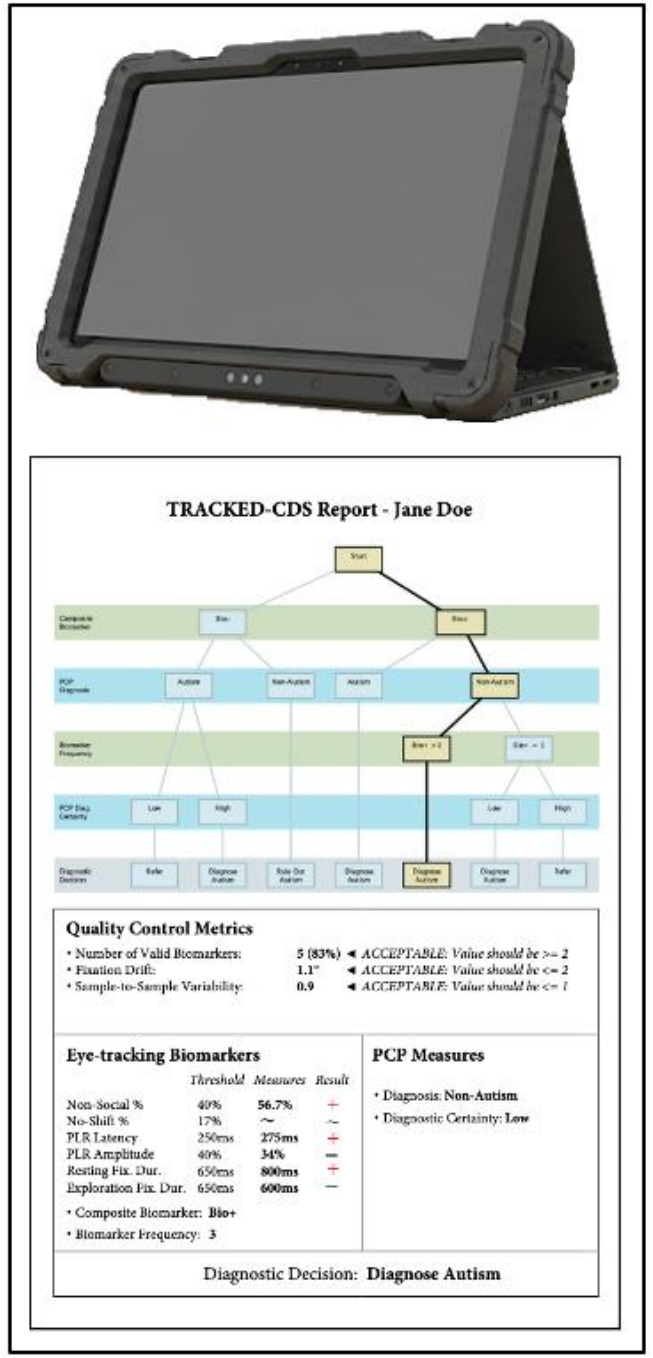
Riley Children's Foundation





TRACKED-CDS: AI-Driven Clinical Decision Support Tool

- Integrates PCP assessment & eye-tracking biomarkers
- Provides point-of-care autism diagnosis
- Empowers non-specialists → earlier detection & intervention



TRACKED-CDS Report - Jane Doe

Quality Control Metrics

• Number of Valid Biomarkers:	5 (83%)	◄ *ACCEPTABLE: Value should be >= 2*
• Fixation Drift:	1.1°	◄ *ACCEPTABLE: Value should be <= 2*
• Sample-to-Sample Variability:	0.9	◄ *ACCEPTABLE: Value should be <= 1*

Eye-tracking Biomarkers

	Threshold	*Measures*	*Result*
Non-Social %	40%	56.7%	+
No-Shift %	17%	~	~
PLR Latency	250ms	275ms	+
PLR Amplitude	40%	34%	–
Resting Fix. Dur.	650ms	800ms	+
Exploration Fix. Dur.	650ms	600ms	–

• Composite Biomarker: **Bio+**

• Biomarker Frequency: **3**

PCP Measures

• Diagnosis: **Non-Autism**

• Diagnostic Certainty: **Low**

Diagnostic Decision: **Diagnose Autism**



QUESTIONS

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REFERENCES

1. Harnett A, Tierney E, Guerin S. (2009) Convention of hope–communicating positive, realistic messages to families at the time of a child's diagnosis with disabilities. British Journal of Learning Disabilities 37, 257-264.
2. Gaspar de Alba MJ, Bodfish JW. (2011). Addressing parental concerns at the initial diagnosis of an autism spectrum disorder. Research in Autism Spectrum Disorders, 5, 633-639.
3. Hodges H, Fealko C, Soares N. Autism spectrum disorder: definition, epidemiology, causes, and clinical evaluation. Transl Pediatr. 2020 Feb; 9 (Suppl 1):S55-S65.
4. Havdahl A, Niarchou M, Starnawska A, Uddin M, van der Merwe C, Warrier V. Genetic contributions to autism spectrum disorder. Psychol Med. 2021 Oct;51(13):2260-2273.
5. American Academy of Neurology. Guideline Summary for Clinicians: Evaluation Of The Child With Global Developmental Delay. https://www.aan.com/globals/axon/assets/2603.pdf
6. Rodan LH, Stoler J, Chen E, Geleske T, Council on Genetics; Genetic Evaluation of the Child With Intellectual Disability or Global Developmental Delay: Clinical Report. Pediatrics July 2025; 156 (1): e2025072219.
7. McLeod S, Kawamura A, Orsino A, Assessing children and youth with global developmental delay and intellectual developmental disorder, Paediatrics & Child Health, 2026;, pxag032.
8. Moeschler JB, Shevell M, Committee On Genetics. Comprehensive Evaluation of the Child With Intellectual Disability or Global Developmental Delays. Pediatrics September 2014; 134 (3): e903–e918.

Updates In Pediatric Epilepsy For the Non-Neurologist

Indiana Joint Pediatric Conference
September 25, 2026
Lauren James, MD

Learning Objectives

1. Familiarize yourself with newer preventative treatments for epilepsy.
2. Learn how seizure medications are being tailored to treat specific epilepsy conditions.
3. Discuss advances in outpatient treatment of prolonged seizures.

The History of Preventative Seizure Medication





History of Preventative Seizure Medications

- Epilepsy has been described in texts dating back to 4000 years ago
- Ancient treatments included special diets, herbal supplements, blood-letting
- Ancient Assyrian tablets from 3000 BC discuss using cannabis for “ghost of hand”
- Avicenna, Persian physician and philosopher (980-1036 AD) describes herbal treatments including: rue, chives, savory, wormwood, dill, hyysop, and truffle.
- In 1857, **potassium bromide**, a sedative, was discovered to reduce seizure frequency in patients with catamenial epilepsy
- In 1912, **phenobarbital**, another sedative, was introduced as a medication to prevent seizures

History of Preventative Seizure Medications - Part 2

- In the early 1930s, a reliable electroshock animal testing was developed
- **Phenytoin** was approved in 1938, first drug to undergo animal model testing followed by an observational study in 200 patients
- **Carbamazepine** and **valproate** were added in the 1960s and 1970s
- In 1975, the National Institute of Neurological Diseases and Stroke (NINDS) started an Anticonvulsant Screening Program (ASP), screening more than 32,000 drugs and developing drugs such as **topiramate, felbamate, rufinamide,** and **lacosamide**
- In 2015, the ASP became the Epilepsy Therapy Screening Program to address a changing landscape; focusing on treatments that may address the pathogenesis of epilepsy and possibly prevent or reduce comorbid symptoms in patients (such as with genetic epilepsies)

Before We Start...

Universal Warnings for Seizure Prevention Medications



Avoid Abrupt Withdrawal of Preventative Seizure Medications

- Missing a single dose of seizure medication is unlikely to provoke seizures but missing multiple doses of medication can increase the risk for seizures
- Patients admitted to an EMU with rapid discontinuation of preventative seizure medications had a reduced time to onset of first seizure but also a higher frequency of seizures clustering for > 4 hr.
- Additionally, some medications can cause dependence and so abrupt withdrawal could cause additional complications

Preventative Seizure Medications and Suicidal Ideation

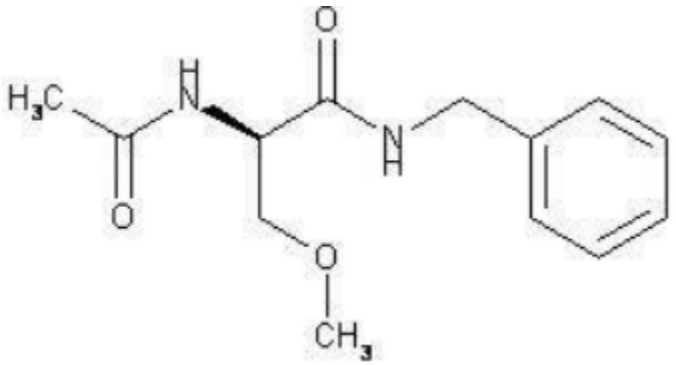
- In 2008 the FDA mandated that all seizure prevention medications carry a warning for risk of increased risk of suicidal thoughts and behaviors
- Warning based on pooled data from 199 placebo controlled trials involving 11 seizure prevention medications which demonstrated a 2 fold increased risk for suicidal thoughts and behaviors in patients taking active medication versus placebo (0.43% versus 0.24%)
- Concerns in epilepsy community due to validity of study methods, pre-existing increased risk for depression in patients with epilepsy and concern that warning may affect compliance
- Studies since that time have reported conflicting data

The Medications

- Lacosamide (Vimpat), approved 2008
- Perampanel (Fycompa), approved 2012
- Eslicarbazepine acetate (Aptiom), approved 2013
- Cenobamate (Xcopri), approved 2019
- Medications For Dravet Syndrome
  - Cannabidiol (Epidiolex), approved 2018
  - Stiripentol (Diacomit), approved 2018
  - Fenfluramine (Fintepla), approved 2020
- Medication for CDKL5
  - Ganaxolone (Ztalmy), approved 2022



Lacosamide



Lacosamide



- Brand Name: Vimpat
- Indication: (1) focal seizures in children 1 mo and older, (2) generalized tonic-clonic seizures in children ages 4 and older
- Mechanism of Action: enhances slow inactivation of voltage-gated sodium channels
- Dosage Forms:
  - Liquid (10 mg/1 ml)
  - Tablet (50 mg, 100 mg, 150 mg, 200 mg) **Should not cut or crush**
  - IV form (200 mg/1 ml)
- Twice daily dosing

Lacosamide



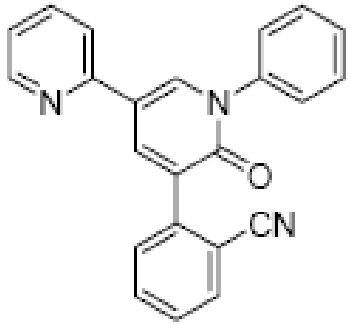
- Common Side Effects: double vision, ataxia, dizziness, headache, nausea,
- Warnings
  - Monitor ECG in patients with underlying proarrhythmic conditions or patients who take medications that can affect cardiac conduction
  - Risk for DRESS syndrome, Multiorgan Hypersensitivity
  - May cause syncope
  - Oral solution contains aspartame: avoid in patients with PKU

Lacosamide



- Monitoring: ECG at baseline, baseline Cr
- No significant drug interactions
- Pediatric Dosing: Weight based; around 5 mg/kg/d - 10 mg/kg/d
- Level V Controlled Substance with no dependence potential
- Good RX Cost
  - 30 day supply of 100 mg tablets, 1 tablet twice daily: $9 (Walgreens) to $105 (Costco)
  - 30 day supply of 10 mg/1 ml solution, 10 ml twice daily: $41 (CVS) to $290 (Meijer)
- Preferred Medicaid Medication

Perampanel



• $3/4H_2O$

Perampanel



- Brand Name: Fycompa
- Indication:
  - Partial onset seizures in patients with epilepsy ages 4 and above
  - Primary generalized tonic-clonic seizures in patient with epilepsy 12 years and older
- Mechanism of Action: non competitive AMPA glutamate receptor antagonist
- Dosage Forms:
  - Tablets (cannot be crushed or chewed): 2 mg, 4 mg, 6 mg, 8 mg, 10 mg, 12 mg
  - Liquid: 0.5 mg/1 ml
  - Once daily Dosing

Perampanel



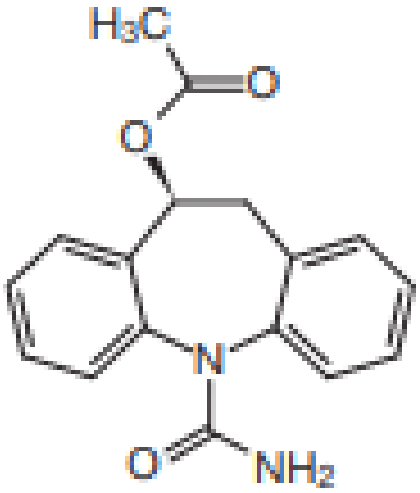
- Warnings
  - Serious psychological and behavioral reactions
  - Neurologic Effects
  - Falls
- Common Side effects: dizziness, sedation, irritability, weight gain, gait disturbance, vertigo

Perampanel



- Monitoring: Cr at baseline, weight; monitor for behavior changes
- Drug Interactions: does interact with multiple seizure medications AND with oral contraceptives!
- Pediatric Dosing: not weight based (8-12 mg daily); adjust dosing in patients with liver or kidney impairment
- Classified as a level III controlled substance with unknown dependence risk
- Good RX cost for 1 mo supply of 6 mg once daily
    - Tablets: $220 (CVS)
    - Liquid: $419 (Walgreens)
- Indiana Medicaid Non-preferred medication (must have failed a preferred medication)

Eslicarbazepine acetate



Eslicarbazepine acetate

- Brand Name: Aptiom
- Indication: treatment of focal onset seizures in patients ages ≥4
- Mechanism of Action:
  - Inhibits rapid voltage gated sodium channels
  - Enhances slow inactivation of voltage gated sodium channels
  - Inhibits $Ca_V3.2$ T-type Ca^{2+} channels
- Formulations:
  - Pill at 200 mg, 400 mg, 600 mg, 800 mg, or 1000 mg daily
  - Pill can be crushed or swallowed
  - Once daily dosing

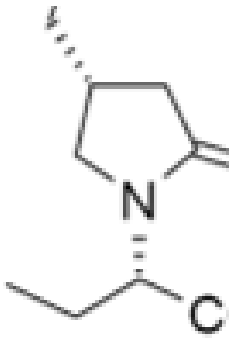
Eslicarbazepine acetate

- Warnings
  - DRESS syndrome and other dermatologic adverse reactions
  - Hyponatremia
  - Drug induced liver injury
  - Hematologic side effects
  - Neurological adverse reactions
- Common Side effects: dizziness, sedation, headache, diplopia, ataxia, blurred vision and tremor

Eslicarbazepine acetate

- Monitoring: Cr and LFTs at baseline
- Drug Interactions: does interact with multiple seizure medications AND with oral contraceptives
- Pediatric Dosing: weight based with adjustment for renal failure
- Non-controlled substance with no abuse potential but mild withdrawal symptoms (nausea and anxiety)
- Good RX cost for 1 mo supply of 800 mg once daily
    - $1,344 at Giant Eage
- Indiana Medicaid Non-preferred medication - requires a PA
    - Must have failed a “preferred medication” first

Brivaracetam



Brivaracetam



- Brand Name: Briviact
- Indication: treatment of focal seizures in children 1 month or older
- Mechanism of Action: Unknown, binds to SV2A (synaptic vesicle protein 2A), preventing release of neurotransmitter from the vesicle into the synapse
- Formulations are bio-equivalent
  - Tablets (cannot be crushed or chewed): 10 mg, 25 mg, 50 mg, 75 mg and 100 mg
  - Liquid: 10 mg/1 ml
  - IV: 50 mg/5 ml

Brivaracetam



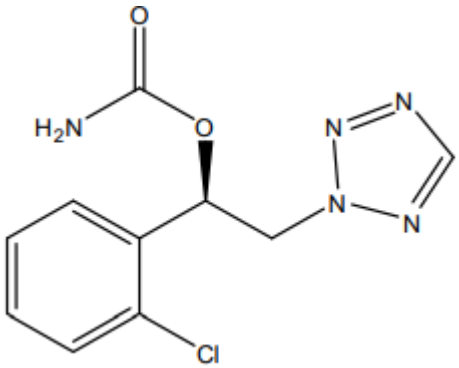
- Warnings
  - Psychiatric adverse reactions and abnormal behavior
  - Hypersensitivity
  - Dermatological reactions
- Side effects
  - Fatigue related reactions (25% versus 14%)
  - Dizziness/coordination issues (16% vs 10%)
  - Psychiatric adverse reactions (13% versus 8%)
  - Hypersensitivity
  - Decreased appetite (pediatric patients)
  - Rare cases of leukopenia or neutropenia

Brivaracetam



- Monitoring: no labs; monitor for behavior changes
- Drug interactions: does affect metabolism of a few seizure prevention medications and other medications; does not affect OCPs
- Pediatric dosing: is based on age and weight with adjustments for hepatic impairment
- Classified as a level V controlled substance with no dependence
- Good RX cost for 1 mo supply of 50 mg BID
  - Tablets: $30 (Kroger)
  - Liquid: $73 (Target)
- Indiana Medicaid Non-preferred medication (must have failed a “preferred” medication first)

Cenobamate



Cenobamate



- Brand Name: Xcopri
- Mechanism of Action:
  - **Precise mechanism unknown**
  - Inhibits voltage gated sodium channels
  - Positive allosteric modulator of $GABA_A$ channels
- Indication: focal onset seizures in adults
- Forms:
  - Tablet only, once daily
  - 12.5 mg tablet, 25 mg tablet, 50 mg tablet, 100 mg tablet, 150 mg tablet, 200 mg tablet

Cenobamate

Warnings/Side Effects

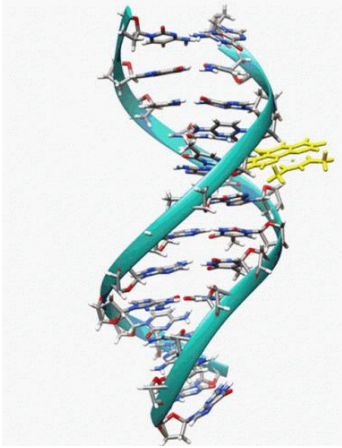
- Risk for DRESS syndrome, Multiorgan Hypersensitivity
- Cardiac Arrhythmia: risk for shortened Qt interval
- Liver Injury/hepatic failure
- Neurological Adverse Reactions
  - Somnolence
  - Dizziness
  - Headache
  - Diplopia

Cenobamate



- Monitoring: LFT and bilirubin and as needed for symptoms
- Drug Interactions: may interact with other AEDs; decreases efficacy of OCPs
- Pediatric Dosing: not established
- Level V Controlled Substance with dependence potential
- Good RX Cost
  - 30 day supply of 200 mg tablets, 1 tablet daily: $1204 (Meijer)
- Non-preferred Medicaid medication; requires PA (must have failed one prior seizure medication)

Medications Approved for Genetic Epilepsies

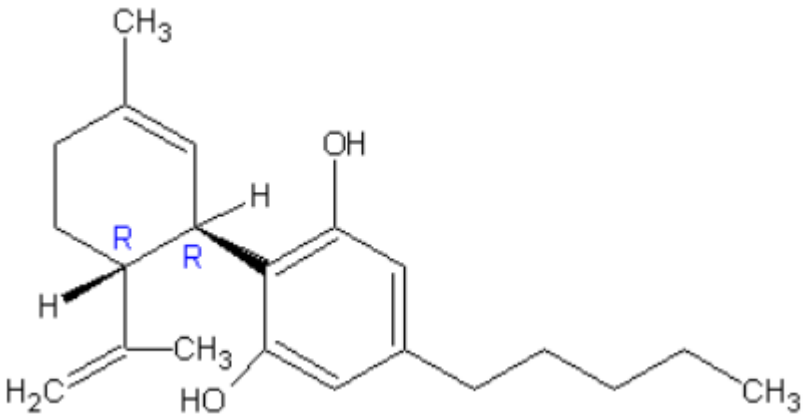


Dravet Syndrome



- Epileptic encephalopathy secondary to a pathogenic mutation in the SCN1A gene
- Presents with convulsive or hemi-convulsive seizures during infancy, often triggered by fever. Status epilepticus may occur and over time, seizures can evolve to include atypical absence seizures and myoclonic seizures.
- Development can stagnate with high percentage of patients with intellectual disability, autism/ADHD, and insomnia.
- Incidence is between 1:16,000 and 1:46,000 live births
- Incidence of SUDEP is 4.4/1000 person years compared to 0.22/1000 person years in children with epilepsy

Cannabidiol



Cannabidiol

Epidiolex®
(cannabidiol)

- Brand Name: Epidiolex
- Mechanism of Action:
  - **Precise mechanism unknown**
- Indication: Treatment of seizures in patients with Dravet Syndrome, Lennox Gastaut Epilepsy (LGS), and Tuberous Sclerosis ≥ age 1
- Forms: Liquid 100 mg/1 ml

Cannabidiol

Epidiolex®
(cannabidiol)

Warnings/Side Effects

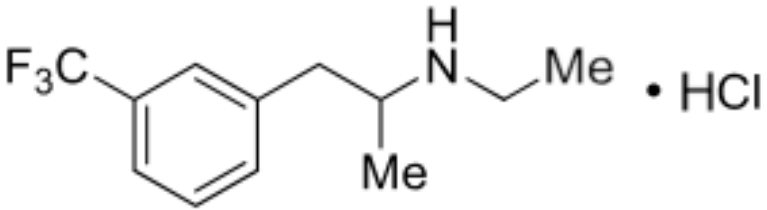
- Sedation and somnolence
- Elevated LFT/bilirubin
- Hypersensitivity reaction
- Common Adverse Reactions include fatigue, decreased appetite, diarrhea, sleepiness, weakness, insomnia, malaise, infections, elevated LFTs

Cannabidiol

Epidiolex® (cannabidiol)

- Monitoring: LFT and bilirubin at baseline then at 1,3, and 6 mo and as needed
- Drug Interactions: can interact with other AEDs
- Pediatric Dosing: 2.5 mg/kg/dose BID to 10 mg/kg/dose BID
- NOT a controlled substance; no reported abuse potential or dependence
- Must be obtained through a specialty pharmacy
- Out of Pocket Cost Through Drugs.com
    - $1,051 for a 60 ml bottle ($2,102 for a 30 day supply in a 20 kg child)
- Requires a PA through Medicaid (must have a diagnosis of Dravet Syndrome, LGS or Tuberous sclerosis AND have failed 2 medications)

Fenfluramine



Fenfluramine



- Brand Name: Fintepla
- Mechanism of Action:
  - Acts on serotonergic receptors to enhance GABA neurotransmission
  - Modulates sigma-1-receptors to suppress excitatory signals
- Indication: patients with Dravet Syndrome or LGS who are ≥ 2 years old
- Forms: oral solution, 2.2 mg/ml

Fenfluramine

Warnings/Side Effects



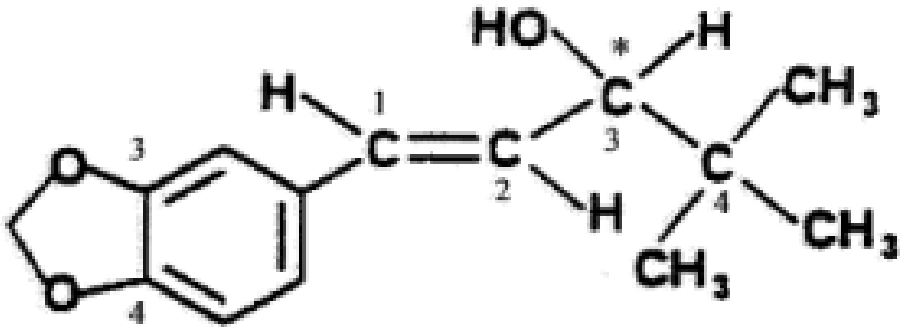
- Valvular Heart Disease and Pulmonary Arterial Hypertension
- Decreased appetite and weight loss
- Acute Angle Glaucoma
- Sleepiness
- Increase in blood pressure
- Common side effects: sleepiness, decreased appetite, diarrhea, vomiting

Fenfluramine



- Monitoring: echocardiogram at baseline, every 6 mo during treatment, and 3-6 mo post-treatment
- Drug Interactions: dosing may need to be adjusted based on concomitant medications, dosage adjustment in hepatic and renal impairment
- Pediatric Dosing: 0.1 mg/kg twice daily to 0.35 mg/kg twice daily
- Not a controlled substance
- Medication only available through a specialty pharmacy, cost estimated at $1,693 per 30 ml bottle
- Requires PA through Medicaid (must have diagnosis of Dravet Syndrome AND failed Epidiolex and Diacomit or have a diagnosis of LGS and failed Epidiolex)

Stiripentol



Stiripentol



- Brand Name: Diacomit
- Mechanism of Action:
  - Potentiates $GABA_A$ transmission
  - Blocks sodium channels and reduces calcium influx
  - Regulates CNS glucose metabolism and lactate dehydrogenase activity
- Indication: patients with Dravet Syndrome who are ≥ 6 mo and ≥ 7 kg and taking clobazam
- Forms:
  - Capsule (250 mg, 500 mg), must be taken whole
  - Powder packet (250 mg, 500 mg)

Stiripentol



- Warnings
  - Thrombocytopenia and Neutropenia
  - Decreased appetite and weight loss
  - Sleepiness
  - Powder contains aspartame and should be avoided in patients with PKU
- Common side effects: sleepiness, decreased appetite, agitation, ataxia, low muscle tone, tremor, dysarthria, and insomnia

Stiripentol

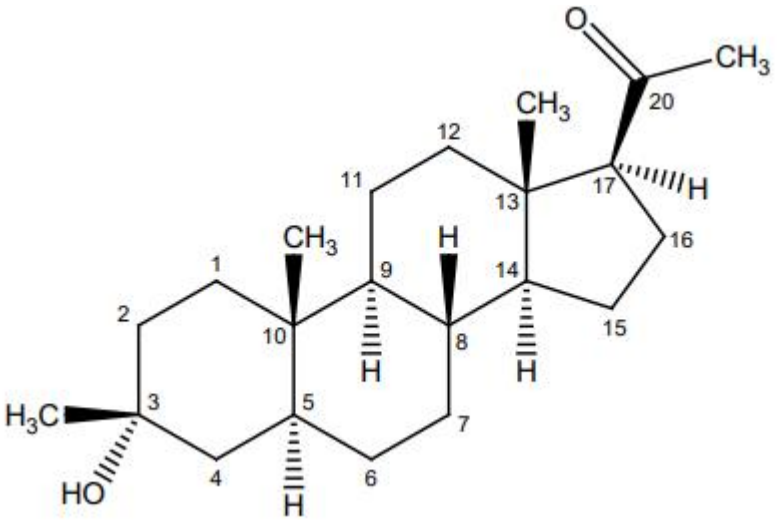


- Monitoring: CBC at baseline then every 6 mo, height / weight
- Drug Interactions: dosing may need to be adjusted based on concomitant medications including clobazam, avoid with moderate to severe kidney or liver impairment
- Pediatric Dosing: 50 mg/kg/d divided BID or TID
- Not a controlled substance
- Medication only available through a specialty pharmacy, cost estimated at $2,250 for a 1 mo supply at a dose of 250 mg BID (appropriate dose for a 10 kg child) via drugs.com
- Requires a PA through Medicaid (must have a diagnosis of Dravet syndrome or LGS)

CDKL5 Deficiency Disorder

- Epileptic encephalopathy secondary to a mutation in the CDKL5 gene located on the X chromosome (X22.13)
  - Heterozygous mutation in females
  - Hemizygous mutation in males
- Symptoms:
  - Medically refractory epilepsy with seizures starting between 2 and 12 mo
  - Severe Global developmental delay/Intellectual Disability
  - Movement Disorders: stereotypy, dystonia, chorea
  - Hypotonia
  - Autonomic symptoms: GERD, constipation, abnormal breathing patterns
  - Abnormal eye movements

Ganaxolone



Ganaxolone



- Brand Name: Ztalmy
- Mechanism of Action: Neuroactive steroid which uses allosteric modulation of $GABA_A$ receptors to enhance GABAergic inhibitory tone
- Indication: treatment of epilepsy in patients with cyclin-dependent kinase-like 5 deficiency who are ≥ age 2
- Forms: liquid, cherry flavored solution with 50 mg/ml
  - Must be shaken for 1 min prior to administration
  - Must wait for 1 min after shaking is complete to draw up

Ganaxolone



- Warnings: Somnolence and sleepiness
- Common side effects: sleepiness, fever, seasonal allergies and hypersalivation

Ganaxolone



- Monitoring: monitor for signs of behavior changes
- Drug Interactions: dosing may need to be adjusted based on concomitant medications including phenobarbital, adjustment with severe hepatic impairment
- Pediatric Dosing:
  - ≤ 28 kg, 21 mg/kg/dose scheduled TID
  - > 28 kg, 600 mg TID
- Level V controlled substance with unknown dependence potential
- Good RX cost at 600 mg TID for a one month supply is $29,312 (Walgreens)
- Medicaid Requires PA (must have a diagnosis of CKDL5 deficiency disorder, failed two prior seizure prevention medications, and dose cannot exceed 36 mL/day)

Status Epilepticus

- Operational Definition: continuous convulsive or electroclinical seizure activity for more than 5 min or recurrent seizures without recovery
- Status epilepticus is the most common neurological emergency in pediatric patients.
- Complications can include: aspiration pneumonia, respiratory failure, cardiac arrhythmia, CNS injury, death
- Standard of Care is to use an abortive seizure medication after 5 min of seizure activity or for a seizure cluster to prevent complications of prolonged seizures
- Most seizures occur in out of hospital settings so at home abortive medications are ideal but require easy administration for families

Rectal Diazepam



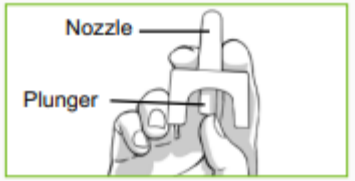
- Approved for children ages 2 and older
- Comes in a syringe with an acu-dial for dosing (2 per package)
  - 2.5 mg syringe
  - 5 mg - 7.5 mg - 10 mg syringe
  - 12.5 mg - 15 mg - 20 mg syringe
- Store at room temperature (59 to 86°F)
- Warning: Although respiratory depression is a possible side effect, a 2004 study which reviewed MedWatch cases over a 7 year period found 9 episodes of respiratory depression with 3 episodes of death related to diazepam administration.
- Common side effect: sedation
- Should be used no more than every 5 days, no more than 5 days per month due to dependence potential
- Good Rx: $87 at Walgreens

Intranasal Diazepam

VALTOCO® (diazepam nasal spray) CIV

- Brand Name: Valtoco
- Approved for children ages 2 to 16 with epilepsy
- Similar warnings to rectal diazepam
- Comes as a 5 pack with 5 mg, 7.5 mg or 10 mg atomizers
- Dosing is weight based
- Common side effects: sedation, nasal discomfort, abnormal taste, nose bleed, or runny nose
- Should be stored at room temperature (66 - 78°F); protect from light
- Does contain benzyl alcohol so should be avoided in newborns and infants
- Good Rx Cost: $1,846 at Giant Eagle for 10 mg dose









Intranasal Midazolam



- Brand Name: Nayzilam
- Approved for children ages 12 and older for treatment of status epilepticus
- Warnings: (1) do not administer with opioids, (2) monitor for risk of dependence, (3) avoid taking more than every 3 days, no more than 5 days per month, (4) risk of cardiopulmonary reaction
- Common side effects: sedation, sore throat, nasal discomfort, abnormal taste, headache
- Administration: 1 x 5 mg atomizer in single nostril; may repeat with 2nd dose after 10 min, if needed
- Store at room temperature (68 - 78°F)

Questions?

Please email
lauren.james@ascension.org

Resources

1. Asadi-Pooya AA, Nikseresht AR, Yaghoubi E. Old Remedies for Epilepsy: Avicenna's Medicine. Iran Red Crescent Med J. 2012 Mar;14(3):174-7. Epub 2012 Mar 1. PMID: 22737575; PMCID: PMC3372027.
2. Devinsky O, Jones NA, Cunningham MO, Jayasekera BAP, Devore S, Whalley BJ. Cannabinoid treatments in epilepsy and seizure disorders. Physiol Rev. 2024 Apr 1;104(2):591-649. doi: 10.1152/physrev.00049.2021. Epub 2023 Oct 26. PMID: 37882730.
3. Corrales-Hernández MG, Villarroel-Hagemann SK, Mendoza-Rodelo IE, Palacios-Sánchez L, Gaviria-Carrillo M, Buitrago-Ricaurte N, Espinosa-Lugo S, Calderon-Ospina CA, Rodríguez-Quintana JH. Development of Antiepileptic Drugs throughout History: From Serendipity to Artificial Intelligence. Biomedicines. 2023 Jun 3;11(6):1632. doi: 10.3390/biomedicines11061632. PMID: 37371727; PMCID: PMC10295412.
4. Rho JM, White HS. Brief history of anti-seizure drug development. Epilepsia Open. 2018 Oct 24;3(Suppl Suppl 2):114-119. doi: 10.1002/epi4.12268. PMID: 30564769; PMCID: PMC6293064.
5. Goldenholz DM, Cheng JC, Chang CY, Moss R, Westover MB. Does Missing Medication Acutely Change Seizure Risk? A Prospective Study. Ann Neurol. 2026 Apr;99(4):1076-1082. doi: 10.1002/ana.78134. Epub 2026 Jan 5. PMID: 41489031; PMCID: PMC12782288.
6. Kirby J, Leach V, Brockington A Drug withdrawal in the epilepsy monitoring unit – The patsalos table Seizure - European Journal of Epilepsy, 2019; 75, 75-81
7. Lacosamide [package insert]. UCB, Inc.; 2018.
8. Fycompa (perampanel) [package insert]. Woodcliff Lake, NJ: Eisai Inc.; 2025
9. Aptiom:Aptiom (eslicarbazepine acetate) [package insert]. Marlborough, MA: Sunovion Pharmaceuticals Inc.; 2019.
10. Briviact [package insert]. Smyrna, GA: UCB, Inc.; 2021
11. Xcopri (cenobamate) [package insert]. Paramus, NJ: SK Life Science, Inc.; 2019.
12. Samanta D. Cenobamate in pediatric epilepsy and developmental and epileptic encephalopathies: Efficacy, safety, and syndrome-specific considerations. Epilepsy Behav. 2025 Dec;173:110787. doi: 10.1016/j.yebeh.2025.110787. Epub 2025 Oct 16. PMID: 41106086.
13. Bjurulf B, Reilly C, Sigurdsson GV, Thunström S, Kolbjer S, Hallböök T. Dravet syndrome in children-A population-based study. Epilepsy Res. 2022 May;182:106922. doi: 10.1016/j.eplepsyres.2022.106922. Epub 2022 Apr 8. PMID: 35461153.
14. Andersson K, Bjurulf B, Blom M ...“Daring to speak of SUDEP” - caregiver and neurologist perspectives on the risk for premature mortality in Dravet Syndrome
    Epilepsy & Behavior, 2025; 173

Resources

1. Epidiolex [package insert]. Carlsbad, CA: Greenwich Biosciences; 2018.
2. Fintepla [package insert]. Smyrna, GA: UCB, Inc.; 2025.
3. Simon K, Sheckley H, Anderson CL, Liu Z, Carney PR. A review of fenfluramine for the treatment of Dravet syndrome patients. Curr Res Pharmacol Drug Discov. 2021 Dec 16;3:100078. doi: 10.1016/j.crphar.2021.100078. PMID: 34988433; PMCID: PMC8695265. Curr Res Pharmacol Drug Discov. 2021 Dec 16;3:100078. doi: 10.1016/j.crphar.2021.100078
4. Diacomit (stiripentol) [package insert]. San Mateo, CA: Biocodex, Inc.; 2026.
5. Bacq A, Depaulis A, Castagné V, Le Guern ME, Wirrell EC, Verleye M. An Update on Stiripentol Mechanisms of Action: A Narrative Review. Adv Ther. 2024 Apr;41(4):1351-1371. doi: 10.1007/s12325-024-02813-0. Epub 2024 Mar 5. PMID: 38443647; PMCID: PMC10960919.
6. Ztalmy [package insert]. Radnor, PA: Marinus Pharmaceuticals, Inc.; Nov 2025.
7. Benke TA, Demarest S, Angione K, et al. CDKL5 Deficiency Disorder. 2024 Apr 11 [Updated 2025 May 1]. In: Adam MP, Bick S, Mirzaa GM, et al., editors. GeneReviews® [Internet]. Seattle (WA): University of Washington, Seattle; 1993-2026. Available from: https://www.ncbi.nlm.nih.gov/books/NBK602610/
8. Wylie T, Sandhu DS, Murr NI. Status Epilepticus. [Updated 2023 May 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK430686/
9. Pellock JM, Shinnar S. Respiratory adverse events associated with diazepam rectal gel. Neurology. 2005 May 24;64(10):1768-70. doi: 10.1212/01.WNL.0000162031.03390.BA. PMID: 15911807.
10. Samanta D. Rescue therapies for seizure emergencies: current and future landscape. Neurol Sci. 2021 Oct;42(10):4017-4027. doi: 10.1007/s10072-021-05468-9. Epub 2021 Jul 16. PMID: 34269935; PMCID: PMC8448953.
11. Diastat AcuDial (diazepam rectal gel) [package insert on the Internet]. Bethesda (MD): National Library of Medicine (US), DailyMed; [revised 2023 July; cited 2026 Sep 20]. Available from: https://dailymed.nlm.nih.gov/dailymed/drugInfo.cfm?setid=a84a73a7-8e3a-4985-8be0-04b3028f5e49
12. Valtoco (diazepam) [package insert on the Internet]. San Diego, CA: Neurelis, Inc.; [revised 2025 June - cited 2026 Sep 20]. Available from: DailyMed Label for Valtoco.
13. Nayzilam (midazolam) nasal spray [package insert]. Smyrna (GA): UCB, Inc.; Jan 2023. Available from: DailyMed [cited 2026 Sept 20]

Teen Driving Safety: The Pediatrician's Role in the Journey



2026 Indiana Joint Pediatric Education Conference

September 25, 2026

Marilyn Bull, MD, FAAP & Indigo Yeager, DO, NDD PGY-5

Objectives

1. Understand the landscape of teen driving and what puts teen drivers at risk.
2. Know the actionable items that providers can implement to support teens and their families during this unique time of development.
3. Understand how to best support adolescents with physical and neurodevelopmental disabilities who want to drive.

Why Teen Driving Safety?



Obtaining a driver’s license is a big step for teens in their future with many positive opportunities.

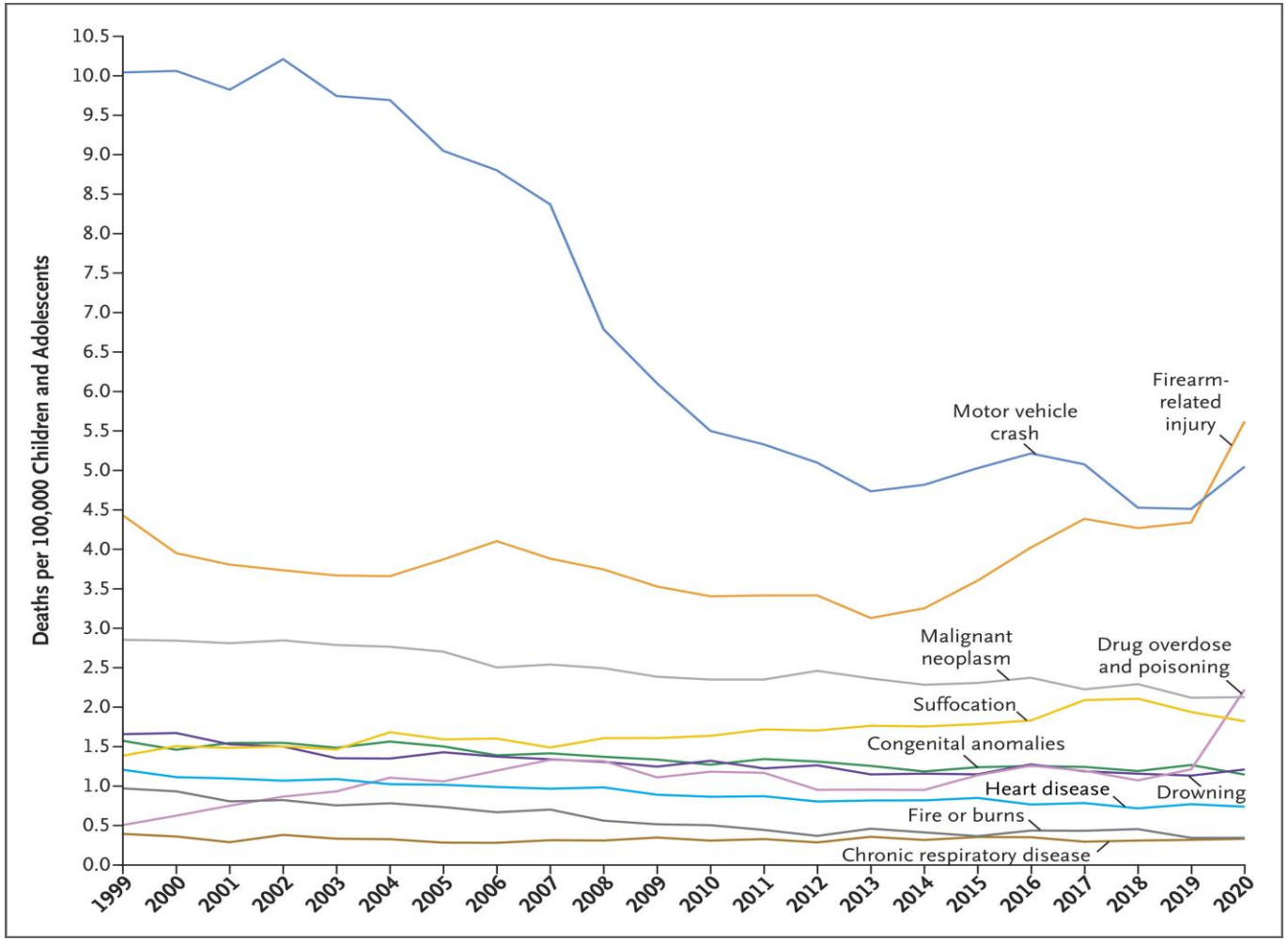


However, learning this skill is dangerous and not without risk.



Pediatricians can play a direct role in both preparing adolescents and families and be involved in advocacy and population level change.

Driving Is Dangerous



Motor vehicle crashes are the second leading cause of death in children.

These are <u>preventable</u> deaths.

NEJM “Current Causes of Death in Children and Adolescents in the United States”

The Teen Driver

- Novice adolescent drivers have four times the overall risk of crash or near-crash events.
- Drivers 16-17 years old have the highest rates of crash involvement, injuries to themselves or others, and death to people outside of their car in a crash.
- The first 6 months after receiving licensure carry the highest risk.

Risk Factors for Teen Drivers: Inexperience

- Inexperience is the single most important risk factor for teen drivers.
- Majority of teen driver crashes are due to three critical errors:
  - **Scanning/hazard detection**
  - **Speed**
  - **Distraction**

Scanning/Hazard Detection



Good scanning
- Far ahead
- To the sides
- In the rear
- Anticipate hazards

- Recognize hazard

- Decide to react
- Choose action
- Act

Safe Driving



Starts with attention and scanning



Eyes on the road



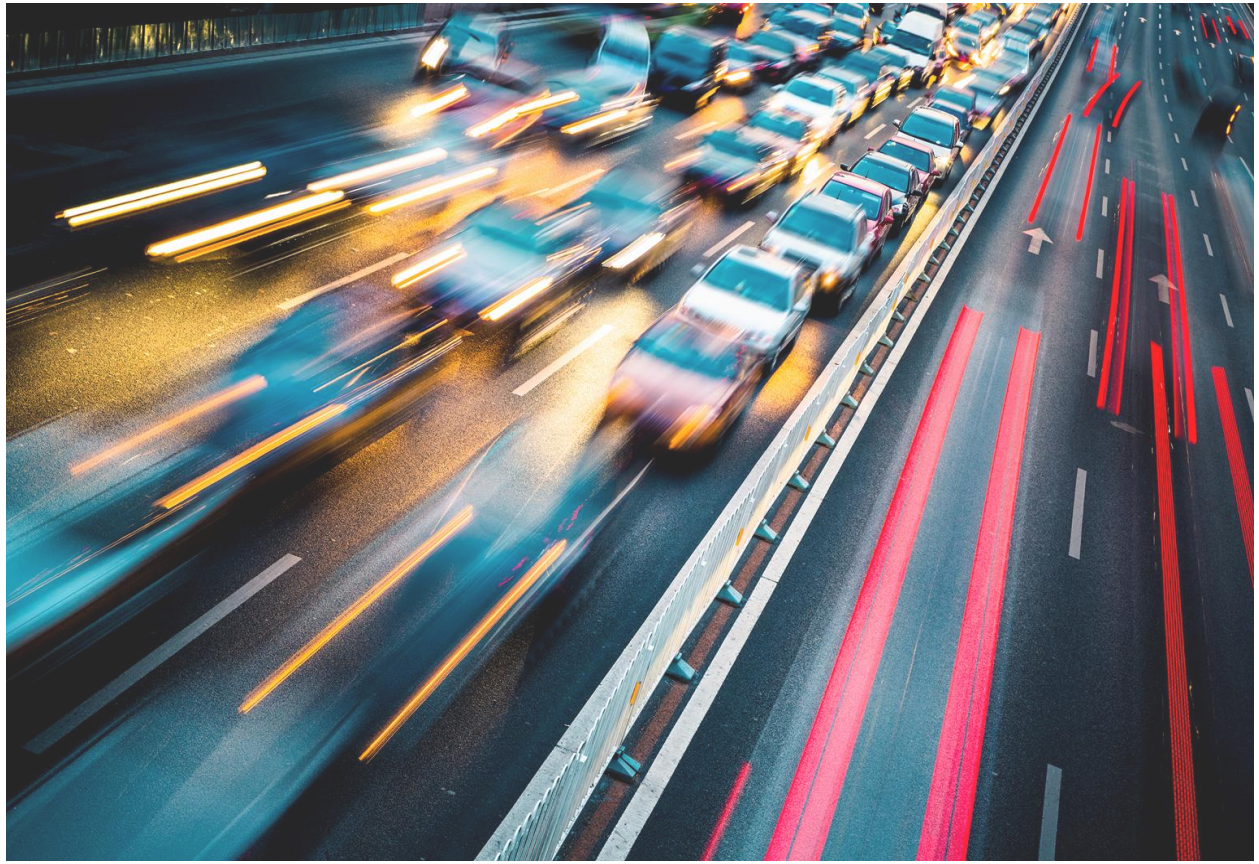
Mind on the task



Hands on the wheel

Speed

- Concern for driving too fast in general, and too fast for conditions.
- Learning how quickly the vehicle can stop.
- Learning to assess speed of oncoming traffic.



Distraction

- Distracted Driving
  - ✓ Distraction can be visual, manual, cognitive.
- Secondary tasks have negative impacts on driving performance when drivers look away from the roadway to engage with the task.
- Impact of impairment, substances, sleep deprivation.



Inexperience

- During practice driving and early in licensure, focus on good scanning, speed management, and distraction reduction.
- Expose teens to a wide variety of driving conditions when practicing.
    - How might situational factors affect young drivers (driving at night, weather, friends in the car)?



Young drivers are inexperienced. Any situational factor can challenge their inexperience.



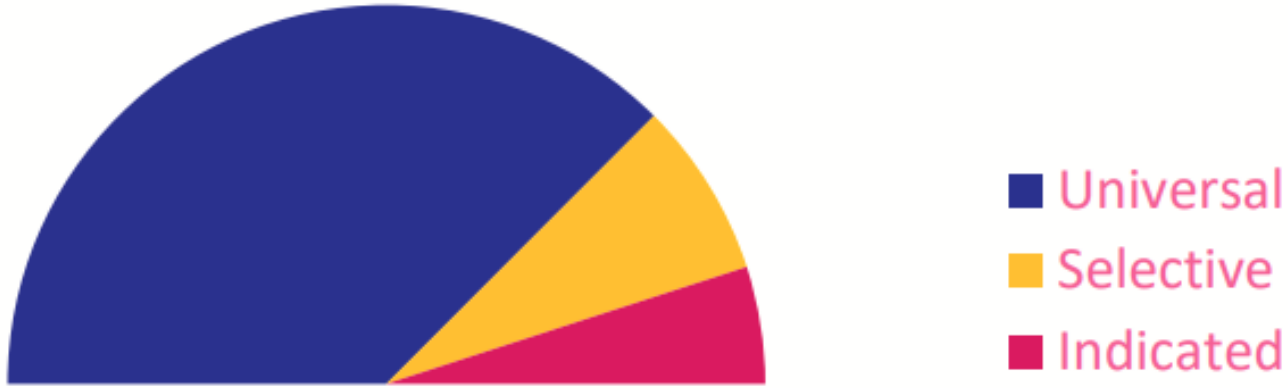




Key Takeaways

- Limit challenging drives early on in licensure.
- Practice in challenging situations under supervision.
- Outline strict rules on distractions, impairment, passengers.
- Increase privileges with skills, maturity and experience.

TRIAGE CRASH PREVENTION



UNIVERSAL	SELECTIVE	INDICATED
Typical risk of population	Individual as part of at-risk group	Individualized prevention for personal risk

Potential Interventions: Prelicensure Medical Visits

- Consider a pre-driving medical visit and establish if the teen wants to drive!
  - ✓Includes discussion of any chronic conditions that warrant further discussion.
  - ✓Consider recommending a virtual driving assessment tool.
- Discuss with parents directly what they can do to support their teen driving and address any concerns.

Interventions: Driver's Education

- Provides exposure and experience.
- What to look for in a driving school:
  - ✓Curriculum
  - ✓Situational awareness and response training
  - ✓Variable weather training



Interventions: Graduated Driver's Licensing (GDL)

- Graduated Driver's Licensing has been shown to be effective with 25-40% reduction in crashes.
- Focus on time of licensure.

Practice Driving Log



Date	Total time of drive	Total hours thru today	Notes (setting, conditions, road type, things teen did well, things that need more work, etc.)

Interventions: Graduated Driver's Licensing (GDL)

Prepare
Assess
Model
Teach



Coach
Monitor
Assess
Set rules
Remediate

Time Zero
Independent driving

Indiana Law

LEARNER'S PERMIT	
MINIMUM ISSUANCE AGE	15 years old with Driver Education
	16 years old without Driver Education
MANDATORY LEARNER'S PERMIT HOLDING PERIOD	180 days
CERTIFIED DRIVING HOURS	**50 hours of supervised driving practice is required, 10 must be at night** completed with: • A certified driving instructor • A certified driving rehabilitation specialist • A licensed driver with valid driving privileges who is at least 25 years old related to the applicant by blood, marriage or legal status • A spouse who is at least 21 years old. The completed "Log of Supervised Driving Practice - State Form 54706" must be submitted at time of application for a driver's license.
PROBATIONARY LICENSE	
MINIMUM AGE	16 years 90 days old with Driver Education
	16 years 270 days old without Driver Education

Risk Factors for Teen Drivers

ADHD

- About 11% of children age 3-17 have ever been diagnosed with ADHD.
- People with ADHD have a 36% increased risk of traffic violations and crashes, particularly in the first month after licensing.
- Medication helps reduce the risk of crash.

Risk Factors for Teen Drivers

Concussion

- What are the criteria for clearing teens with concussion for return to driving?
- Nearly 50% of teens returned to driving about two weeks following a concussion, despite few returning to sports.

Risk Factors for Teen Drivers

Autism

- 1 in 36 children have Autism Spectrum Disorder.
- Autistic drivers have similar or lower crash rates and traffic violations compared to non-autistic drivers.
- Autistic drivers are about 2x more likely to have moving violations and nearly 6x higher rate of license suspensions due to traffic violations.

Additional Resources for Autistic Persons

- **Drive assessment-** Life skills provides preparation for driving
  - https://drivefocus.com/occupational-therapy-tools/
  - Free and online for parents and young adults
- **Drive screen** – Determine who is ready for driving evaluation
- **Drive Focus** – APP on Amazon apps; Google play; Apple app store
  - Videos with off road practice
  - Practice visual search/screen skills- teaches identification of priorities

Teens With Special Needs

Accommodations to be aware of:

- Accommodations for testing are available.
- A Certified Driver Rehabilitation Specialist can assist with driver evaluation and driver's training.
- Learning to drive may be added to an IEP if over age 18 and in Vocational Rehab.
- Management of ADHD, anxiety and other comorbidities.

Certified Driver Rehabilitation Specialists

- Driver Rehabilitation Specialists work with people of all ages and disabilities with the aim to:
  - Conduct a thorough evaluation of abilities and limitations
  - Provide driver remediation and training
  - Assist with navigating the state driver licensing process
  - Work closely with mobility equipment dealers to achieve optimum vehicle fit
- Search official BMV list at IN.gov
- https://www.aded.net/





Resources: Teen Driver Source

- Developed at CHOP with researchers from the Center for Injury Research and Prevention.
- Evidence-based interactive resource that helps parents plan and structure supervised driving.
- Includes information and tools from TeenDrivingPlan (TDP), which has been shown to reduce dangerous driving errors in a randomized controlled trial.
- https://teendriversource.research.chop.edu/

Resources: Checkpoints

- Developed at NIH and evaluated by AAP PROS (Pediatric Research in Office Setting).
- Involves an interactive, personalized first year driving agreement.
- Additional evidence-based prevention strategies and tips for new teen drivers and parents.
- https://youngdriverparenting.org/

Resources: AAA StartSmart Online Parent Session

- Provides *Pointers for Parents*, a tip sheet on helping parents support safe teen driving.
- Online Parent Session: two-hour webinar that further explains both the licensing process and the parents' role and demonstrates how to reinforce what (hopefully) is being taught in Driver's Education.
- https://exchange.aaa.com/safety/teen-driver-safety/pointers-for-parents/

Resources: Ford Driving Skills For Life

- Offers no-cost hands-on training courses and an online academy.
- Hands-on driver training with professional instructors designed to provide experience and improve driver decision making.
- Online academy with videos, simulations, tips and quizzes.
- https://drivingskillsforlife.com/

Resources: Indiana Resources

- Impact Teen Drivers
- www.impactteendrivers.org
- Provides information and videos for parents and teens in class settings
- Must register and then select desired resources

Blue Envelope Program

Provides training for Law Enforcement- resource for Autistics in event needed

- Driver hands Blue Envelope to officer
- Contains Driver license
  - Vehicle registration
  - Insurance information
  - Contact for trusted person if needed
- Exterior provides guidance for officer and driver. Tips to stay calm; allow extra time for responses; reduce sensory input

Resources: SAFEE Module

- Training module targeting attention maintenance and latent hazard anticipation and mitigation.
- 1 - SAFEE Intersection Hazard Anticipation 8 28 25.pptm

Pediatricians Can Make a Difference

- Develop plan and provide resources in office
- Introduce topic of interest in driving a year before provisional license
- Identify patients with possible or definite special needs
- Patients with autism should start discussion at age 11
- Discuss topic with parents and offer resources

Conclusions/Review



Driving continues to be a leading cause of preventable injury and death among teens.



Teens are particularly vulnerable to the risks of driving, and we as providers offer a unique opportunity to support teens in their driving endeavors.



There are numerous interventions we can discuss with our own children, our patients and their families to help reduce the risks seen with teen driving. The most important aspect is improving experience safely.



Teens with special needs who want to drive can do so with the proper support.

Special Appreciation To:

- T4CIP (Trainees for Child Injury Prevention)
- Dr. Flaura Winston, MD, founder of the Center for Injury Research and Prevention- CHOP

- Applications for 2027 cohort open October 1st for medical students, residents, and fellows: https://www.t4cip.org/potential-applicants

Thank You!

Questions?



References

1. Alderman EM, Johnston BD, Breuner C, et al. The Teen Driver. *Pediatrics*. 2018;142(4). doi:10.1542/peds.2018-2163

2. Johnston B. Teen Drivers: Safety Strategies for Parents and Pediatricians. September 30, 2024.

3. Goldstick JE, Cunningham RM, Carter PM. Current Causes of Death in Children and Adolescents in the United States. *New England Journal of Medicine*. 2022;386(20). doi:10.1056/nejmc2201761

4. Licenses, Permits, & IDs. Driver's License. Licenses, Permits, & IDs. July 2020. Accessed August 29, 2026. https://www.in.gov/bmv/licenses-permits-ids/learners-permits-and-drivers-licenses-overview/drivers-license/#Age_Requirements_for_a_Probationary_Driver_s_License

5. Basic Facts about Teen Crashes | Teen Driver Source. teendriversource.research.chop.edu. 2024. Accessed August 29, 2026. https://teendriversource.research.chop.edu/teen-crash-risks-prevention/car-accident-prevention/basic-facts-about-teen-crashes

6. Practice Driving Lessons | Teen Driver Source. Chop.edu. 2024. Accessed August 29, 2026. https://teendriversource.research.chop.edu/learning-to-drive/practice-driving-lessons

7. CDC. Data and statistics on ADHD. Attention-Deficit / Hyperactivity Disorder (ADHD). November 19, 2024. Accessed August 29, 2026. https://www.cdc.gov/adhd/data/index.html

8. McDonald CC, Jain D, Storey EP, Gonzalez M, Master CL, Arbogast KB. Changes in Driving Behaviors After Concussion in Adolescents. *J Adolesc Health*. 2021;69(1):108-113. doi:10.1016/j.jadohealth.2020.10.009

Practice Question

A 16-year-old male with a history of ADHD is hoping to learn to drive soon. The patient and his father share that they would like to discuss how to best prepare for success during this exciting time. Which of the following can you share with the patient and his family?

a) Eliminate as many distractions from the vehicle as possible
b) Encourage continuation of medication treatment for ADHD
c) Discuss the increased risks associated with driving with ADHD
d) All of the above

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Practice Question

A parent expresses excitement though apprehension and concern about their adolescent learning how to drive soon. You listen and validate their concerns, then share a resource that has been shown in a randomized controlled trial to reduce dangerous driving errors. This resource is:

- CarSafe
- AdolescentAwareness
- TeenDrivingPlan
- There has not been a program developed to help support families like this before

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Peyton Manning Children's Hospital

Ascension St. Vincent

Pediatric Anxiety and Depression

Eric Swanson, MD
Child and Adolescent Psychiatrist
St. Vincent Stress Center

Questions?



Objectives

- Navigate first line treatment recommendations for pediatric anxiety and depression according to AACAP guidelines
- Understand levels of treatment based on risk assessment
- Name treatment relevant complicating factors to care

American Association of Child & Adolescent Psychiatry

Anxiety and Depression Guidelines

AACAP suggests that cognitive-behavioral therapy and interpersonal therapy could be offered to adolescents and children with major depressive disorder or persistent depressive disorder.

AACAP recommends that cognitive-behavioral therapy (CBT) be offered to patients 6 to 18 years old with social anxiety, generalized anxiety, separation anxiety, specific phobia, or panic disorder.

AACAP suggests that selective serotonin reuptake inhibitor medication (except paroxetine), preferably fluoxetine, could be offered to adolescents and children with major depressive disorder, social anxiety, generalized anxiety, separation anxiety, or panic disorder

Research supporting guidelines

Depression:

- Therapy:
  - 25 studies
  - 14 RCTs
- Pharmacologic:
  - 27 studies
  - 14 RCTs
    - All SSRIs

Anxiety:

- Therapy:
  - 92 RCTs
- Pharmacologic:
  - 13 RCTs

Research supporting guidelines

Depression:

- SSRIs improved response and functional status for adolescents and children with MDD
- Fluoxetine with statistically significant improvements

Anxiety:

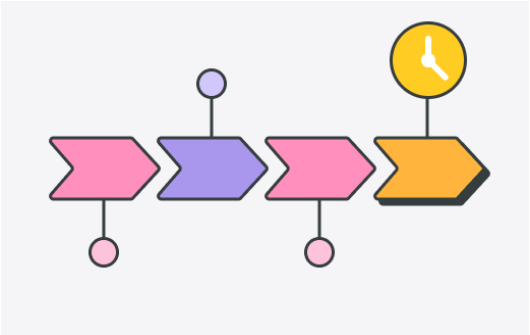
- SSRIs as a class improved primary anxiety symptoms, response to treatment, global function, and may have improved remission of disorder.

SSRI treatment trials

1.

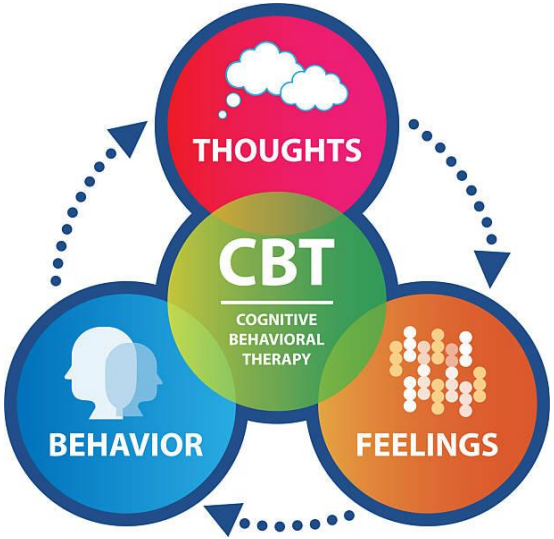


2.



Therapy

12-24 sessions



Common SSRI concerns

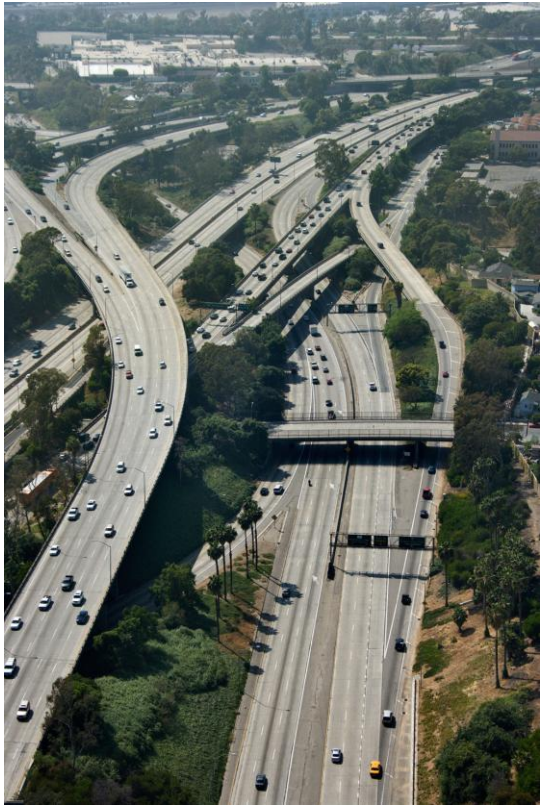




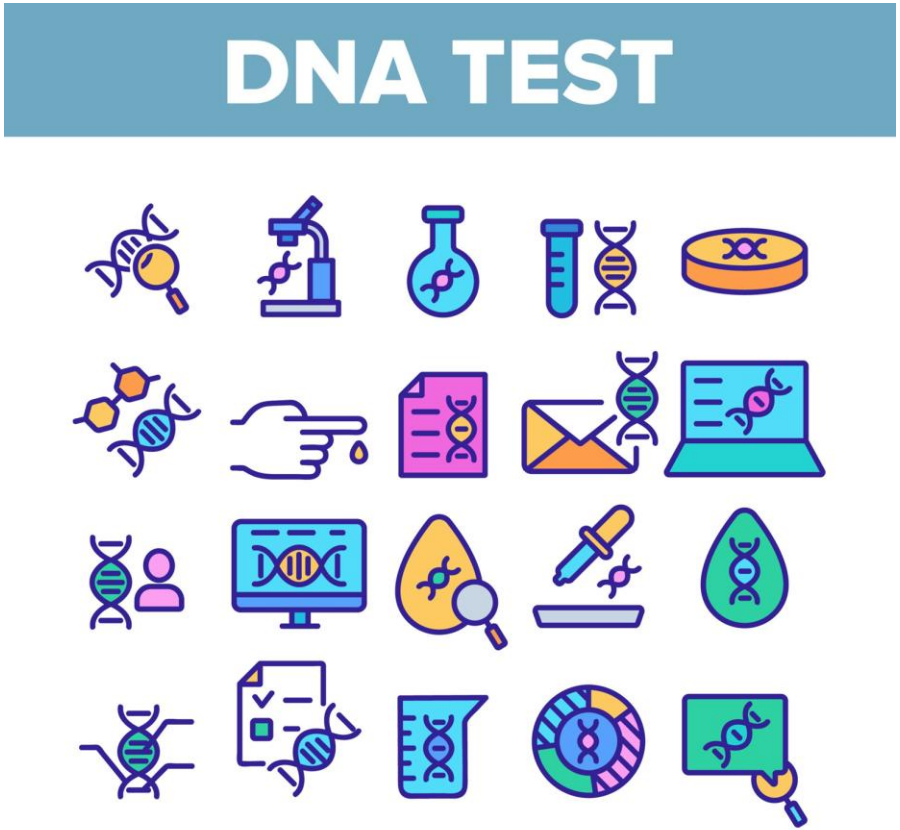


The pooled risk difference (between treatment and control) has been reported to be 0.7% (95% confidence interval −0.4% to 2%; p = .21)

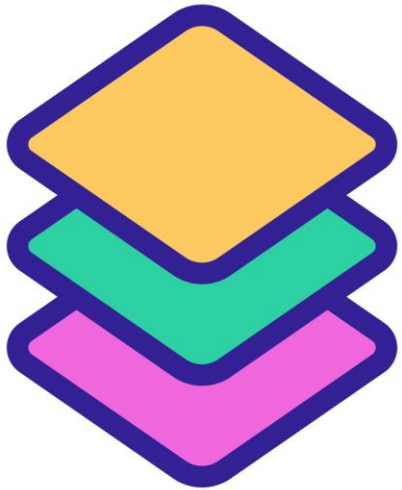
Common SSRI concerns



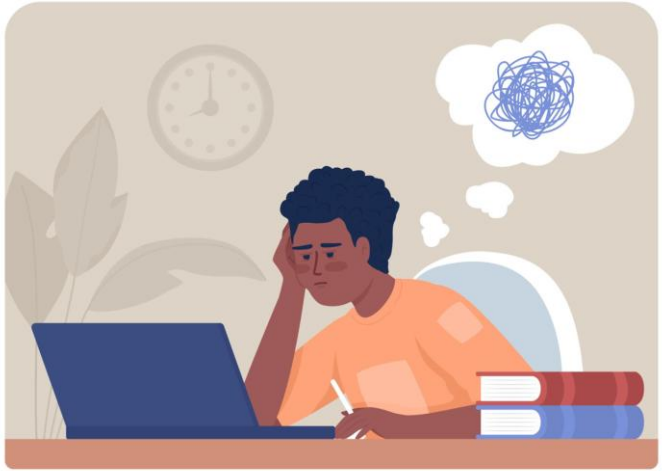
GeneSight testing



What level of care is appropriate for my patient?



ADHD and mood disorders



Effects of ADHD and ADHD medications on depression and anxiety in children and adolescents: A systematic review and meta-analysis

Yanyi Zhang, Wenjing Liao, Yanxiao Rao, Weijia Gao, Rongwang Yang *

Department of Psychology, Children's Hospital, Zhejiang University School of Medicine, National Clinical Research Center for Child Health, Hangzhou, 310003, Zhejiang, China

Autism and mood disorders



Digital use and mood disorders

JAMA Pediatrics | Original Investigation

Digital Media Use and Child Health and Development
A Systematic Review and Meta-Analysis

Samantha Teague, PhD; Klaire Somoray, PhD; Adrian Shatte, PhD; Daniel Miller, PhD; Kristian Moss, BPsych; Andrew Crawford, BPsych(Hons); Harrison Wildman, BPsych(Hons); Diana Kayal, GradDip(Psych); Delyse Hutchinson, MClinPsych, PhD



Racial disparities & social determinants of health



MOC questions:

Question 1

A 12 year old patient with diagnosis of major depressive disorder presents for follow up of escitalopram management. Based on your interview, depression is not adequately controlled on her dose of 20 mg daily. She and her parents report no missed doses. She is in weekly therapy, which she finds helpful and has a good relationship with her therapist. She previously tried 10mg of fluoxetine for 4 weeks but had significant insomnia, which she could not tolerate and so she discontinued her medication. There are no acute safety concerns identified in your encounter. Family is asking about additional medication management options. What would be your next recommendation?

A. Augment with 2mg of aripiprazole daily
B. Augment with 150mg of bupropion XL daily
C. Discontinue escitalopram and start 20mg of duloxetine daily
D. Discontinue escitalopram and start 25mg of sertraline daily
E. Augment with 7.5mg of mirtazapine daily

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Per AACAP guidelines, two trials of SSRIs should be completed before moving to an SNRI or augmentation with a second agent. SSRI trials are only considered complete if they were for an evidence based amount of time and an evidence based dose. Fluoxetine 10mg is not an evidence based dose and 4 weeks is not an evidenced based amount of time.

MOC questions:

Question 2

A 15-year-old Black adolescent presents to a primary care clinic with declining grades, irritability, fatigue, difficulty concentrating, and social withdrawal over the past 3 months. His mother reports that he has become less interested in activities he previously enjoyed and has had several visits to the school counselor for behavioral concerns. The pediatrician notes that the patient appears withdrawn and has a flat affect. After further evaluation, he meets DSM-5 criteria for major depressive disorder.

Which of the following best describes a documented racial disparity in the diagnosis and treatment of anxiety and depression among children and adolescents in the United States?

A. Black and Hispanic youth are more likely than white youth to receive evidence-based treatment for depression after diagnosis.
B. Black youth are more likely than white youth with similar symptoms to be diagnosed with disruptive behavior disorders rather than mood disorders.
C. Anxiety and depression are diagnosed at similar rates across racial groups when symptom severity is equivalent.
D. White youth are less likely than Black youth to receive antidepressant medication when clinically indicated.
E. Black youth have higher rates of mental health specialty care utilization than white youth despite similar access barriers.

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D. White youth are less likely than Black youth to receive antidepressant medication when clinically indicated.
E. Black youth have higher rates of mental health specialty care utilization than white youth despite similar access barriers.

Numerous studies have demonstrated that racial and ethnic minority youth, particularly Black children and adolescents, experience disparities in mental health diagnosis and treatment. Compared with white youth presenting with similar symptoms, Black youth are more likely to be diagnosed with disruptive behavior disorders (such as oppositional defiant disorder or conduct disorder) and less likely to receive diagnoses of depression or anxiety. These diagnostic differences may contribute to delays in appropriate treatment and poorer mental health outcomes.

Additionally, Black and Hispanic youth are less likely to receive mental health services, psychotherapy, or antidepressant treatment after diagnosis compared with white youth. Contributing factors include structural racism, differences in access to care, clinician bias, stigma, and socioeconomic barriers.

Questions?

Resources

Depression Assessment tools

Preschool Age Psychiatric Assessment (PAPA) for DSM-5 (https:// devepi.duhs.duke.edu/files/2018/06/PAPA-Core-Diagnostic Modules-DSM-5-1.pdf)

Patient Health Questionnaire 9 (PHQ-9) modified for adoles cents110-112 (https://www.aacap.org/App_Themes/AACAP/docs/ member_resources/toolbox_for_clinical_practice_and_outcomes/ symptoms/GLAD-PC_PHQ-9.pdf)

Mood and Feelings Questionnaire (MFQ), parent and child versions113,114 (https://devepi.duhs.duke.edu/measures/the-mood-and feelings-questionnaire-mfq/)

Preschool Feelings Checklist115 (www.jaacap.org/article/S0890-8567(09)61320-4/ fulltext)

Anxiety Assessment tools

Screen for Child Anxiety Related Emotional Disorders (SCARED), parent and child versions https://www. pediatricbipolar.pitt.edu/resources/instruments78

Spence Children's Anxiety Scale (SCAS), parent and child versions https://www.scaswebsite.com79

Preschool Anxiety Scale, parent version https://www. Scaswebsite.com79

Generalized Anxiety Disorder 7 (GAD- teen/adult version https://www.phqscreeners.com

CDC 2023-2024

Condition	Ages 3-5	Ages 6-11	Ages 12-17
Anxiety	2.7 %	9.7 %	16.5 %
Depression	0.1 %	1.8 %	8.2 %
Behavior Disorders	5.3 %	9.9 %	6.7 %

CDC 2023-2024

Among US high school students in 2023:

- 40% reported persistent feelings of sadness or hopelessness in the past year.
- 20% reported seriously considering attempting suicide in the past year.
- 16% reported making a suicide plan in the past year.
- 9% reporting attempting suicide in the past year.

CDC Suicide Data 2024

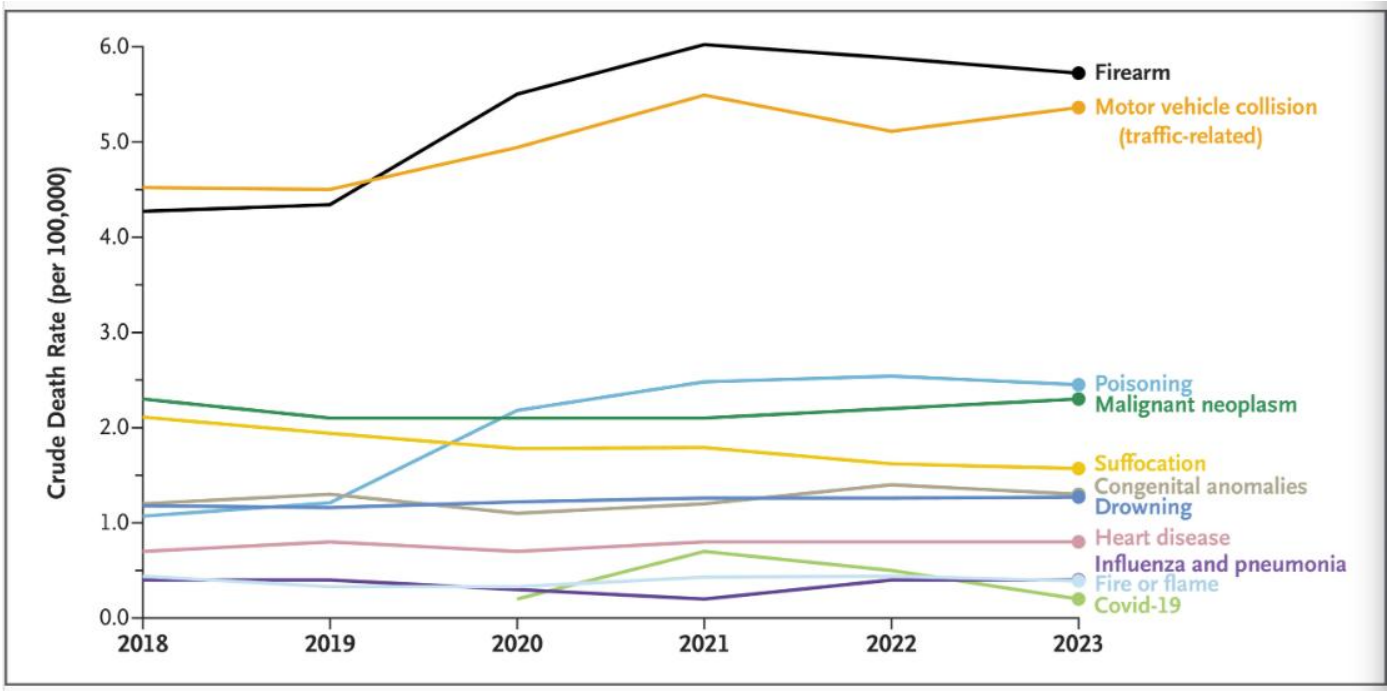
Indiana suicides (total): 1,175

Suicide was a top 3 leading cause of death for children 10-14

Suicide was a top 3 leading cause of death for kids 15-19

NEJM - Leading causes of death

Leading Causes of Death among Children and Adolescents in the United States (2018 through 2023).



Decoding Dysphagia: Digestive Drivers of Feeding and Swallowing Disorders

Roma Bose, MD
Assistant Professor of Clinical Pediatrics
Pediatric Gastroenterology, Hepatology, and Nutrition
September 25, 2026



Riley Hospital for Children
Indiana University Health



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Overview

- Define an aerodigestive patient and program
- Review mechanics of swallowing
- Discuss GI-specific conditions characterized by dysphagia
- Review common testing modalities used

- I have no disclosures

"A pediatric aerodigestive *patient* is a child with a combination of multiple and interrelated congenital and/or acquired conditions affecting airway, breathing, swallowing, or growth that require a coordinated interdisciplinary diagnostic and therapeutic approach to achieve optimal outcomes…

…this includes (but is not limited to) structural and functional airway, upper GI tract disease, and lung disease because of congenital or developmental abnormality or injury, swallowing dysfunction, feeding problems, genetic diseases, and neurodevelopmental disability"

Boesch RP et al. Structure and Function of Pediatric Aerodigestive Programs: A Consensus Statement. Pediatrics 2018;141(3).

An aerodigestive *program* provides coordinated and interdisciplinary care to aerodigestive patients

- Core team members include:
  - Care Coordinator
  - Nursing
  - GI
  - Pulmonology
  - ENT
  - SLP

For a subset of patients:

- Sleep medicine
- Social work
- Dietician
- Respiratory therapy

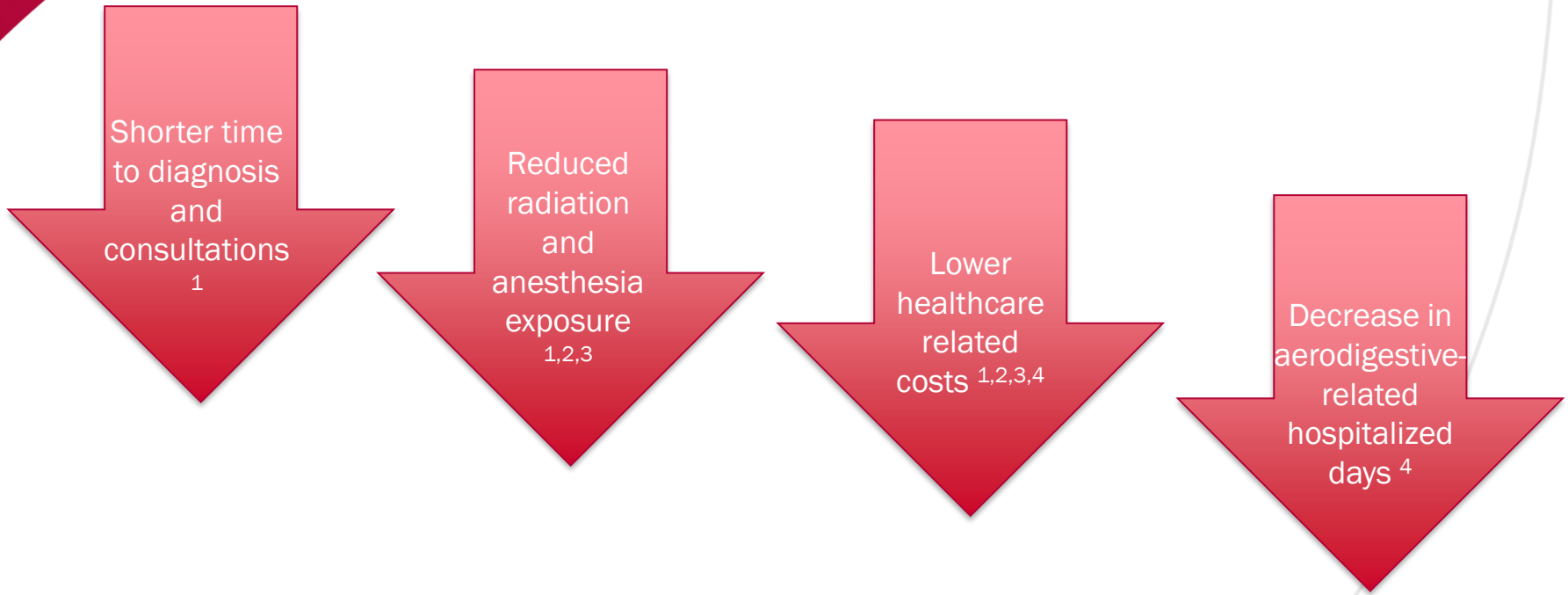
Boesch RP et al. Structure and Function of Pediatric Aerodigestive Programs: A Consensus Statement. Pediatrics 2018;141(3).

Pediatricians and specialists are seeing more patients with medical complexity/special healthcare needs

- Advances in the care of critically ill infants and children have led to improved survival of premature infants with subsequent complex and chronic disease [1]
- Medical complexity of hospitalized children is rising [2]
- Children with medical complexity have higher healthcare utilization and higher odds of in-hospital mortality [3]

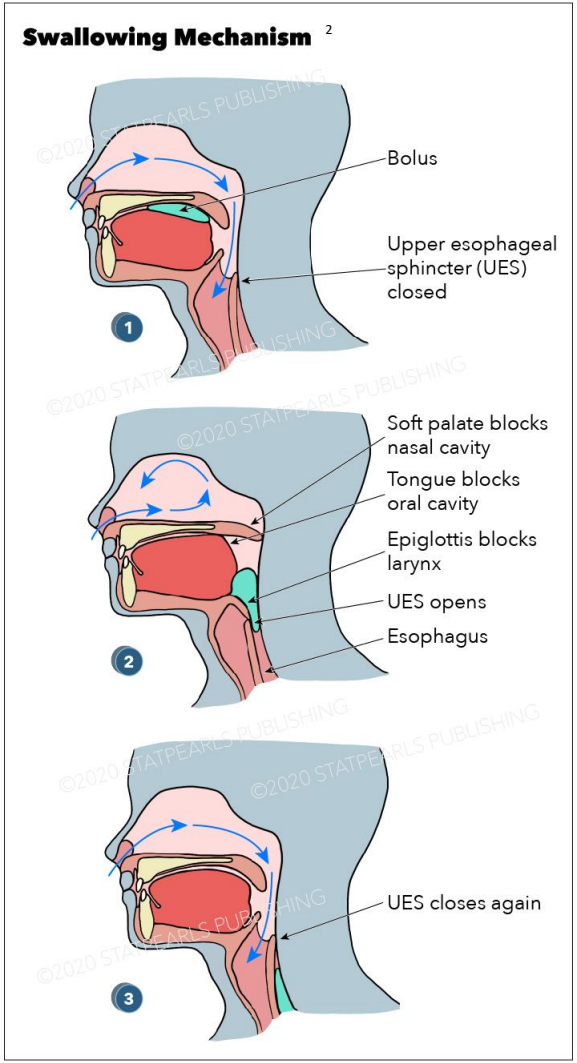
[1]Kaul I & Chiou EH. The role of pediatric gastroenterologists in the evaluation of complex aerodigestive disorders. Curr Gastroenterol Reports 2022; 24: 11-221.
[2]Burns KH et al. Increasing prevalence of medically complex children in US Hospitals. Pediatrics 2010; 126(4): 638-646.
[3]Leyenaar JK et al. Prevalence of Children With Medical Complexity and Associations With Health Care Utilization and In-Hospital Mortality. JAMA Pediatrics 2022; 76(6): e220687.

There are many benefits to Aerodigestive programs



[1]Boesch RP et al. Interdisciplinary aerodigestive care model improves risk, cost, and efficiency. International Journal of Pediatric Otorhinolaryngology 113 (2018) 119–123.
[2] Ruiz AG et al. Demonstrating the Benefits of a Multidisciplinary Aerodigestive Program. The Laryngoscope 2019; 130: 521-525
[3] Collaco JM et al. Interdisciplinary Pediatric Aerodigestive Care and Reduction in Health Care Costs and Burden. JAMA Otolaryngol Head Neck Surg. 2015;141(2):101-105.
[4] Appachi S et al. Association of Enrollment in an Aerodigestive Clinic With Reduced Hospital Stay for Children With Special Health Care Needs. JAMA Otolaryngol Head Neck Surg. 2017;143(11):1117-1121.

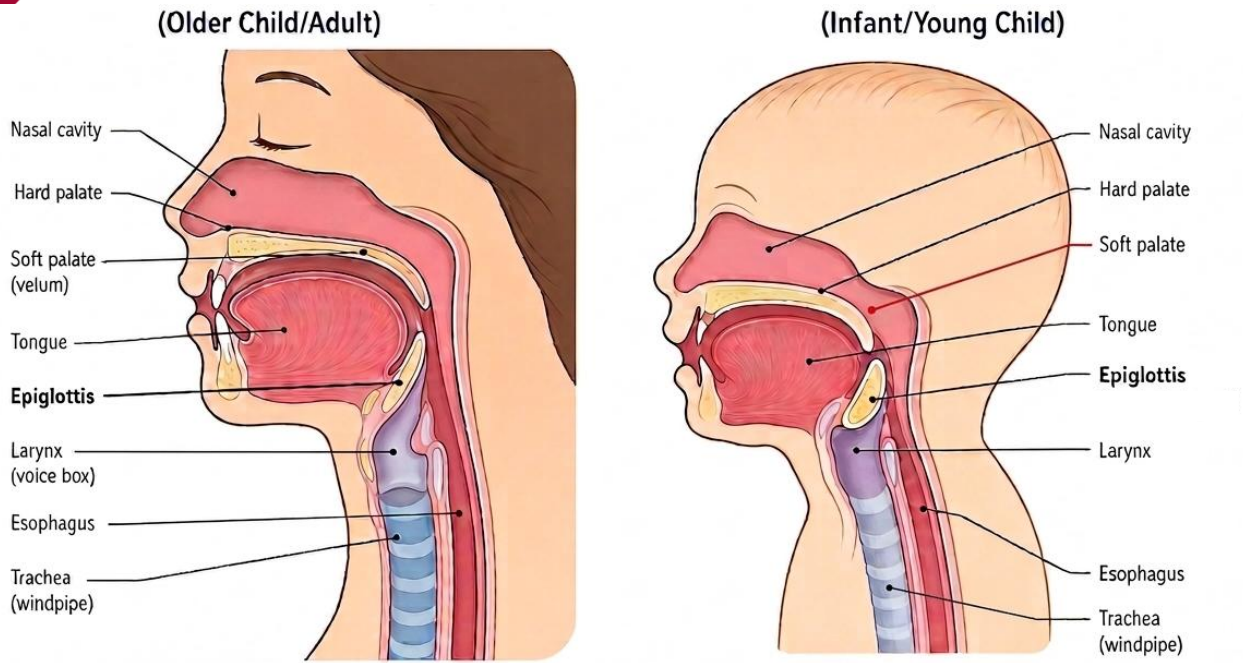
Swallowing is an intricate process that requires "neuromotor coordination of upper aerodigestive tract and both cortical and brain stem control"[1]



- Oral- preparatory & propulsion/transit
  - Lips, cheeks, jaw, tongue, palate
- Pharyngeal
  - Cranial nerve, pharynx, larynx
- Esophageal

[1]Hennessy M, Goldenberg D Surgical anatomy and physiology of swallowing. Operative Techniques in Otolaryngology-Head and Neck Surgery 2016;27(2):60-66.
[2]Gregory E. "Swallowing Mechanism." In: Panara K, Ramezanpour Ahangar E, Padalia D. *Physiology, Swallowing*. StatPearls. NCBI Bookshelf. CC BY-NC-ND 4.0.

Swallowing anatomy in infants and toddlers is different from that in older children and adults



- Large tongue
- No distinct oropharynx
- Narrow epiglottis
- Larynx is smaller and higher in the neck

Arvedson, Joan C., Brodsky, Linda, and Lefton-Greif, Maureen A.. *Pediatric Swallowing and Feeding : Assessment and Management*. San Diego: Plural Publishing, Incorporated, 2017. ProQuest Ebook Central.

A majority of neurotypical infants with swallowing dysfunction will have resolution within 2 years of diagnosis

Reason for Swallow Study	# of patients	Median Oropharyngeal Dysphagia resolution days	Probability of Resolution - 24 months
Presumed aspiration	18	346	72.2%
Poor feeding (FTT)	17	153	70.6%
Noisy breathing	10	252	70%
Reflux	5	277	80%
Total	**50**	**202**	**76%**

Casazza GC et al. Aspiration in the Otherwise Healthy Infant—Is There a Natural Course for Improvement? Laryngoscope 2020;130:514–520.

Red flag symptoms that increase concern for an identifiable anatomic or organic issue are…

- Persistent aspiration after 2 years of age
- Recurrent hospitalization for respiratory indication
- Recurrent antibiotic use for sinopulmonary indication
- Recurrent vomiting leading to dehydration
- Malnutrition despite adequate calorie intake
- Dysmorphic features

Esophageal and extraesophageal symptoms can be associated with swallowing disorders

Esophageal

- Reflux
- Vomiting
- Choking
- Oral aversion
- Feeding problem
- Abdominal pain
- Growth faltering

Extraesophageal

- Chronic cough
- Throat clearing
- Recurrent respiratory infection
- Recurrent croup

Kaul I & Chiou EH. The role of pediatric gastroenterologists in the evaluation of complex aerodigestive disorders. Curr Gastroenterol Reports 2022; 24: 11-221.

A role of the GI specialist is to determine if a condition of the GI tract is associated with the aerodigestive symptoms

- Gastroesophageal reflux disease
- Eosinophilic esophagitis
- Esophageal atresia
- Esophageal stenosis or stricture
- Esophageal dysmotility
  - Achalasia



Gastroesophageal Reflux Disease (GERD)

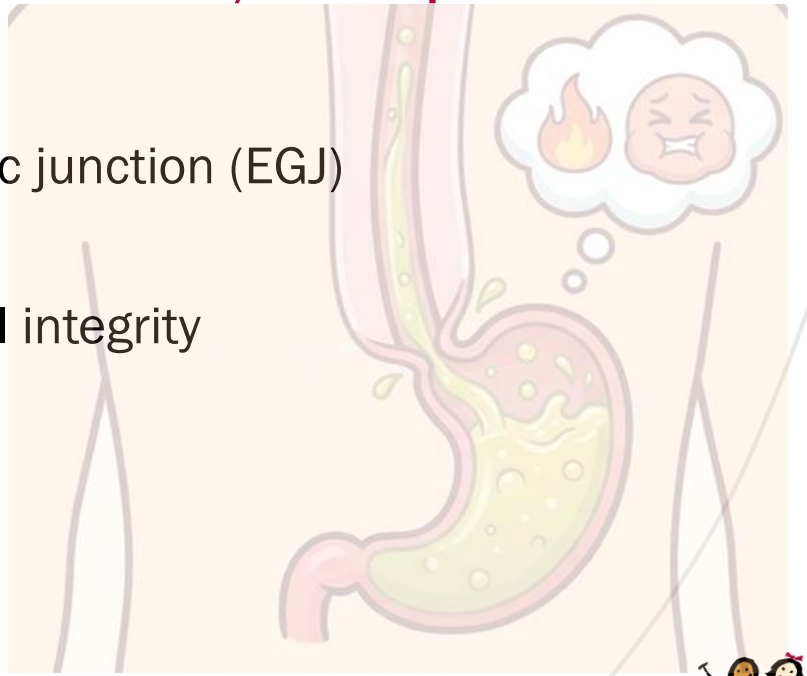


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GERD is the condition in which reflux of gastric contents into the esophagus results in symptoms and/or complications



- Poorly functioning esophagogastric junction (EGJ)
- Impaired esophageal clearance
- Alterations in esophageal mucosal integrity
- Decreased salivary production
- Delayed gastric emptying
- Esophageal hypersensitivity

Katz PO et al. ACG Clinical Guideline for the Diagnosis and Management of Gastroesophageal Reflux Disease. Am J Gastroenterol 2022;117:27–56.

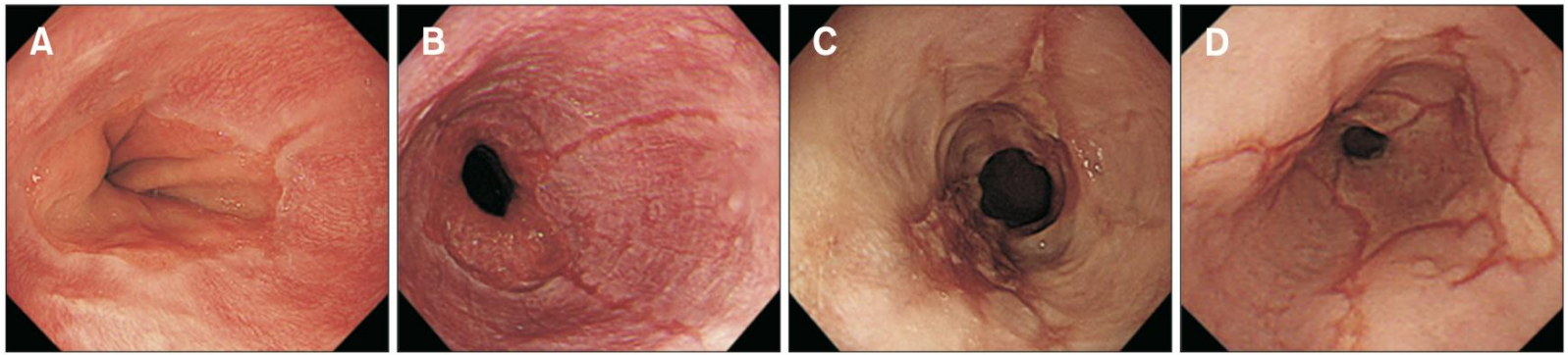
GERD can have objective or subjective criteria for diagnosis

- Objectively defined by
  - presence of characteristic mucosal injury seen at endoscopy (reflux esophagitis)
  - abnormal esophageal acid exposure demonstrated on a reflux monitoring study
- Subjectively defined by response to trial of GERD treatment

Katz PO et al. ACG Clinical Guideline for the Diagnosis and Management of Gastroesophageal Reflux Disease. Am J Gastroenterol 2022;117:27–56.

Mucosal injury of GERD on endoscopy is labeled based on severity

- Los Angeles (LA) Classification[1]
  - A and B: one or more mucosal breaks </= 5mm (A) or >5mm (B), does not extend between the tops of two mucosal folds
  - C: one or more mucosal breaks continuous between the tops of two or more mucosal folds, < 75% circumference
  - D: > 75% circumference

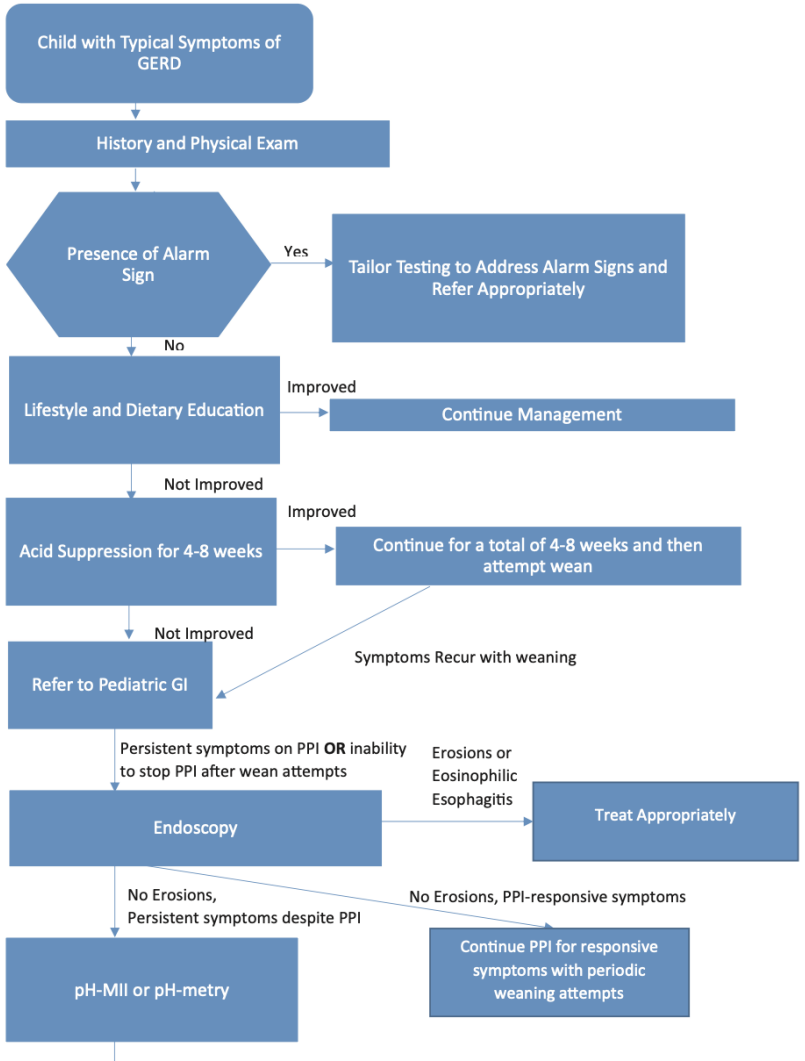


[2]

[1]Lundell LR et al. Endoscopic assessment of oesophagitis: clinical and functional correlates and further validation of the Los Angeles classification. Gut 1999;45:172-180.

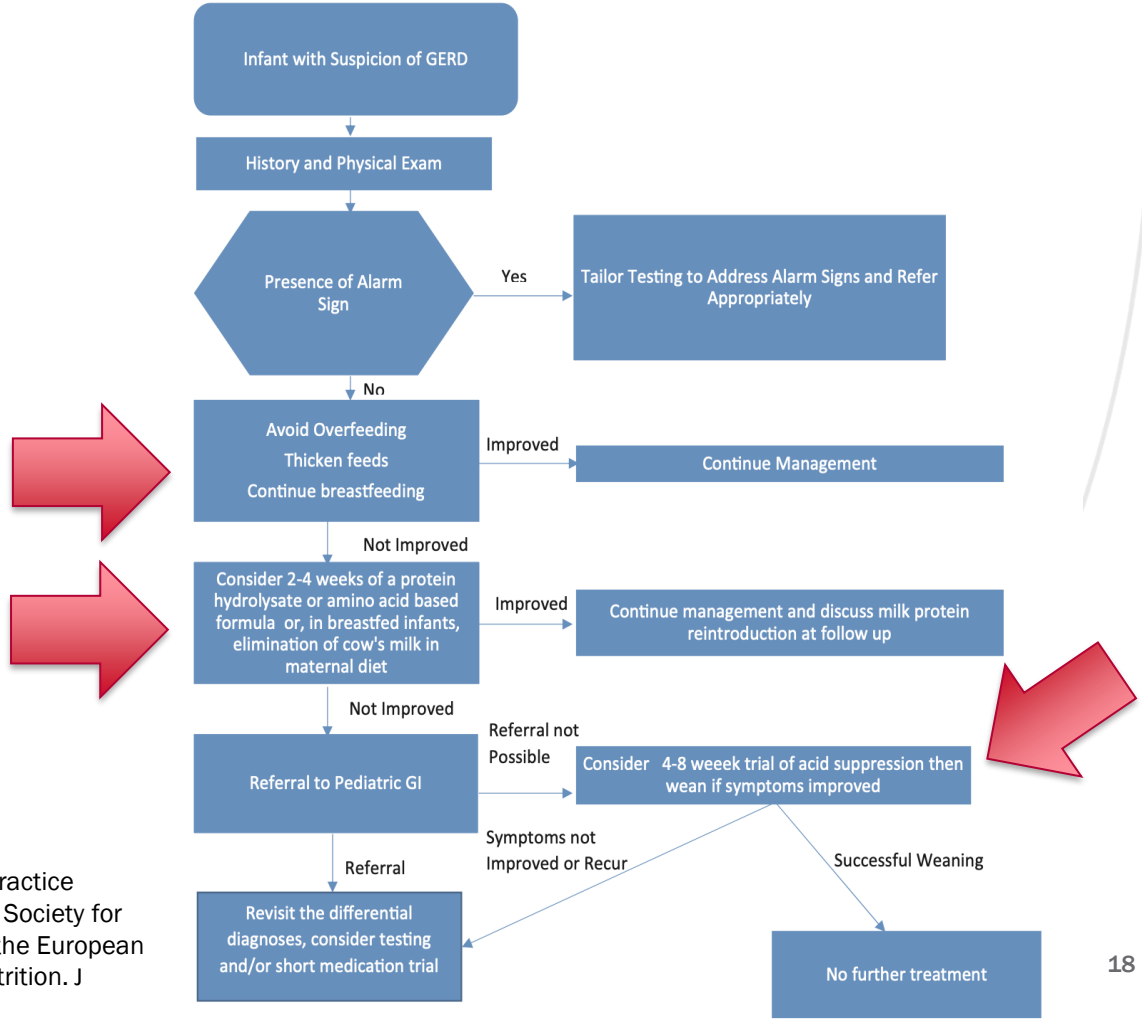
[2]Noh JH & Jong HY. Role of Endoscopy in Motility Disorders of Upper Gastrointestinal Tract. J Neurogastroenterol Motil 2023;29:7-19.

PPIs are the mainstay of treatment of GERD AFTER infancy[1,2]



[1]Rosen R et al. Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition. J Pediatr Gastroenterol & Nutr 2018;66(3):516-554.
[2]Katz PO et al. ACG Clinical Guideline for the Diagnosis and Management of Gastroesophageal Reflux Disease. Am J Gastroenterol 2022;117:27–56.

But, the approach to GERD in infants is different because most reflux in infants is NOT acidic



Rosen R et al. Pediatric Gastroesophageal Reflux Clinical Practice Guidelines: Joint Recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition. J Pediatr Gastroenterol & Nutr 2018;66(3):516-554.

PPI side effect with the highest-quality data in adults and pediatrics is infection

- Adult study: 17,598 patients >/= 65 years with stable CAD or PAD on rivaroxaban or aspirin
- RCT: PPI (Pantoprazole 40mg daily) vs Placebo
- Followed for 3 years
- 33% increased risk of enteric infection
- No increased risk for CKD, dementia, PNA, fracture, COPD, DM

Moayyadi P et al. Safety of Proton Pump Inhibitors Based on a Large, Multi-Year, Randomized Trial of Patients Receiving Rivaroxaban or Aspirin. Gastroenterol 2019;157:682–691.

- French Health Data System Cohort Study
- 1,262,424 children
- Born between 2010-2018
- Followed until hospitalized for serious infection, loss to follow up, death, or 2019
- 34% increased risk of serious infection

Risk of Serious Infection by Site or Pathogen (>12mo PPI exposure)	aHR (95% CIs w. significance)
GI	1.47
ENT	1.57
LRTI	1.47
Renal	1.44
Skin	1.12
Bacterial	1.63
Viral	1.28

Lassalle M et al. Proton Pump Inhibitor Use and Risk of Serious Infections in Young Children. JAMA Pediatr 2023;177(10):1028-1038.

What about PPIs and Asthma? Fractures?

- Cohort study using registry data from Sweden
- 80,870 matched pairs of children
- Risk of incident asthma; 3 year follow up
- 57% increased risk of asthma
- Similar risk across different PPIs and time to asthma diagnosis since initiation of PPI
- Highest risk among infants and toddlers < 2yo

Wang YH et al. Association Between Proton Pump Inhibitor Use and Risk of Asthma in Children. JAMA Pediatr 2021;175(1):394-403.

- Cohort study using registry data from Sweden
- 115,933 matched pairs of children
- Risk of fractures; 5 year follow up
- 11% increased risk of fractures

Wang YH et al. Association Between Proton Pump Inhibitor Use and Risk of Fracture in Children. JAMA Pediatr 2020;174(6):543-551.

Potassium-Competitive Acid Blocker (P-CAB) is a new class of acid suppressant

- Blocks the potassium binding site of a proton pump in gastric parietal cells
- Differences from PPIs: not a prodrug, longer half life, acid stable, reversible, not impacted by CYP2C19 genetic polymorphisms
- But expensive, not available OTC

LA Grade A/B Erosive Esophagitis[1]	PCAB = PPI	US Adult RCT 94% vs 91% @ 8 weeks
LA Grade C/D Erosive Esophagitis[1]	PCAB > PPI	US Adult RCT 70% vs 53% @ 2 weeks 92% vs 72% @ 8 weeks
H.Pylori infection[1]	PCAB > PPI	Systematic Review 92% vs 80%

- No pediatric RCTs
- Exposures of vonoprazan in children and adolescents matches that of adults[2]

[1]Patel A et al. AGA Clinical Practice Update on Integrating Potassium-Competitive Acid Blockers Into Clinical Practice: Expert Review. Gastroenterology 2024;167:1228–1238.
[2]Mulford DJ et al. The pharmacokinetics and safety of vonoprazan in adolescents and children with gastroesophageal reflux disease. J Pediatr Gastroenterol Nutr. 2026;82:1153–1161.

Eosinophilic Esophagitis (EoE)



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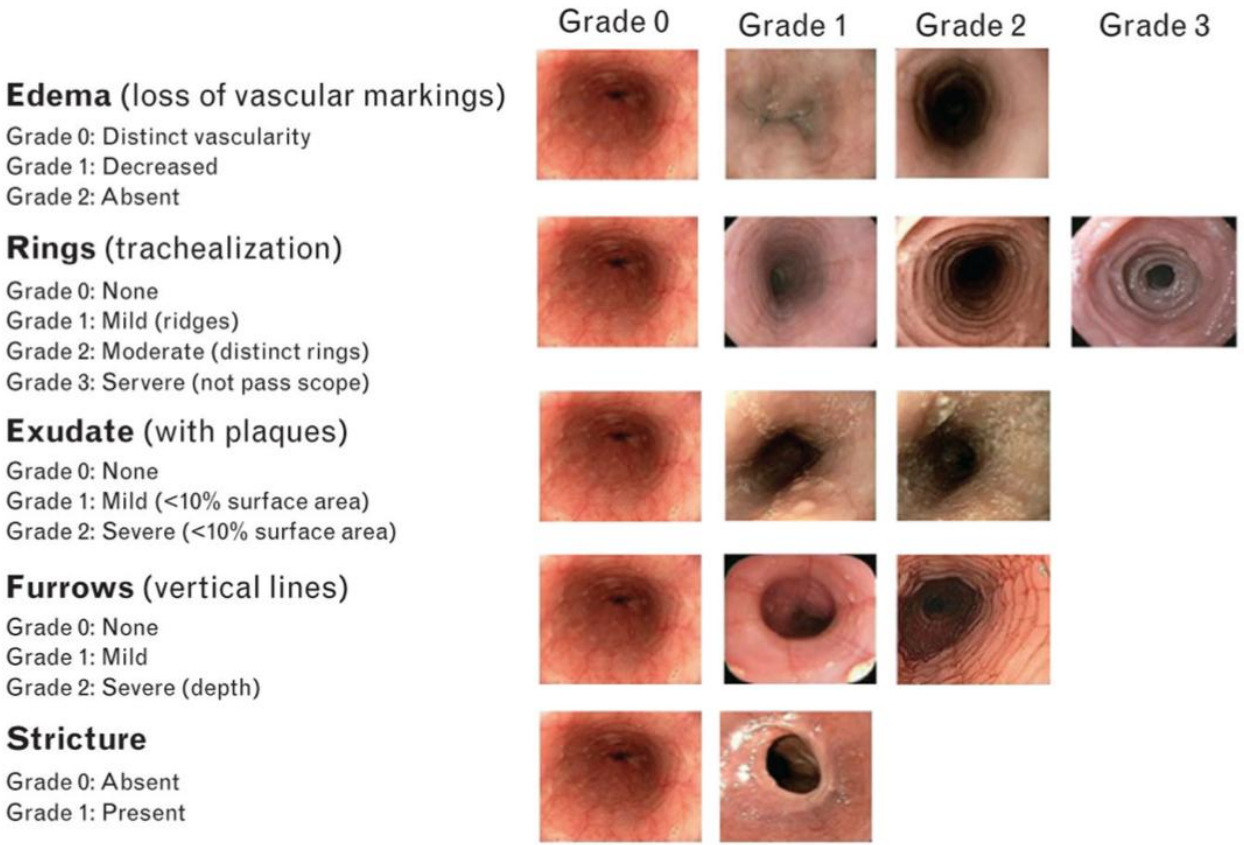
EoE is a chronic, progressive, fibrostenotic disease of the esophagus

- Symptoms of esophageal dysfunction (varies based on age)
- 15 or more eosinophils per high-powered field on a biopsy from the esophagus

Adolescents & Adults	Infants & Toddlers
Dysphagia	Vomiting
Heartburn	Choking on food
Abdominal pain	Feeding aversion
Food impaction	Poor weight gain
Adaptive behaviors	

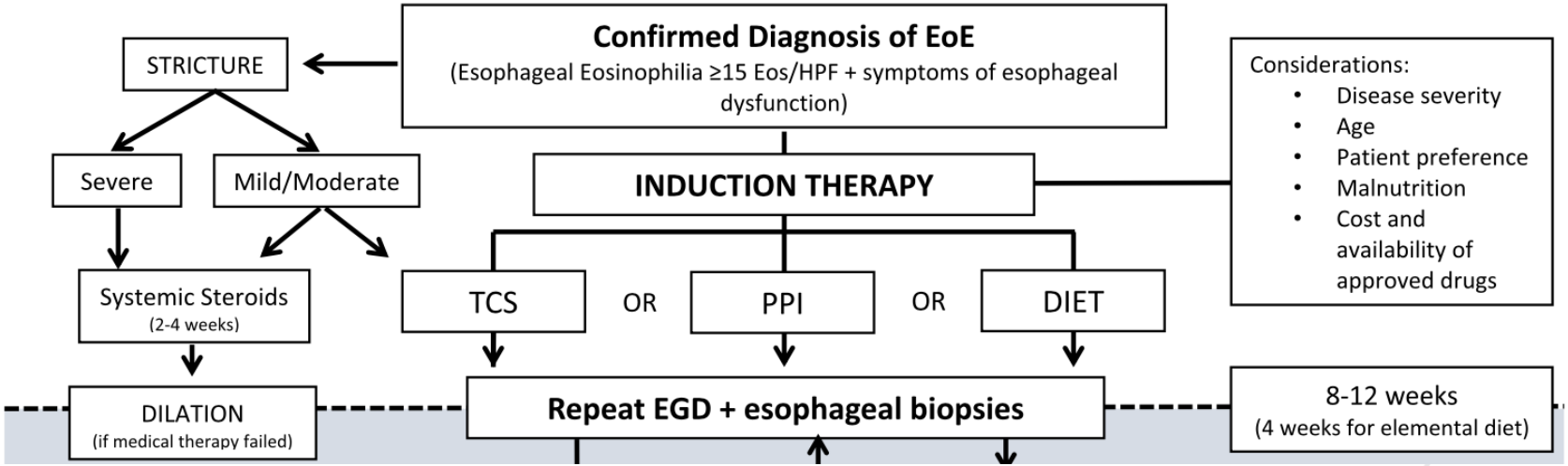
Furuta GT et al. Eosinophilic esophagitis in children and adults: a systematic review and consensus recommendations for diagnosis and treatment. *Gastroenterol* 2007;133:1342-1363.

There are esophageal texture changes in EoE



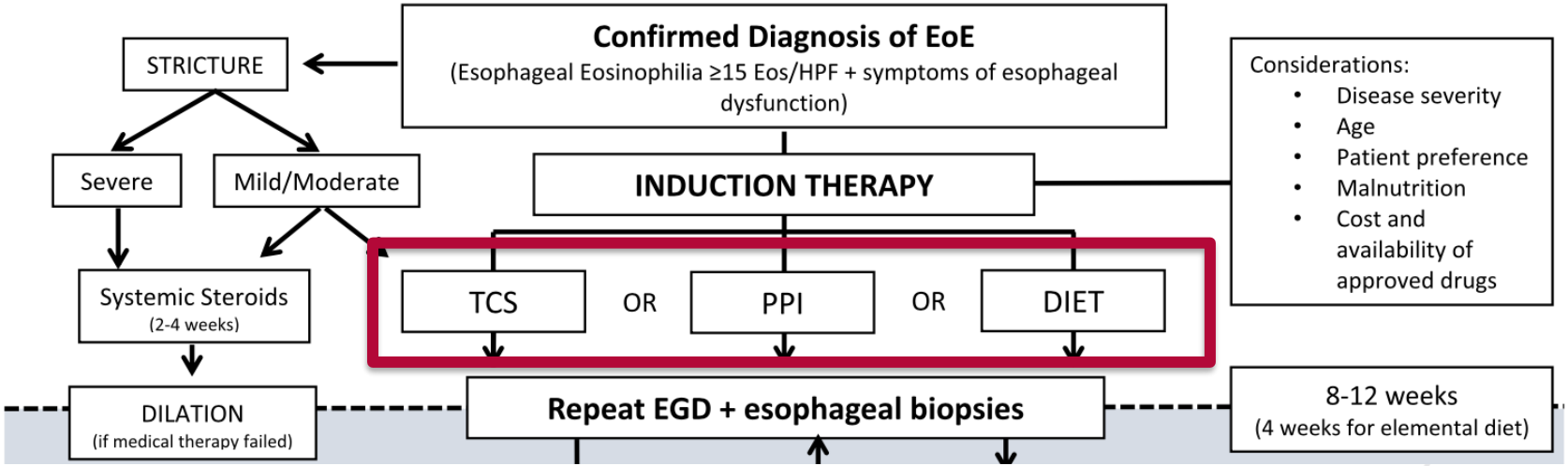
Hirano I et al. Endoscopic assessment of the oesophageal features of oeosinophilic esophagitis: validation of a novel classification and grading system. *Gut* 2013;62:489-495.

EoE treatment includes diet elimination and medications like PPIs, topical corticosteroids, and biologics



Amil-Das J et al. Diagnosis and management of eosinophilic esophagitis in children: an update from European society of pediatric gastroenterology, hepatology, and nutrition. J Pediatr Gastroenterol Nutr 2024;79:394-437.

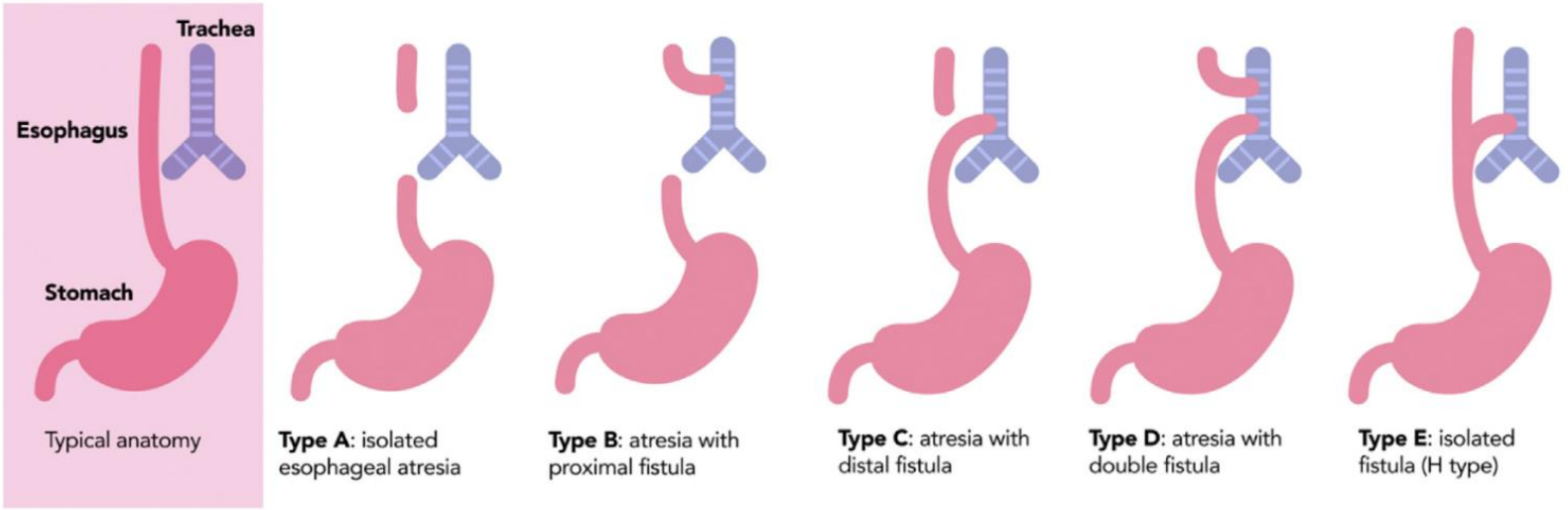
EoE treatment includes diet elimination and medications like PPIs, topical corticosteroids, and biologics



Amil-Das J et al. Diagnosis and management of eosinophilic esophagitis in children: an update from European society of pediatric gastroenterology, hepatology, and nutrition. J Pediatr Gastroenterol Nutr 2024;79:394-437.

Esophageal atresia (EA)

Esophageal atresia is the one of the most common digestive malformations



Khlevner J et al. Management of adults with esophageal atresia. Clin Gastro and Hepatol 2023;21:15-25.

Other esophageal disorders can occur in patients with esophageal atresia

- GERD
  - Pulmonary complications, anastomotic stricture, growth faltering
  - Acid suppression is recommended during infancy
- EoE
- Esophageal hypomotility

Routine endoscopy in asymptomatic EA patients is recommended:

- After stopping PPI therapy
- Before the age of 10 years
- At transition to adulthood

Krishnan U et al. ESPGHAN-NASPGHAN Guidelines for the Evaluation and Treatment of Gastrointestinal and Nutritional Complications in Children With Esophageal Atresia-Tracheoesophageal Fistula. J Pediatr Gastroenterol & Nutr 2016;63:550-570.

Testing Modalities

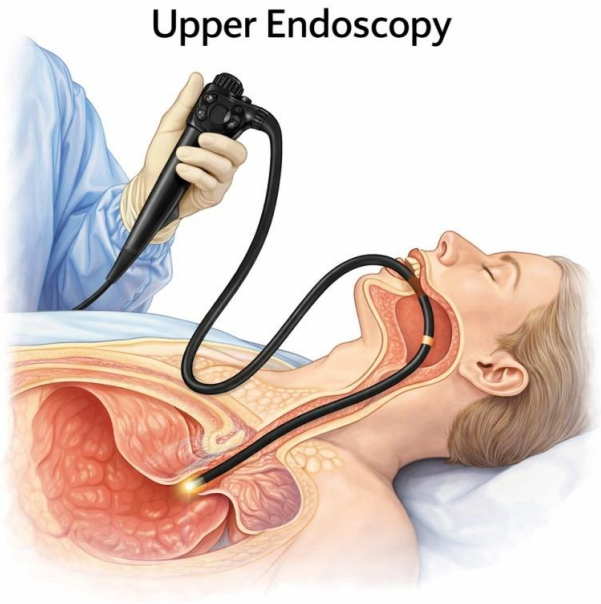


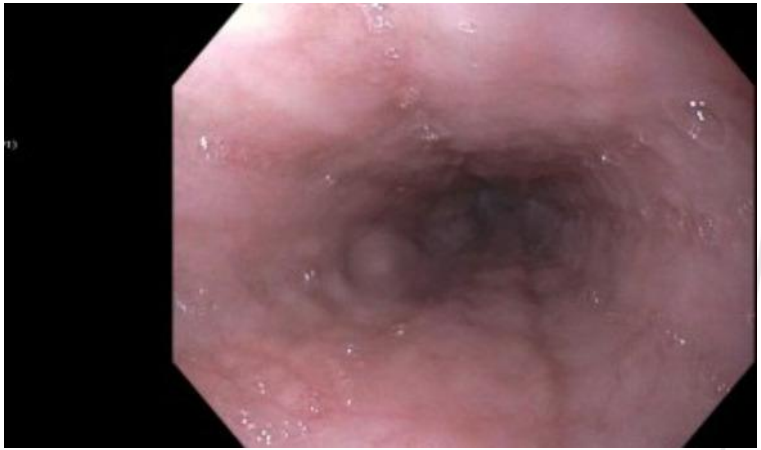
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Endoscopy assesses for mucosal GI disease

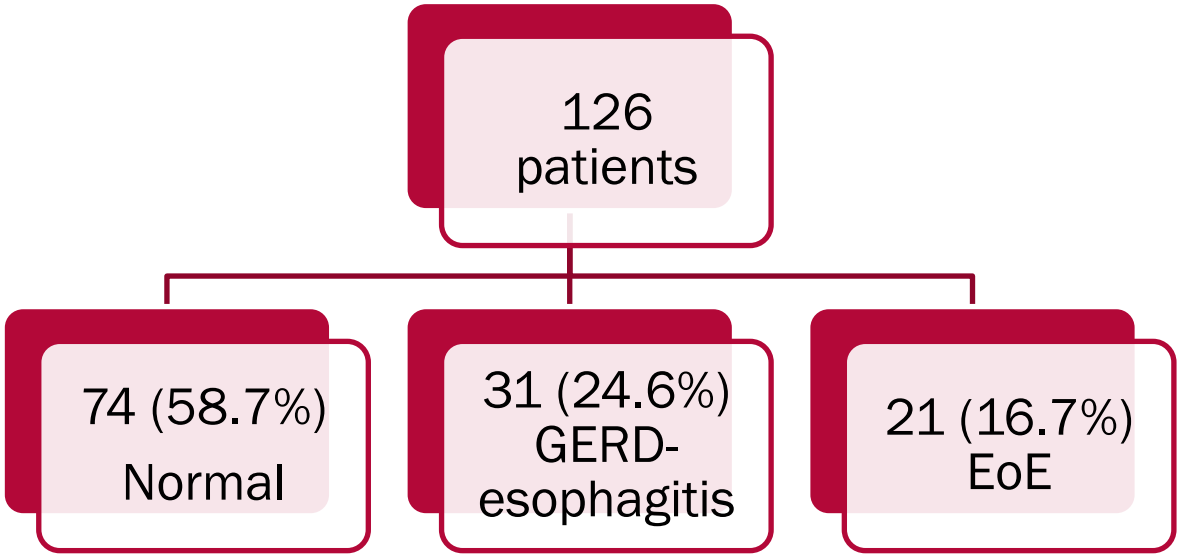






Hudgi A, Parthasarathy S, Mirza A, et al. Esophagogastroduodenoscopy (EGD) [Updated 2026 Feb 15]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2026 Jan.

A majority of children undergoing triple endoscopy will have normal GI biopsies



Ballinger K et al. Ten Years in a Pediatric Center: Detecting Esophageal Pathology and Symptoms in Aerodigestive Patients. Gastro Hep Advances 2026;5(3):100879.

Fluoroscopy assess for structural abnormalities

- Esophagram
- Upper GI series
  - To Ligament of Treitz
- ***NOT A TEST FOR GERD

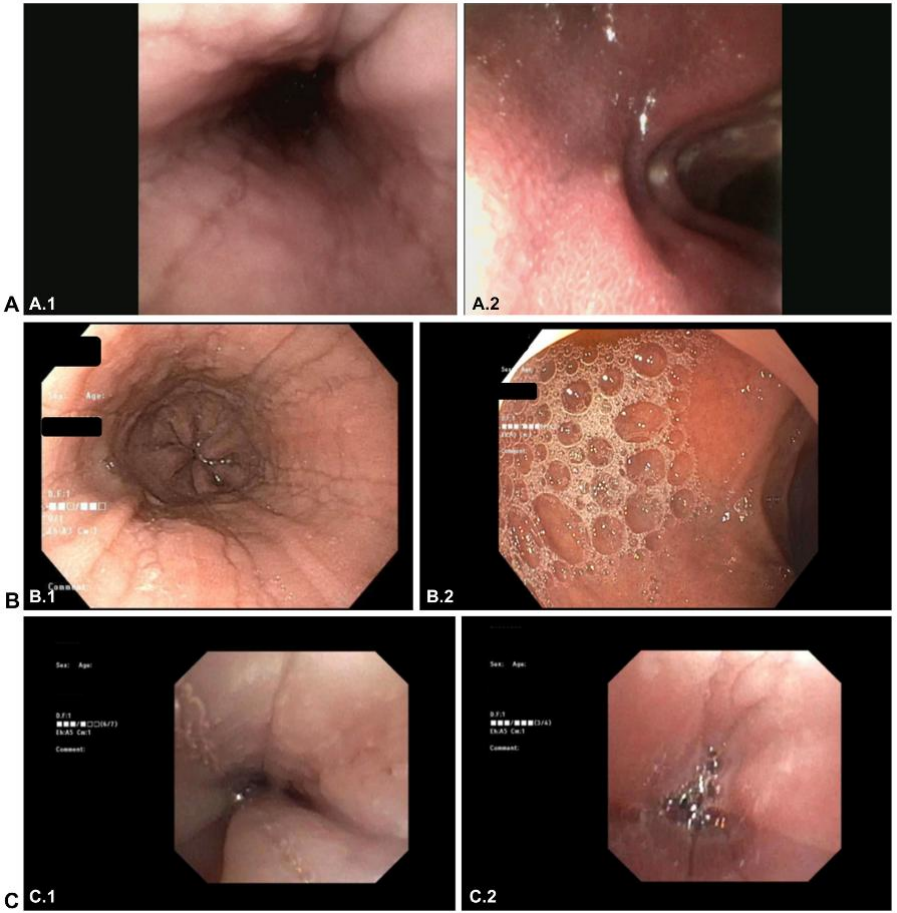


Case courtesy of Ian Bickle, Radiopaedia.org, rID: 53859

Transnasal Endoscopy is a sedation-free alternative to follow up upper GI conditions

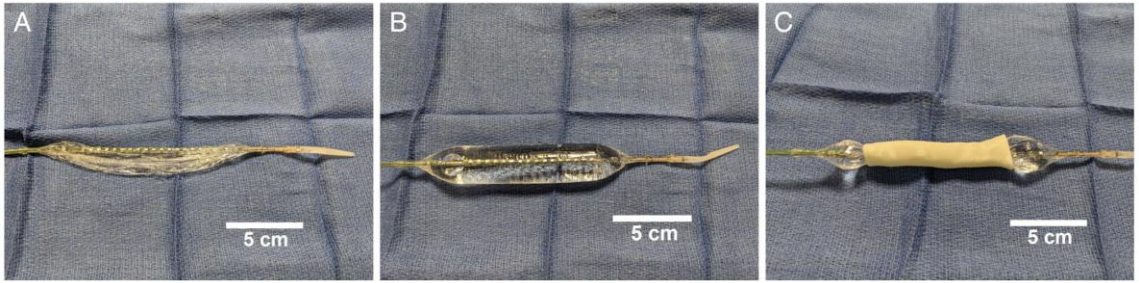


Lee R et al. Left lateral decubitus position during sedation-free transnasal endoscopy: A pilot study. J of Pediatr Gastroenterol & Nutr Reports 2025;6:215-218.

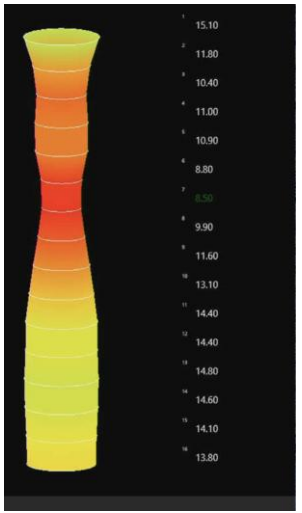


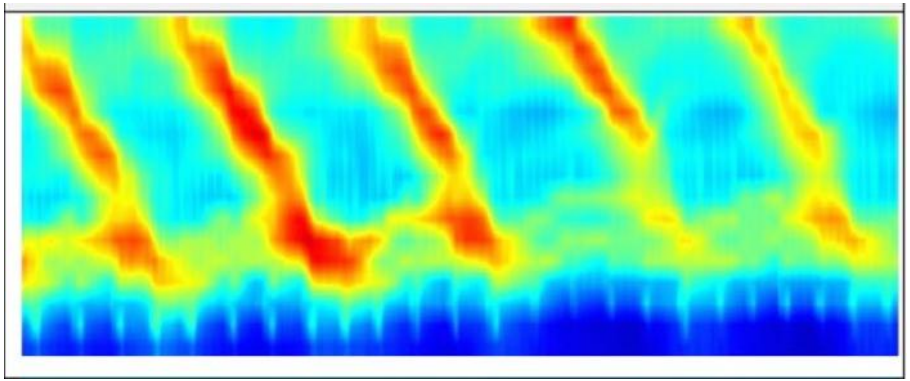
Thavamani A et al. Safety and efficacy of a novel ultrathin gastroscope for unsedated transnasal endoscopy in children and adults for the evaluation of upper GI disorders. iGIE 2024; 3(1): 15-19.

FLIP Planimetry can be performed during sedated endoscopy to assesses esophageal diameter, distension, and motility



Shen SA et al. Utilizing a Functional Lumen Imaging Probe for Evaluation of the Pediatric Airway, A Pilot Study. The Laryngoscope 2023;134:108-112.

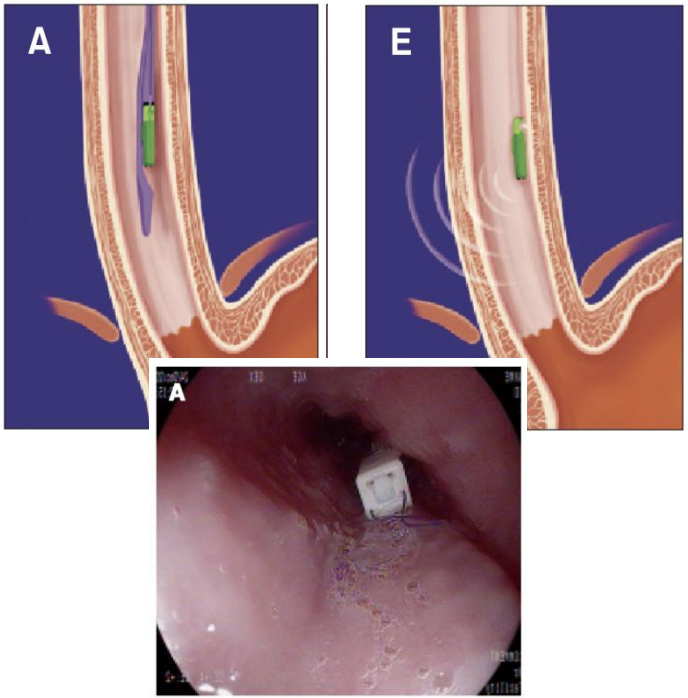




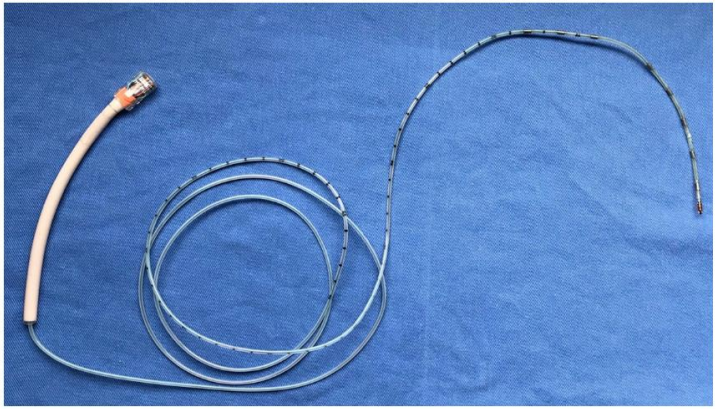
Fass OZ et al. Validation of Functional Lumen Imaging Probe Panometry Esophageal Motility Classification Version 2.0: A Study of 805 Patients. Neurogastroenterol & Motility 2025;7:e70188.

Ambulatory reflux monitoring measures esophageal acid exposure and can correlate symptoms with reflux episodes

Wireless (pH only)



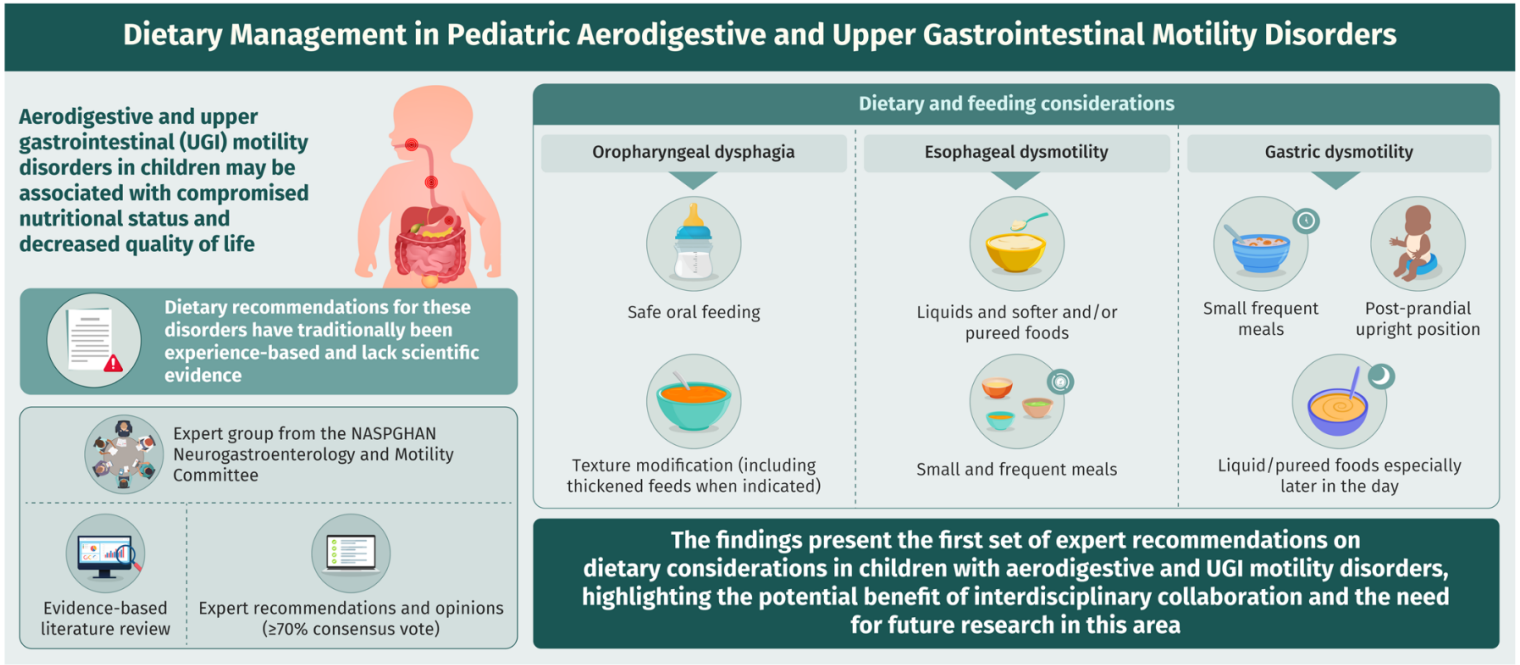
Wired (pH/impedance)



Lawenko RMA et al. Evaluation of Gastroesophageal Reflux Disease Using the Bravo Capsule pH System. J Neurogastroenterol Motil 2016;22:25-30.

Costa VA et al. Updated interpretation of Impedance–pH monitoring. Rev Colomb Gastroenterol. 2021;36(1):73-80.

Another role of the GI specialist (and dietician) is to support adequate nutrition



El-Chammas K et al. Dietary management and feeding considerations of pediatric aerodigestive and upper gastrointestinal motility disorders: A position paper by the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) Neurogastroenterology and Motility Committee. J Pediatr Gastroenterol & Nutr 2026;1-13.

Take Aways

- A pediatric aerodigestive *patient* is a child with a combination of multiple and interrelated congenital and/or acquired conditions affecting airway, breathing, swallowing, or growth, and an aerodigestive *program* provides coordinated and interdisciplinary care to these patients
- Swallowing dysfunction will resolve in a majority of neurotypical infants with dysphagia
  - Aspiration > 2 years; recurrent hospitalization for respiratory indications, vomiting, and dehydration; malnutrition; dysmorphism are red flag symptoms suggesting atypical course
  - PPIs are not necessarily the answer for feeding problems and reflux, especially in infants
- The role of the gastroenterologist is to diagnose and treat conditions of the GI tract that may cause or contribute to swallowing dysfunction and support growth/nutrition
- Triple endoscopy, and adjunctive testing, may help identify a GI condition, though a majority of aerodigestive patients who undergo GI endoscopy will have normal results
- Above all, identify a safe and effective feeding plan that promotes growth

Thank you!

pbose@iuhealth.org

Aspiration and Differentials for Cough

Dr. Chandar Ramanathan
Peyton Manning Children's Hospital
Pediatric Pulmonology

Peyton Manning Children's Hospital
Ascension St. Vincent

Peyton Manning Children's Hospital
Ascension St. Vincent

No conflicts to disclose

Goals

-To discuss various aspects of aspiration in children

-To discuss diagnosis, management and outcomes of aspiration in children

-Review alternate causes of chronic cough other than aspiration in the pediatric population

Dysphagia and Chronic Pulmonary Aspiration in Children. Pediatrics in Review. 2020. Tutor JD.

Dysphagia versus Aspiration

Peyton Manning Children's Hospital
Ascension St. Vincent

-It is important to differentiate between dysphagia (difficulties in swallowing) versus aspiration (pathologic entrance of material into the airway)

-Dysphagia may increase the risk of aspiration, but not always associated

-Aspiration can occur without dysphagia (usually silent aspiration)

Types of Aspiration

Peyton Manning Children's Hospital
Ascension St. Vincent

-Direct/Oral

    -Food/drink

    -Saliva

    -Foreign body

-Indirect/reflux aspiration

Aspiration - Associated Symptoms

Peyton Manning Children's Hospital
Ascension St. Vincent

-Respiratory symptoms: Persistent cough**, wheezing, noisy breathing, chronic tachypnea, hoarse voice, chronic congestion

- GI symptoms: Difficulties feeding, arching, lipsmacking, pooling of oral secretions, vomiting, failure to gain weight

-In children, it is important to remember that a significant number may present with silent aspiration which may present with secondary symptoms which can make assessment difficult

**Further discussion coming up in the lecture

-Diagnosis and Management of Pediatric Dysphagia: A Review. JAMA Otolaryngology-- Head & Neck Surgery. 2020. Lawlor CM, Choi S.
-Dysphagia and Chronic Pulmonary Aspiration in Children. Pediatrics in Review. 2020. Tutor JD

Aspiration - Risk Factors

Peyton Manning Children's Hospital
Ascension St. Vincent

-Prematurity

-Anatomic defects of the upper and lower airways and GI tract

-Chromosomal anomalies associated with aspiration

-Neuromuscular/developmental disorders

-Prenatal drug exposure

Aspiration - Risk Factors - Prematurity

-Prematurity is associated with tachypnea

-Tachypnea complicates the ability for coordination of breathing and swallowing

-Further evaluation should ONLY be considered for children with cough, oxygen desaturations, failure to wean respiratory support, failure to thrive or chronic pulmonary symptoms

Outpatient Respiratory Management of Infants, Children, and Adolescents With Post-Prematurity Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline.
American Journal of Respiratory and Critical Care Medicine. 2021. Cristea AI, Ren CL, Amin R, et al.

Aspiration - Anatomic Defects of Upper and Lower Airways and GI Tract

Peyton Manning Children's Hospital
Ascension St. Vincent

-Primarily congenital, and in some cases acquired

-Upper airway - nasal (choanal stenosis/atresia), vocal cord (paralysis/paresis), palate (cleft), larynx (laryngeal cleft)

-Lower airway - Tracheomalacia, bronchomalacia, subglottic stenosis, TEF (tracheoesophageal fistula), complete tracheal rings, vascular compression

-GI tract - esophageal atresia, pyloric stenosis, dysmotility

Evaluation and Management of Chronic Aspiration in Children With Normal Upper Airway Anatomy. JAMA Otolaryngology-- Head & Neck Surgery. 2015. Adil E, Al Shemari H, Kacprowicz A, et al.

Aspiration - Risk Factors - Chromosomal anomalies

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Ascension St. Vincent

-Trisomy 13, 18, 21

-DiGeorge Syndrome

-Craniofacial abnormalities - Pierre Robin sequence, Beckwith-Wiedemann syndrome, Apert, Crouzon

-...and many more (see OMIM -Online Mendelian Inheritance in Man website for details)

-Health Supervision for Children and Adolescents With Down Syndrome. Pediatrics. 2022. Bull MJ, Trotter T, Santoro SL, et al.
-Patterns of Dysphagia and Airway Protection in Infants With 22q11.2-Deletion Syndrome. The Laryngoscope. 2020. Wong NS, Feng Z, Rappazzo C, et al
-Feeding Considerations for Infants With Craniofacial Malformations.
Seminars in Fetal & Neonatal Medicine. 2021. Green MA, Resnick CM

Aspiration - Risk Factors - Neuromuscular/Developmental Disorders

Peyton Manning Children's Hospital
Ascension St. Vincent

-Cranial nerve or recurrent laryngeal nerve injury and vocal cord paralysis — swallowing requires intact CN V, VII, IX, X, and XII

- CENTRAL: Cerebral palsy, Hypoxic ischemic encephalopathy, Nonaccidental trauma, Periventricular leukomalacia, Seizure disorders

-PERIPHERAL: Dysautonomia, Guillain-Barre syndrome

-STRUCTURAL: Arnold-Chiari malformation, Tumors

-NEUROMUSCULAR: Muscular dystrophy, Spinal muscular atrophy, Congenital myopathies

-Dysphagia and aspiration in children. Pediatric Pulmonology. 2012. Tutor JD, Gosa MM.
-Global State of the Art and Science of Childhood Dysphagia: Similarities and Disparities in Burden. Dysphagia. 2024. Lefton-Greif MA, Arvedson JC, Farneti D, Levy DS, Jadcherla SR.

Aspiration - Risk Factors - Prenatal Drug Exposure

Peyton Manning Children's Hospital
Ascension St. Vincent

-Highest risk factors are with intrauterine opioid exposure

-Relates to disorganized coordination of suck-swallow and respiration due to brainstem dysregulation and dysmotility.

- Children showed increasing number of swallows without breathing and increased pharyngoesophageal dysmotility

-In Indiana, about 8 out of 1,000 live birth diagnosed with prenatal substance exposure (2023 State information)

-Persistent Feeding Difficulties Among Infants With Fetal Opioid Exposure: Mechanisms and Clinical Reasoning. The Journal of Maternal-Fetal & Neonatal Medicine : The Official Journal of the European Association of Perinatal Medicine, the Federation of Asia and Oceania Perinatal Societies, the International Society of Perinatal Obstetricians. 2019. Hart BJ, Viswanathan S, Jadcherla SR.
-Coordination of Suck-Swallow-Respiration in Infants Born to Mothers With Drug-Abuse Problems. Developmental Medicine and Child Neurology. 2004. Gewolb IH, Fishman D, Qureshi MA, Vice FL.

Evaluation/Testing

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Ascension St. Vincent

-Direct/Oral

-Pediatric trained swallow therapist evaluation

- Videofluoroscopic swallow study/VFSS (modified barium swallow)

- Fiberoptic endoscopic evaluation of swallowing (FEES)

- Direct laryngoscopy/bronchoscopy

-Indirect/Reflux Aspiration

-pH/impedance probe testing

Evaluation/Testing - Pediatric trained swallow therapist evaluation

Peyton Manning Children's Hospital
Ascension St. Vincent

-When available, an evaluation with a pediatric trained speech language pathologist can be helpful for screen for swallowing difficulties

-Alone, there is poor sensitivity and poor specificity

-Can be helpful in non-tertiary canters where access to immediate imaging or endoscopic imaging is not available.

Diagnosis and Management of Pediatric Dysphagia: A Review. JAMA Otolaryngology-- Head & Neck Surgery. 2020. Lawlor CM, Choi S.

Evaluation/Testing - VFSS (videofluoroscopic swallow study

Peyton Manning Children's Hospital
Ascension St. Vincent

-Fluoroscopic evaluation of swallowing with various consistencies of liquids recommended to be performed with pediatric trained speech-language pathologist with recommendation of multiple levels of consistency

- Can provide initial recommendations for therapy, recommendations for thickened liquids, or nonoral nutrition in severe cases

- Preferred at centers performing large number of pediatric cases with trained pediatric providers.

Evaluation/Testing - VFSS (videofluoroscopic swallow study - Radiation concerns

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Where a swallow study sits among common exposures

Source of radiation	Typical dose (mSv)	In everyday terms
Dental X-ray	0.005	A few hours of ordinary background
Cross-country flight / air travel	0.03	Cosmic rays on one trip
Video swallow study — older child	0.04 – 0.05	About half a chest X-ray
Video swallow study — toddler (1–3 yr)	0.05 – 0.07	≈ one week of background
One week of natural background	0.06	What everyone gets, from soil/air/food/space
Video swallow study — infant	0.08 – 0.12	≈ one chest X-ray, or ~1–2 weeks of background
Chest X-ray (adult)	0.10	The common yardstick
Mammogram	0.40	≈ 4–8 swallow studies
Head CT	~2	≈ 20–40 swallow studies
Abdominal CT	10 – 15	≈ 150+ swallow studies

Evaluation/Testing - Fiberoptic Endoscopic Evaluation of Swallowing (FEES)

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-Flexible nasolaryngoscopy performed in conjunction (or by) trained SLP in awake child

-Colored food and liquids are used to visualize feeding process

-Advantages: no radiation exposure, ability to record swallow for review

-Disadvantages: tolerance of child to undergo nasal endoscopy, availability of trained personell

Evaluation/Testing - Direct laryngoscopy and bronchoscopy

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-Used to evaluate for laryngeal cleft or variant deep interarytenoid notch which can allow drainage of material into the airways

-Best performed by trained otolaryngologists with pediatric experience

-Advantage: immediate evaluation with potential for surgical treatment

-Disadvantages: general anesthesia, subjective variability between providers

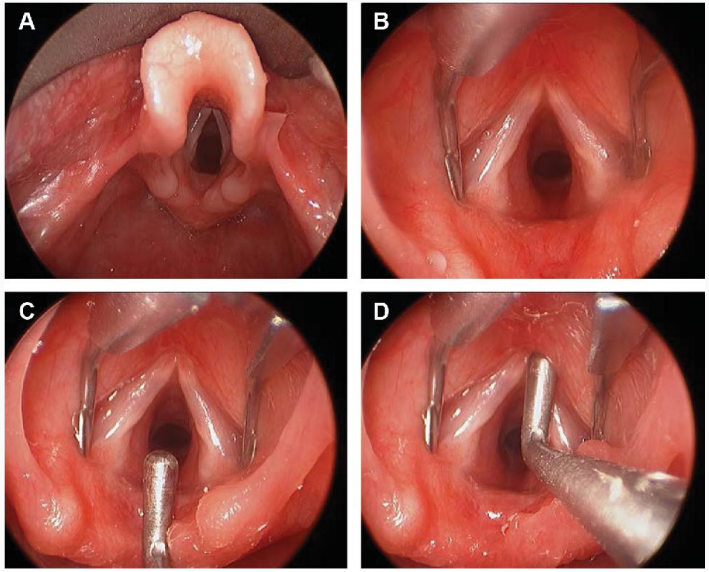


Figure 1A: Step 1 is to establish suspension laryngoscopy.

Coppess, Steven et al. “Standardizing Laryngeal Cleft Evaluations: Reliability of the Interarytenoid Assessment Protocol.” Otolaryngology–Head and Neck Surgery 160 (2018): 533 - 539.

Evaluation/Testing - ph/impedance probe

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Ascension St. Vincent

-Best to evaluate pathologic reflux which may predict risk of reflux aspiration

-Advantages: objective data (number of episodes, height of episodes, acid versus non-acid, and correlation with symptom reporting)

-Disadvantages: tolerance of probe (impedance), correlation of symptoms depends on user interface, limited time frame of testing (24 hours), availability, equipment failure

Aspiration - Evaluation and Treatment - Aerodigestive Center

Peyton Manning Children's Hospital
Ascension St. Vincent

-With many aspects of evaluation available, a combined multidisciplinary approach can be helpful

-Involvement with providers from Otolaryngology, Gastroenterology, Pulmonology and Speech Language Pathology

-Decrease anesthesia exposure, decrease time to evaluation and testing, and decreased fragmented care

Structure and Functions of Pediatric Aerodigestive Programs: A Consensus Statement. Pediatrics. 2018. Boesch RP, Balakrishnan K, Acra S, et al.


Pulm
ENT
GI

Management

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-Speech/Feeding Therapy

-Thickened liquids - until showing improvement as a bridge to improvement of aspiration and dysphagia symptoms

-Reflux medications - limited trials if no other indications of chronic reflux

-NG tube feedings or G-tube feedings if long term feeding issue is suspected

-Control of underlying respiratory illnesses and inflammation (reactive airway disease, asthma)

Management - Speech/Feeding Therapy

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-First line therapy for aspiration associated with dysphagia

-Rehabilitation of swallowing to prevent aspiration

-Providing compensatory strategies for preventing aspiration

-Close communication with provider team can help meet goals of decreasing aspiration

Structure and Functions of Pediatric Aerodigestive Programs: A Consensus Statement. Pediatrics. 2018. Boesch RP, Balakrishnan K, Acra S, et al

Management - Thickened Liquids

Peyton Manning Children's Hospital
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-Thickeners provide a bridge for decreasing risk of direct oral aspiration until therapies and other treatments can achieve goals

-Slowing of liquid transit time provides opportunity for decreasing risk for aspiration

-Advantages: can provide tolerance of liquids, potential to decrease risk of aspiration, provide oromotor skill development

-Disadvantages: limited cost coverage, intolerance/texture, preparation

Diagnosis and Management of Pediatric Dysphagia: A Review. JAMA Otolaryngology-- Head & Neck Surgery. 2020. Lawlor CM, Choi S.

Management - Thickened Liquids - Advocacy

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Ascension St. Vincent

-Currently, most commercial thickeners used for breastmilk or for children greater than 1 year of age are not covered.

-Out of pocket cost for thickeners can lead to failure to provide the appropriate thickness indicated, or lead to non-use overall increasing aspiration

- Anecdotal cases of non-use or limited use suggest increased medical resource use including increased clinic visits, ED visits and hospitalizations

-There is opportunity to help advocate for coverage of thickeners as a medically necessary item for children with aspiration and associated dysphagia

Clinical Aspects of Thickeners for Pediatric Gastroesophageal Reflux and Oropharyngeal Dysphagia. Current Gastroenterology Reports. 2019. Duncan DR, Larson K, Rosen RL.

Management - Tube feedings

-NG tube feedings for direct aspiration can provide medical oral rest that can increase caloric intake, decrease metabolic demand (abnormal feeding and inflammatory response from aspirated material)

-Long term use (>3 months) may necessitate placement of gastrostomy tube until aspiration concerns cleared or if chronic safety concerns of oral intake.

-Advantage: bridge for severe feeding concerns, allows for coordination of diagnostic and other treatment options

-Disadvantages: Does not eliminate indirect aspiration, potential for alteration of the normal GI tract motility, associated risk of equipment used, social/family burden

-A Quality Improvement Initiative to Reduce Gastrostomy Tube Placement in Aspirating Patients. Pediatrics. 2020. McSweeney ME, Meleedy-Rey P, Kerr J, et al.
-Providing a Primary Care Medical Home for Children and Youth With Cerebral Palsy. Pediatrics. 2022. Noritz G, Davidson L, Steingass K, Council on Children with Disabilities, THE AMERICAN ACADEMY FOR CEREBRAL PALSY AND DEVELOPMENTAL MEDICINE, et al.

Management - Control of underlying respiratory illnesses and inflammation

Peyton Manning Children's Hospital
Ascension St. Vincent

-Use of inhaled steroids for treatment of aspiration related inflammation is not always indicated

-Co-morbidities of steroid responsive asthma or reactive airway disease may benefit from inhaled steroids and bronchodilators

-Symptomatic respiratory disease may benefit from limited trials of systemic or inhaled steroids when indicated with close monitoring and management

-Lung Disease in Children With Laryngotracheoesophageal Clefts. Pediatric Pulmonology. 2025. Hosfield EA, Patten HC, Hopson PE, et al.
-Outpatient Respiratory Management of Infants, Children, and Adolescents With Post-Prematurity Respiratory Disease: An Official American Thoracic Society Clinical Practice Guideline. American Journal of Respiratory and Critical Care Medicine. 2021. Cristea AI, Ren CL, Amin R, et al

Aspiration - Outcomes

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-Dependent on material aspirated (food with/without gastric material, saliva, other*)

-Volume of aspiration (small vs large volume)

-Time course of aspiration (acute vs. chronic)

-Time to diagnosis

*other - could include chemicals, other materials

-Dysphagia and Chronic Pulmonary Aspiration in Children. Pediatrics in Review. 2020. Tutor JD.

Aspiration - Outcomes

-Recurrent aspiration pneumonia/pneumonitis

-Bronchiectasis

-Feeding/swallowing aversion

-Growth related disorders (failure to thrive, limited growth)

Aspiration Outcomes - Aspiration Pneumonia or Pneumonitis

Peyton Manning Children's Hospital
Ascension St. Vincent

-Thought to be primarily neutrophilic process

-May be masked by other conditions more commonly found (asthma, gastric reflux, viral illnesses, recurrent bronchitis)

-Review of imaging, appropriate suspicion based on history and evaluation

-Primary treatment is supportive care unless with high risk factors for lung injury, clinical deterioration, or chronic bacterial colonization history

Dysphagia and Chronic Pulmonary Aspiration in Children.Pediatrics in Review. 2020. Tutor JD.

Aspiration Outcomes - Bronchiectasis

Peyton Manning Children's Hospital
Ascension St. Vincent

-Bronchiectasis is a chronic long term airway injury of the bronchial airways (also commonly associated with cystic fibrosis)

-Aspirated foreign material triggers macrophage activation, neutrophil chemotaxis, and protease release (e.g., neutrophil elastase)

-Neutrophil elastase damages the airway and drives cycle of impaired mucociliary clearance → infection → inflammation → airway damage

-Airway clearance, and use of as needed antibiotic treatment is gold standard of treatment

-Dysphagia and Chronic Pulmonary Aspiration in Children. Pediatrics in Review. 2020. Tutor JD.
-Bronchiectasis in chronic pulmonary aspiration: Risk factors and clinical implications. Pediatric Pulmonology. 2012. Piccione JC, McPhail GL, Fenchel MC, Brody AS, Boesch RP.

Aspiration Outcomes - Feeding/Swallowing Aversion

Peyton Manning Children's Hospital
Ascension St. Vincent

-Process of aspiration is can be a painful experience

-Behavioral negative associations especially with feeding can develop long-term

-Recognition of early cues from the child and evaluation of underlying causes may show reversible behaviors

-Access to intensive feeding programs are key to overcoming aversions

Nutritional and Feeding Challenges in Aerodigestive Patients. Current Opinion in Pediatrics. 2023. Chen CB.

Aspiration Outcomes - Growth Related Disorders

Peyton Manning Children's Hospital
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-Chronic ongoing aspiration has downstream effects that limit weight gain and growth

-Aversion may lead to decreased intake of calories needed

-Poor absorption in the GI tract may also lead to decreased caloric intake

-Increased metabolic demand from respiratory infections, cough, chronic lung injury

-Failure to Thrive or Growth Faltering: Medical, Developmental/Behavioral, Nutritional, and Social Dimensions. Pediatrics in Review. 2021. Tang MN, Adolphe S, Rogers SR, Frank DA.

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Ascension St. Vincent

Not aspiration?
What else makes you cough?

Chronic cough (not aspiration)

Peyton Manning Children's Hospital
Ascension St. Vincent

-Asthma

-Recurrent respiratory infections

-Post-infectious cough

-Upper airway cough syndrome (chronic rhinitis)

-Environmental factors (cigarette smoke, allergen exposure)

Chronic cough (not aspiration)

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-Foreign body aspiration

-Cystic fibrosis

-PCD (primary ciliary dyskinesia)

-Immune dysfunction

-Habit cough

Overall Recommendations

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-Consider aspiration as a cause of chronic respiratory symptoms especially in high risk populations of children

-If strong consideration for aspiration, EARLY evaluation and testing can be helpful starting with accessible/orderable testing (including chest x-ray, VFSS)

-Consider referral to multidisciplinary groups (Aerodigestive Centers) for evaluation and management of aspiration

-Other causes of respiratory symptoms have potential to mask aspiration concerns, or may be comorbidities

-Always remember…

Do not trust kids

Acknowledgements

-Indiana Chapter - American Academy of Pediatrics

-Peyton Manning Children’s Hospital Pediatric Pulmonology and Aerodigestive Teams

-My Family

-My Patients

-Audience

Indiana Department of Health

INDIANA HEALTH AT A CROSSROADS:

Rural Health Transformation Program and More

LINDSAY WEAVER, M.D., FACEP
STATE HEALTH COMMISSIONER

9/25/26

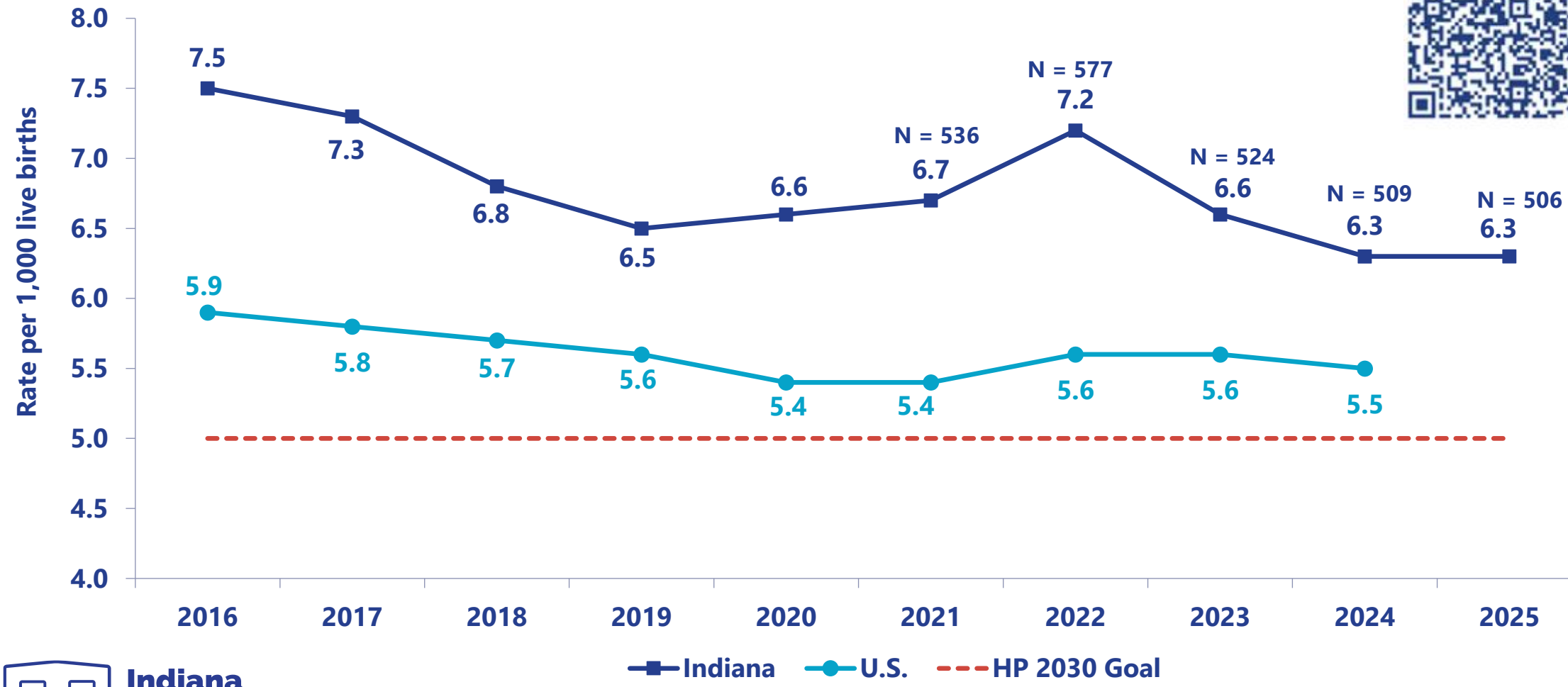
AGENCY PRIORITIES

1. Promote Maternal and Infant Health Outcomes
2. Prevent Chronic Disease
3. Strengthen Data Quality and Transparency
4. …Healthy Aging
5. …Youth Social Media and Screen Use



Infant mortality rates (IMRs)
2016-2025

Check out our new preliminary data dashboards:

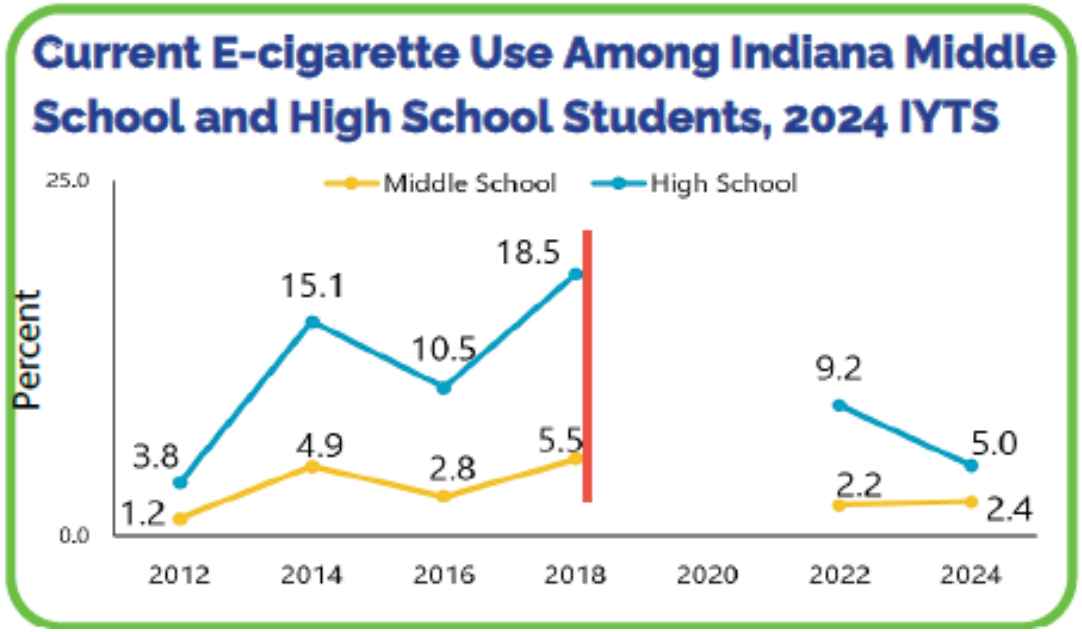


** U.S. data not currently available

Source: Indiana Department of Health, Family Health Data and Fatality Prevention Division [September 14, 2026]
United States Original Source: Centers for Disease Control and Prevention National Center for Health Statistics
Indiana Original Source: Indiana Department of Health, Vital Records, ODA

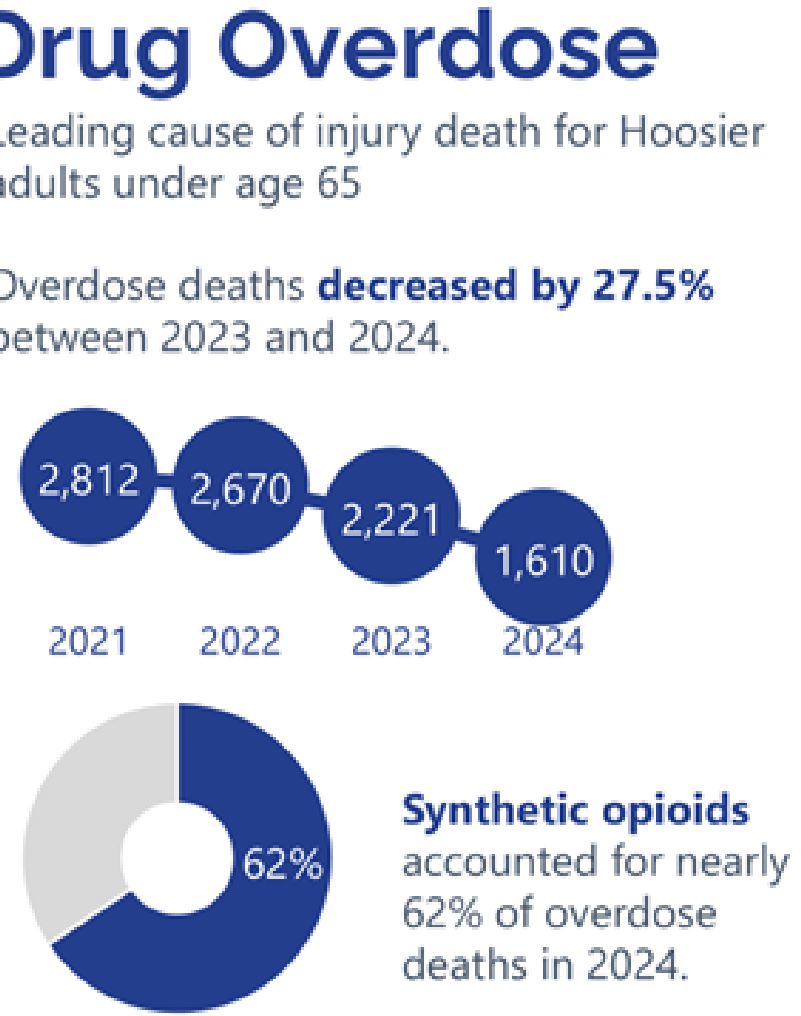
Youth tobacco use rate lowest in two decades

- The 2024 Indiana Youth Tobacco Survey (IYTS) shows that youth tobacco use continues to decline, with high school tobacco use at its lowest level in two decades.
- Despite this progress, concerns remain as flavored tobacco products, frequent e-cigarette use, and the rising popularity of oral nicotine pouches indicate ongoing risks for nicotine addiction.



Overdose deaths decline

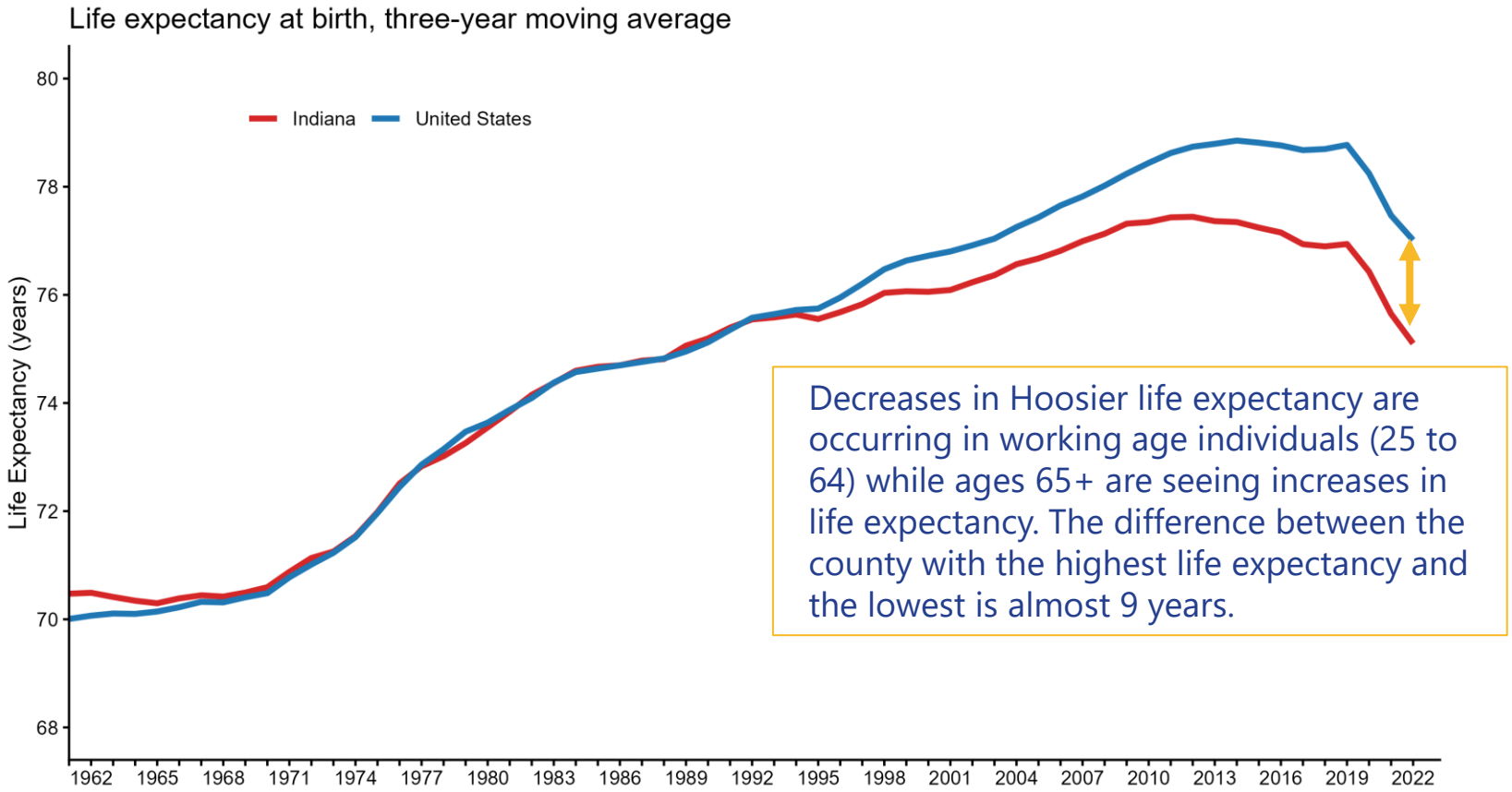
- Overdose trends: In 2024, 1,610 Indiana residents died by drug overdose, a decline from 2,221 in 2023.
- This marked the third consecutive year of declining overdose rates and the lowest fatal overdose rate since 2019.
- More work is needed to reduce overdose deaths, especially deaths due to synthetic opioids, which accounted for nearly 62% of overdose deaths in 2024.



Indiana Department of Health

Source: Indiana Department of Health, Vital Records, ODA

Life Expectancy in Indiana



Source: Barbieri, Magali; Winant, Celeste, 2025, "U.S State Life Tables CSV + TXT 1941-2022", https://doi.org/10.7910/DVN/19WYUX, Harvard Dataverse, V1 (data downloaded on 7/13/2026)

Decreases in Hoosier life expectancy are occurring in working age individuals (25 to 64) while ages 65+ are seeing increases in life expectancy. The difference between the county with the highest life expectancy and the lowest is almost 9 years.

UPDATE:

Life expectancy in Indiana held steady in 2025 at 75.6 years, the first year it hasn't increased since 2020.

Indiana Department of Health



Rural Health Transformation Program

Indiana Department of Health

What is RHTP?

INDIANA RURAL HEALTH TRANSFORMATION

Federal Grant Program

- The One Big Beautiful Bill Act created a $50 billion fund called the **Rural Health Transformation Program (RHTP),** which empowers states to **strengthen their rural communities** by improving healthcare access, quality, and outcomes by transforming the healthcare delivery ecosystem.
- The funds are allocated to approved States over **five fiscal years** (FY), with $10 billion of funding available each fiscal year, beginning in FY 2026 and ending in FY 2030.

Indiana's Plan

- The State of Indiana was awarded **approximately $207 million in December 2025** for the Indiana Rural Health Transformation Program that is designed to address growing challenges in health care access and worsening health outcomes across rural communities in Indiana.
- Indiana is pursuing **12 RHTP initiatives** that align with CMS's strategic goals for the program through efforts that **support rural communities** and **engage local stakeholders** as they tackle specific community needs

Make rural America healthy again

Support rural health innovations and new access points for preventing, diagnosing, and treating diseases. Projects use evidence-based, outcomes-driven interventions to improve disease prevention, chronic disease management, behavioral health and prenatal care.

Provide sustainable access

Help rural clinicians become long-term access points for care by improving efficiency and sustainability. Support systems helping rural facilities navigate together to coordinate operations, technology, primary and specialty care, and emergency services.

Improve the rural health workforce

Attract and retain a highly-skilled healthcare workforce by strengthening recruitment and retention of healthcare providers. Provide resources and support to rural clinicians, including social workers, pharmacists, and other health professionals.

Implement new ways to provide care

Spark the growth of new service models to improve health outcomes, coordinate care and promote flexible care arrangements. Develop and implement payment mechanisms incentivizing providers or Accountable Care Organizations (ACOs) to reduce healthcare costs.

Leverage technology

Foster use of creative technologies that promote efficient care delivery, data sharing, strengthen cybersecurity, and invest in emerging technologies. Projects support access to remote care, improve data sharing, strengthen cybersecurity, and invest in emerging technologies.

12 Initiatives

INDIANA RURAL HEALTH TRANSFORMATION

Initiative 1 – Growing Care Coordination: Medical Operations Coordination Center (MOCC) & Alternate Payment Model Feasibility Study

Initiative 2 – Growing Community Connections through Indiana 211

Initiative 3 – Growing Improved Patient Outcomes through Enhanced Interoperability and Technology

Initiative 4 – Growing Pediatric & Obstetric Readiness in Rural Emergency Departments

Initiative 5 – Growing Cardiometabolic Health Standards of Care in Rural Indiana

Initiative 6 – Growing Access to Hospital Post-Discharge Medications

Initiative 7 – Growing Specialty Provider Access through Expanded Teleconsult Capabilities

Initiative 8 – Growing Telehealth Access and Infrastructure

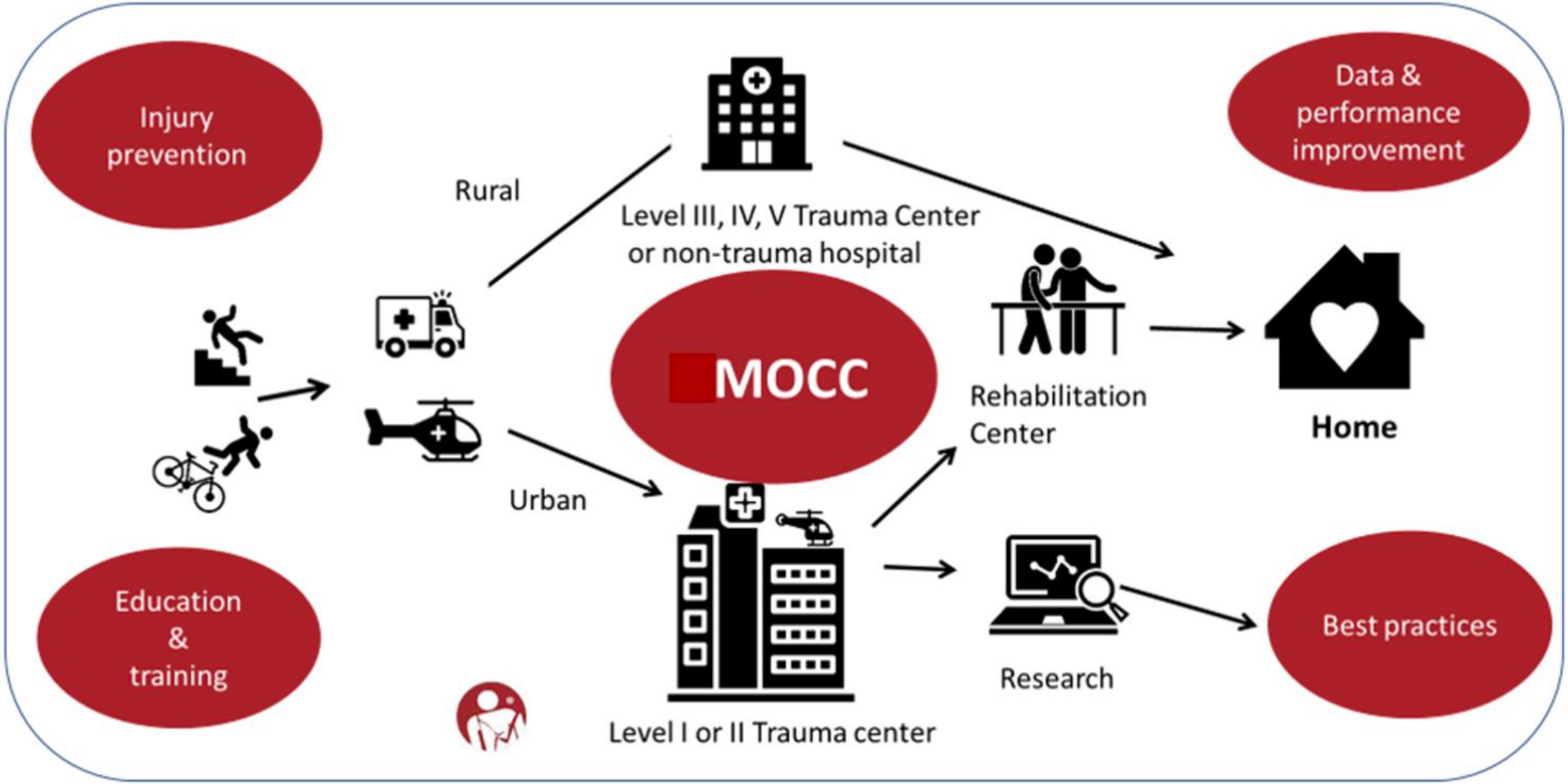
Initiative 9 – Growing Our Rural Health Paraprofessional Workforce

Initiative 10 – Growing Clinical Training and Readiness

Initiative 11 – Growing Our Rural Behavioral Health Workforce

Initiative 12 – The GROW Regional Grants

Initiative 1: Daily MOCC Use for Coordination of Emergency Care



Initiative 2: Growing Community Connections through Indiana 211

Objective: To leverage Indiana 211 as the statewide infrastructure for health and human services resource data, enabling providers to identify needs, initiate referrals and track outcomes with a closed-loop system of care.



Initiative 3: Improving Patient Outcomes through Enhanced Interoperability and Tech

Objective: To connect over 450 facilities/organizations to the Indiana Health Information Exchange (IHIE) enabling the secured sharing/access of patient health information. To advance Mobile Integrated Health (MIH) by integrating EMS into the HIE and care

Right Care



Right Place

Right Time

Indiana Department of Health

Initiative 4: Pediatric and Obstetric Readiness in Rural Emergency Departments

Establishing partnerships with all qualifying rural EDs and pre-hospital entities



Setting up infrastructure and connecting resources to rural EDs and pre-hospital partners

Taking an assessment that is comprehensive and provides a plan to OB/PEDs readiness.

Indiana Department of Health

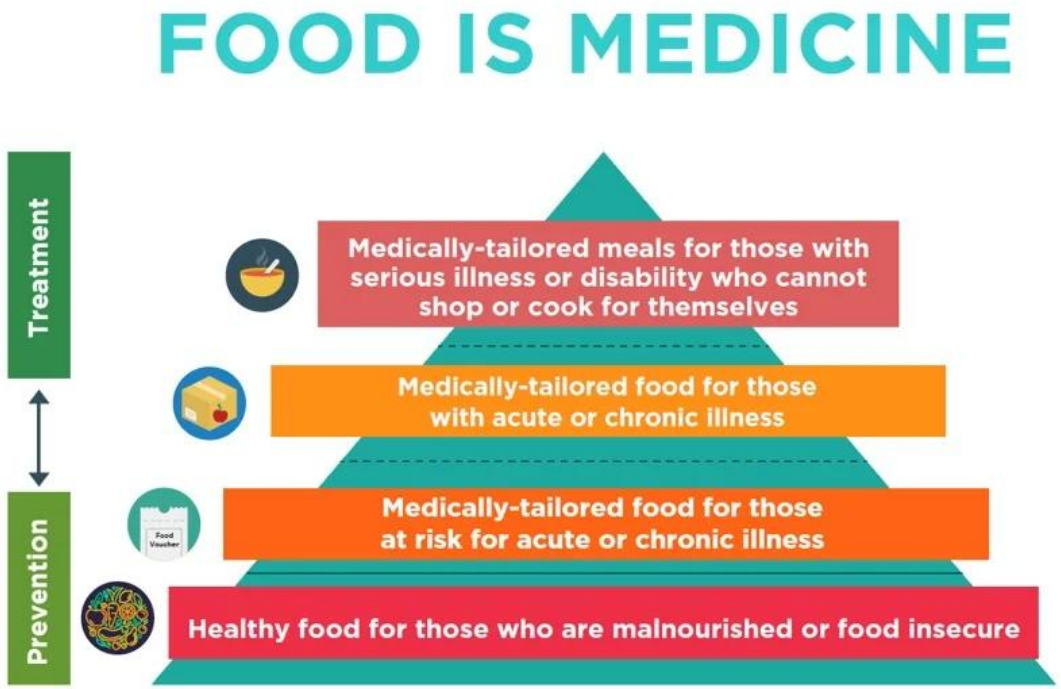
Initiative 5: Cardiovascular-Kidney-Metabolic Centers of Excellence

Objective: In rural Indiana, health starts at home — Initiative 5 strengthens that foundation by expanding access to chronic disease prevention through local Cardiometabolic Centers of Excellence, practical nutrition and physical activity education, workforce training in Lifestyle Medicine and community-driven Food is Medicine opportunities.

- RHTP will support the implementation of seven new CKM Centers of Excellence
- With support from Major Hospital in Shelbyville and the American Heart Association (AHA), IDOH will facilitate the creation of 7 new rural access points for Hoosiers to receive comprehensive cardiometabolic treatment.
- IDOH received 24 letters of interest from rural hospitals around the state.
- In collaboration with AHA, IDOH is reviewing these submissions and will announce the implementation sites in July.

Initiative 5: Lifestyle Support Activities

- SNAP participants in rural counties will have increased access to fruits and vegetables through expansion of Double Up Indiana into retail
- Purdue Extension and the Indiana Alliance of YMCAs will deliver direct education and multi-level health behavior supports in rural counties
- To increase access to healthy food as a component of care in rural communities, IDOH is reviewing proposals for a comprehensive Food is Medicine feasibility study



Indiana Department of Health

Initiative 5: Cardiovascular-Kidney-Metabolic Centers of Excellence

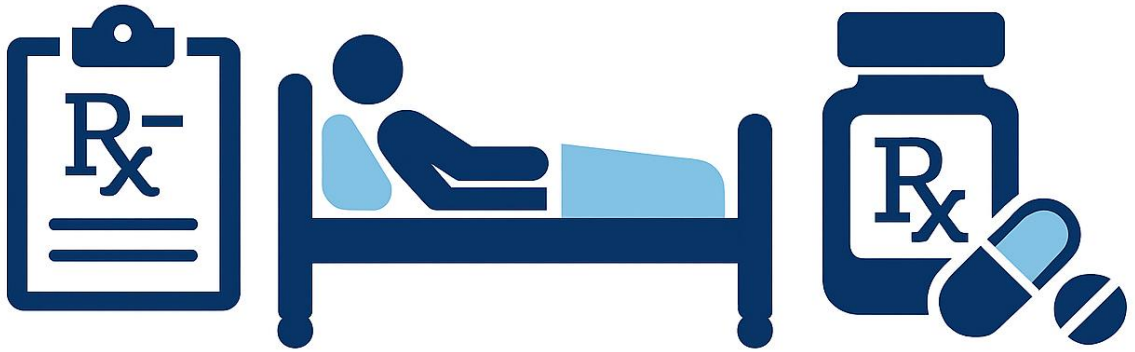
- ✓ Rural hospital feasibility assessment for CKM model released
- ✓ 5-2-1-0 marketing plan finalized
- ✓ American College of Lifestyle Medicine onboarded to provide up to 700 certifications and up to 500 trainings in Year 1

- **In process**: reviewing proposals for Food is Medicine Feasibility Study
- **In process**: reviewing proposals for Double Up retail expansion study
- **In process**: finalizing grant agreements with Purdue Extension and Indiana Alliance of YMCAs

Initiative 6: Access to Hospital Post-Discharge Medications

Objective: Ensure hospital patients in rural communities receive their prescription medications before discharge, at outpatient prices, and that clinical staff work with each patient to review their medications, answer questions and support transition of care.

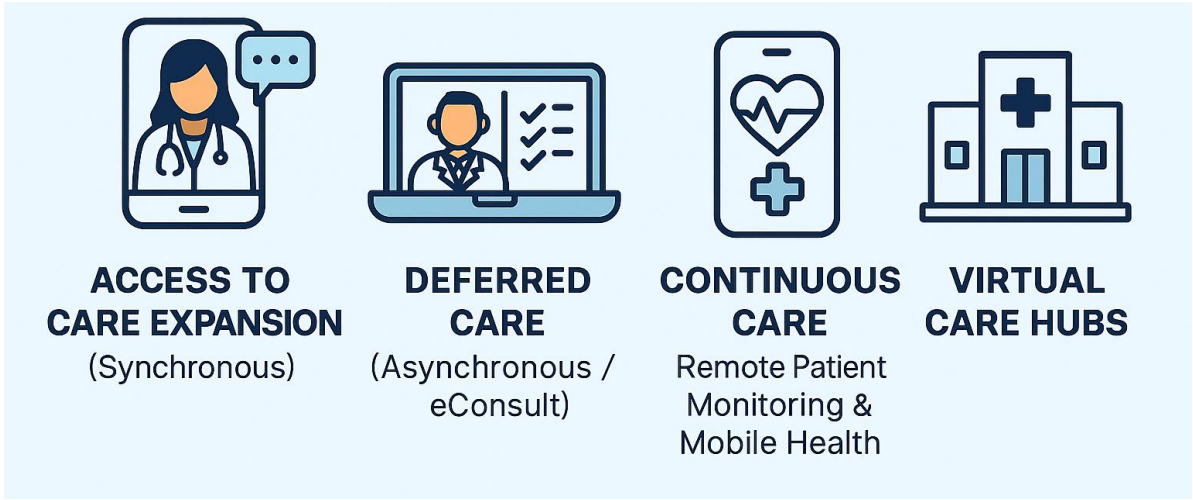
Hospital Meds-to-Beds Program



A pharmacy service providing medications to hospital inpatients and Emergency Department patients prior to discharge

Initiatives 7 & 8: Expanding Teleconsultation and Telehealth Access and Infrastructure

Objective: Improve access to care in rural communities by expanding telehealth and teleconsultation capabilities, strengthening infrastructure, and enabling timely, coordinated, technology-supported care for high-impact conditions.





Indiana Department of Health

Initiative 9: Growing our Rural Health Paraprofessional Workforce

Objective: Strengthen and retain the healthcare, behavioral health and oral health paraprofessional workforce by building career pathways, providing employer technical assistance and integrating community health workers into clinical and community care.



Indiana Department of Health

Initiative 10: Growing Clinical Training and Readiness

Key Year 1 Activities

I. GME enhancement – Rural Graduate Medical Education Strategic Plan

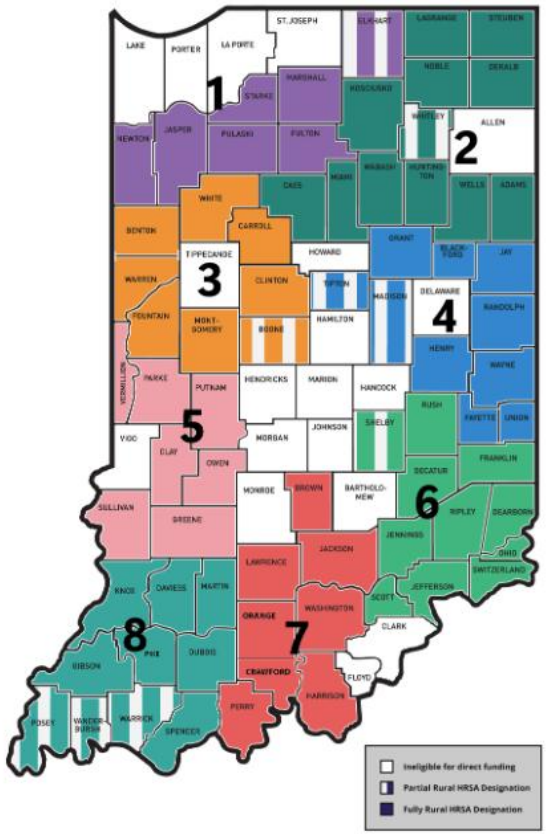
II. Physician incentives

$5 million for existing rural GME programs – **In process**

- Funds to be awarded in July

Rural GME strategic plan – **In process**

- Vendor Selected



Physician Incentives – Closed

Up to $300,000 for a 5-year, full time commitment

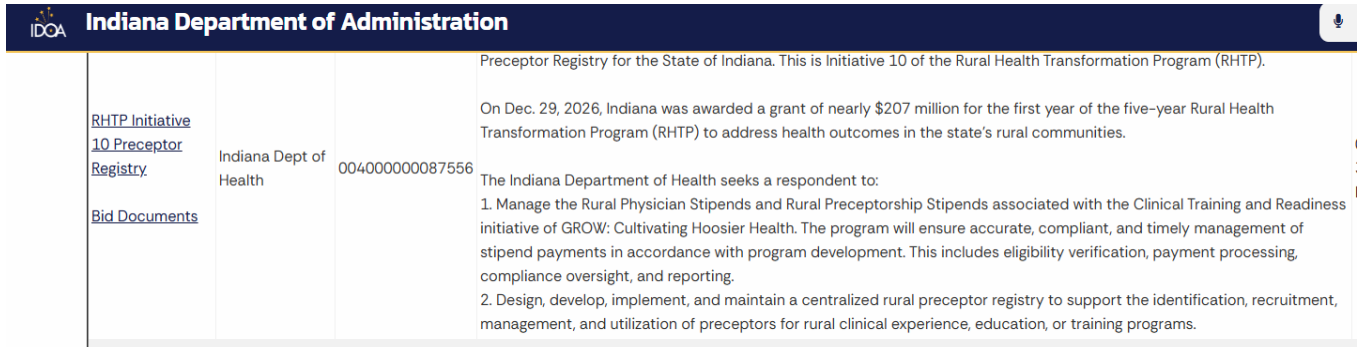
Indiana Department of Health

Initiative 10: Growing Clinical Training and Readiness

Key Year 1 Activities

III. Rural preceptor incentives

IV. Development of Rural Health Preceptor Registry



Indiana Department of Administration

RHTP Initiative 10 Preceptor Registry Bid Documents	Indiana Dept of Health	004000000087556	Preceptor Registry for the State of Indiana. This is Initiative 10 of the Rural Health Transformation Program (RHTP). On Dec. 29, 2026, Indiana was awarded a grant of nearly $207 million for the first year of the five-year Rural Health Transformation Program (RHTP) to address health outcomes in the state's rural communities. The Indiana Department of Health seeks a respondent to: 1. Manage the Rural Physician Stipends and Rural Preceptorship Stipends associated with the Clinical Training and Readiness initiative of GROW: Cultivating Hoosier Health. The program will ensure accurate, compliant, and timely management of stipend payments in accordance with program development. This includes eligibility verification, payment processing, compliance oversight, and reporting. 2. Design, develop, implement, and maintain a centralized rural preceptor registry to support the identification, recruitment, management, and utilization of preceptors for rural clinical experience, education, or training programs.

- Request for proposals being accepted through IDOA until June 15 at 3 p.m. EST – **Closed**

- Preceptor Incentives of up to $10,000 per year to launch in 2027– **In process**
- Rural Preceptor Registry to launch in 2027 – **In process**

Indiana Department of Health

Initiative 10: Growing Clinical Training and Readiness

Key Year 1 Activities

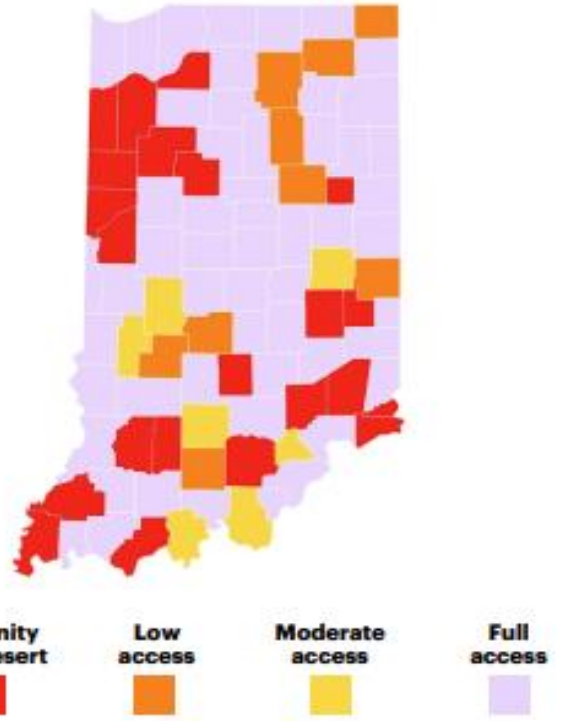
V. Investing in maternal health to empower rural communities

OB Fellowship for Family Med Physicians

Certified Nurse Midwife Training

Applications in, target award date of early August

https://www.in.gov/grow-rural-health/initiatives/initiative-10/



Indiana Department of Health

Initiative 11: Growing our Rural Behavioral Health Workforce

Objective: Grow and retain the rural behavioral health workforce through career pathways, employer support and expanded training.

Indiana ranks 44th nationally for Mental Health Workforce availability with a 500 to 1 ratio compared to the national ratio of 320 to 1.



Initiative 12: GROW Regional Grants

The GROW Regional Grants are designed to complement the 11 statewide initiatives by serving as the local implementation engine for Indiana's RHTP priorities.

Each Region must submit a unified application that supports the statewide RHTP objectives, with three required focus areas:

1. Pre- and postnatal care
2. Chronic disease prevention and management
3. Access to care and unmet social needs

Collaboratively designed and implemented with unique, community-driven governance structure.

Regional Grant Proposals

- Expanded access to early prenatal care, including supports to help pregnant women overcome transportation, scheduling and insurance barriers so they can enter care earlier in pregnancy.
- Food-as-medicine programs that pair nutrition classes with medically tailored produce boxes for families with chronic conditions.
- Bringing maternal care closer to home through home-based visits, mobile maternal health services, telehealth-enabled prenatal check-ins, and remote monitoring for conditions such as hypertension
- Integrated maternal health pathways that link clinical care with nutrition services, transportation assistance, behavioral health support, and community-based outreach to ensure families receive coordinated help throughout pregnancy and beyond.
- An innovative multi-county specialty telehealth network connecting rural clinics to specialists that eliminates travel time and brings specialty care within reach of every Hoosier, no matter their ZIP code.
- A care navigation network linking hospitals, health departments, EMS, schools, behavioral health providers and social services into one seamless system of support.
- Transforming community spaces such as rural libraries, community centers, and extension offices, into local telehealth access points to bring health care closer to home than ever before.

Learn More

Website: GrowRuralHealth.in.gov

Visit the **Indiana RHTP** website for updates including:

- Frequently Asked Questions
- Initiative Descriptions and Opportunities
- Details on regional initiatives

Email questions to GrowRuralHealth@health.in.gov



Health First Indiana

Indiana Department of Health

Core investment in public health



Investment in public health is investment in a healthier future.

- Since 1900, the average lifespan of persons in the United States has lengthened by greater than 30 years, and 25 years of those years are due to advances in public health.[1]
- Communities thrive when they have sufficient resources devoted to public health, which in turn supports the economy.
- Every $1 spent on public health interventions returns $14.30 in benefit.[2]
- Other studies show that 25% of U.S. medical care spending is on treatment for diseases that could have been prevented.[3]

Indiana is transforming the state's public health system with the funding that will strengthen the delivery of core services to ensure that the state is prepared for the future.

Indiana Department of Health

1 Centers for Disease Control and Prevention, Ten Great Public Health Achievements -- United States, 1900-1999 (cdc.gov)
2 Masters R, Anwar E, Collins B, Cookson R, Capewell S. Return on investment of public health interventions: a systematic review. J Epidemiol Community Health. 2017;71(8):827-834.
3 Bolnick HJ, Bui AL, Bulchi A. Health-care spending attributable to modifiable risk factors in the USA: an economic attribution analysis. Lancet Public Health. 2020;5:e525-e535.

Key successes

SCOPE OF SERVICES:
LHDs delivered 4.3 million services between January 2024 and December 2025, of which we assessed cost savings attributed to five specific types of prevention services.

AGGREGATE SAVINGS:
The combined direct and indirect savings from the 5 types of services we assessed are estimated at $742.6 million (in 2024 dollars). This includes approximately $229.3 million in direct health care savings and $513.2 million in indirect savings from reduced premature mortality and caregiving expenses.

1. **Cardiovascular screenings**
2. **Diabetes prevention and treatment**
3. **Obesity prevention and treatment**
4. **Food Security**
5. **Prenatal Care**

Indiana Department of Health

SOURCE: Assessment of the RETURN ON INVESTMENT for HEALTH FIRST INDIANA Funding and Program Achievements Among Five Key Areas of Public Health, Regenstrief Institute

Benefits of Prevention

1 Cardiovascular

Screenings were estimated to save $555,740 in direct health care costs and $54,954,387 in indirect cost savings.

2 Diabetes

In total, diabetes prevention and treatment efforts by LHDs should save about $26,179,816 in direct medical spending.

3 Chronic Disease

Approximately $111,664,854 in lower medical expenditures for five obesity-related conditions

4 Obesity

74,756 food security services were provided under HFI between January 2024 and December 2025, resulting in total cost savings of $13,989,837

5 Maternal Care

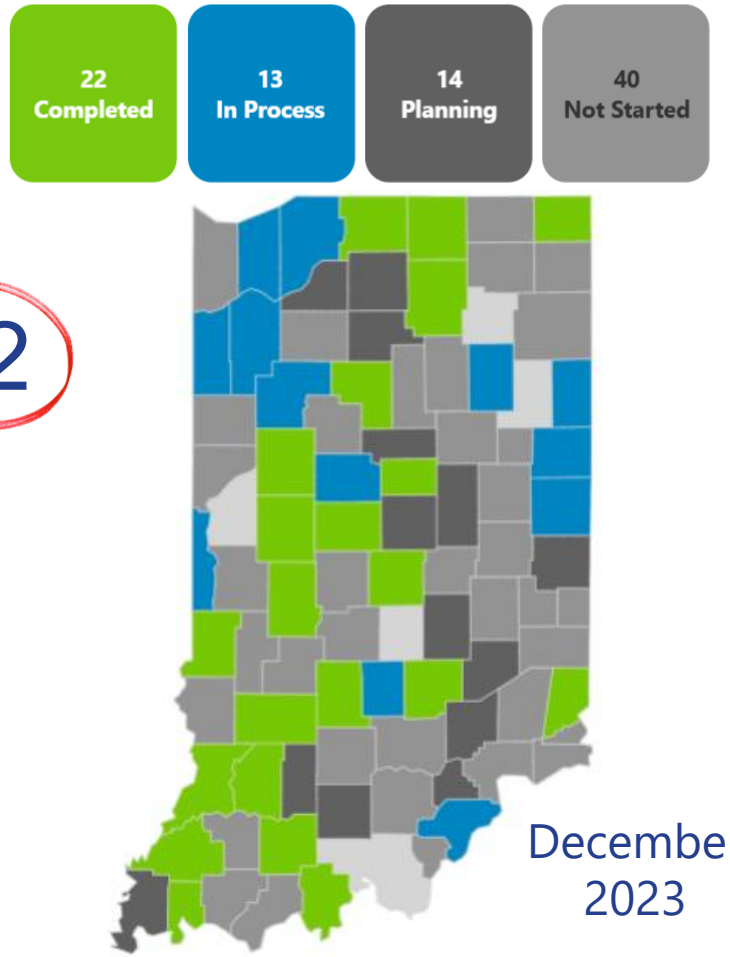
These prenatal services will generate $70,628,366 in direct health care cost savings and $1,417,871 in indirect cost savings from reduced caregiving for infants born with birth defects.

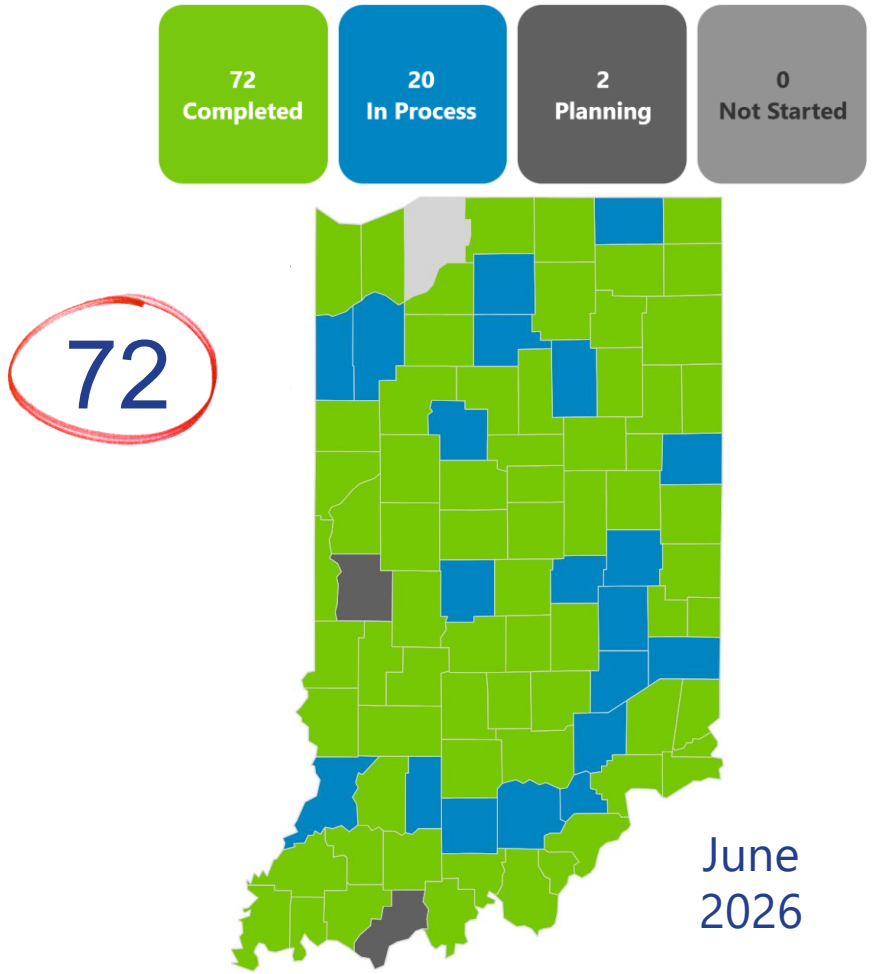
Indiana Department of Health

SOURCE: Assessment of the RETURN ON INVESTMENT for HEALTH FIRST INDIANA Funding and Program Achievements Among Five Key Areas of Public Health, Regenstrief Institute

Local Health Departments who have implemented a comprehensive, evidence-based or promising program to improve birth outcomes?

Maternal and Child Health





Indiana Department of Health

Since the start of HFI, the number of LHDs who have a program to improve birth outcomes increased from 22 to 72

County Level Information

Activities | County-Level KPIs | Partnerships

- ACHD provided 48 lead related services including testing, home services, and education
- ACHD served 541 people with adult and child vaccines
- ACHD provided 158 prenatal services including vitamins, immunization and my Healthy Baby referrals
- ACHD provided 1730 vision and oral screenings to students through their school health program
- ACHD provided 18 chronic disease prevention services including a nutrition and physical activity program

Activity Report

Activities | County-Level KPIs | Partnerships



Maternal and child health

Improve the infant mortality rate in Adams County from 9.0 (2022) to 8.5 (2027).



Child and adult immunizations

Increase the number of children in Adams County completing the DTaP immunization series from 37.9% (2022) to 38.9% (2027).



Trauma and injury prevention and education

Reduce the rate of falls-related hospitalizations from 224.6 (2022) to 220 (2028).

Activities | County-Level KPIs | Partnerships

Crossroads Adams County	Unfailing Love	Firefly Children and Family Alliance
SAFE	Adams Memorial Hospital	

Indiana County Health Scorecard

The dashboard below displays county level data for the state of Indiana. Use the drop down menu below to select a topic and filter whole page.

Dashboard refreshed on 6/12/2026.

County At-A-Glance

Select Topic

Children < 3 Years Old Completing Recommende...

Children < 3 Years Old Completing Recommended Vaccine Series

Definition: Completion rate (%) for the recommended immunization series (4:3:1:3:3:1:4) for children aged 19-35 months. This includes 4 doses of DTaP, 3 doses of IPV, 1 dose of MMR, 3 doses of Hib, 3 doses of Hep B, 1 dose of varicella, and 4 doses of PCV.

Year(s) of data used: *2024, Q4*

Source: Indiana Department of Health, Immunization Division (2024, Q4)

Highest & Lowest Ranked Counties

Gibson	#1
Pike	#2
Lawrence	#3
Owen	#4
Tipton	#5
Jasper	#88
Lake	#89
Martin	#90
Daviess	#91
LaGrange	#92

Indiana Children < 3 Years Old Completing Recommended Vaccine Series *(2024, Q4)*

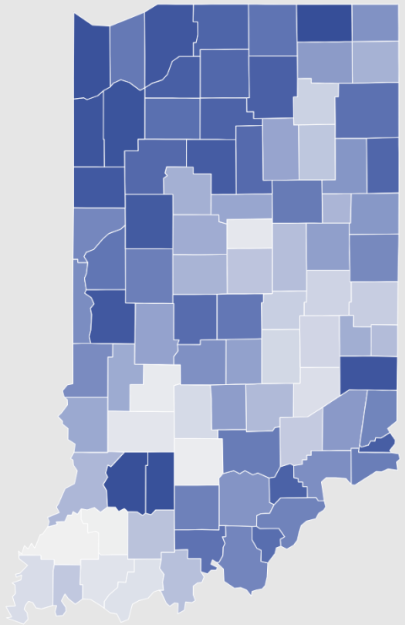
Statewide Children < 3 Years Old Completing Recommended Vaccine Series

62.2%

Highlight County

County Rankings

#1 #92



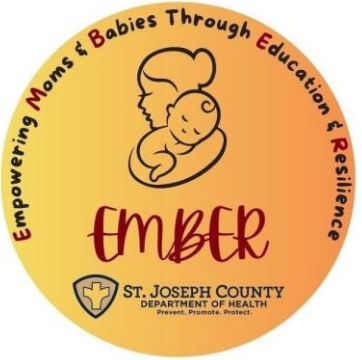
County	Count..	Ranking
Gibson	80.0%	#1
Pike	77.6%	#2
Lawrence	76.6%	#3
Owen	75.8%	#4
Tipton	75.6%	#5
Greene	75.3%	#6
Warrick	74.9%	#7
Spencer	74.6%	#8
Decatur	74.3%	#9
Posey	74.1%	#10
Monroe	74.0%	#11
Shelby	73.9%	#12
Rush	73.4%	#13
Henry	73.2%	#14
Whitley	73.0%	#15
Hancock	72.9%	#16
Wayne	72.8%	#17
Jennings	72.4%	#18
Vanderburgh	71.7%	#19
Huntington	71.6%	#20
Hamilton	71.2%	#21
Dubois	70.6%	#22
Perry	70.2%	#23
Madison	70.1%	#24
Union	70.0%	#25
Bartholomew	69.9%	#26
Knox	69.6%	#27
Blackford	69.6%	#28
Boone	69.5%	#29
DeKalb	69.4%	#30
Carroll	69.3%	#31
Fayette	68.7%	#32
Clinton	67.9%	#33
Clay	67.4%	#34
Sullivan	67.3%	#35
Howard	67.1%	#36
Wabash	66.7%	#37
Putnam	66.7%	#38
Johnson	66.7%	#39
Delaware	66.6%	#40
Brown	66.3%	#41
Noble	65.9%	#42
Ripley	64.8%	#43
Jay	64.5%	#44
Wells	64.3%	#45
Washington	64.2%	#46

County	Count..	Ranking
Steuben	63.9%	#47
Morgan	63.5%	#48
Jefferson	63.4%	#49
Vermillion	63.3%	#50
Vigo	63.3%	#51
Randolph	63.2%	#52
Warren	63.0%	#53
Harrison	62.4%	#54
Dearborn	62.2%	#55
Clark	62.2%	#56
Orange	61.9%	#57
Montgomery	61.7%	#58
Switzerland	61.7%	#59
Jackson	61.6%	#60
Grant	61.1%	#61
Porter	61.0%	#62
Marion	60.8%	#63
Fountain	60.6%	#64
Elkhart	60.1%	#65
Crawford	60.0%	#66
Allen	60.0%	#67
Pulaski	59.6%	#68
Floyd	59.4%	#69
Hendricks	59.4%	#70
Miami	59.3%	#71
White	59.1%	#72
Marshall	58.1%	#73
Adams	58.0%	#74
St. Joseph	57.7%	#75
Fulton	57.2%	#76
Scott	56.9%	#77
Kosciusko	56.3%	#78
Starke	55.5%	#79
Ohio	55.3%	#80
Cass	55.3%	#81
Tippecanoe	55.2%	#82
Benton	54.7%	#83
Parke	54.2%	#84
LaPorte	52.9%	#85
Franklin	51.5%	#86
Newton	50.8%	#87
Jasper	49.5%	#88
Lake	45.2%	#89
Martin	43.0%	#90
Daviess	38.4%	#91
LaGrange	35.9%	#92

Indiana Department of Health

Partnerships: Maternal and Child Health

- **Dubois** County Health Department started a home visiting program called BLOOM for pregnant women, infants and postpartum mothers. Each parent/guardian/caregiver is assigned a community health worker (CHW). The CHW visits the home and shares the curriculum in Growing Great Kids. Services include safe sleep education and information about newborn care and postpartum depression.
- To address the county's infant mortality rate, the **St. Joseph County Health Department** facilitates EMBER (Empowering Moms & Babies Through Education & Resilience), a program implemented in 2024 to provide support and resources to expectant mothers and families. In 2025, it supported 103 unique women and 26 familial support people, for a total of 1,362 encounters across all classes and support groups.



Partnerships: Maternal and Child Health

- **Whitley County** Health Department has partnered with BABE to assist with education and resource navigation. BABE is an organization that provides incentives for pregnant women and families to consistently participate in parter programs and services that benefit the health and well-being of infants and young children. WCHD has partnered with BABE for their pregnancy test wrapping program. Pregnancy tests are wrapped at retailers with a flyer containing information on LHD resources, providers, and helpful contacts. Clients can bring these flyers into the BABE store to receive items, and BABE uses this information to track program utilization for the LHD.
- **Shelby County** Health Department is taking meaningful steps to strengthen maternal and child health by creating a free, consistent, and welcoming Breastfeeding Support Group for families in their community. Meeting monthly, the group connects mothers directly with an International Board-Certified Lactation Consultant (IBCLC) who is available to answer questions, provide feeding guidance, complete baby weight checks, and help families schedule individualized one-on-one lactation visits when additional support is needed.

health first
INDIANA

- Covers 100% of Hoosiers
- Funding for local health departments
- Focus on prevention and direct needs of community to improve health outcomes

INDIANA
RURAL HEALTH TRANSFORMATION

- Covers 27% of population who live in rural areas
- Focus on healthcare transformation in addition to health outcome improvement



Focus on Obesity and Chronic Disease

Indiana Department of Health

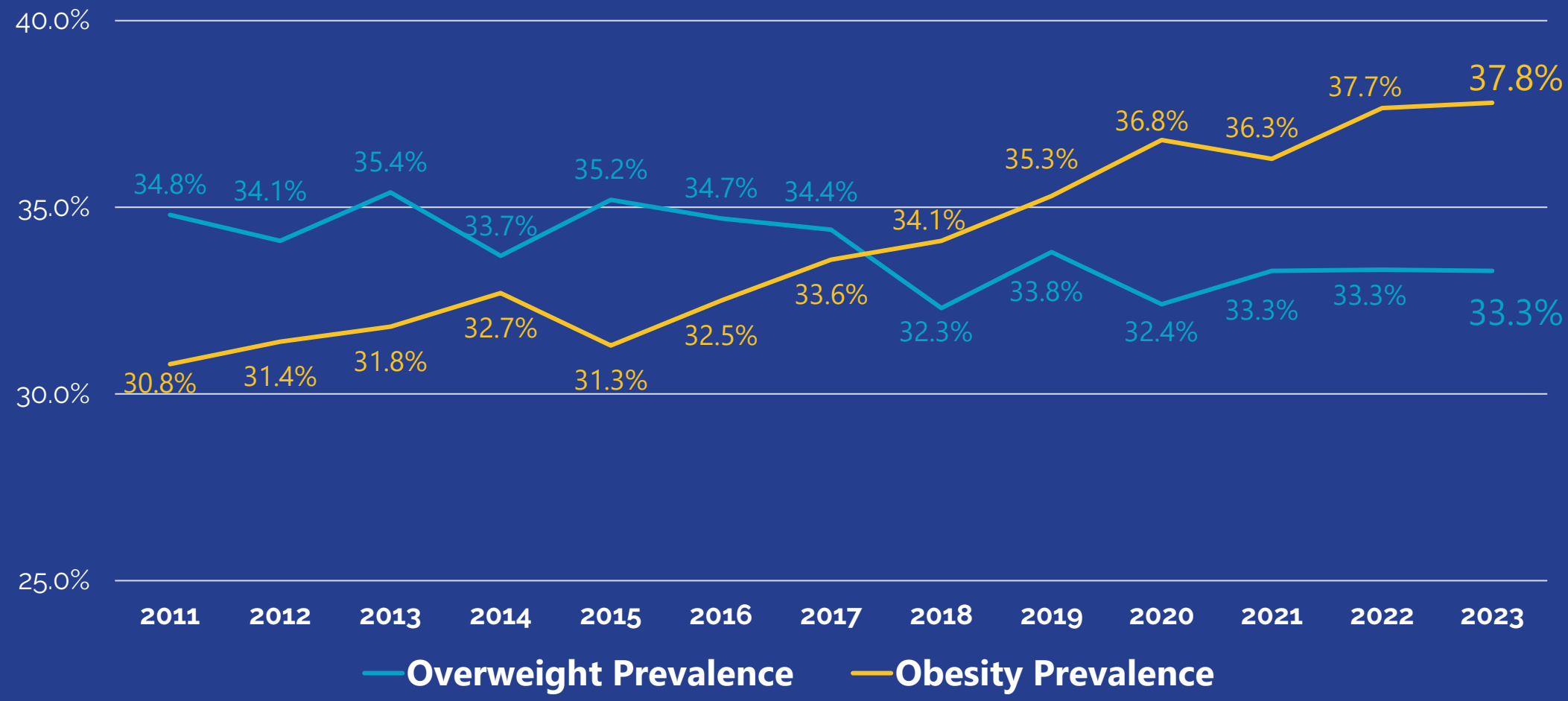
Obesity in Indiana, 2021-2023

- Indiana is the 7th most obese state in the U.S.* (tied with Iowa)
- Over two-thirds (71%) of Indiana adults are overweight or obese*
  - 37.8% obese, 33.3% overweight (71% total)*
- 32.4% of our youth are overweight or obese (Youth Risk Factor Surveillance Survey)**

*2023 Behavioral Risk Factor Surveillance System (BRFSS),

**2021 YRBS

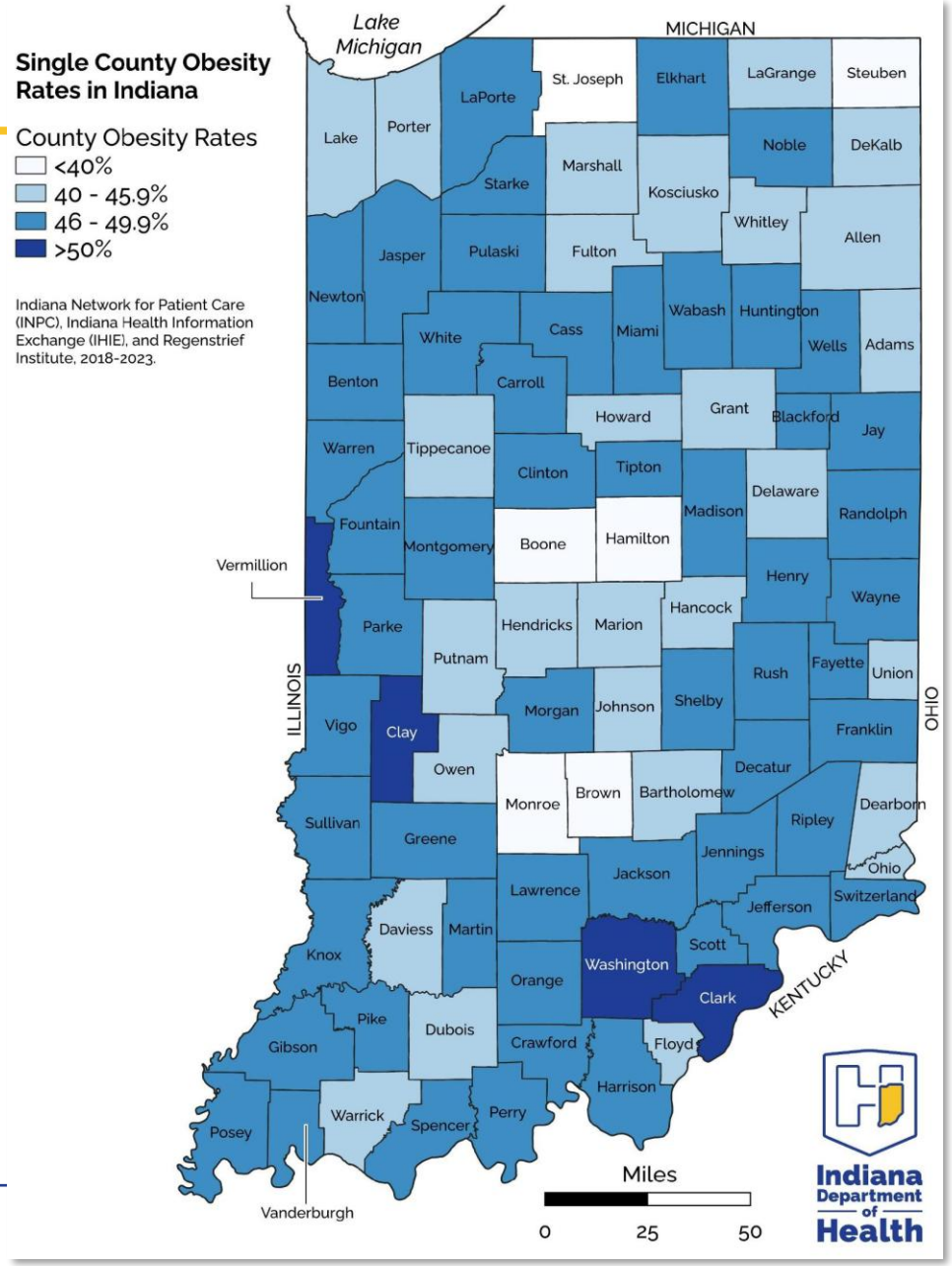
Weight classification of Hoosier adults (18+), BRFSS, 2011-2023



Indiana Department of Health

Adult Obesity Rates by County

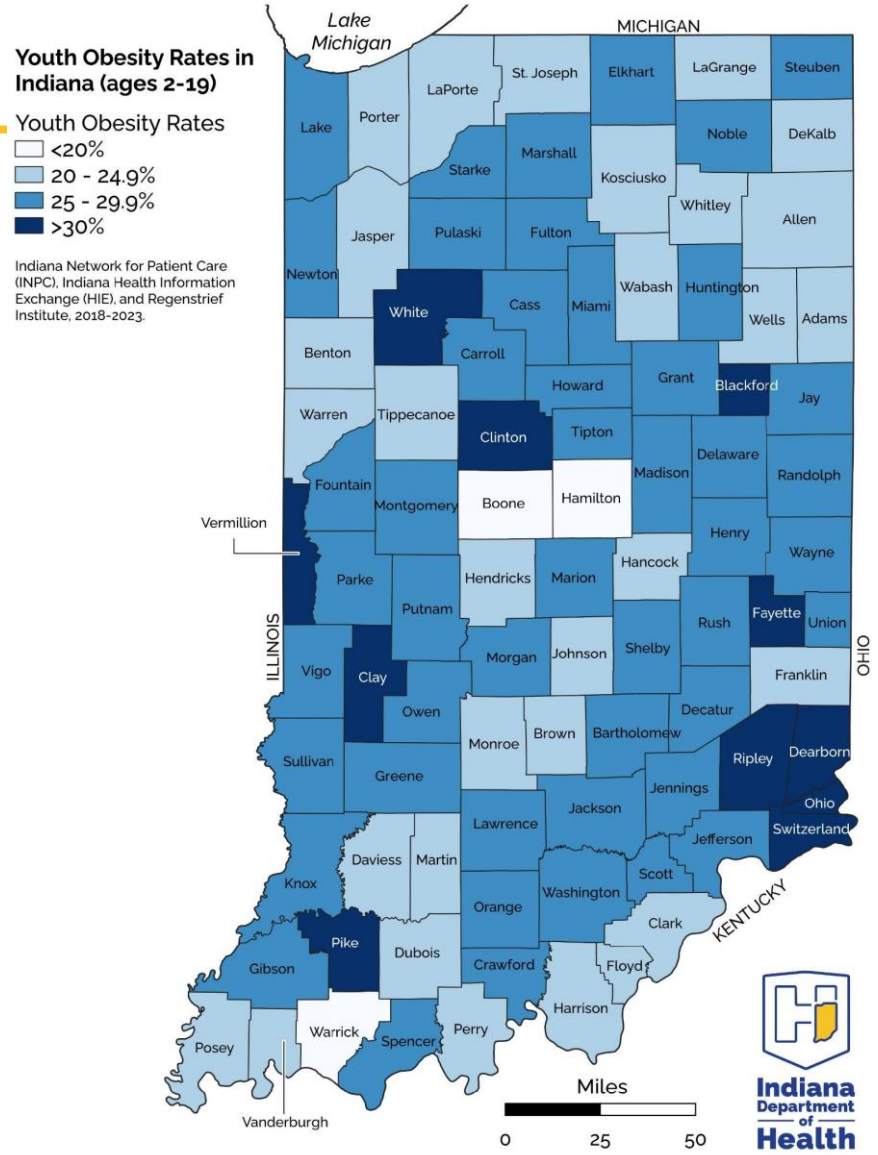
- The map presents county-level adult obesity rates by quartile, based on INPC data collected from 2018–2023.[1]
- The analysis shows that adult obesity is widespread across the state, with only six counties reporting rates below 40%.[1] Most counties fall within the 46% – 49.9% range, indicating consistently high prevalence across much of Indiana.[1]
- Vermillion County has the highest adult obesity rate in the state, while Hamilton County has the lowest. This distribution illustrates the geographic variation in obesity burden and helps identify areas where targeted interventions may be especially important.



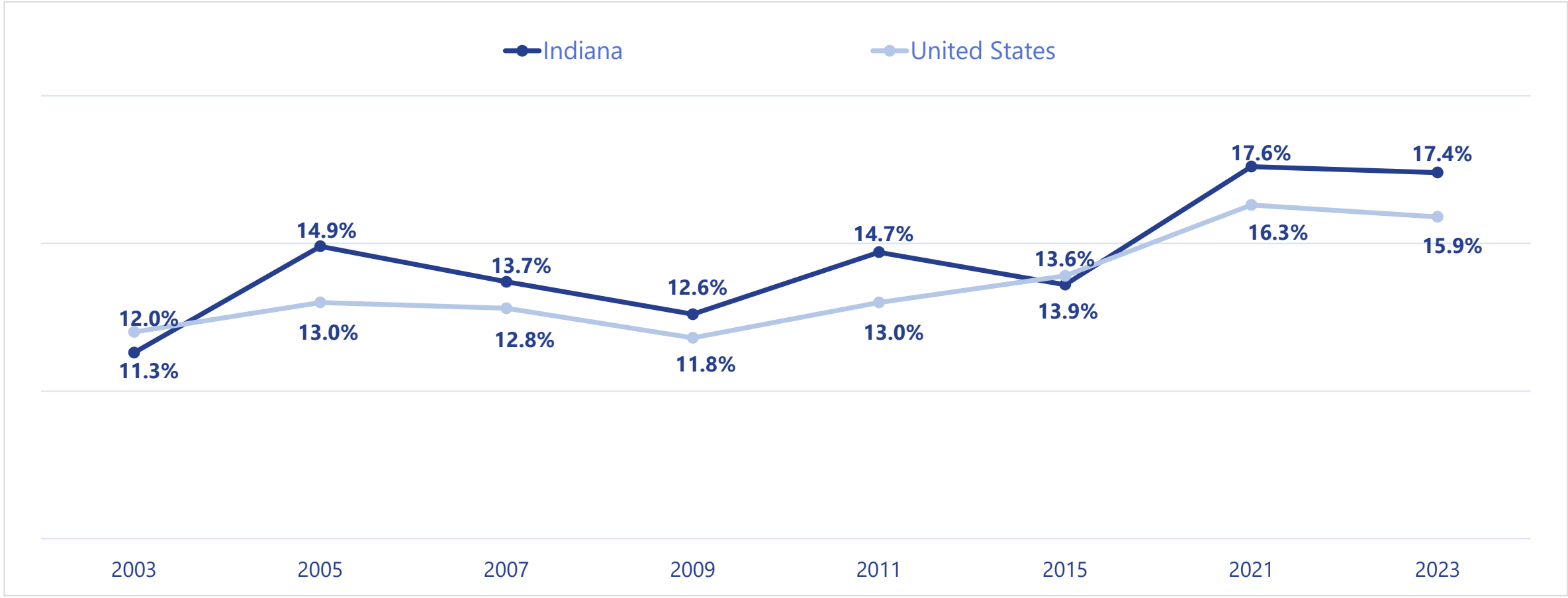
Indiana Department of Health

Youth Obesity Rates by County

- County-level estimates of youth obesity have been calculated using INPC data collected 2018–2023.[8]
- The map displays county-level youth obesity rates by quartile, highlighting notable variation across the state. Only three counties have youth obesity rates below 20%, while the majority fall between 25.0%–29.9%.[1]
- Eleven counties have estimated youth obesity rates of 30% or higher.[1] Among these, Ohio County has the highest youth obesity rate, Hamilton County has the lowest.



Youth Obesity Prevalence in Indiana and the U.S.



Indiana Department of Health

SOURCE: *Youth Risk Behavior Surveillance System (YRBSS); 2003-2023*

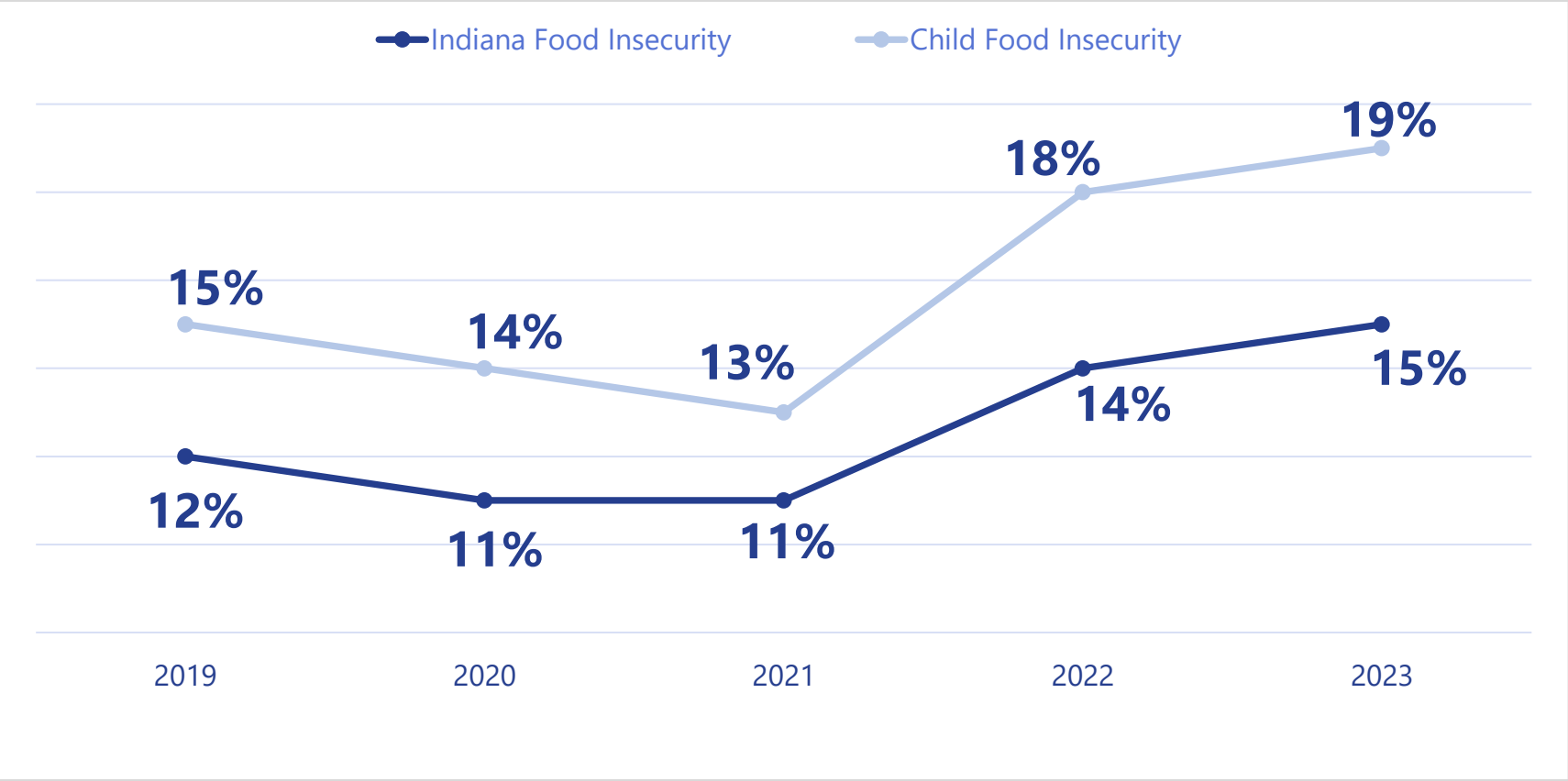
Youth Nutrition & Physical Activity Behaviors

Health Behavior	Percent of High School Students
High school students who ate fruit or drank 100% fruit juices one or more times per day (2023)	90.9%
High school students who ate vegetables one or more times per day (2023)	31.4%
High school students who did not drink a can, bottle, or glass of soda or pop (2023)	25.4%
High school students who were physically active at least 60 minutes per day on 5 or more days (2023)	44.5%
High school students who attended physical education classes on one or more days (2023)	39.6%

Indiana Department of Health

SOURCE: *Youth Risk Behavior Surveillance System; 2023*

Food insecurity in Indiana (2019-2023)



Source: Feeding America: Map the Meal Gap

Indiana's Obesity and Chronic Disease Plan

IDOH is developing a plan that will serve as a statewide framework for implementing innovative strategies, optimizing resource coordination, and developing actionable, data-driven solutions to reduce obesity and chronic disease across Indiana.

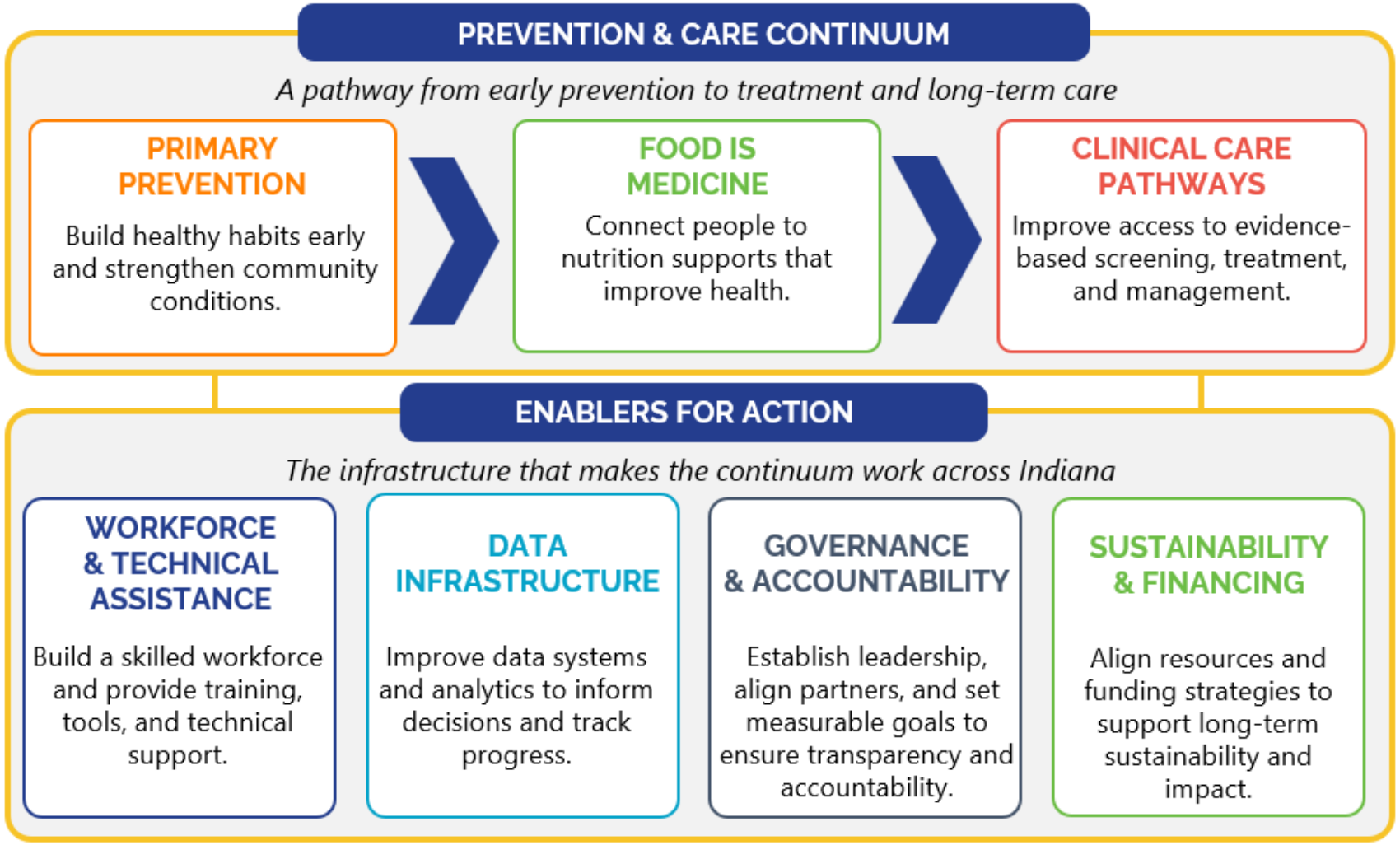
Identify and highlight current data, programming, and gaps in obesity/disease prevention and treatment in Indiana

Engage stakeholders and experts to identify methods to better integrate and coordinate clinical and public health practices

Align with parallel state initiatives such as Health First Indiana and Make Indiana Healthy Again

Create an actionable plan tailored to the unique characteristics of Indiana

Indiana Obesity Plan Framework



Indiana Department of Health



Small Habits. Better Health.

- 5 or more fruits and veggies
- 2 hours or lease of recreational screen time
- 1 hour or more of physical activity
- 0 sugary drinks – more water



Social Media Use

Indiana Department of Health

2024 Indiana Youth Tobacco Survey

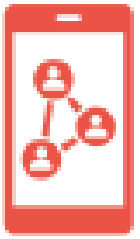
Social Media Use



9 in 10 Middle and High School students reporting **using social media.**



4 in 5 Middle and High School students reporting **using social media daily.**



1 in 3 Middle and High School students reporting **using social media four or more hours/day.**

Indiana Department of Health

Social Media and Youth

- 77% of U.S. high schoolers use social media several times/day; frequent use is associated with higher bullying victimization, persistent sadness/hopelessness, and suicide risk.
- ≥4 hours/day of non-school screen time linked with irregular sleep, less physical activity, depression/anxiety symptoms, and reduced social/peer support.
- Social media carries a 'profound risk of harm' for youth; use is nearly universal (≈95% of teens; ~1/3 'almost constantly'). Risks include cyberbullying, negative body image, and exposure to self-harm content.
- Emerging risks include AI-driven feeds and short-form video; engagement-driven design can displace sleep, activity, and offline connection.

Sources: CDC MMWR (2024); CDC Preventing Chronic Disease (2025); AAP News (2023); AAP Center of Excellence (2026)

How Social Media Contributes to Teen Obesity

Unhealthy Food Marketing: Platforms are flooded with ads and influencer promotions for high-calorie, low-nutrient, and ultra-processed foods, which subtly shape teens' eating preferences and trigger cravings. [1, 2]

Sedentary Behavior: Hours spent scrolling on phones replace time that could be used for physical activity and exercise. [1]

Sleep Disruption: Late-night phone and screen use cuts into necessary sleep hours, and poor sleep is a major biological risk factor for weight gain. [1]

Mindless Eating: Teens often eat more calories without realizing it when they snack while distracted by their screens because it dampens natural fullness cues. [1, 2]

Emotional Eating and Body Image: Unrealistic beauty standards and cyberbullying on social media can cause chronic stress, anxiety, and body dissatisfaction, which sometimes drive compulsive or emotional eating. [1, 2]

https://pmc.ncbi.nlm.nih.gov/articles/PMC5769928/
Does screen media exposure cause obesity in children? - Children and Screens

2024 IYTS Social Media Use

Girls

	Middle School	High School
I don't use social media	9.2	6.1
< 1 time per week	2.5	1.2
About 1 time per week	1.3	0.5*
A few times per week	4.5	3.5
< 1 hour daily	5.8	3.7
About 1-2 hours, daily	20.3	18.6
About 3-4 hours, daily	18.5	24.9
4 or more hours daily	37.8	41.5

Boys

	Middle School	High School
I don't use social media	14.1	10.2
< 1 time per week	2.0	1.5*
About 1 time per week	2.3	0.5*
A few times per week	5.2	4.2
< 1 hour daily	4.7	5.1
About 1-2 hours, daily	21.6	24.3
About 3-4 hours, daily	18.3	25.9
4 or more hours daily	31.9	28.3



Child Fatality Review in Indiana

Indiana Department of Health

Why Child Fatality Review?

- Injury is the No. 1 cause of death among children in Indiana
- More than 1,600 Indiana children died from injury-related causes in the last five years
- In 2024, there were 1,380 non-fatal hospitalizations and 149,295 non-fatal emergency department visits among children
- Every 3.5 minutes, a child is treated for an injury in an emergency room in Indiana
- ***Injury deaths are preventable!***

Indiana Department of Health

Sources: Indiana Department of Health Vital Records, ODA
IDOH Division of Trauma and Injury Prevention Special Emphasis Reports

Top 5 Injury Causes/Manners of Death by Age Group

Indiana Vital Records 2021-2025 (ICD-10 Codes R95, R99, >V00)

Infants	Ages 1-4	Ages 5-9	Ages 10-14	Ages 15-17
SUID (455)	Drowning (54)	Transportation Accident (45)	Suicide (74)	Transportation Accident (139)
Suffocation (42)	Transportation Accident (43)	Homicide (24)	Transportation Accident (53)	Suicide (127)
Homicide (32)	Homicide (39)	Drowning (20)	Homicide (32)	Homicide (125)
Transportation Accident (13)	Suffocation (29)	Fire (9)	Drowning (11)	Poisoning (72)
Unspecified Event (4)	Fire (17)	Poisoning (6)	Poisoning (11)	Firearms (15)

Indiana Department of Health

Source: Indiana Department of Health, Vital Records, ODA

Current Statewide CFR Committee Recommendations

- Based on the recommendations provided from local CFR teams, the Statewide CFR Committee develops recommendations for prevention
- Statewide CFR Committee has recommended:
  - Dissemination of infant safe sleep materials to prevent SUIDs
  - Additional opportunities for organizations to receive education on infant safe sleep and standardize the messaging provided to families
  - Supporting community-led water safety programs to prevent pediatric drownings
  - Expansion of the Handle with Care program to more counties to prevent pediatric suicide and address youth mental health

CFR Recommendation: Infant Safe Sleep Education

Infant Safe Sleep and Family Engagement training

- Provided virtually or in person
- Can be modified to address caregivers or professionals who work with families
- So far in 2026, IDOH has trained **517 individuals** at 155 different organizations throughout the state
- Live bi-monthly virtual infant safe sleep training opportunities are now available and posted on the IDOH website
- An interactive map is available on the safe sleep website with all safe sleep providers that received their certification from IDOH listed

CFR Recommendation: Youth Mental Health Resource Development

- Develop print and digital resources promoting youth mental health that feature Indiana teenagers
  - Video testimonials were created that feature Indiana teenagers sharing their struggles with mental health
  - Print resources (pictured below) that correspond with those testimonials are available and can be shipped to local partners across the state at no cost
- Enhance IDOH suicide prevention resources to include awareness videos in American Sign Language (ASL)
  - Two mental health awareness videos were filmed in ASL – one video for adults and one video for youth







Handle with Care

- Began in Indiana in 2021
- Active in 38 counties (80 K-12 school districts)
- **6,955 individual notifications have been sent in 2026**
- Expanding into early learning centers (0-5 years) and emergency department setting
- Program priorities:
  - Expand HWC statewide
  - Build capacity for enhanced technical assistance for local partners
  - Develop coordinated statewide notification system



Indiana Department of Health

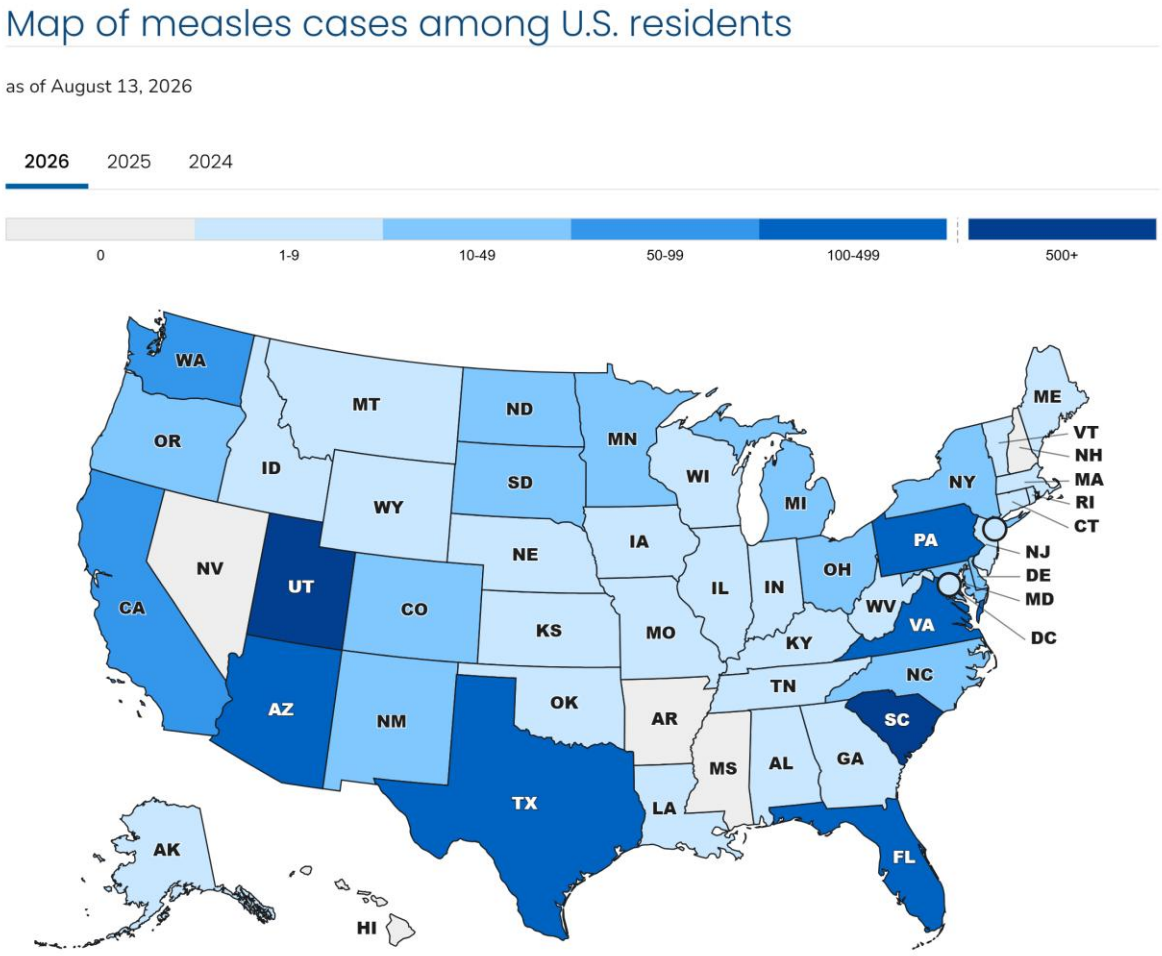


Public Health Updates

Indiana Department of Health

National Measles Trends

- As of Sept. 10, there have been 3,294 confirmed cases of measles in the U.S.
- 95% of cases are associated with an outbreak
- Majority of cases are unvaccinated individuals
- Other Midwest states are experiencing similar outbreaks



Indiana Department of Health

Measles in Indiana

- Indiana has reported 15 confirmed cases of measles as of Sept. 18
- IDEPD VPD Team is handling increased measles assessments
- Stay up to date with the IDOH measles webpage

Measles Resources and Information

As of Sept. 18, there are 15 known measles cases in Indiana this year.

2026 Measles Cases by County of Residence

County	Cases
Parke	3
Switzerland	6
Wayne	6

Indiana Department of Health

https://www.in.gov/health/idepd/diseases-and-conditions-resource-page/measles

Measles Updates

- To prevent measles infections and reduce the risk of community transmission from importation, all U.S. residents that plan to travel internationally should be current on their MMR vaccinations
- Healthcare providers should ensure children are current on routine immunizations, including MMR
- Given high population immunity against measles in most U.S. communities, the risk of widescale spread is low
- However, pockets of low coverage leave some communities at risk for outbreaks

Measles Testing Guidance for Providers

Measles testing should be performed for patients who:

- Meet the clinical case definition for measles (generalized maculopapular rash; and fever ≥101˚F; and cough, coryza, or conjunctivitis) AND
- Within the 21 days prior to symptom onset, had an elevated risk of exposure to measles including:
  - Had a known exposure to measles, or
  - Traveled internationally or to an area with known measles cases, or
  - Had contact with someone with a febrile rash illness, particularly if those individuals had traveled internationally or to an area with known measles cases.

Measles Testing Guidance for Providers

- Clinicians should consult public health authorities regarding testing if:
  - Measles is strongly suspected based on clinical presentation in patients with no known increased risk of measles exposure, particularly if the patient has no evidence of immunity to measles.
  - Patients have had a known measles exposure and present with atypical signs or symptoms.
- To avoid false positive results, testing is **discouraged** for patients with clinical presentation inconsistent with measles and no known increased risk of exposure to measles

Measles Testing with IDOHL

- Measles should be reported to IDOH **immediately upon suspicion**
- Authorization is **required** for measles testing at IDOHL:
  - Consultation with an epidemiologist available 24/7
    - Business hours: 317-233-7125
    - After Hours: 317-233-1325
- Measles submission instructions:
  - Measles PCR: https://www.in.gov/health/laboratories/testing/measles-pcr
  - Measles serology: https://www.in.gov/health/laboratories/testing/measles-serology

Measles Resources

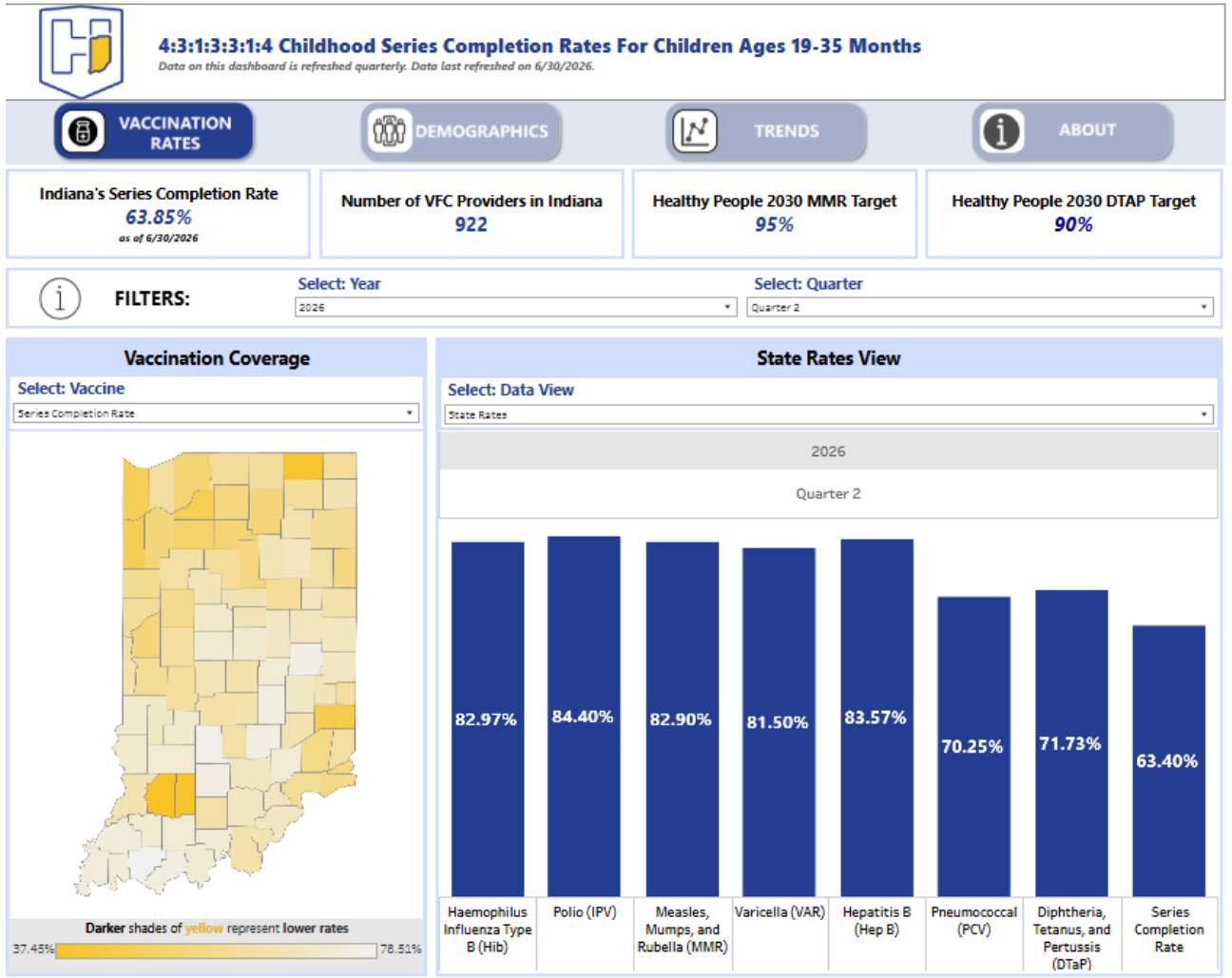
- IDOH Measles Webpage
- CDC Measles Webpage
- Measles Testing at IDOH Laboratory

Measles Vaccine

- CDC recommends two doses of measles-containing vaccine routinely for children, starting with the first dose at age 12 through 15 months and the second dose at age 4 through 6 years
  - This can be administered as MMR or MMRV vaccine
- For international travelers:
  - Persons aged 6 months+ who will be traveling internationally should be vaccinated with measles-containing vaccine if they are not already protected against measles, mumps, and rubella
  - Infants 6 through 11 months of age should receive one dose of MMR vaccine. Infants who get one dose of MMR vaccine before their first birthday should get two more doses according to the routinely recommended schedule
  - Persons 12 months of age and older should receive two doses of measles-containing vaccine, separated by at least 28 days

https://www.cdc.gov/measles/hcp/vaccine-considerations/index.html

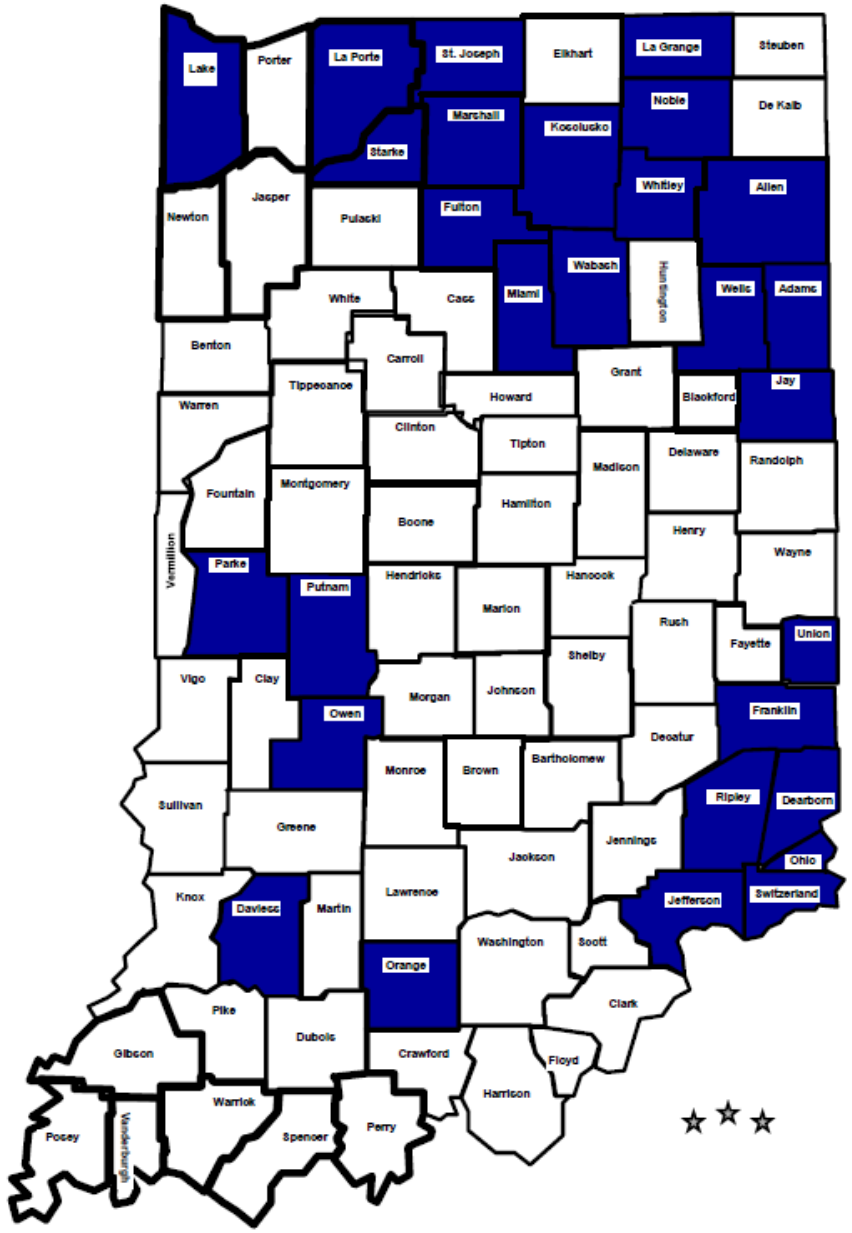
Vaccination by County: Dashboards



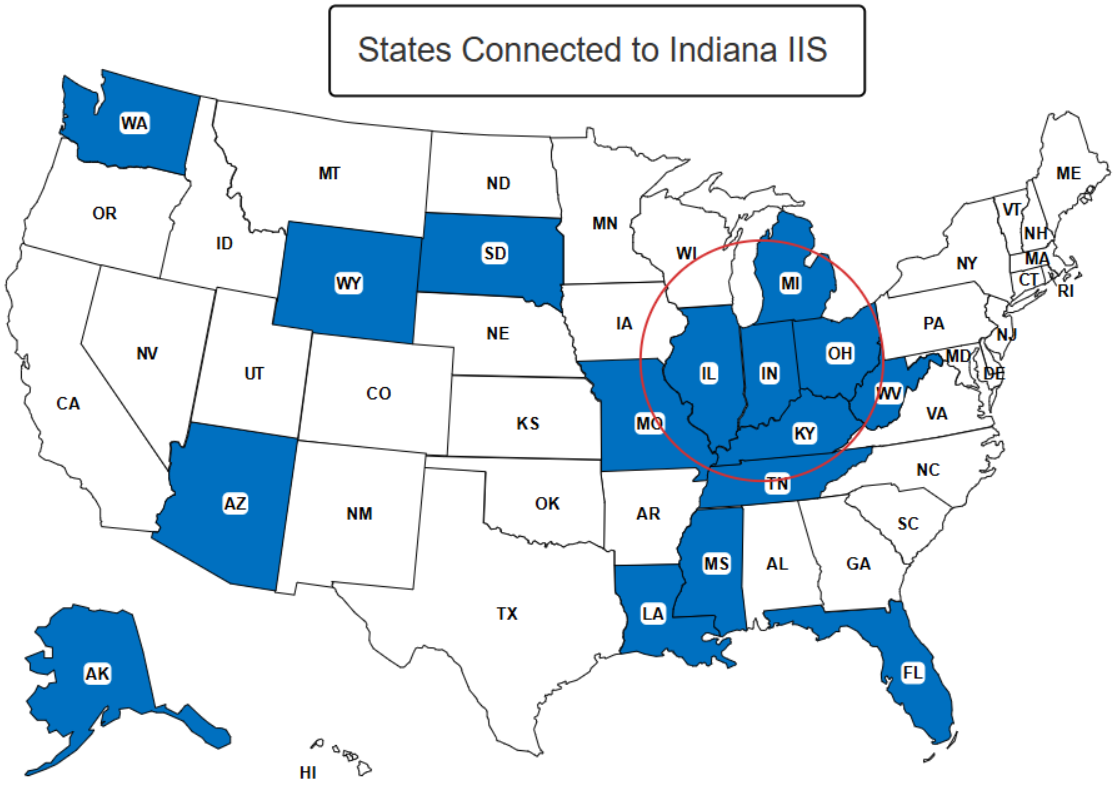
Indiana Department of Health

MMR Vaccination Coverage

- 19-35 month assessment rates for MMR coverage
- Counties shaded in blue are below the state average

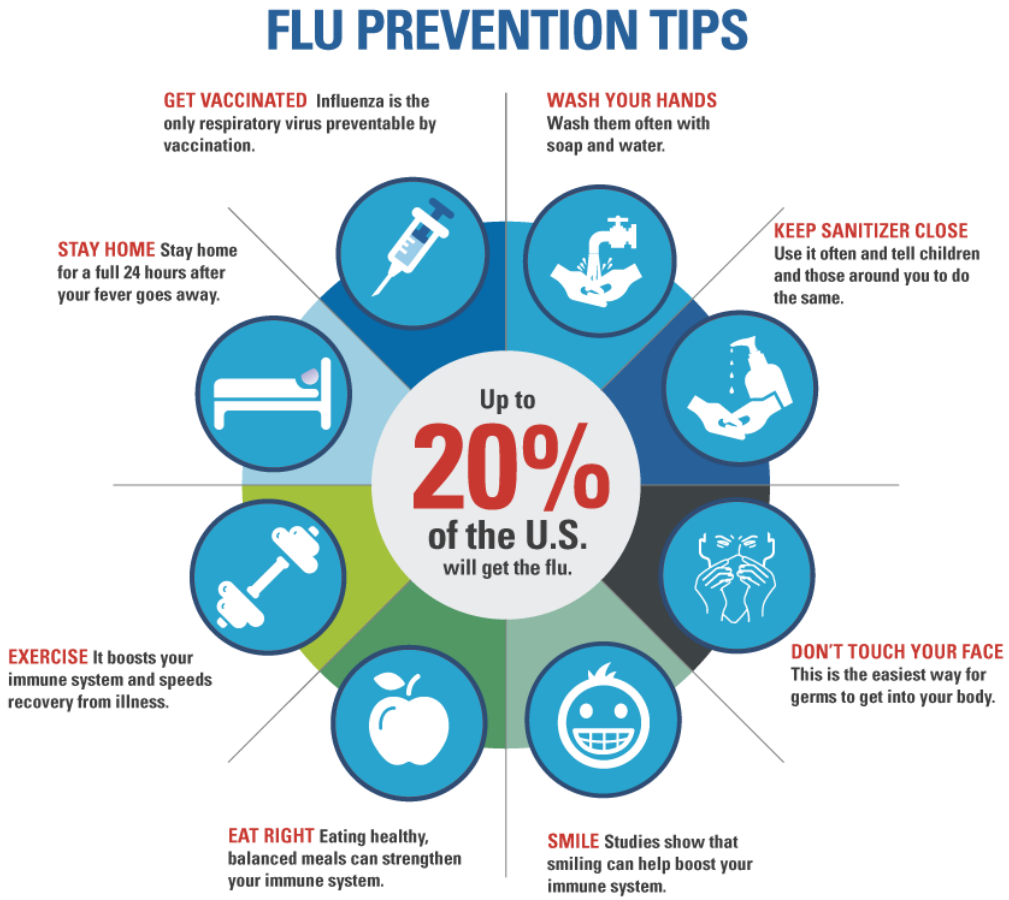


Indiana Immunization Information System Remote Registry



- Indiana is now connected to IIS systems in 17 jurisdictions
- Allows providers to retrieve immunization records from other states/territories
- All border states are connected as of December 2025
- Florida and Arizona are important for Hoosiers that winter in warm climates

Seasonal Influenza Vaccine

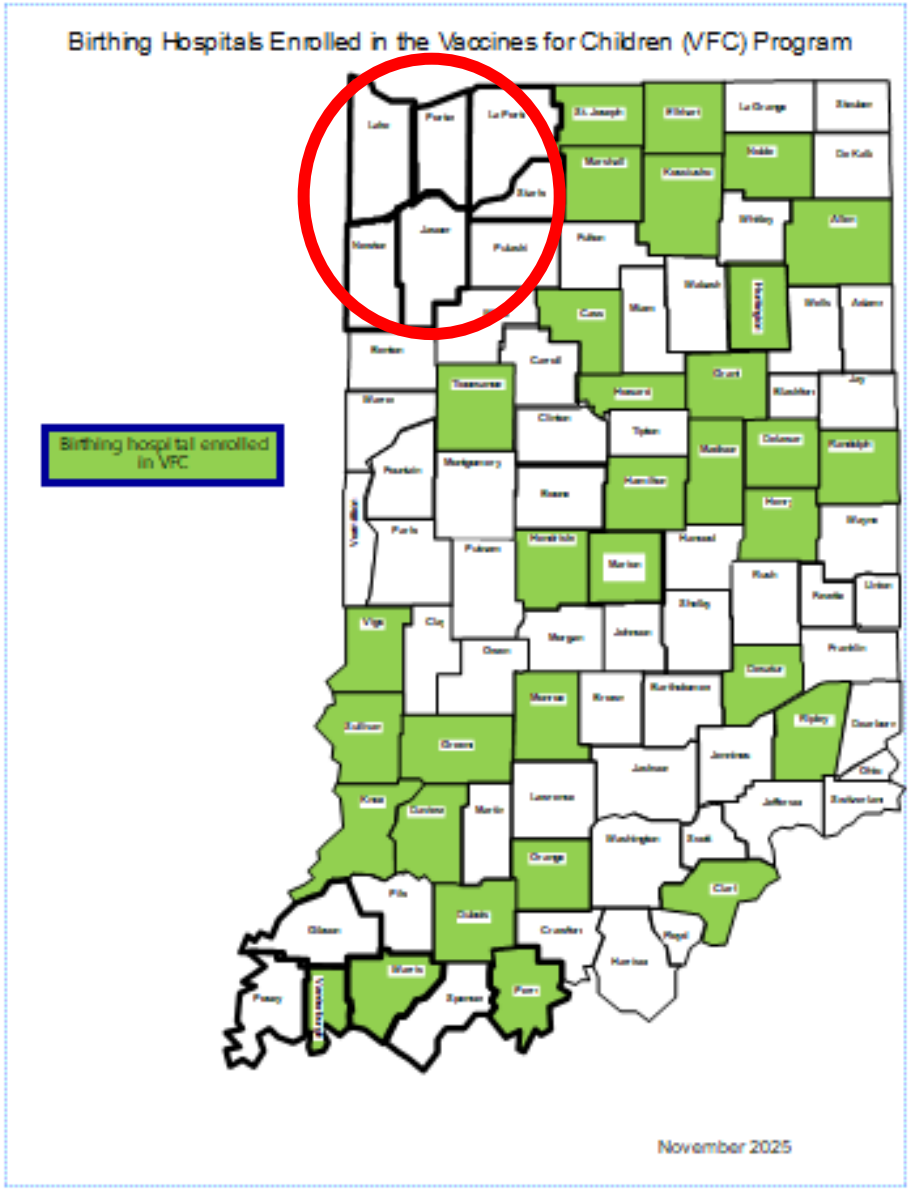


- The current recommendation is an annual influenza vaccination for all Hoosiers 6 months and older who do not have contraindications
- No shortages or delays in shipment expected

Source: www.nationaljewish.org

Indiana Birthing Hospitals Enrolled in the VFC Program

- 54% of Indiana birthing hospitals are enrolled in the Vaccines for Children (VFC) program
- 59% of Medicaid infants are born at a birthing hospital enrolled in the VFC Program and able to receive an RSV vaccine prior to discharge
- Still great areas of need where vaccine is not available prior to discharge



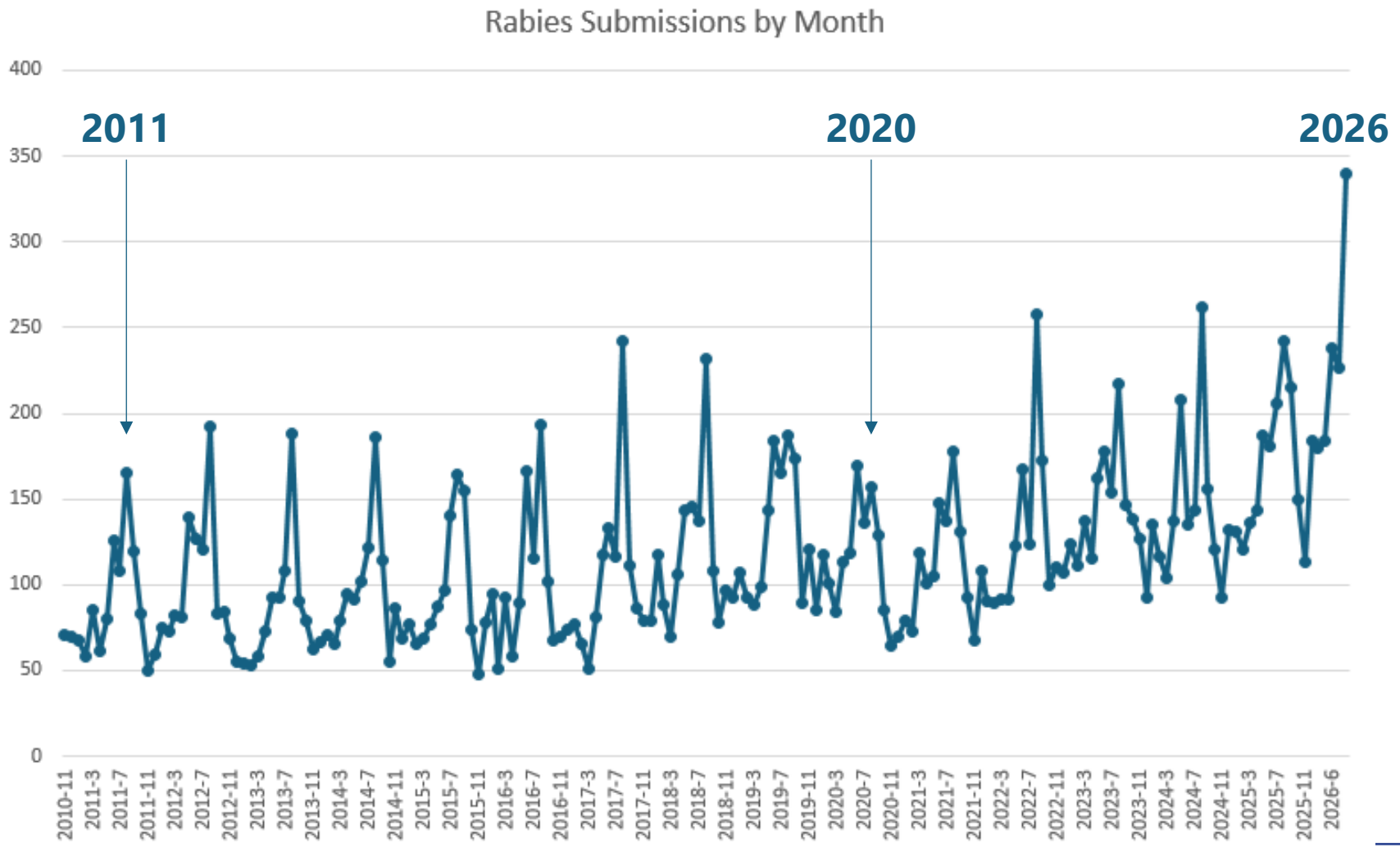
Indiana Department of Health

Consumer Access via MyVaxIndiana.in.gov

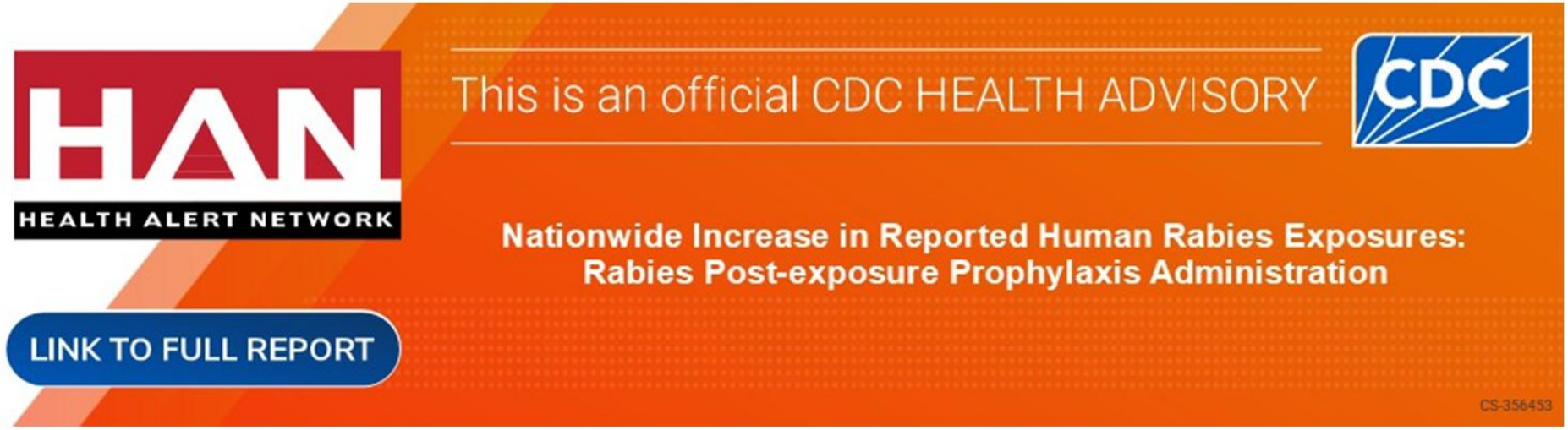


Indiana Department of Health

The IDOH Laboratory received a record number of rabies test requests in August 2026



Indiana Department of Health



- From July through August 2026, CDC received 17% more rabies-related inquiries than during the same period in 2025, including reports of mass exposure events (e.g., involving more than one person).
- During this time frame, CDC also received reports from at least eight state health departments of increased rabies PEP use, PEP administration errors, or both.
- Each year, an estimated 1.4 million people in the United States seek medical care after animal contact and undergo evaluation, and approximately 100,000 people receive rabies PEP following a potential exposure.
- According to weekly pharmacy data as of September 2, 2026, utilization for the two rabies vaccines and the two rabies immunoglobulins licensed in the United States has increased by an estimated 33% and 76%, respectively, compared with the same time period last year.

The IDOH Laboratory is currently prioritizing rabies testing for higher-risk species

- Pending test requests have exceeded the current capacity of the IDOH Laboratory for timely completion.
- Dog and cat testing has been temporarily suspended for most counties.
- Bat testing may be conducted out of state and is likely to take longer than normal.
- Restoration of full testing capacity is expected by the end of September.
- Bite victims are advised to contact their healthcare provider or local health department for risk assessment.

Contacts

Erik Ohannesian, Rabies Epidemiologist

erohannesian@health.in.gov

317-646-4637

IDOH main number: 317-233-1325

After hours: press “1” to speak with the epidemiologist on call

Blood Lead Testing- How Indiana Compares

Percentage of kids under age 6 tested:

- Nationally 8% (CDC data from 2022*)
- Indiana 19% (2025 data)

Kids tested who have an elevated lead level:

- Nationally, 1.7% of all kids tested have a confirmed elevated lead level (CDC data from 2022*)
- Indiana had 1.88% confirm as elevated in 2022, but 2025 figures show that dropping to 1.63%

Kids covered by Medicaid who were tested:

- Nationally, 63% of kids under age 3 were tested (CDC data from 2022)
- Indiana is at 50% as of June 2026

Indiana Department of Health

*CDC counts include data reported from 28 states and Puerto Rico

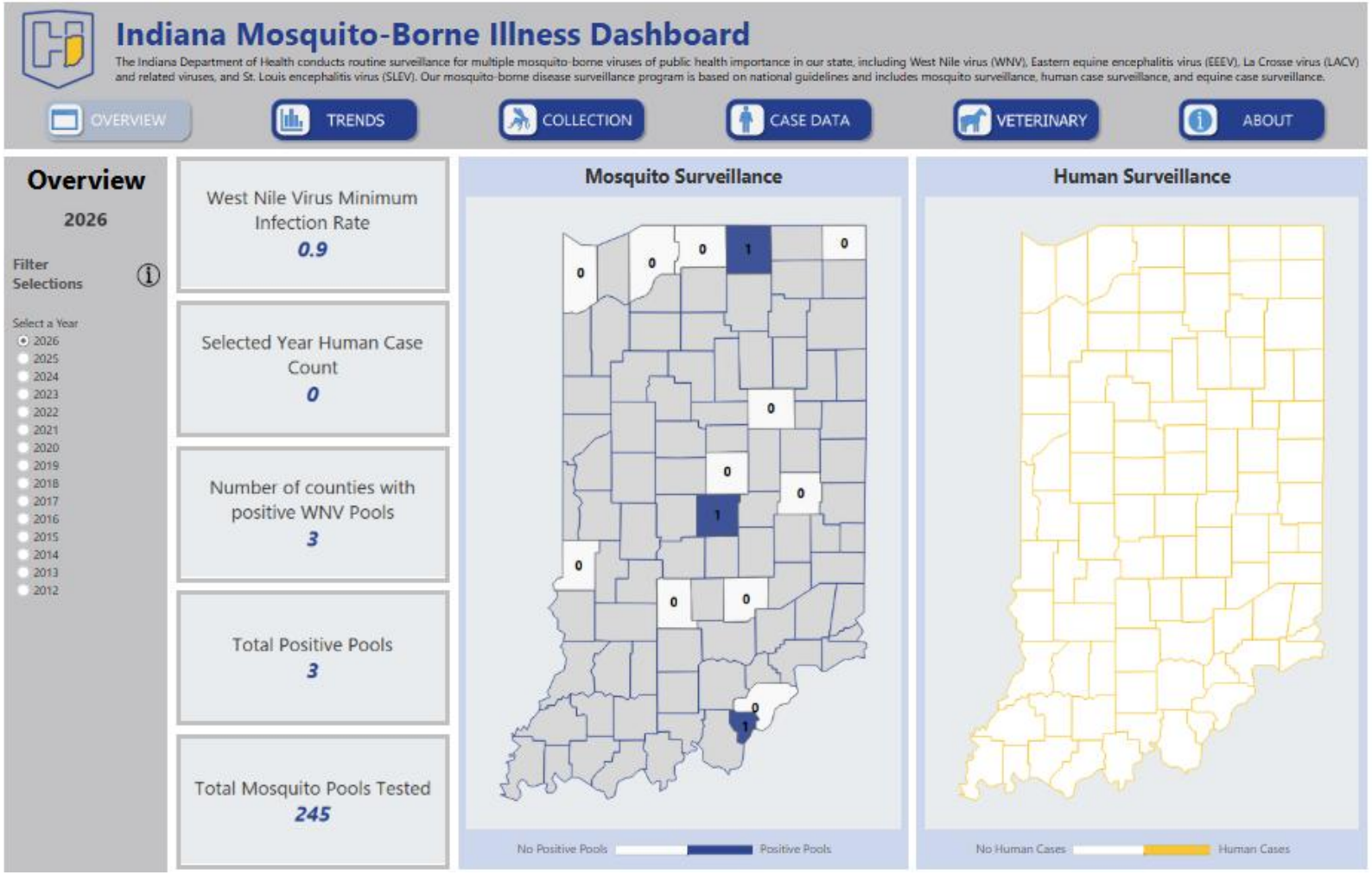
Lead Test Reporting Gaps

ONE CLINIC EXAMPLE:

In 2025, across 13 clinics statewide, saw a 62% drop in reported tests

- Issue started in May 2025 and continued through December
- Reached out to a county health department about the drop-off in early 2026
- Spring 2026, healthcare system diagnosed and fixed the issue, sent 7,919 results

West Nile Virus

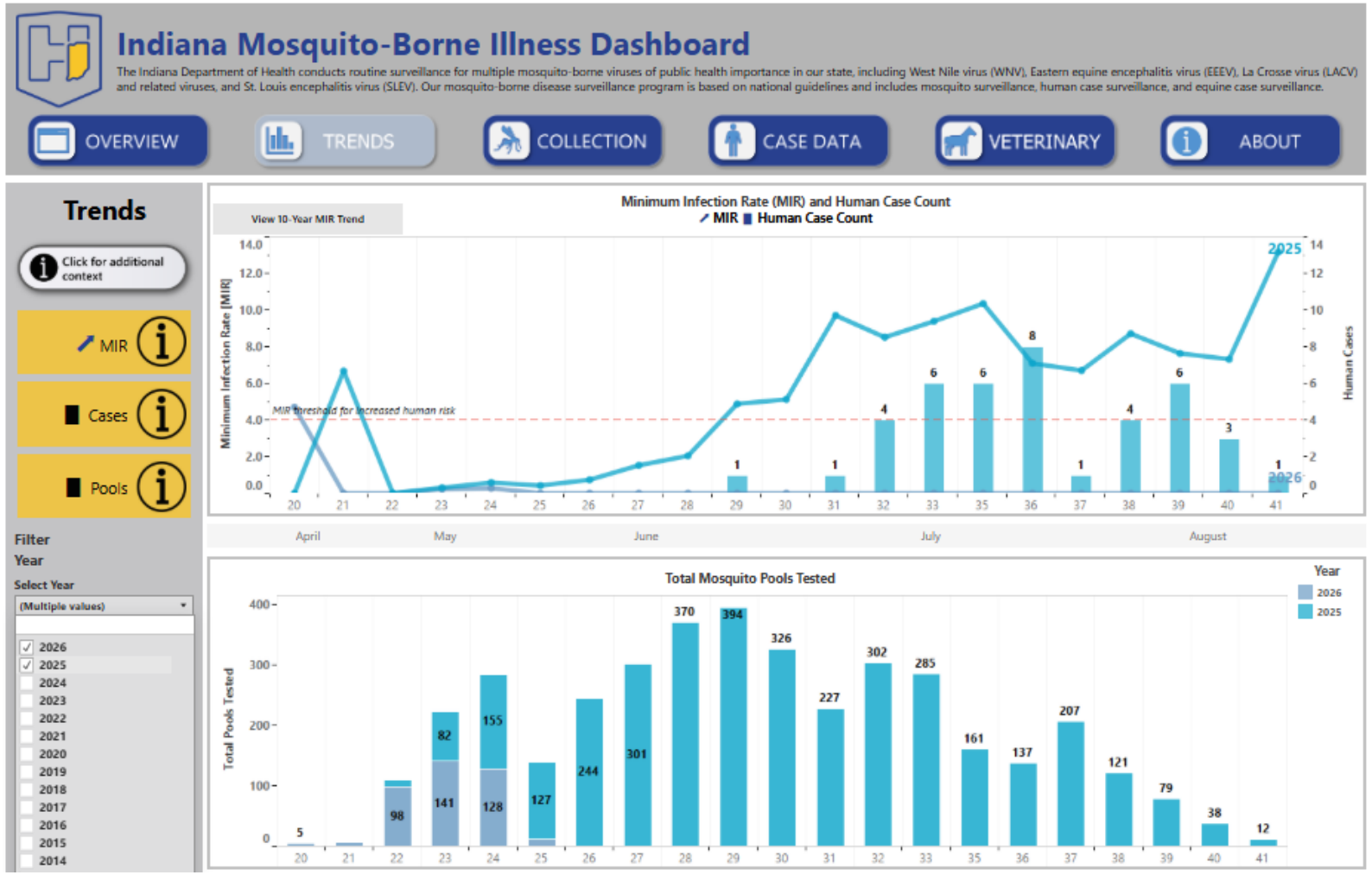


Indiana Department of Health

West Nile Virus

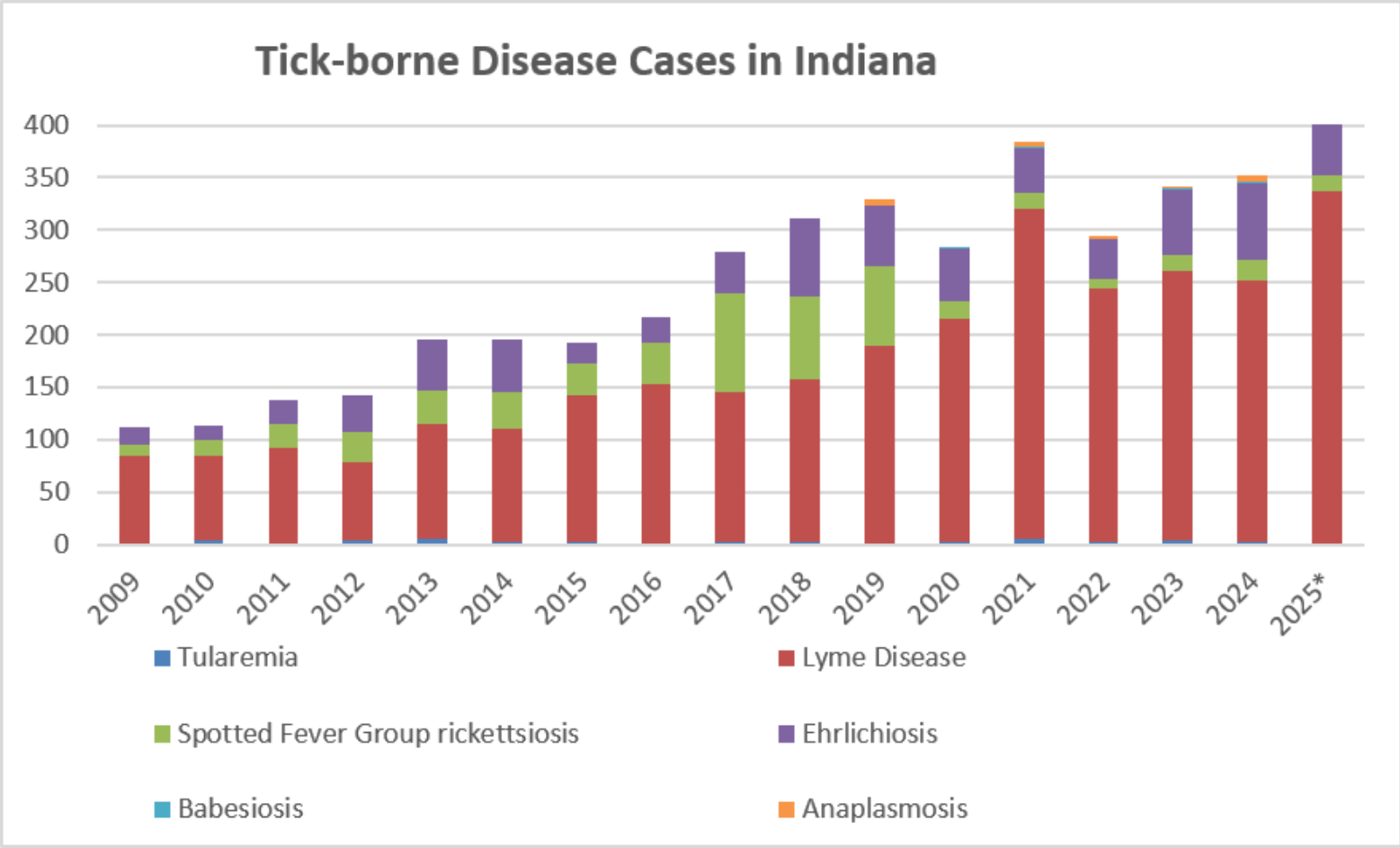
Know the Risk





Indiana Department of Health

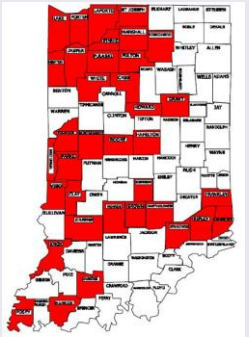
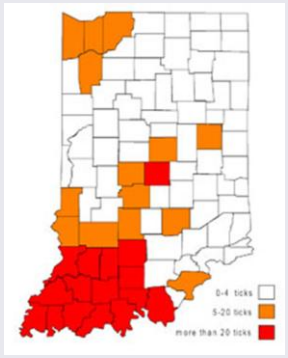
Tick-Borne Disease in Indiana



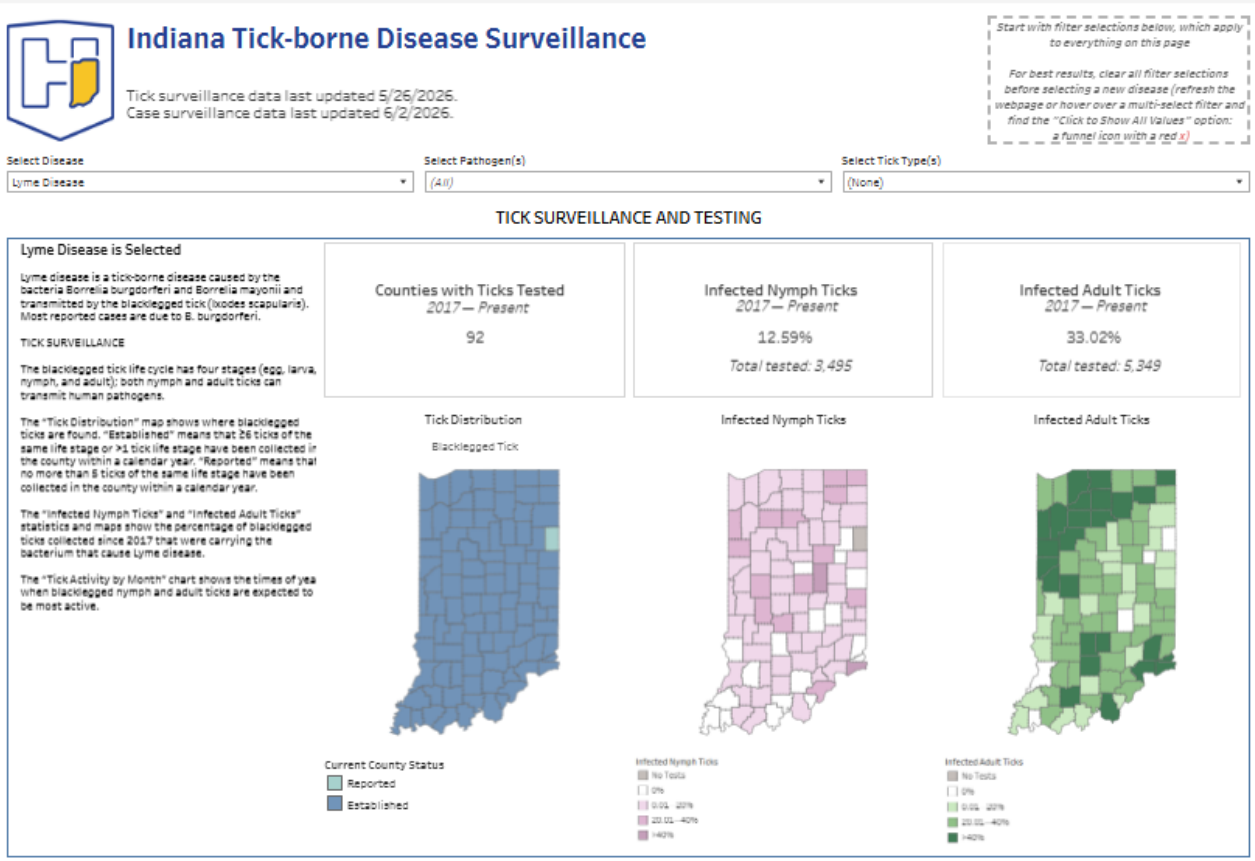
Expanded IDOH Tick Surveillance

1. Determine the distribution of medically-important ticks in Indiana
2. Determine what pathogens ticks in Indiana are carrying
3. Determine level of infectivity of pathogens in ticks in Indiana

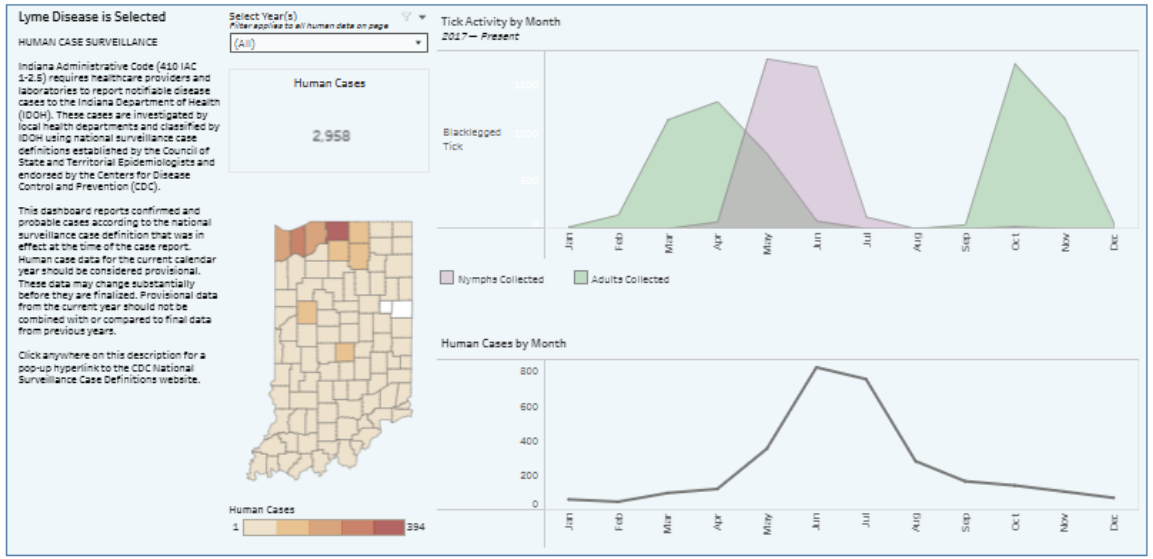
Ticks of Medical Importance - Indiana

	Blacklegged Tick	Lone Star Tick	American Dog Tick	Gulf Coast Tick	Asian Longhorned Tick
					
2016					
2025					

Tick and Tick-Borne Disease Dashboard



HUMAN CASE SURVEILLANCE



Indiana Department of Health



Water Safety Awareness

Indiana Department of Health

Water Safety and Drowning Prevention

- According to preliminary data for Indiana, to date in 2026:
  - 20 pediatric drownings
  - 11 pediatric near-drownings

These deaths are preventable!

- IDOH is partnering with local YMCAs, Indiana University School of Public Health, and other organizations to develop a water safety state action plan.
- IDOH provides support to local organizations for resource development and swim lessons.

How can you get involved in water safety?

- Participate in state and local child fatality review teams.
- Partner with IDOH on the water safety state action plan.
- Discuss with families the importance of water safety, especially for children with autism who live near pools or retention ponds.



Water Safety

- In Indiana, drowning is the leading cause of death for children 1-4 years old. That age group is most likely to drown in pools and retention ponds.
- 88% of children drown with at least one adult present. Having a designated Water Watcher ensures that there is an identified adult that is actively supervising children when they are in and around water.
  - Water Watcher resources are available at no cost through Pool Safely.
- Two-thirds of drowning deaths occur between May and August.
- Boys account for three out of four child drowning deaths.
- Most children who drown in swimming pools:
  - Were last seen in the home
  - Had been missing for less than five minutes
  - Were in the care of one or both parents

Sources: Safe Kids Worldwide, 2025 and Centers for Disease Control and Prevention, 2024

Water Safety – Five Layers of Protection

The National Drowning Prevention Alliance (NDPA) recommends using the five layers of protection to reduce the risk of drowning.

Here are some tips for engaging with families around the five layers of protection:

Barriers and alarms – Encourage families to use four-sided fencing with self-closing, self-latching gates, pool safety covers, and alarm systems, to help prevent children from accessing water unsupervised.

Active Supervision – Reinforce the importance of staying vigilant of their surroundings and that there is always active adult supervision from a designated water watcher or lifeguard anytime children are near water.

Water Competency – Refer families to opportunities for swim lessons so that children can gain skills in the water.

Life Jackets – Remind families to only wear U.S. Coast Guard approved life jackets and check to make sure they are fitting properly and not damaged.

Emergency Preparation – Connect families to opportunities to learn more about CPR and basic water rescue skills to respond to emergencies. Talk to caregivers about the importance of having a phone available and ready to call 911.

Water Safety - IDOH Resources

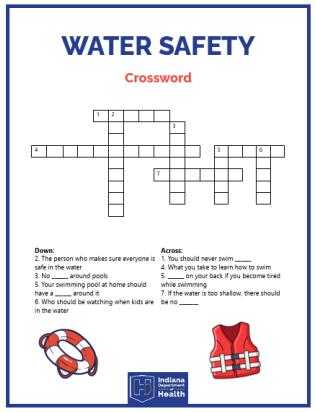
Resources are available through IDOH for organizations to use when spreading awareness about water safety.

Some examples of how to use these resources include:

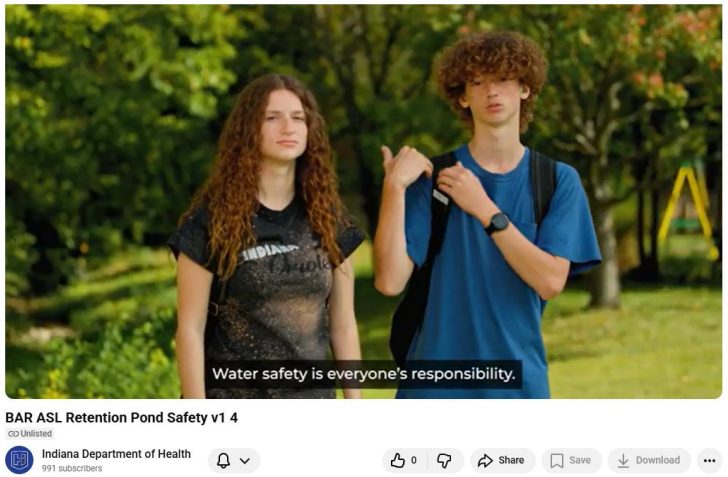
- Place water safety activity sheets in waiting rooms for families to fill out while waiting for their appointments.
- Play the ASL retention pond safety video in waiting rooms.
- Print out the active supervision one pager and give to parents after discussing water safety and swim lessons.

[Activity Sheets]

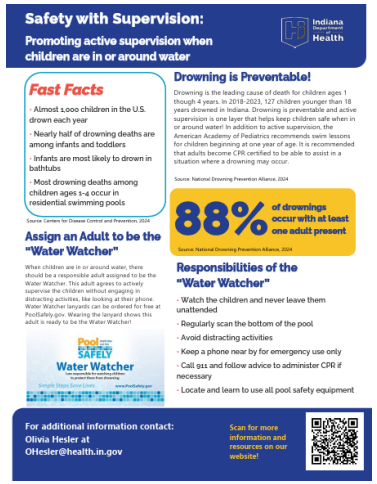




[ASL Retention Pond Safety Video]



[Active Supervision One-Pager]



Indiana Department of Health

IDOH Water Safety website: https://www.in.gov/health/safesleep/prevention/water-safety/



Clinician Resources

Indiana Department of Health

Ways to connect with us

- Clinician webinar fourth Friday of the month
- Access our webpage with resources for clinicians
- The Doctor is IN podcast
- Watch for Indiana Health Network Alert messages
- Scan the QR code to sign up for any IDOH newsletter or communication:



Indiana Department of Health

Public Health Data Navigator



Indiana Department of Health

Meet the CMO: Dr. Eric Yazel

- CMO Public Health Practice
- Dr. Yazel was most recently the Clark County Health Officer and chief medical director for Indiana Emergency Medical Services (EMS)
- Graduated from Indiana University with a B.S. in biology, followed by a M.A. in clinical physiology from Ball State University
- Medical degree from the University of Louisville and completed his residency there in Emergency Medicine
- Attending Physician at Norton Clark Emergency Department, Chief Medical Officer for LifeSpring Health Systems, and Chief Tactical Physician for the Jeffersonville Police Department
- Dr. Yazel was born in northern Indiana and grew up in Indianapolis. He has been a Clark County resident since 2006. He enjoys travelling, basketball, and all things outdoors, especially spending time on his farm in Borden with his wife and two children.



Meet the CMO: Dr. Emily Fitz

- CMO Clinical Health
- Dr. Fitz has over a decade of clinical experience as an emergency physician
- She obtained her medical degree from the University of Missouri, then subsequently completed both her emergency medicine residency and disaster medicine fellowship at Indiana University
- She has practiced in multiple states, has extensive experience in rural medicine, and has served as an EMS medical director.
- She has been active in advocating for Hoosier patients as the former president of INACEP and as a former member of the Trauma Care Commission
- Dr. Fitz works at Eskenazi Health
- She and her husband have six children



Thank you!

Scan to connect on LinkedIn

Scan to submit feedback survey

Pediatric Obesity Pharmacotherapy

Sara Naramore, MD
Diplomate of the American Board of Obesity Medicine
Associate Professor of Clinical Pediatrics
Pediatric Gastroenterology, Hepatology, and Nutrition

Riley Children's Health
Indiana University Health

INDIANA UNIVERSITY
SCHOOL OF MEDICINE

BEST CHILDREN'S HOSPITALS
U.S.News & WORLD REPORT
RANKED IN 11 SPECIALTIES
2025-2026

Disclosure

- I have no financial relationships or disclosures
- I will be talking about the off-label use of anti-obesity medications

Obesity Classification

BMI Category	BMI Percentile
Underweight	<5%
Healthy	5% to <85%
Overweight	85% to <95%
Obesity	>95%
Severe Obesity	>120% of the 95th percentile (35 kg/m^2)

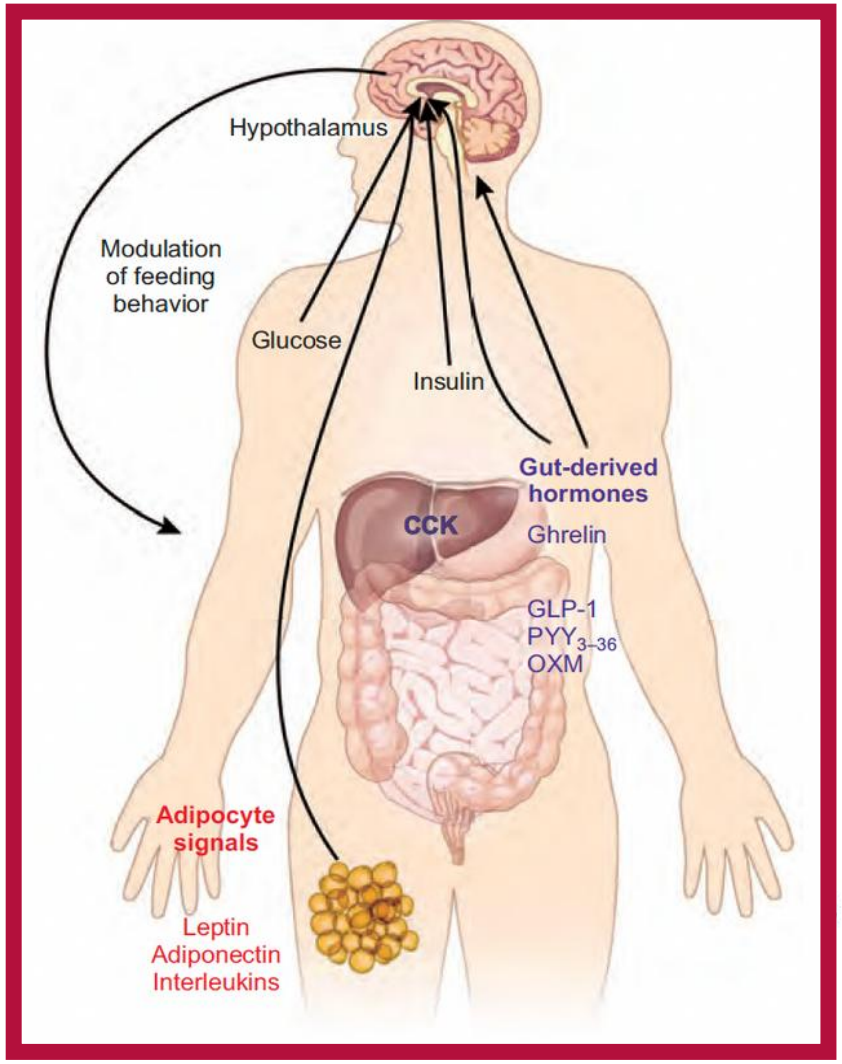
Class 1: 95% to <120% of the 95th percentile

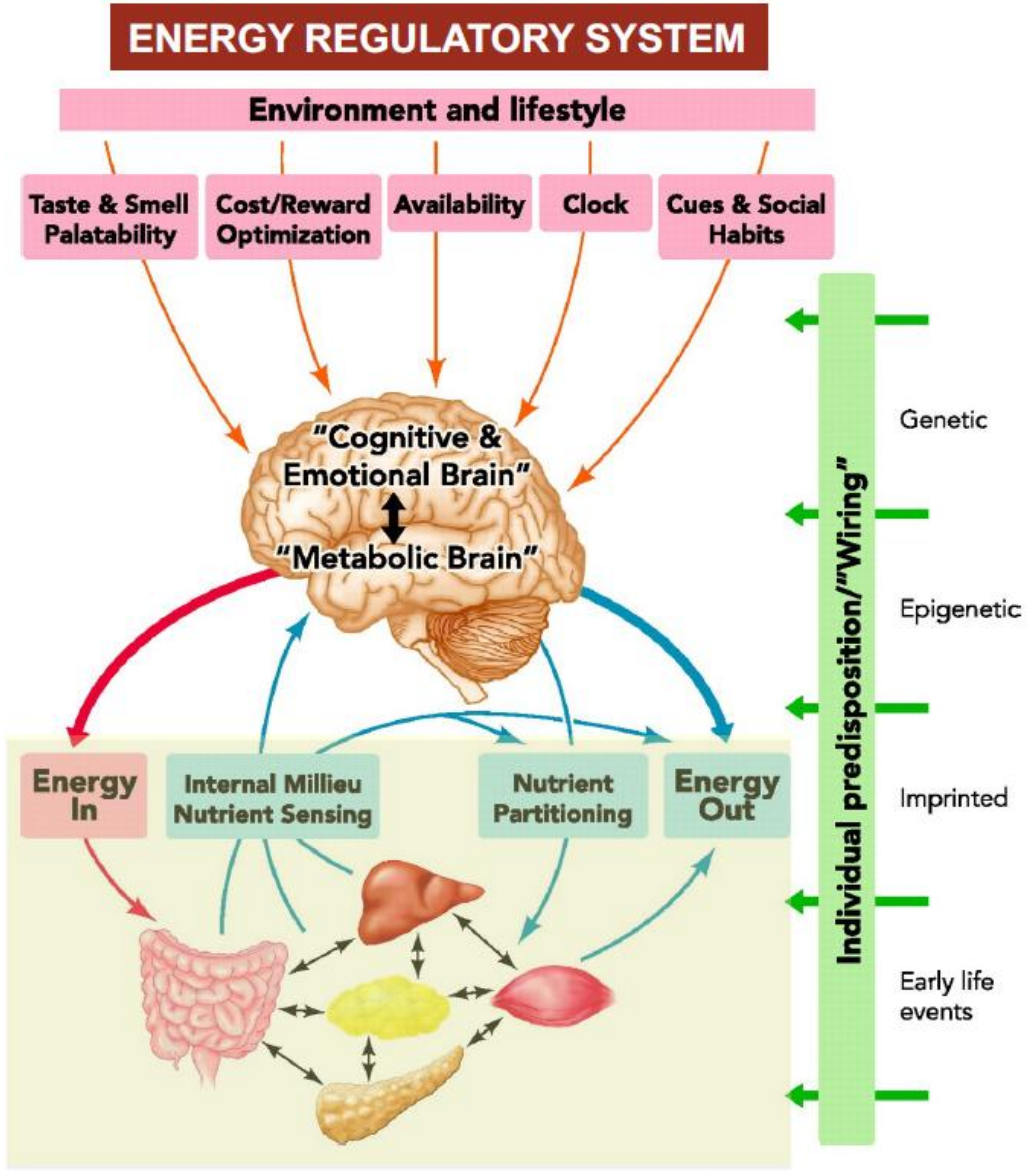
Class 2: 120% to <140% of the 95th percentile (BMI 35-40)

Class 3: >140% of the 95th percentile (BMI >40)

- Children in the U.S. age 2-19 years old with overweight or obesity: 31.8%
- Children with obesity: 18.5%

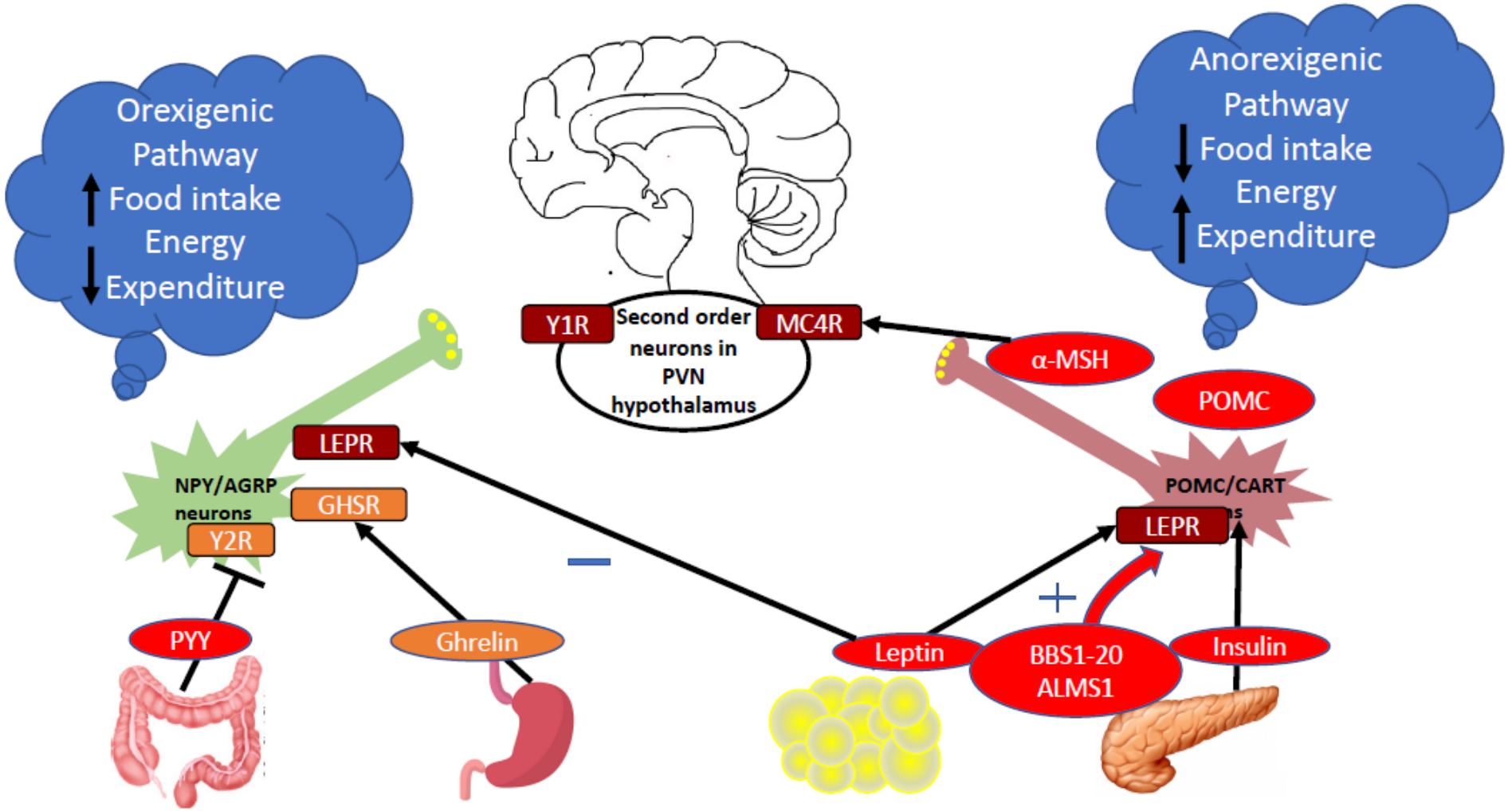
Energy regulation occurs in the hypothalamus





Berthoud et al. *Physiology*. 2008;23 75-83.

Energy Balance Regulation

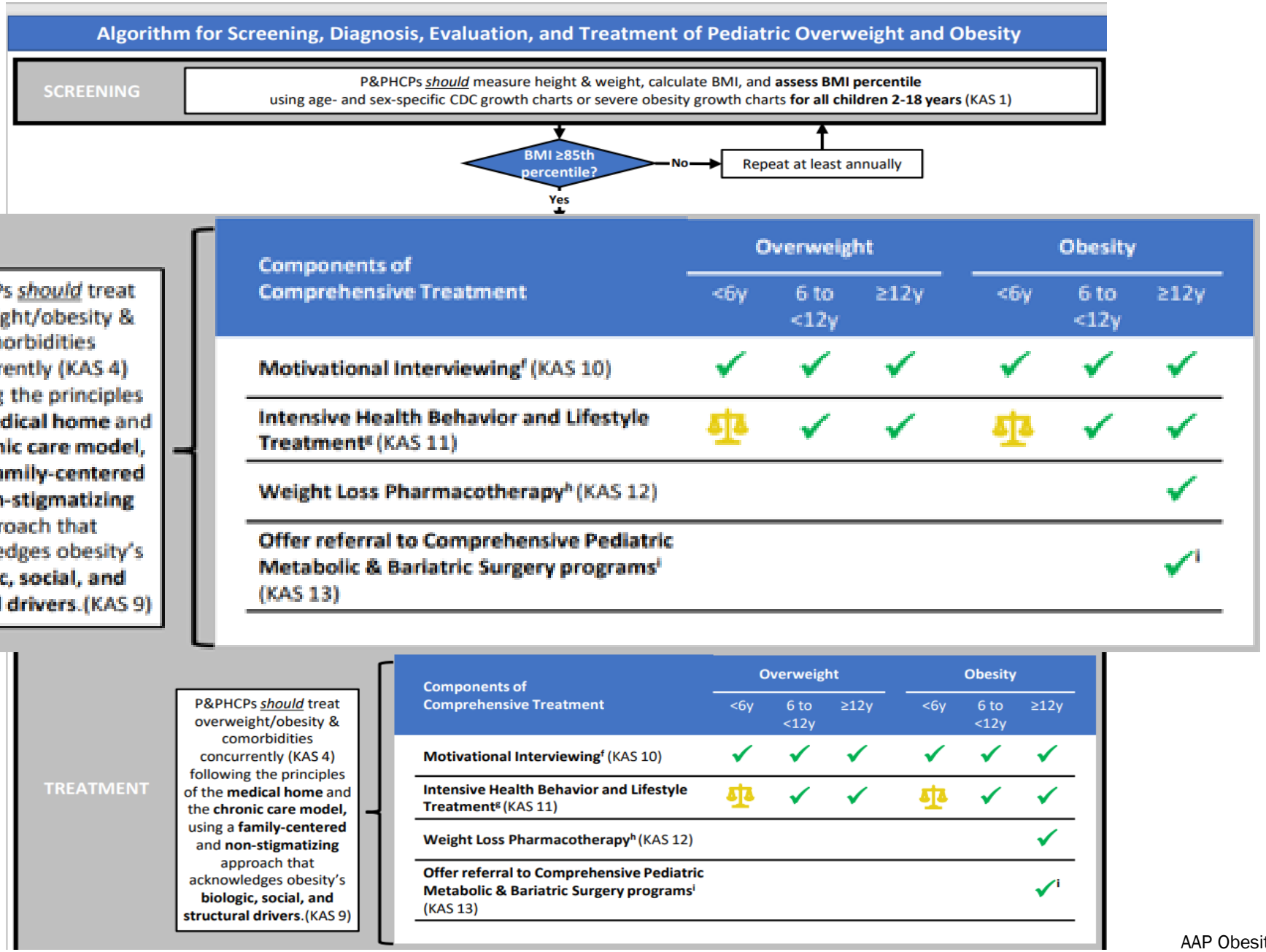


LEPR = leptin receptor; MC4R = melanocortin-4-receptor.
Courtesy Dr. Laurie Braun. Adapted from Bell CG, et al. *Nat Rev Genet*. 2005;6(3):221-34.

Management of Obesity



Intervene early because “watchful waiting” does not work



AAP Obesity Guidelines 2023

Determining which medication to use - Eating Habits

- **Night Eating Syndrome**: Does your child get up in the middle of the night to get something to eat in order to fall back asleep?
- **Satiety**: How long does your child stay full between meals and snacks? Hyperphagia (*Hungry Gut phenotype*)
- **Satiation**: Does you child require larger portions of food, second helpings in order to reach fullness? (Hungry Brain phenotype)
- **Emotional Hunger/Hedonic Eating**: Does your child eat to comfort themselves when they are mad , sad, or anxious, or out of boredom?
- **Binge eating**: Does your child have times where they will eat a large amount of food rapidly/loss of control eating that results in abdominal pain or vomiting?

Obesity Medications – FDA-approved

	Mechanism	Weight loss	Side Effects	Contraindications
Orlistat >12 years	Lipase inhibitor	-2.6 kg in 1 year, BMI -2.5%	**Steatorrhea**, incontinence, flatulence, decreased absorption of vitamins A, D, E, K	Malabsorption syndromes, cholestasis, antiepileptic drugs, warfarin, pregnancy
Phentermine >16 years	Reduces reuptake of norepinephrine	4.1% BMI reduction in 6 months	Tachycardia**, palpitations**, increased BP, insomnia, **anxiety**, headache, tremor	h/o heart disease, hypertension, anxiety, hyperthyroidism, glaucoma, pregnancy
Phentermine/topiramate >12 years	Reduce NE, GABA modulation		Tachycardia**, palpitations**, increased BP, insomnia, **anxiety**, headache, tremor	h/o heart disease, hypertension, anxiety, hyperthyroidism, glaucoma, pregnancy
Liraglutide 12-17 years	GLP-1 receptor agonist	-4.5 kg in 56 weeks	**Vomiting**, diarrhea, constipation, fatigue, suicidal ideation	Gallbladder disease, pancreatitis, h/o medullary thyroid cancer, MEN2
Semaglutide	GLP-1 receptor agonist	16.1% BMI reduction in 1 year	**Vomiting**, diarrhea, headache, gallstones	Gallbladder disease, pancreatitis, h/o medullary thyroid cancer, MEN2

Off-Label use of medications for obesity

	Patient Selection	Mechanism	Weight loss	Side Effects	Contraindications
Metformin	Pre-diabetes, diabetes, PCOS, taking atypical antipsychotics	Decreases hepatic glucose production, decreases intestinal absorption of glucose and improves insulin sensitivity	-0.86 BMI	**Nausea**, vomiting, diarrhea	Metabolic acidosis
Topiramate	Poor satiety, strong hunger, night eating, weight gain from atypical antipsychotics	GABA modulation	-4.9% BMI	Kidney stones, glaucoma, teratogenicity, metabolic acidosis, **paresthesia**, poor cognitive function	None
Lisdexamfetamine	ADHD, impulsive eating, binge-eating behaviors	NE and dopamine reuptake inhibitor	-2.5 lbs in 4 weeks	Anxiety, **loss of appetite**, nausea, diarrhea, sleep difficulties, dizziness	Use of MAOI within 14 days. Use with caution with hypertension and congenital heart disease

Discuss and document off-label use of these medications

Metformin

- Benefits/targets- FDA approved for children 10 and up with Type 2 DM, has been studied in children ages 6-19 for obesity
- Reduces blood glucose levels in three ways
  - Decreases intestinal absorption
  - Decreases production in the liver
  - Increases insulin sensitivity
- Patient selection
  - PCOS
  - pre-diabetes
  - Patients on second generation atypical anti-psychotics
- Percent body weight loss/BMI: 3%

Metformin

- Risks/side effects- mostly GI including vomiting, nausea, diarrhea, flatulence
- Contraindications- DKA, metabolic acidosis
- Initiation considerations- check HgbA1c and BMP
  - Consult Endocrinology if A1c in diabetic range- consider sending auto-antibodies
- Length of treatment
  - Start 500 mg daily with evening meal, increase to 500 mg BID
  - Max dose 2000mg daily

Topiramate

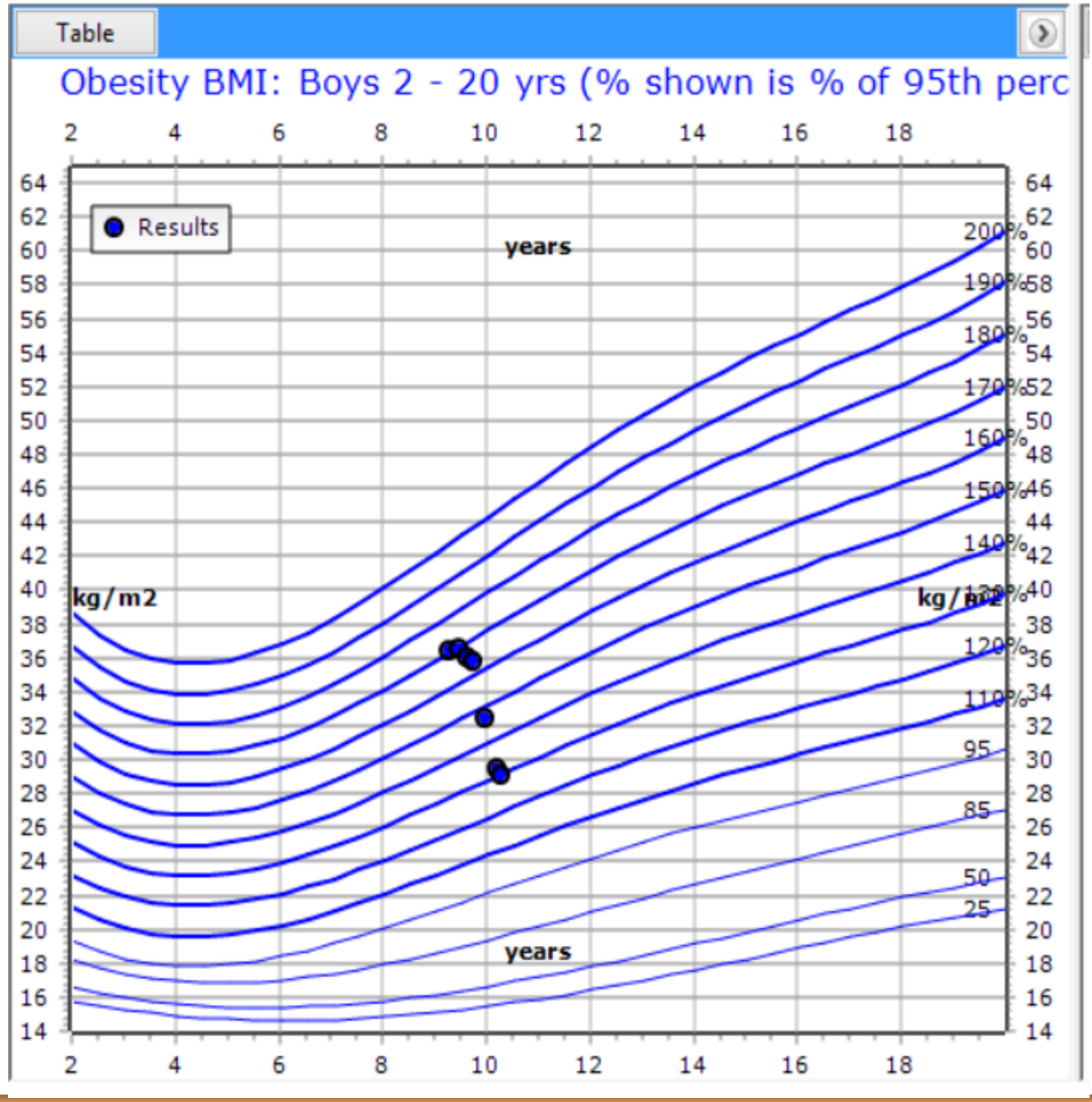
- Benefits/targets- weight loss mechanism is not well understood- GABA modulation/reduced action of NPY
- Patient selection- (in addition to BMI criteria)
  - weight gain secondary to atypical anti-psychotic medication
  - Poor satiety
  - Concomitant migraines (FDA approved for migraine prophylaxis age 12 and up)
  - History of seizures (FDA approved for seizures age 2 and up)
  - Late night eating and symptoms of binge eating
  - Dosage: 25 mg/d up to 200 mg bid

Topiramate

- Risks/side effects-
  - Cognitive impact (typically seen at doses of 100 mg daily or more)
  - Renal stones
  - Metabolic acidosis (increased risk if treated with acetazolamide for IIH)
  - Glaucoma
- Contraindications- none
- Initiation considerations
  - Pregnancy/fetal anomaly risk (consider UPT and contraception counseling/monitoring)
  - Typical % BMI reduction: 5-8%
- Length of treatment- discontinue if BMI continues to increase at full dosage after 3-4 months or secondary to side effects
  - Wean off slowly to avoid precipitation of seizures

13 yo male with anxiety, depression, migraines, night eating and poor satiety.

- Started on topiramate 25 mg/d and titrated up to 50 mg/d in the evening
- BMI decreased from 170% to 120% of the 95th percentile



Phentermine

- Benefits/targets- noradrenergic agonist that suppresses appetite- enhances primarily norepinephrine release with some serotonin and dopamine release in the CNS
- Patient selection- (in addition to BMI criteria)
  - Approved for short-term use only (<12 weeks), **often used for longer (may need to stop/start for insurance coverage)**
  - Not recommended under age 16
  - Strong hunger cues/low energy/poor satiety
- Individualized dosing with lowest effective dose, typically 8-37.5 mg/day
- Risks/side effects- dry mouth, insomnia and dizziness (most reported)
  - Elevated BP, tachycardia, palpitations
  - Diarrhea and constipation

Phentermine

- Contraindications
  - history of or current substance abuse
  - Currently on psychostimulants
  - history of uncontrolled hypertension or cardiovascular disease/arrhythmia
  - Hyperthyroidism
  - Glaucoma
  - MAOI use (current or historical)
  - Agitation/may worsen anxiety
  - Typical weight loss: 5%
- Initiation considerations- check HR, BP, review cardiac history, BMP
  - Review cardiovascular warnings with patient and parent
  - Review CNS warnings (headache, insomnia, restlessness, tremor, dysphoria

Phentermine/topiramate

- Benefits/targets- noradrenergic agonist that suppresses appetite- enhances primarily norepinephrine release with some serotonin and dopamine release in the CNS, also a glutamate agonist with exact mechanism under investigation
- Patient selection- (in addition to BMI criteria)
  - Not recommended under age 12
  - Strong hunger cues/low energy/poor satiety
- Contraindications
  - Uncontrolled HTN
  - CV disease
  - Chronic kidney disease
  - Glaucoma
  - Hyperthyroidism
  - On MAOIs

Phentermine/topiramate

- Side effects
  - Paresthesia, dizziness, insomnia, constipation, dry mouth and dysgeusia
- Initiation considerations
  - Insurance unlikely to cover (may need to prescribe individual medications)
  - Percent weight loss: 8-10%
  - Four stage dose escalation: 7.5 mg/46 mg, 15 mg/92 mg once daily in the morning
  - Monitor BP and HR
  - Negative pregnancy test at initiation and FDA recommends effective birth control in women in addition to monthly UPT given significant birth defects

Lisdexamfetamine

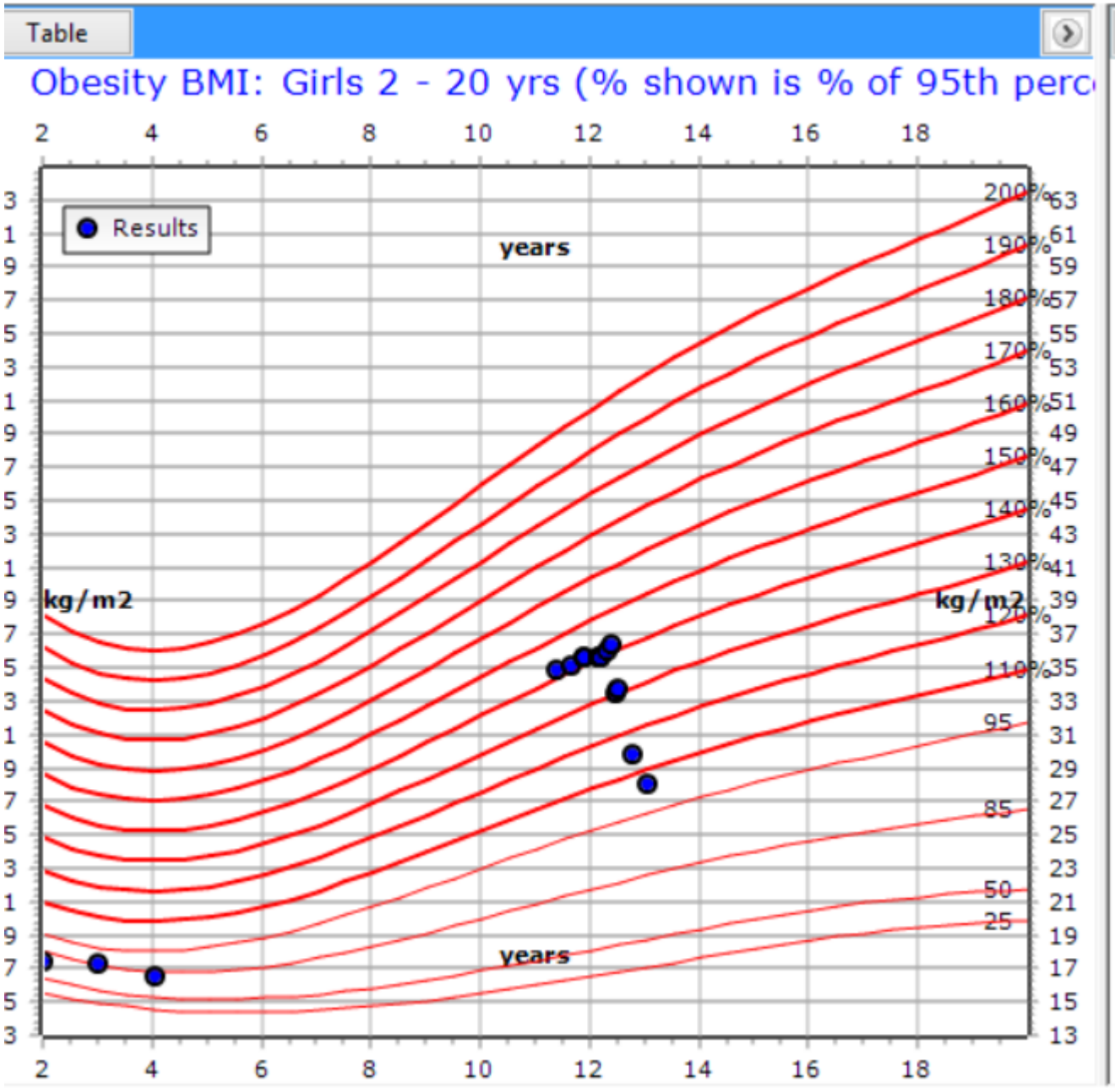
- Benefits/targets- FDA approved for ADHD (age ≥ 6) and binge-eating disorder (age ≥18)
- Patient selection
  - Concomitant ADHD diagnosis
  - Binge eating disorder
- Risks/side effects
  - Sleep disturbances
  - Poor appetite
  - GI side effects (nausea/diarrhea/upper abdominal pain/vomiting)
  - Anxiety or irritability

Lisdexamfetamine

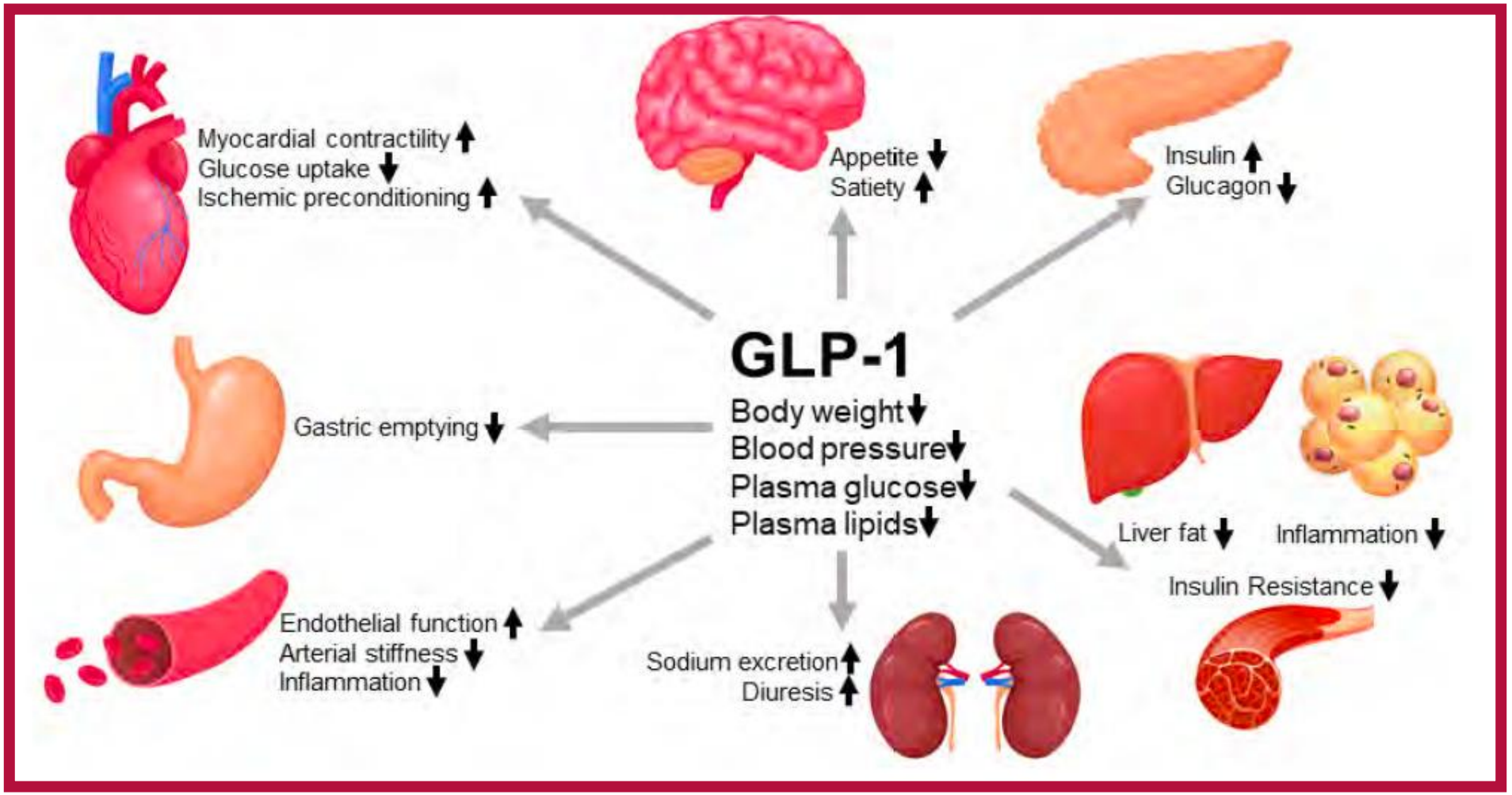
- Contraindications- on phentermine or use of MAO inhibitor
- Initiation considerations- check vital signs (HR and BP), if any CV history consult a Cardiologist
  - Dosage varies for ADHD treatment vs binge eating disorder
- Length of treatment-
  - Q4 week visits- increase by 10 mg every 1-2 months
  - In binge eating disorder, adolescents may need 50-70 mg daily
  - Discontinue for side effects or persistent increase in BMI

10 yo female with Autism, PCSK1 genetic variant, elevated LFTs, and pre-diabetes.

- Started on Lisdexamphetamine 20 mg/d and titrated up to 40 mg/d
- BMI decreased 140% to 105% of the 95th percentile



GLP-1 Receptor Agonists



Liraglutide

- Benefits/targets- GLP-1 (glucagon-like peptide-1) receptor agonist
  - GLP1 is an incretin hormone secreted by the L-cells of the distal ileum, proximal colon and the vagal nucleus of the solitary tract
    - Enhances insulin secretion/inhibits glucagon secretion- regulates blood glucose
    - Slows gastric emptying therefore increases satiety and fullness post-prandially
    - Acts in the hypothalamus to decrease appetite and food consumption
- Contraindications- family or personal history of MEN type 2 or medullary thyroid cancer
- Patient selection-
  - weight greater than 60 kg in addition to BMI criteria
  - FDA approved for type 2 DM age ≥ 10 and obesity age ≥ 12
  - Poor satiety and cravings

Liraglutide

- Risks/side effects-
  - GI side effects (nausea, vomiting, abdominal pain, diarrhea)
  - Pancreatitis
  - Headache, dizziness, hypoglycemia
- Initiation considerations
  - Insurance coverage and overall cost- varies state to state
  - Check BMP for kidney function
  - Initial dose of 0.6 mg sq **daily** for 1 week with weekly dose increase
    1.2 mg ⇨ 1.8 mg ⇨ 2.4 mg ⇨ 3.0 mg daily
  - Reduce dose to previously tolerated dose if initial ramp up is poorly tolerated

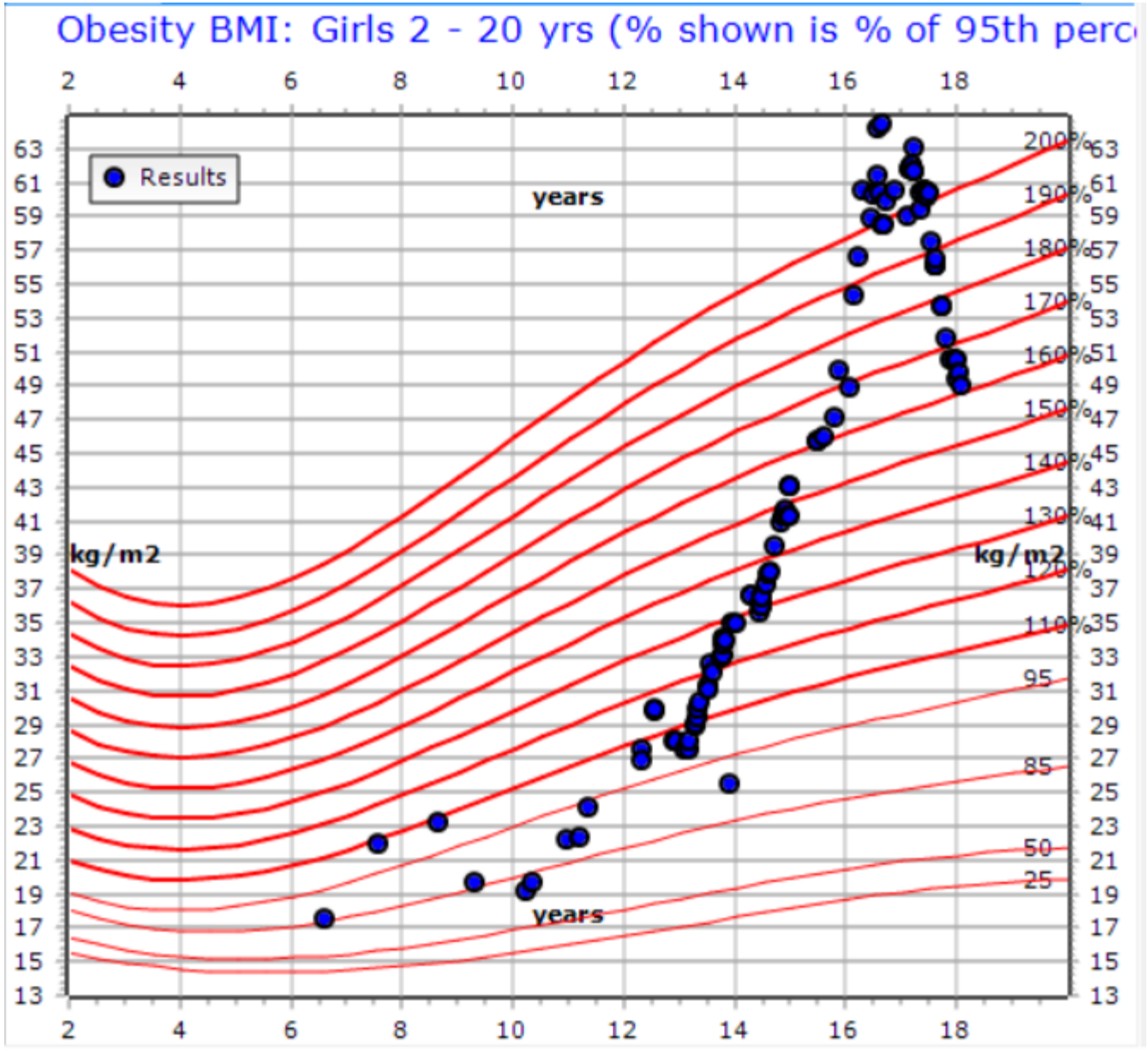
- ** Stop any GLP-1 agonist 1 week prior to anesthesia for any procedure

Liraglutide

- Length of treatment
  - Monthly visits for first 3 months
  - Discontinue if persistent increase in BMI after 16 weeks or significant side effects
  - Expectation- BMI stabilization with up to 5-10% reduction in body weight

18 yo female with Trisomy 21, PCSK1 variant, ADHD, severe OSA, GERD, Hashimoto's Thyroiditis, Juvenile Idiopathic Arthritis, and pulmonary hypertension.

- Titrated up to max dose of 3 mg daily
- BMI decreased from >200% to 160% of 95th percentile



Semaglutide

- Approved for adolescents in January 2023
- **Weekly** injection
  - Start at 0.25 mg for weeks 1-4
  - Increase to 0.5 mg weeks 5-8
  - Increase to 1 mg week s 9-12
  - Increase to 1.7 mg weeks 13- 16
  - Maintenance dose 2.4 mg weeks 17 and onward

- Consider ondansetron or loperamide for mild nausea or diarrhea, particularly around the time of the injection
- Give injection on Friday to avoid missing school from side effects

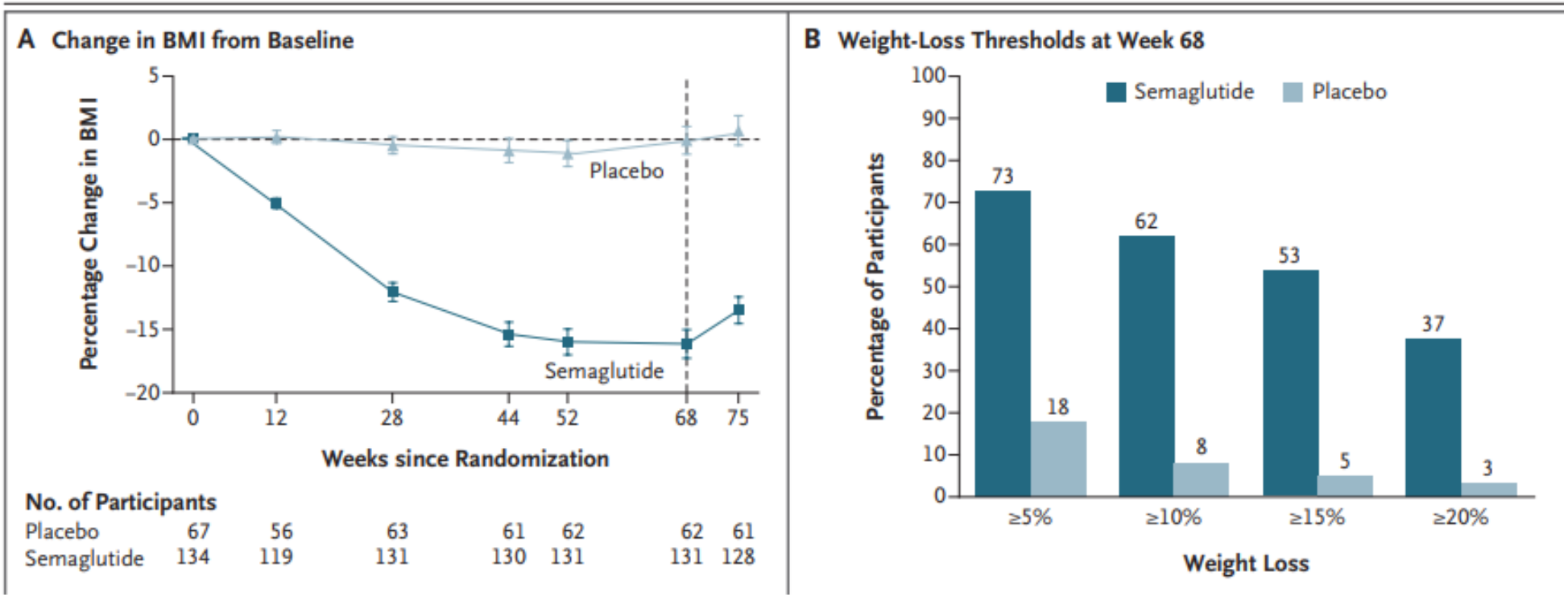
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Once-Weekly Semaglutide in Adolescents with Obesity

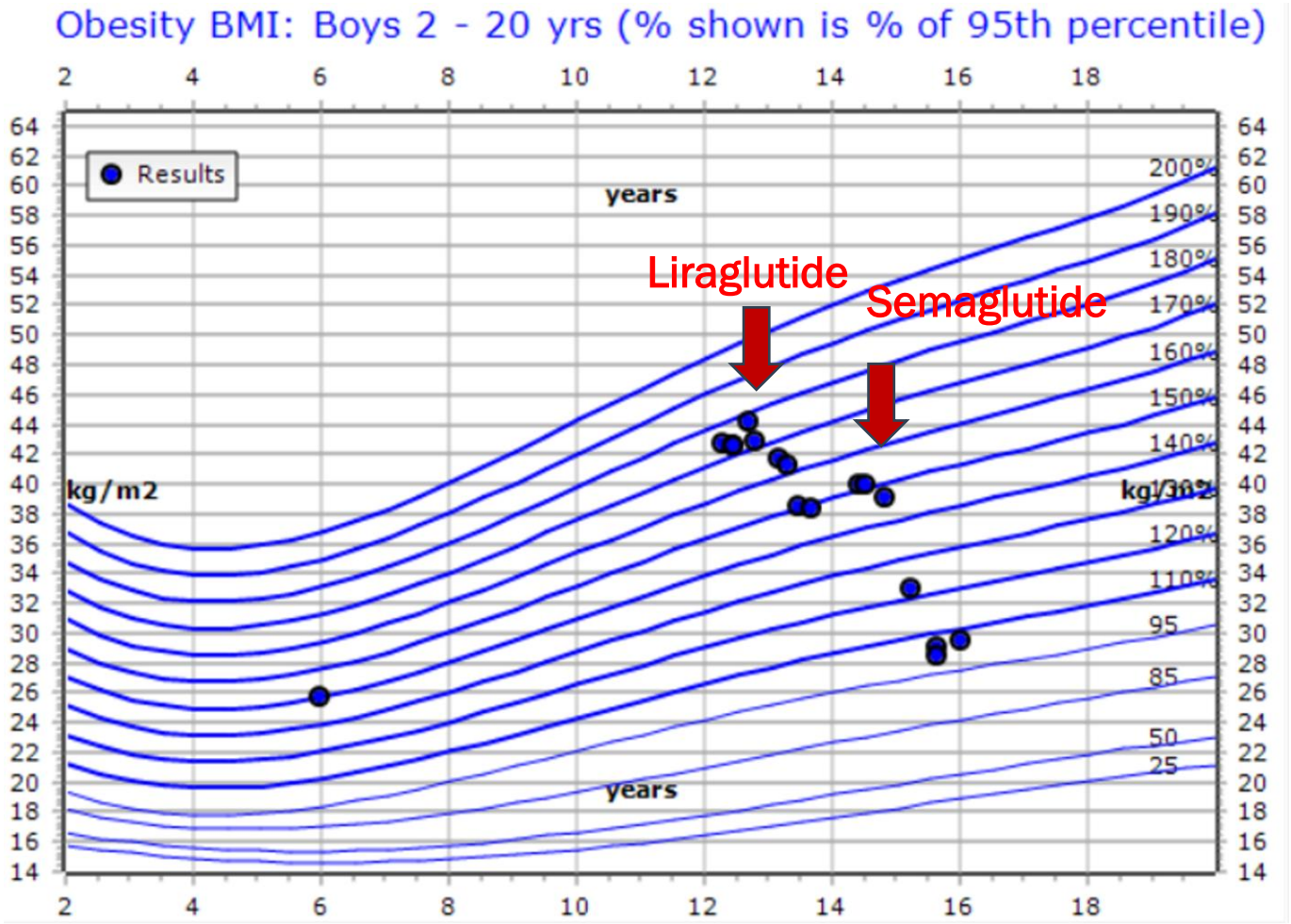
- 201 Adolescents 12-18 yo with BMI greater than 95% , 180 finished the study,
- 12 weeks of lifestyle intervention, family based, followed by randomization to Semaglutide vs Placebo
- **16.1 % reduction from baseline BMI in Semaglutide group** and 0.6% reduction in placebo group
- 62% had GI side effects most commonly Nausea, Vomiting, and Diarrhea, usually for 2-3 days that peaked during or shortly after dose escalations
- 4% cholelithiasis, some increases in Amylase and Lipase but no cases of pancreatitis
- In addition to weight reduction, saw improvements in waist circumference, Hgb A1C, total cholesterol and LDL, triglycerides, and ALT

Weight loss with semaglutide vs. placebo



Once-weekly semaglutide in adolescents, NEJM. 2023

May change or use dual therapies



What's next??

- STEP Young phase 3 trial for semaglutide in 6 to <12 year olds
  - 40.4% of children were no longer classified as having obesity after 64 weeks
  - Safety and tolerability were similar to trials in adolescents and adults

- Tirzepatide -GLP-1 and GIP receptor agonists
  - Induces insulin secretion, effects fatty acid metabolism
  - Increased appetite suppression when compared to GLP-1 agonists alone

- Orforglipron –oral GLP-1 agonist

- Amylin Analogs
  - hormone secreted from the Pancreatic B Cells to decrease blood glucose, modulates rate of gastric emptying and increases satiety

- More dual and triple peptides
- Over 300 drugs with 30 mechanisms of action under investigation

Summary

- Select an obesity medication based on:
  - BMI
  - Oral vs injection
  - Age
- Age ≥12: discuss a GLP-1 receptor agonist
- Age <12:
  - Lisdexamfetamine: hyperphagia, strong food-seeking, concomitant ADHD, binge eating
  - Topiramate: poor satiety, night eating, migraines
- Age ≥16:
  - Phentermine: strong hunger, low energy, avoid with uncontrolled anxiety or heart disease

Helpful Tips

- Discuss benefits and risks with each medication
- Must be following dietary and physical activity recommendations
- Set expectations for rate of weight loss – No more than 1-2 lbs per week
- Demonstrate the injection pens in clinic
- Utilize drug websites, videos, and brochures
- Nurse injection training and patient education
- Needle desensitization therapy
- Prior auth team
- Close follow-up through any mechanism
  - Nurse phone call or portal message for a weight update, side effects, nutritional intake
  - Virtual visit
  - Advanced practice providers alternating with physician visits
  - 1-3 month follow up while titrating medication dose

Pediatric Obesity Guidelines and Resources

CLINICAL PRACTICE GUIDELINE Guidance for the Clinician in Rendering Pediatric Care

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity

Sarah E. Hampl, MD, FAAP,[a] Sandra G. Hassink, MD, FAAP,[b] Asheley C. Skinner, PhD,[c] Sarah C. Armstrong, MD, FAAP,[d] Sarah E. Barlow, MD, MPH, FAAP,[e] Christopher F. Bolling, MD, FAAP,[f] Kimberly C. Avila Edwards, MD, FAAP,[g] Ihuoma Eneli, MD, MS, FAAP,[h] Robin Hamre, MPH,[i] Madeline M. Joseph, MD, FAAP,[j] Doug Lunsford, MEd,[k] Eneida Mendonca, MD, PhD, FAAP,[l] Marc P. Michalsky, MD, MBA, FAAP,[m] Nazrat Mirza, MD, ScD, FAAP,[n] Eduardo R. Ochoa, Jr, MD, FAAP,[o] Mona Sharifi, MD, MPH, FAAP,[p] Amanda E. Staiano, PhD, MPP,[q] Ashley E. Weedn, MD, MPH, FAAP,[r] Susan K. Flinn, MA,[s] Jeanne Lindros, MPH,[t] Kymika Okechukwu, MPA[u]

THE OBESITY SOCIETY
Professionals Collaborating to Overcome Obesity

Obesity Medicine Association®

Riley

AMERICAN BOARD of OBESITY MEDICINE

PEDIATRIC OBESITY MEDICINE

Pediatric Obesity—Assessment, Treatment, and Prevention: An Endocrine Society Clinical Practice Guideline (2017) – Styne et al. *J Clin Endocrinol Metab*. PMID: 28359099.

https://academic.oup.com/jcem/article/102/3/709/2965084

AAP: Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents with Obesity (2023) – Hampl et al. *Pediatrics*. PMID: 36622115.

https://publications.aap.org/pediatrics/article/151/2/e2022060640/190443/Clinical-Practice-Guideline-for-the-Evaluation-and

Obesity Medicine Association (OMA) Pediatric Obesity Algorithm®

Cuda S, Censani M, O'Hara V, Conroy R, Kharofa R, Paisley J, Browne A, Browne NT. Pediatric Obesity Algorithm, presented by the Obesity Medicine Association.

Riley Children's Health at IU Health
Obesity Evaluation and Management Guidelines

Riley Children's Health
Indiana University Health

INDIANA UNIVERSITY
SCHOOL OF MEDICINE

Child with obesity

HISTORY
Diet | Exercise | Family | Psychosocial

Vitals, anthropometrics and physical exam

SCREENING LABS:
CMP, lipid profile, hemoglobin A1c

Make a referral to Riley Children's Health at IU Health

You may find additional referral information and refer a patient online at **rileychildrens.org/form/refer-a-patient**.

Cardiology
T 317.274.8906 | F 317.274.4022

Child Psychiatry
T 317.944.8162 | F 317.948.0609

Diabetes Prevention Clinic and Endocrinology
T 317.944.3889 | F 317.944.3882

Gastroenterology, Hepatology and Nutrition | Weight Management Program
T 317.944.3774 | F 317.968.1055

Medical and Molecular Genetics
T 317.944.3966 | F 317.968.1354

Nephrology and Kidney Disease
T 317.274.2563 | F 317.287.3599

Sleep Medicine
T 317.948.7208 | F 317.944.7245

Sleep disorders
- Snoring + apnea
- Dyspnea
- Sleep disturbance or daytime sleepiness

→ Refer to sleep specialist

- Sleep study
- Pulmonary function test
- Check iron, ferritin, vitamin D, magnesium

Hypertension
- 3 blood pressure (BP) measurements each >1 week apart and >90% for age and sex

→ If BP elevated, obtain ambulatory blood pressure monitor

→ Refer to nephrologist

→ Evaluate etiology of hypertension

Dyslipidemia
- LDL <130
- LDL >130
- Triglycerides >130

LDL <130 → Discuss disease prevention

LDL >130 → Lifestyle modifications,* CHILD-1 diet and repeat lipid profile in 3 – 6 months

- LDL >130
- Triglycerides <200
- Triglycerides >200

LDL >130 → Refer to lipid specialist

Triglycerides <200 → Continue lifestyle modifications

Triglycerides >200 → CHILD-2 diet, check lipids in 3 months

Triglycerides >200, refer to lipid specialist

Lifestyle modifications* and consider omega-3 fatty acids

Diabetes
- Glucose 100 – 126, HbA1c 5.7 – 5.9%
- Glucose >126, HbA1c >6.0%

Glucose 100 – 126, HbA1c 5.7 – 5.9% → Lifestyle modifications,* CHILD-1 diet and repeat HbA1c in 6 months

Glucose >126, HbA1c >6.0% → Refer to diabetes prevention clinic

- Hemoglobin A1c <6%
- Hemoglobin A1c >6%

Hemoglobin A1c <6% → Continue lifestyle modifications

Fatty liver disease
- ALT >50

→ Refer to the fatty liver disease clinic

→ Evaluate etiology of hepatopathy

Genetic syndrome
→ Refer to geneticist or genetic counselor

Mental health condition
→ Refer to psychologist and/or psychiatrist



***Lifestyle modifications**
- Weight loss
- Exercise
- Dietary fiber
- CHILD-1 diet
- CHILD-2 diet

Additional comorbidities
- Assess for precocious puberty.
- If menstrual irregularities are present, consider polycystic ovary syndrome (PCOS) and refer to adolescent medicine.
- Consider referral to orthopedics for evaluation of slipped capital femoral epiphysis (SCFE), arthritis and persistent arthralgia.
- If poor linear growth is present, obtain thyroid function testing.

Created by the members of the Riley Children's Health at IU Health Pediatric Obesity Council

More resources!
www.rileychildrens.org/departments/weight-management-program

References

Bays HE, McCarthy W, Burridge K, Tondt J, Karjoo S, Christensen S, Ng J, Golden A, Davisson L, Richardson L. Obesity Algorithm eBook, Presented by the OMA

Katzmarzyk PT, Barlow S, Bouchard C, et al. An evolving scientific basis for the prevention and treatment of pediatric obesity. Int J Obes. 2014;38:887-905.

Levels and trends in child malnutrition: UNICEF/WHO/The Word Bank Group joint child malnutrition estimates: key findings of the 2020 edition

Woodard K, Louque L, Hsia, D Medications for the treatment of obesity in adolescents. Ther Adv Endocrinol Metab 2020, Vol. 11:1-12

O'ConnorEA, Evans CV, Burda BU, et al. Screening for obesity and intervention for weight management in children and adolescents: evidence report and systematic review for the US preventive services task force. JAMA 2017; 317:2427-2444.

Pilitsi E, Farr OM, Polyzos SA, et al. Pharmacotherapy of obesity: available medications and drugs under investigation. Metabolism 2019; 92:170-192.

University of Minnesota Center for Pediatric Obesity Medicine- Advance therapies for Pediatric Obesity
O'Rahilly S, Farooqi IS. Human obesity:a heritable neurobehavioral disorder that is highly sensitive to environmental conditions. Diabetes 2008;57(11):2905-10

Barlow SE; Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: summary report. Pediatrics. 2007 Dec;120 Suppl 4:S164-92. doi: 10.1542/peds.2007-2329C. PMID: 18055651.

Weghuber D, Barrett T, Barrientos-Pérez M, Gies I, Hesse D, Jeppesen OK, Kelly AS, Mastrandrea LD, Sørrig R, Arslanian S; STEP TEENS Investigators. Once-Weekly Semaglutide in Adolescents with Obesity. N Engl J Med. 2022 Dec 15;387(24):2245-2257. doi: 10.1056/NEJMoa2208601. Epub 2022 Nov 2. PMID: 36322838.

Sarah E. Hampl, Sandra G. Hassink, Asheley C. Skinner, et al. Executive Summary: Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity. *Pediatrics* 2023; e2022060641. 10.1542/peds.2022-060641

Hampl, Sarah E., Sandra G. Hassink, Asheley C. Skinner, Sarah C. Armstrong, Sarah E. Barlow, Christopher F. Bolling, Kimberly C. Avila Edwards et al. "Clinical Practice Guideline for the Evaluation and Treatment of Children and Adolescents With Obesity." *Pediatrics* (2023).

World Health Organization. Overweight and Obesity. https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight. 1 March 2024.

Thank you!

- Email Sara Naramore at snaramor@iu.edu

- Visit the Riley Weight Management Program: rileychildrens.org/departments/weight-management-program



Equitable Vaccination Practices for Pediatric and Adolescent Populations

Balancing Barriers, Bias, and Benefits

Amy B. Middleman, MD, MSEd, MPH
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Pamela Butler Keefe and Stephen T. Keefe
Chair of Excellence in Academic Pediatrics
University Hospitals, Rainbow Babies and Children's Hospital
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Vaccine-Education-Eval-BTQ

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PeerView Live

Housekeeping Notes

PeerView

- Thank you to PeerView for providing this session and GSK for providing the educational grant for this activity
- Evaluation: PeerView.com/Vaccine-Education-Eval-BTQ
- Your evaluation of the activity is important in helping us to better meet your educational needs—we welcome your opinions and comments
- We want this session to be interactive—asking and answering questions provides an optimal learning experience

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PeerView Live

Today, We Will Learn That…

- Early childhood vaccination against hepatitis A and B and meningococcal infections is vital to preventing transmission and protecting children from severe disease complications
- Utilizing empathetic, active communication strategies is the key to addressing vaccine hesitancy, fatigue, and bias, allowing for confident conversations about vaccine safety
- Implementing team-based vaccination strategies allows us to tailor care to diverse populations, reduce disparities in uptake, and adhere to official immunization guidelines

The Vaccination Landscape Right Now: A System Under Stress[1,2]

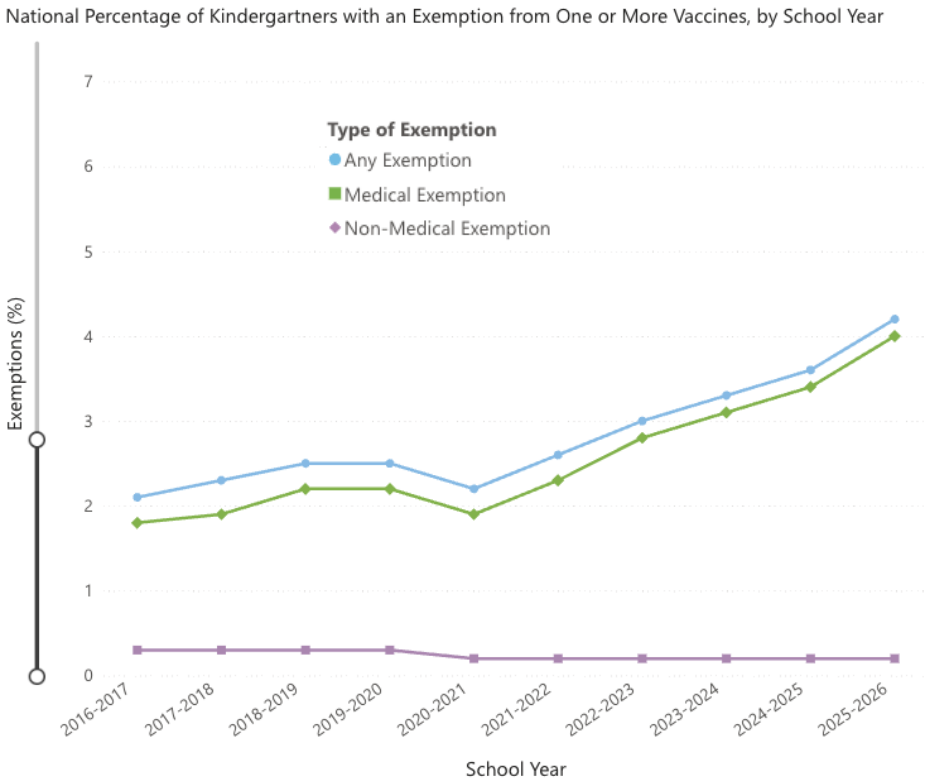
During the US 2025-2026 school year

Vaccination coverage among kindergartners fell across all reported vaccines, from ~95% to ~92%, and continues to decline

Exemptions from ≥1 vaccine among kindergartners rose to 4.2% (vs 3.6% in 2024-2025 and 3.3% in 2023-2024), including medical, religious, and philosophical/personal belief exemptions

Indiana permits only medical and religious exemptions

Exemption rates >5% were reported in 24 states, vs only 9 prepandemic



1. https://www.cdc.gov/schoolvaxview/data/index.html. 2. https://publichealth.jhu.edu/ivac/resources/reports/monitoring-childhood-immunization-at-the-state-level/Indiana.

PeerView

Indiana School-Entry Requirements, 2025–2026[1]

Kindergarten–grade 5: 3 hepatitis B, 5 DTaP, 4 polio, 2 varicella, 2 MMR, and 2 hepatitis A

Grades 6–11 (starting at 6th grade): add 1 meningococcal and 1 Tdap

Grade 12: 2 meningococcal; the second meningococcal dose (booster) is required

Hepatitis A: 2 doses required for ALL grade levels; minimum interval between doses is 6 calendar months

MenB: recommended for grade 12 and required by some Indiana universities

1. https://www.in.gov/health/files/2025-26-School-Immunization-Requirements.pdf

Why These Vaccines?[1,2]

- **ACIP 2026 planned downgrades**: in early 2026, ACIP removed routine HAV, HBV, COVID-19, rotavirus, flu, and meningococcal recs, restricting them to high-risk groups or “shared clinical decision-making (SCDM)”
- **AAP 2026 continuity**: AAP maintains 2025 immunization guidance, fully recommending routine vaccines based on known safety, efficacy, and disease impact

Vaccine	AAP 2026 Recommendation	Contested ACIP 2026 Proposal (Enjoined)
Hepatitis A (HAV)	Routine (universal) Two doses (12-23 mo)	Restrict to high-risk groups or SCDM
Hepatitis B (HBV)	Routine (universal) Three doses, starting at birth	Removed universal birth dose; restricted to high-risk groups
Meningococcal ACWY (MenACWY)	Routine (universal) Two doses (ages 11-12 and 16 y)	Restricted to high-risk groups
Meningococcal B (MenB)	Routine for high-risk groups SCDM for health adolescents aged 16-23 y	Routine for high-risk groups SCDM for health adolescents aged 16-23 y

1. https://downloads.aap.org/AAP/PDF/AAP-Immunization-Schedule.pdf. 2. https://www.cdc.gov/schoolvaxview/data/index.html.

Disease Burden and Epidemiology of Hepatitis A, Hepatitis B, and Meningococcal Disease

Challenge Question 1

A 3-year-old who attends full-time daycare is later identified as the source of a household hepatitis A outbreak. Who in the household is MOST likely to be the first person to present with gastrointestinal symptoms?

1. A vaccinated grandparent
2. An unvaccinated parent
3. An unvaccinated 6-year-old sibling
4. The 3-year-old herself

Challenge Question 1

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1. A vaccinated grandparent
2. **An unvaccinated parent**
3. An unvaccinated 6-year-old sibling
4. The 3-year-old herself

The correct answer here is an unvaccinated parent.

Let's talk about how toddlers with HAV are often asymptomatic or minimally symptomatic, while teen and adult contacts bear the brunt of symptoms.

The Quiet Shield: Why Universal Pediatric Vaccination Cannot Be Substituted[1-5]

HAV

- Spreads silently and asymptomatically in young children
- Older teen and adult contacts typically experience abrupt signs of gastrointestinal illness and flu-like symptoms
- Can cause liver failure

HBV

- Perinatal transmission is clinically quiet
- Leads to lifelong chronic infection in 90% of infected infants, resulting in cirrhosis and liver cancer

Meningococcus

- Carried harmlessly in the throat of up to 10% of healthy teens before invading to cause meningitis or sepsis
- Leads to serious consequences including amputation or death within 24 hours

Targeting only "at-risk" populations historically fails; it requires individuals to disclose stigmatized risk factors and providers to triage them accurately

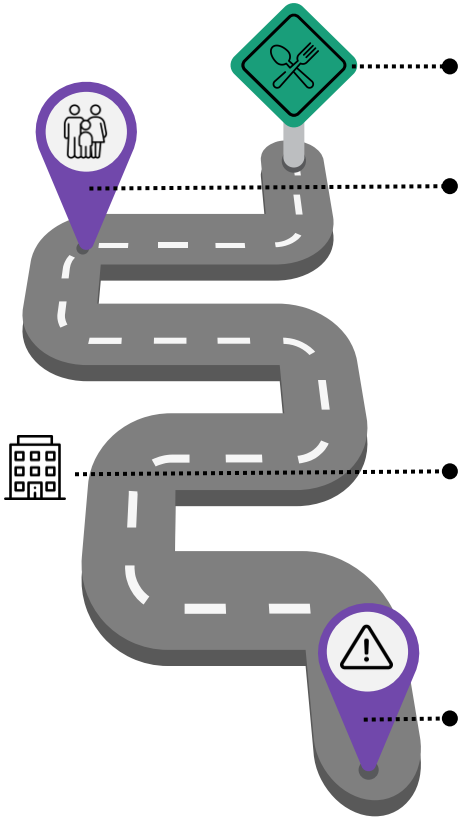
- As the most transmissible human pathogen, measles is the “canary in the coal mine": when coverage slips even slightly below the 95% herd immunity threshold, outbreaks rapidly follow
- In 1900, ~1 in 5 US children died before 5 y of age; vaccines have not eliminated these pathogens—they have simply pushed them below our threshold of perception

1. McDevitt-Irwin M, Irwin JR. *Demographic Research*. 2025;52;315-336. 2. Fine P et al. *Clin Infect Dis*. 2011;52:911-6. 3. Ulrich AK et al. *Pediatrics*. 2026;157:e2025075783. 4. Cohn AC et al. *MMWR Recomm Rep*. 2013;62:1-28. 5. Schillie S, et al. *MMWR Recomm Rep*. 2018:67:1-31.

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Hepatitis A

HAV: Clinical Presentation Across the Pediatric Age Spectrum[1]



HAV is a food-borne illness

Liver failure can occur at any age

- Toddlers spread HAV asymptomatically
- Adult household contacts (eg, parents, grandparents) develop abdominal pain, jaundice, and fatigue weeks later

Outbreaks can occur in varied settings such as schools, childcare centers, and households

- In childcare settings, spread typically occurs before the index case is recognized

There is a long window for silent transmission before any index case is recognized

- Incubation period: 14-50 days (average 28 days)



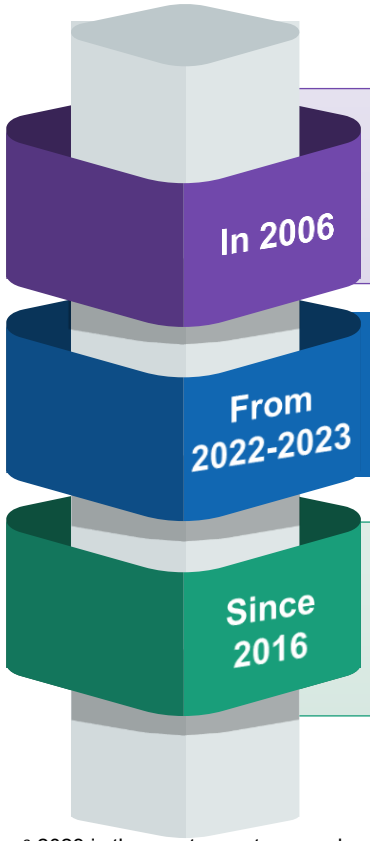
Clinical Pearl

By the time adults develop jaundice, the outbreak is usually recognized, but they're past their infectious window and transmission has already occurred

1. https://www.cdc.gov/hepatitis-surveillance-2023/hepatitis-a/index.html.

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HAV Epidemiology: US Incidence, Outbreak History, and the Vaccine Impact Story[1,2]



Universal childhood vaccination drove a 95% reduction in HAV incidence; the 2016-2019 resurgence illustrated the consequences of waning community-level protection

28% decrease in newly reported cases of HAV; 2023 cases remained 1.2x the 2015 pre-outbreak baseline

HAV outbreaks have been reported in 37 US states, involving ~44,650 cases, ~27,250 hospitalizations, and ~415 deaths as of September 2022

Hepatitis A in the United States in 2023[a]

Number	Details
1,648	New HAV cases reported in 2023
~3,300	HAV infections in 2023, adjusted for under-ascertainment and under-reporting
85	HAV-related deaths reported in 2023

From November 2017 to December 2023, IN Department of Health recorded 2,670 HAV cases and 9 deaths due to HAV

[a] 2023 is the most recent comprehensive annual US surveillance dataset available.

1. https://www.cdc.gov/hepatitis-surveillance-2023/hepatitis-a/index.html.
2. https://www.in.gov/health/idepd/diseases-and-conditions-resource-page/hepatitis-a/indiana-hepatitis-a-outbreak/#tab_0c0e771f07_Demographic_Information

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HAV Risk Factors[1]

The epidemiology of HAV outbreaks in children is complex and multifactorial

- Food contamination by ill or asymptomatic individuals
- Poor sanitation and hygiene practices
- Crowded living conditions
- Low socioeconomic status
- Travel to endemic areas
- Lack of vaccination



Domestic outbreaks now drive the majority of US HAV cases; travel is neither required nor the primary transmission mechanism

1. https://www.cdc.gov/hepatitis-surveillance-2023/hepatitis-a/index.html.

Hepatitis B

HBV: Clinical Presentation and the Age-at-Infection Chronicity Funnel[1-3]

Presentation and Prevalence of HBV

- A viral infection of the liver that can cause both acute and chronic disease
- **Presence of chronic:** can lead to liver damage (cirrhosis), liver failure, liver cancer, or even death
- **Acute symptoms**: fatigue, anorexia, nausea, jaundice, right upper quadrant pain; largely indistinguishable from other viral hepatitides in the short term

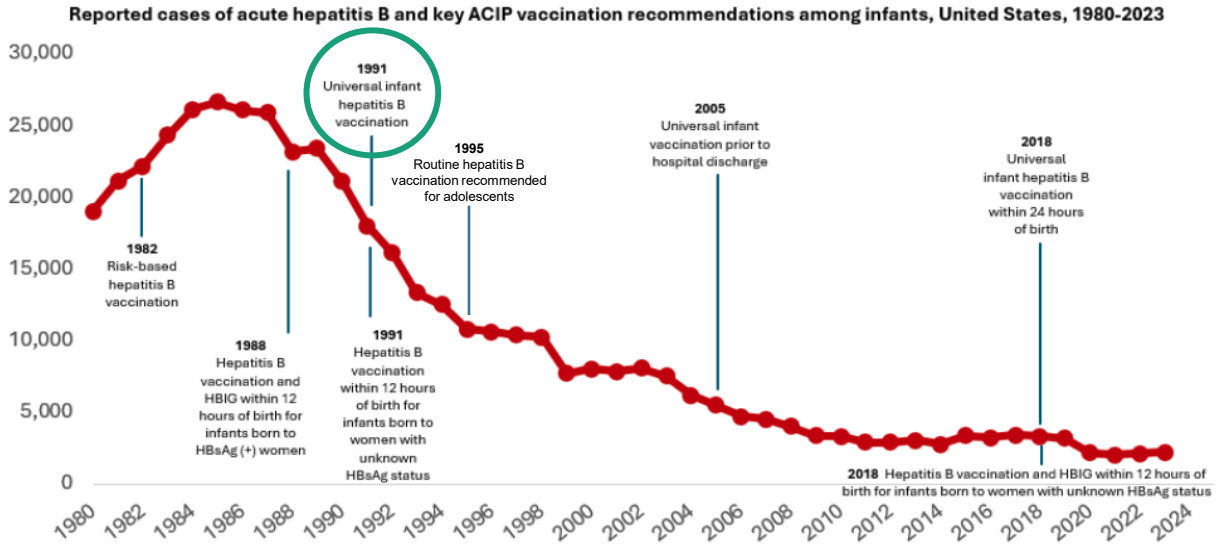
Critical Age-at-Infection Relationship

- Chronic infection develops in 90% of perinatally infected infants, ~25%-30% of children infected at 1-5 years of age, and ~5% of acutely infected adults
  - Children who acquire HBV in early childhood via perinatal, household, or community exposure face the highest risk of chronic infection and premature death
  - Risk of chronic infection returns to adult levels if HBV exposure occurs after age 5

1. https://www.aap.org/en/news-room/fact-checked/fact-checked-hepatitis-b-vaccine-given-to-newborns-reduces-risk-of-chronic-infection.
2. https://www.cdc.gov/hepatitis-b/about/index.html. 3. https://publications.aap.org/redbook/book/755/Red-Book-2024-2027-Report-of-the-Committee-on.

HBV Epidemiology: The Birth-Dose Success Story and What Is at Stake[1,2]

- An estimated 2.4 million people in the United States have HBV; ~50% of those with HBV are unaware of their infection
- After the CDC recommended universal HBV vaccination at birth in 1991, infection rates in children plunged
- Delayed schedules increase acute and chronic infections, HBV-related deaths, and healthcare costs compared with the recommended universal birth-dose policy



1. https://www.cdc.gov/acip/downloads/slides-2025-09-18-19/hep-b-birth-dose-briefing-508.pdf. 2. https://www.aap.org/en/patient-care/hepatitis-b.

HBV Risk Factors: The Universal vs Risk-Based Tension[1,2]

Highest-Priority Groups

- Infants of HBsAg-positive or unknown-status mothers
- Household and sexual contacts of infected individuals
- Adolescents with high-risk sexual exposures
- People receiving hemodialysis
- People with HIV
- Healthcare workers
- Travelers to endemic regions with anticipated sexual or blood exposures

The case for universal HBV vaccination

✓ A **universal birth-dose policy closes the inherent gaps** in maternal screening by removing the need for accurate, documented maternal status at every delivery

✓ The hepatitis B birth dose is associated **with higher rates of vaccine series completion** and greater likelihood of being up to date on other age-appropriate vaccines

1. https://www.cdc.gov/acip/downloads/slides-2025-09-18-19/hep-b-birth-dose-briefing-508.pdf . 2. https://www.cdc.gov/hepatitis-b/hcp/clinical-overview/index.html.

PeerView

Meningococcal

Invasive Meningococcal Disease (IMD) Clinical Presentation[1-4]

Meningitis



~50% of cases

- Headache
- Stiff neck
- Nausea
- Photophobia
- Altered mental status

Sudden onset of fever

Septicemia



~30% of cases

- Chills and cold extremities
- Myalgia and arthralgia
- Vomiting and diarrhea
- Petechiae or purpura
- Hypotension → shock

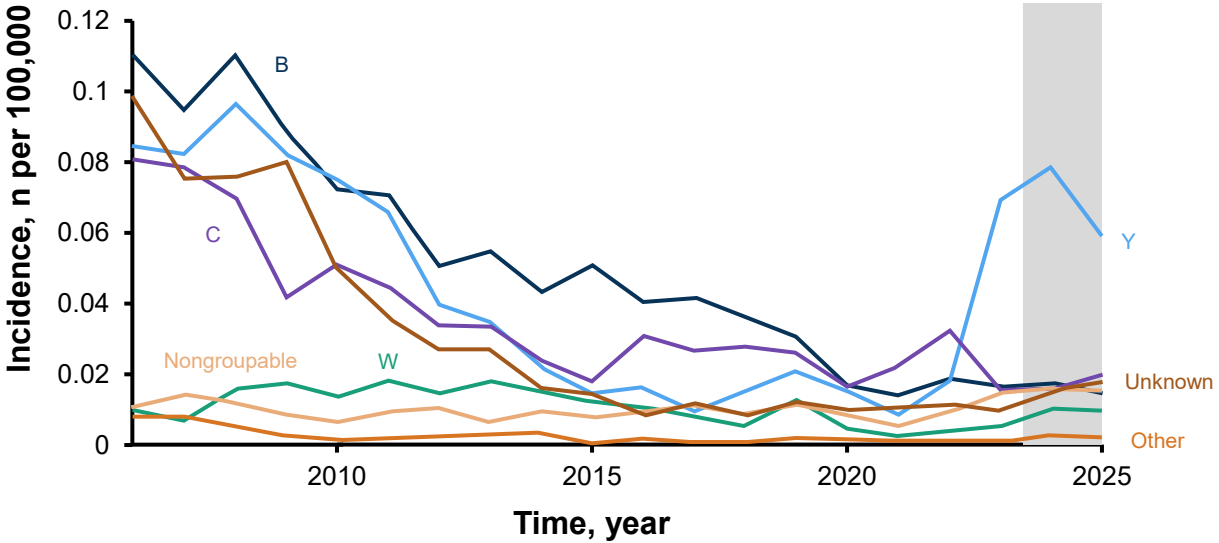
1. https://www.cdc.gov/pinkbook/hcp/table-of-contents/chapter-14-meningococcal-disease.html. 2. Ilo K et al. *J Pediatr*. 2019;207:255.
3. Stephens DS et al. *Lancet*. 2007;369:2196-2210. 4. https://www.immunize.org/clinical/image-library/meningococcal.

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A Resurgent Threat: 2024 Marks the Highest IMD Incidence Since 2013[1,2]

- Though US meningococcal disease rates declined since the 1990s, cases have risen sharply since 2021 and now exceed pre-pandemic levels
- **In 2024, the CDC issued an alert on rising IMD cases; more than 500 were reported, the highest since 2013**
  - Most infections due to a specific strain of the Y serogroup of bacteria, which is included in the MenACWY vaccine
- In 2025, 463 probable cases were reported based on preliminary data

Trends in Meningococcal Disease Incidence by Serogroup: 2006-2025[a]

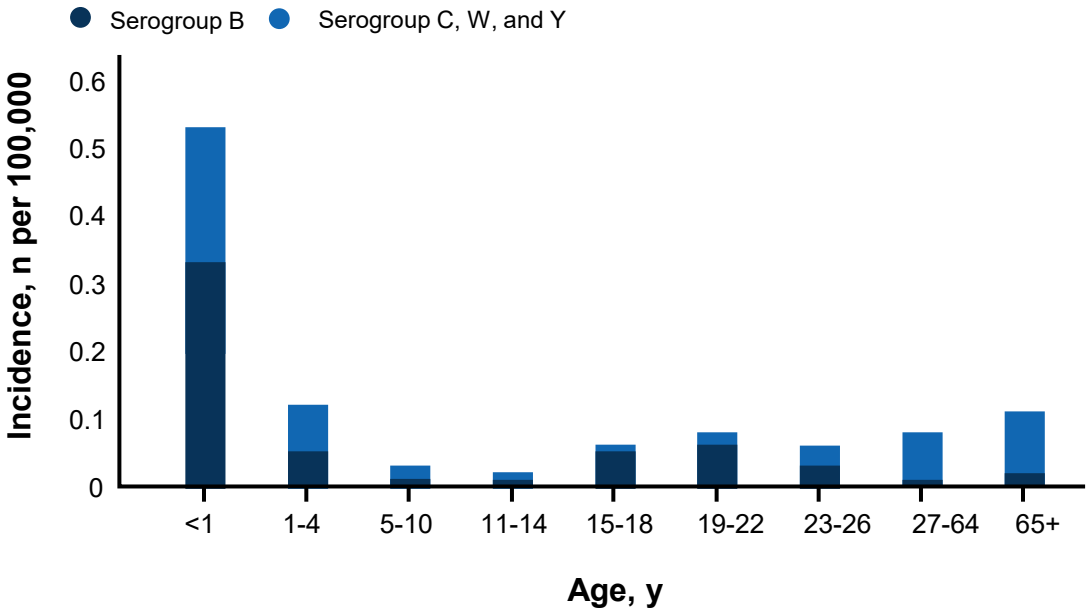


[a] 2024 and 2025 data are provisional.

1. https://www.cdc.gov/meningococcal/php/surveillance/index.html. 2. Presa J et al. Front Public Health. 2026;14:1694023.

IMD Risk Factors: Age-Specific Peaks and High-Risk Populations[1,2]

Meningococcal Incidence by Serogroup[a] and Age Group: 2016-2025[b]



Cases caused by the ST-1466 strain (serogroup Y) are disproportionately occurring in people ages 30-60 y (65%), those who identify as Black (63%), and people with HIV (15%)

Medical high-risk groups: anatomic or functional asplenia; persistent complement component deficiencies; patients on complement inhibitors; HIV; travel to endemic regions; dormitory residents; military recruits

Serogroup B is the predominant serotype in infants and older teens

IMD incidence rates are higher among infants who are Medicaid-insured, aged <4 mo, and with certain conditions

[a] Unknown serogroup (10%) and other serogroups (11%) excluded. [b] 2024 and 2025 data are provisional.

1. Herrera-Restrepo O et al. *Open Forum Infect Dis.* 2026;13:ofag185. 2. https://www.cdc.gov/han/2024/han00505.html.

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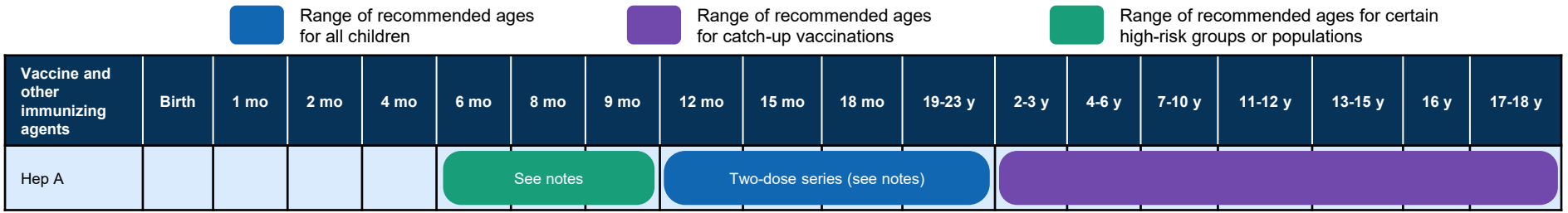
AAP Recommendations and Immunization Schedule

Hepatitis A

HAV: AAP Schedule, Catch-Up Rules, and Special Situations[1,2]

Vaccination Scenario	Dosing
Routine series	Dose one at 12-23 months; dose two ≥6 months after dose one
Catch-up	Children and adolescents aged 2-18 years who missed the routine series should receive the two-dose catch-up series; no maximum age for catch-up
Pre-travel	Single dose at least 2 weeks before departure; second dose for long-term protection
Post-exposure prophylaxis (PEP)	Vaccine preferred over immune globulin for healthy persons aged 12 months to 40 years within 2 weeks of exposure

Special situations: chronic liver disease, HIV, solid-organ transplant candidates, outbreak exposures



1. O'Leary ST et al. *Pediatrics*. 2026;157:e2025075754. 2. https://downloads.aap.org/AAP/PDF/AAP-Immunization-Schedule.pdf.

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The Second-Dose Drop-Off: Data and Workflow Solutions[1,2]

Why It Happens

18-23–month gap

Unclear follow-up plans

No reminders

Workflow Solutions

Schedule dose two at dose one visit

EHR alert for dose two

Children and Hoosiers Immunization Registry Program (CHIRP) check at 18 and 24 mo

Standing orders at rooming

1 dose = 90% immunity

2 doses = 95% immunity

Longer protection with the recommended two-dose series

Safety demonstrated with hundreds of millions of doses

Check vaccination status at every visit

1. O'Leary ST et al. *Pediatrics*. 2026;157:e2025075754. 2. https://downloads.aap.org/AAP/PDF/AAP-Immunization-Schedule.pdf.

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Clinical Consult: Hepatitis A Exposure

Case: Hepatitis A Exposure

- **Case scenario**: A 14-year-old presents with 10 days of fatigue, nausea, anorexia, and new-onset jaundice. LFTs are markedly elevated. He has no personal travel history. On further history, an unvaccinated grandparent who lives in the household recently returned from visiting relatives in a state with an active HAV outbreak. The grandparent is now also symptomatic with jaundice. The patient's unvaccinated 3-year-old sister attends daycare full-time and has no symptoms.

- **Discussion points**:
  - The 14-year-old is symptomatic with jaundice. His 3-year-old sister has no symptoms at all. What explains that difference, and why does it matter clinically?
    - **HAV vaccination may still be considered as post-exposure prophylaxis**. What is the current guidance on this, and how would you approach that conversation with the family today?
  - The 3-year-old has been attending daycare throughout the grandparent's incubation period. What is the public health implication of an asymptomatic, toilet-training-age child with unrecognized HAV infection in a group childcare setting?
  - What does this scenario illustrate about the "no travel history" reassurance many families offer when you counsel them about HAV vaccination?

Case: Hepatitis A Exposure

A 14-year-old presents with 10 days of fatigue, nausea, anorexia, and new-onset jaundice

LFTs are markedly elevated





No personal travel history

Unvaccinated grandparent in the household recently returned from a state with an active HAV outbreak and is now symptomatic with jaundice



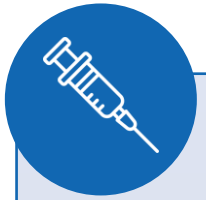


Unvaccinated 3-year-old sister attends daycare full-time and has no symptoms

Hepatitis B

The Universal HBV Vaccine Birth Dose: The Most Timely Vaccine Decision[1-3]

- **90% effective if first dose is given within 24 hours of birth**
- **AAP recommends**
  - Universal birth dose for all medically stable newborns ≥2,000 g within 24 hours of birth, regardless of mother's HBsAg status



Why universal and not risk based?

Risk-Based Strategies Failed

Targeted vaccination failed to control transmission; universal programs drove the dramatic decline in childhood HBV rates

Screening Omission or Errors Happen

Lack of maternal screening or maternal screening errors occur even in well-resourced systems, missing infants who need protection

Hidden Transmission

A substantial proportion of infant HBV cases have no identified perinatal source, pointing to household or community spread

The United States has made significant progress in reducing chronic hepatitis B, largely because of the birth dose and completion of the infant series

1. https://www.aap.org/en/news-room/fact-checked/fact-checked-hepatitis-b-vaccine-given-to-newborns-reduces-risk-of-chronic-infection.
2. Jarvis SB et al. *Vaccines (Basel)*. 2023;12:25. 3. https://www.cdc.gov/hepatitis-b/hcp/perinatal-provider-overview/vaccine-administration.html

Challenge Question 2

An infant is born to an HBsAg-positive mother and receives both the hepatitis B vaccine and HBIG within 12 hours of birth. At what age should post-vaccination serologic testing (anti-HBsAg and HBsAg) first be performed?

1. At 2-3 months
2. At 5-6 months
3. At 9-12 months
4. Post-vaccination serologic testing is not needed

Challenge Question 2

An infant is born to an HBsAg-positive mother and receives both the hepatitis B vaccine and HBIG within 12 hours of birth. At what age should post-vaccination serologic testing (anti-HBsAg and HBsAg) first be performed?

1. At 2-3 months
2. At 5-6 months
3. **At 9-12 months**
4. Post-vaccination serologic testing is not needed

The correct answer here is at 9-12 months.

Post-vaccination serologic testing is needed, but let's talk about why testing too early risks false-positive results from residual maternal antibodies.

HBIG and HBV Vaccine Protocol: Decision Algorithm by Maternal HBsAg Status[1]

Maternal HBsAg Status	Action
Positive	HepB vaccine + HBIG within **12 hours** of birth; complete 3- or 4-dose series; PVST at 9-12 months
Unknown	HepB vaccine within **12 hours**; test mother STAT; administer HBIG if positive (within 7 days of birth)
Negative, infant ≥2,000 g	HepB vaccine within **24 hours** of birth; complete three-dose series
Negative, infant <2,000 g	**Delay** first HepB dose until hospital discharge or 1 month of chronological age; then complete the three-dose series

- **System-level action item**: hospital standing orders in labor and delivery and nursery units are essential
- **Post-vaccination serologic testing**: test anti-HBs and HBsAg in infants born to HBsAg-positive mothers at 9-12 months; do NOT test before 9 months (maternal antibody interference)

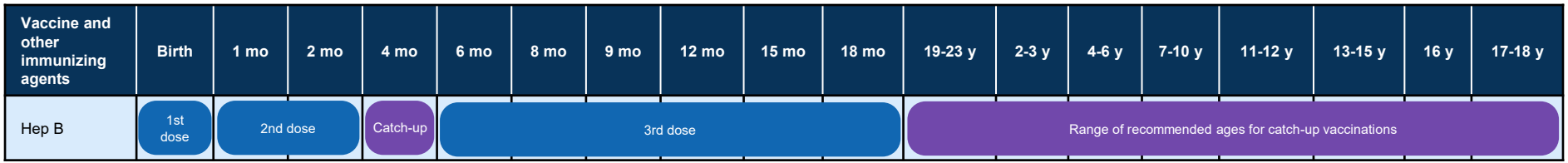
1. https://www.cdc.gov/hepatitis-b/hcp/perinatal-provider-overview/vaccine-administration.html.

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Completing the HBV Vaccine Series and Adolescent Catch-Up[1]

Vaccination Scenario	Dosing	Comments
Standard infant series	Birth, 1-2 months, 6-18 months	• Four-dose series applies when the birth dose was a combination vaccine not containing HepB, or per specific product labeling • Partial series provides NO durable protection; a two-dose series is not a completed series
Adolescent catch-up	*Unvaccinated:* begin the three-dose series *Incompletely vaccinated:* complete the remaining doses	• In completely vaccinated adolescents, do not need to restart the series from the beginning – Prior doses remain valid regardless of the interval since the last dose) • Verify via IIS; do not rely on family report alone

Special situations: two-dose adult HepB series (Heplisav-B®) is licensed for ≥18 years only; standard three-dose series for children and adolescents; can use HAV/HBV combination vaccine (TwinRix) if both are needed on same day



1. https://downloads.aap.org/AAP/PDF/AAP-Immunization-Schedule.pdf.

PeerView

Clinical Consult: Hepatitis B Vaccination

Case: HBV Vaccination at Birth When Mother is HBsAg Positive

- **Case scenario**: Newborn male, now 6 weeks old, born at 38 weeks to a mother with documented chronic hepatitis B (HBsAg positive, HBeAg positive). Chart review reveals hepatitis B vaccine was given within 12 hours of birth; HBIG was also administered. The newborn's mother asks: "*Was the vaccine enough? Does he need more shots*?"

- **Discussion points**:
  - Birth-dose completion data: 60.0% vs 33.8% series completion by 19 months; adjusted OR 2.92[1]
    - ➢ Stress importance of completing 3-dose series
  - Scaling timely birth-dose coverage to 90% in 110 LMICs was modeled to avert 710,000 HBV-related deaths in 2020-2030 birth cohorts[2]
  - PVST timing: test anti-HBsAg and HBsAg at 9-12 months (not before due to maternal antibodies)
  - Children who acquire HBV in early childhood are at highest risk of all age groups for experiencing chronic infection and premature death

1. Oster NV et al. *Am J Prev Med*. 2019;57(4):e117-e124. 2. de Villiers MJ et al. *Nat Commun*. 2021;12(1):6223.

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Case: HBV Vaccination at Birth When Mother Is HBsAg Positive

**6-week-old newborn,
who was born at 38 weeks**

Mother has documented chronic hepatitis B (HBsAg positive, HBeAg positive)





Chart review reveals hepatitis B vaccine was given within 12 hours of birth

HBIG was also administered at birth





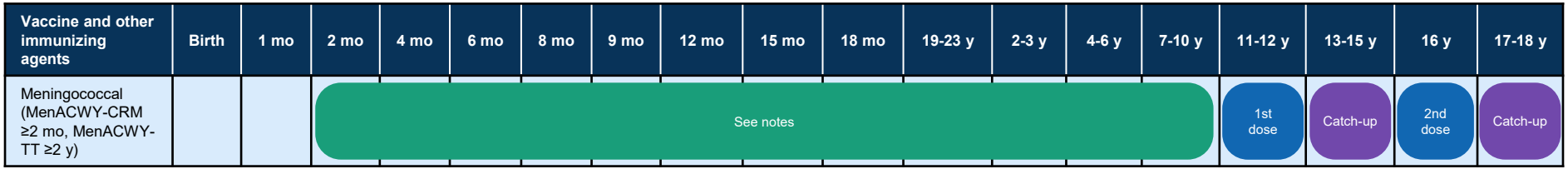
Newborn's mother asks, "Was the vaccine enough? Does my baby need more shots?"

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Meningococcal

MenACWY: Routine Schedule and the Critical Booster at Age 16[1,2]

- AAP routine recommendation: MenACWY dose 1 at 11-12 y; booster dose (dose 2) at 16 y
  - **Why the booster? Waning immunity**: protection from the primary dose at 11-12 y declines over 3-5 y, leaving the highest-risk college-age cohort inadequately protected without a 16-year-old booster
- Flag the MenACWY booster at every visit encounter for patients aged 13-15 y who have received the primary dose
  - CHIRP verification at every sports physical and well visit in this age range



- High-risk children (eg, asplenia, complement deficiency, HIV, complement inhibitor therapy, travel risks) may receive MenACWY starting at 2 mo (schedule varies by brand)
- High-risk children ≥10 y: add MenB three-dose series
- Both available pentavalent MenABCWY vaccines are approved only for ages 10-25 y

1. https://downloads.aap.org/AAP/PDF/AAP-Immunization-Schedule.pdf. 2. Mbaeyi SA et al. *MMWR Morb Mortal Wkly Rep*. 2020;69:1-41.

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MenB: Why and How to Have the SCDM Conversation[1,2]

MenB is recommended by the AAP for adolescents aged 16-23 y (preferred 16-18 y) based on shared clinical decision-making (SCDM)

Why is SCDM not routine? Data are less clear here to routinely recommend the vaccine

Very low background incidence | Shorter duration of protection | High cost-per-QALY

- Pentavalent vaccine (MenABCWY) is an alternative to separate administration of MenACWY and MenB **when both vaccines would be given on the same clinic day**
  - MenB vaccines are not interchangeable between manufacturers; whichever formulation is used for dose one must be used for all subsequent doses

Scripted SCDM opener: "There's also a vaccine for a fifth strain of meningococcal disease called serogroup B. The decision is yours to make, but I want to make sure you have the information to make it"

1. https://downloads.aap.org/AAP/PDF/AAP-Immunization-Schedule.pdf. 2. Mbaeyi SA et al. *MMWR Morb Mortal Wkly Rep*. 2020;69;1-41.

PeerView

Clinical Consult: Meningococcal Vaccination

Case: 16-Year-Old Sports Physical

- **Case scenario**: 16-year-old female presents for sports physical. IIS shows: MenACWY dose 1 at age 11 (no booster); HAV dose 1 at 13 months, no dose 2; HBV series complete. Parent says they "*don't believe in extra vaccines*."

- **Discussion points**:
  - **MenACWY booster**: strongly recommended; she is exactly the right age and is past her primary dose
  - **HAV dose 2**: she received dose 1 at 13 months; she is 16 years old; the 6-month minimum interval has been met for over a decade. This is straightforward catch-up and can be done today.
  - **MenB Dose 1**: if SCDM conversation results in family agreement (engage the adolescent directly, not just the parents)
    - **Can receive the MenABCWY vaccine since she is due for both MenACWY and MenB today**
      - Minimum of 6 months should elapse between MenABCWY doses (can wait a year)

- **If the family declines MenB today**: document that the SCDM conversation occurred, information provided, and the family's decision. Schedule a follow-up conversation at the next clinical encounter; decline of SCDM is not a permanent decision.

Case: 16-Year-Old Sports Physical

A 16-year-old presents for a sports physical exam

IIS shows: MenACWY dose 1 at age 11 years (no booster)



HAV dose one at 13 months; no dose two



HBV series complete





Parent says they "don't believe in extra vaccines"

PeerView

Vaccine-Specific Hesitancy, Barriers, and Equitable Implementation

The Communication Challenge in Today's World[1]

Overall vaccine coverage is declining across the board; the current climate involves resistance even to having the vaccine *conversation*, not just to specific vaccines

Vaccine Hesitancy

- One of the **most pressing** threats to public health
- **Definition:** delay in acceptance or refusal of vaccines despite their availability
- **Drivers include:** misinformation, distrust in healthcare systems, or cultural/personal beliefs
- **Requires:** communication strategies, trust-building, and motivational interviewing

Under-Vaccination

- **Drivers include:** lack of insurance, transportation challenges, missed appts, language barriers, poverty, geographic access
- **Disparities persist** by race/ethnicity, insurance status, poverty level, and urbanicity
- **Requires:** system-level interventions, outreach programs, and improved access (not communication coaching)

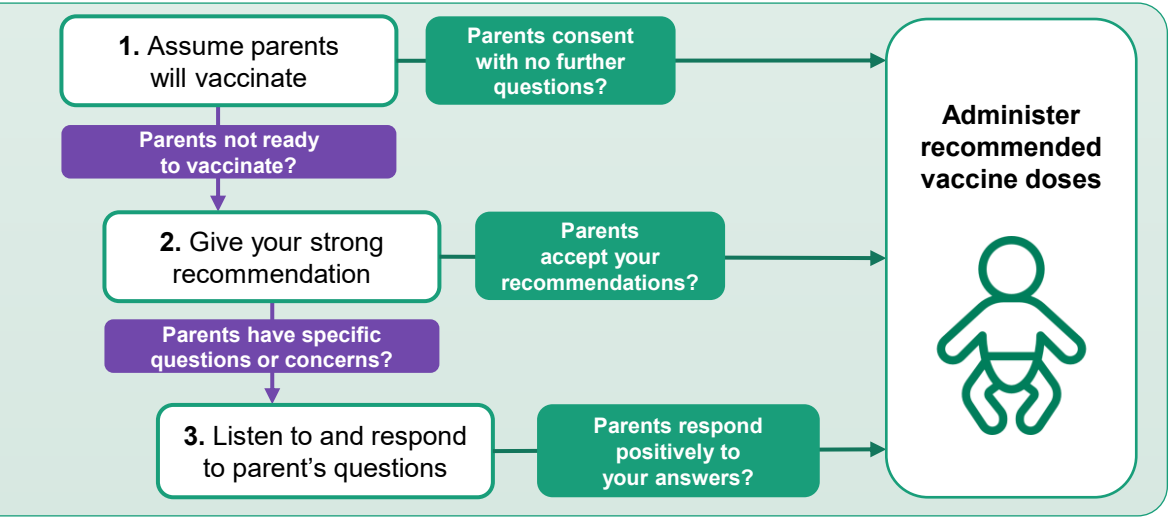
Identifying *which* problem you are facing is the first step; applying the wrong intervention wastes time and misses the family entirely

1. Kaushik A et al. *Vaccines (Basel)*. 2025;13:115.

Communication Toolkit: Presumptive Announcements and Motivational Interviewing[1-3]

Presumptive Announcements

Using strong, clear recommendations in a presumptive format when recommending vaccines (“Sam will get two shots today”) has proven to increase vaccine uptake, even when parents have negative attitudes regarding vaccines

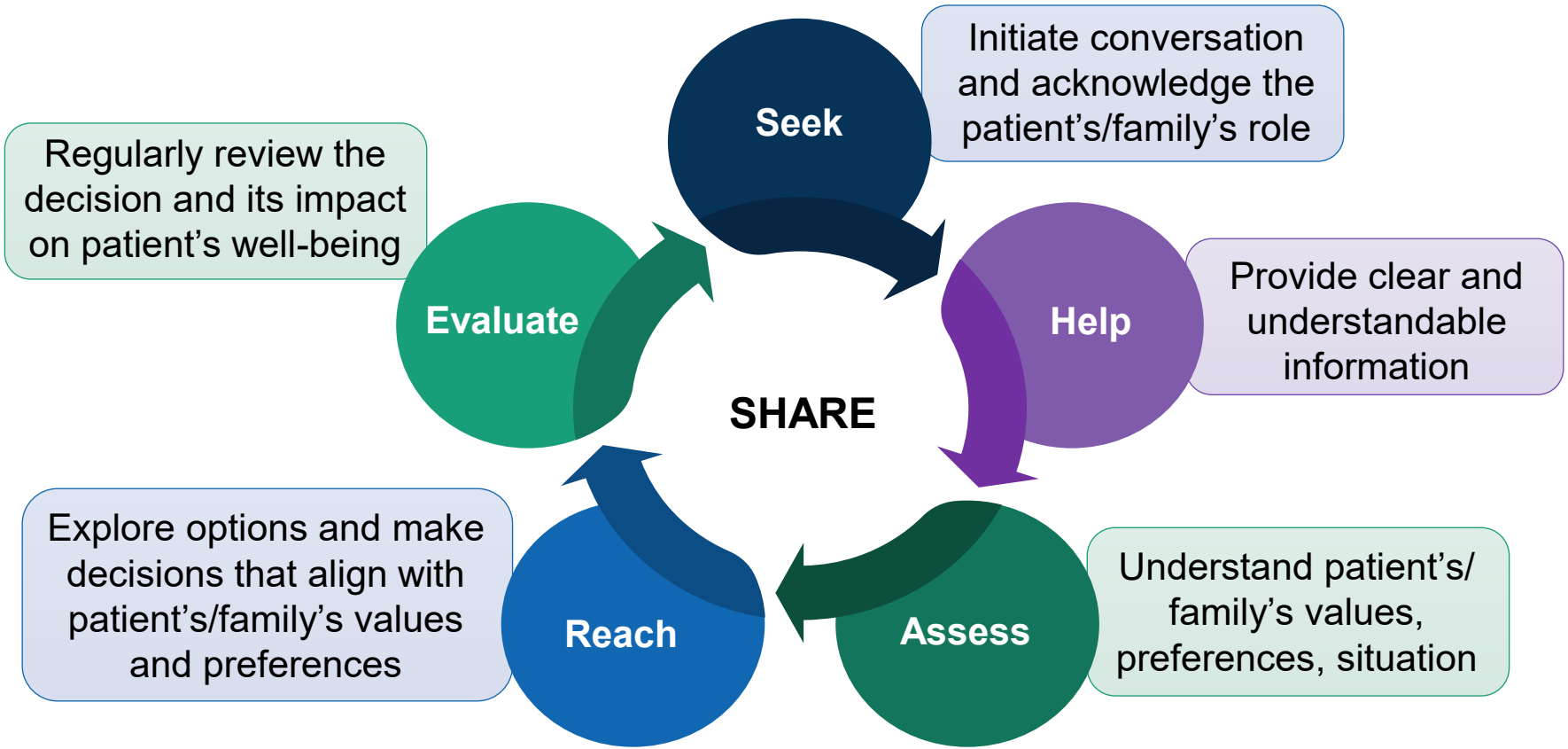


Motivational Interviewing (MI)

- Addresses pediatric vaccine hesitancy by building trust and supporting informed decision-making
- Core MI principles: open-ended questions ("Tell me what you already know about…"); affirmation; reflective listening; summarizing
- An evidence-based, patient-/family-centered communication technique that supports collaborative decision-making and behavioral change

1. Kaushik A et al. *Vaccines (Basel)*. 2025;13:115. 2. O’Leary ST et al. *Vaccine*. 2023;41:1760-1767.
3. https://www.cdc.gov/vaccines-children/hcp/conversation-tips/index.html.

Using SHARE Framework to Encourage Vaccine Uptake[1]



1. https://www.ahrq.gov/sdm/share-approach/index.html.

Vaccine-Specific Hesitancy: Hepatitis A

HAV: Responding to Common Hesitancy Objections[1,2]

Low Incidence

- Acknowledge the objection honestly *("Yes, current incidence is low")* and then immediately explain why
- Scripted response: *"It seems uncommon because of the vaccine. The outbreaks starting in 2016 showed us what happens when that protection slips. We don't want to find out what happens if we stop vaccinating children."*

Travel-Related Risks

- **Travel to endemic areas is one risk factor, but it is not the only one**
- Scripted response: "*I hear this a lot: 'We don't travel internationally.' But hepatitis A doesn't require a plane ticket. Recent US outbreaks were mostly in people who never left the country, through crowded living conditions, food handling, and daycare settings. The vaccine protects your child wherever exposure happens."*

In both cases, reinforce with parents/families that dose two is the immunity-consolidating dose

1. https://www.cdc.gov/hepatitis-surveillance-2023/hepatitis-a/index.html. 2. Horn EK et al. *J Infect Dis.* 2024;230:e199-e218.

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Vaccine-Specific Hesitancy: Hepatitis B

HBV Birth Dose: Responding to Family Concerns[1-3]

"Can't we just wait?"

"I understand wanting to wait, but timing matters. The risk of a lifelong infection is highest right at birth and in early infancy. Today's vaccine is what protects [baby's name] from that outcome—waiting even a few weeks increases that risk."

"My baby isn't at risk"

"Hepatitis B can be present in a parent or caregiver without any symptoms or awareness. A chronic HBV infection acquired at birth can silently cause liver damage, liver failure, or liver cancer decades later. Vaccination at birth is the most reliable way to prevent that."

"I'm worried about what's in it"

"This is actually one of our simplest vaccines. It contains one protein that teaches the immune system to recognize hepatitis B. No live virus, nothing that can cause infection. It's been given to billions of babies for over 40 years."

"Isn't this too many shots too soon?"

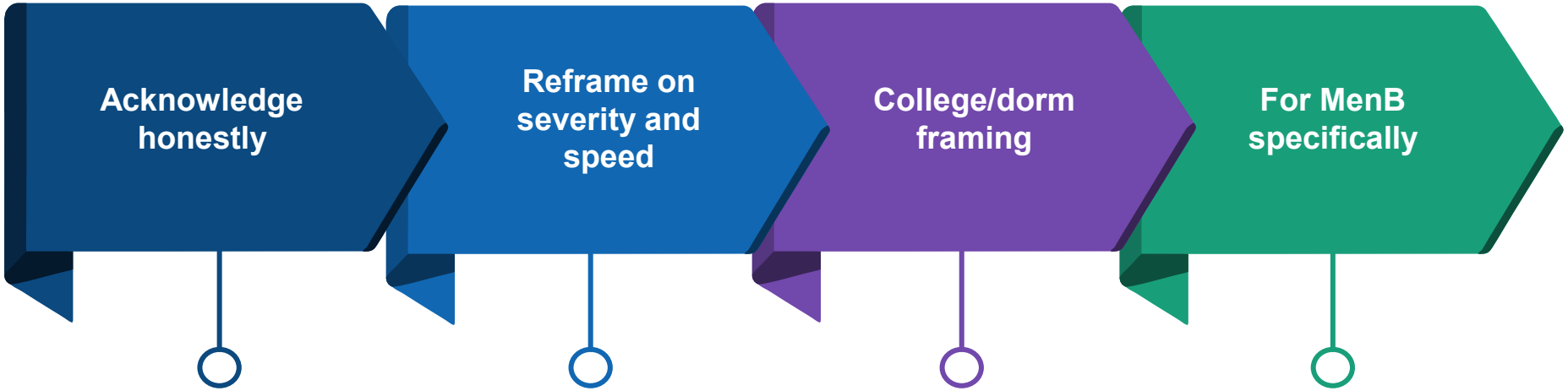
"This is actually the only vaccine we give today. Your baby's immune system encounters thousands of new antigens every single day just by breathing and feeding. One vaccine antigen is a very small ask of a very capable immune system."

1. https://www.aap.org/en/news-room/fact-checked/fact-checked-hepatitis-b-vaccine-given-to-newborns-reduces-risk-of-chronic-infection/.
2. Hall EW et al. *JAMA Pediatr*. 2026:e261221. 3. https://www.cdc.gov/acip/meetings/presentation-slides-september-18-19-2025.html.

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Vaccine-Specific Hesitancy: Meningococcal

Meningococcal Disease: "The Disease Is Rare" Concerns[1,2]



"Meningitis is uncommon here, but when it strikes, it can become a medical emergency very quickly, causing permanent complications or death."

Case-fatality rates of 10%-18%, long-term sequelae in up to 20% of survivors, and the possibility of death within 24 hours of first symptom

"At 16, your child is 2 years from college dorm living, one of the highest-risk settings for meningococcal disease. The booster at 16 years keeps protection in place at exactly that time.."

Acknowledge the lower incidence and higher cost-per-QALY

Address severity, rapid progression, and outbreak risk (UK, college campuses)

Introduce pentavalent MenABCWY as a logistically simpler option

1. https://www.cdc.gov/meningococcal/php/surveillance/index.html. 2. Presa J et al. *Front Public Health*. 2026;14:1694023.

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Challenge Question 3

In your experience, what is the MOST common reason providers skip the MenB shared clinical decision-making (SCDM) conversation at the 16-year-old visit?

1. They aren't aware MenB is recommended for this age group
2. They assume the family will decline, so it's not worth the time
3. They don't know how to document it in the EHR
4. They don't think the disease is serious enough to bring up

Challenge Question 3

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Let’s talk about ways to prioritize the MenB SCDM conversation with 16-year-olds and/or their families.

MenB: Conducting and Documenting SCDM[1-3]

The SCDM conversation for MenB requires more than offering the vaccine;
it requires documentation that the conversation occurred, the information provided, and the family's decision

Conversation Flow	Script
Introduce	"*There's a vaccine for a fifth strain of meningococcal disease called serogroup B. Let me tell you a little about it.*"
Inform	Incidence, severity, who's at higher risk (eg, those who will reside in college dorms), pentavalent vaccine option (one injection), two-dose series, noninterchangeability
Engage the adolescent directly	"*This affects you most. What questions do you have?*"
Decide and document	Yes (administer today); decline (document refusal and schedule follow-up conversation)

EHR documentation template — date, information provided, questions answered, family decision, plan if declined

Safety at-a-glance — Well-characterized safety profile; most reactions are mild to moderate and resolve quickly

1. https://downloads.aap.org/AAP/PDF/AAP-Immunization-Schedule.pdf. 2. Amin AB et al. *MMWR Morb Mortal Wkly Rep*. 2026;75:7-14. 3. Parsa A et al. SAHM 2025.

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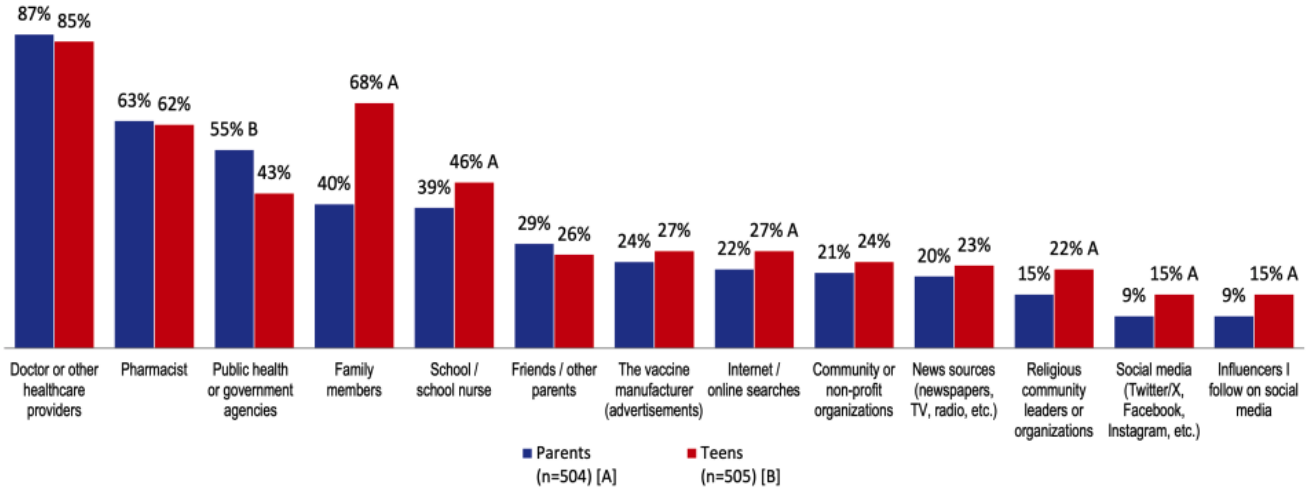
Healthcare Professionals Are the Most Trusted Source of Vaccine Information

Both parents and teens report high trust in healthcare professionals (HCPs); engage adolescents alongside parents

Figure 1.

Summary - Extent of Trust in Vaccine Information Sources - 2024 Survey

(Base=Total Respondents; % Rating 4+5; 5=Highly)



Key takeaway for vaccine conversations

87% of parents
85% and teens

Identify HCPs as the highest-trusted vaccine information source

Ask both voices: "What questions do you each have about this vaccine?"

1. Parsa A et al. SAHM 2025.

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General Approaches to Vaccine Fatigue and Hesitancy

Provider Fatigue, Implicit Bias, and Peer-to-Peer Advocacy[1,2]

Provider Fatigue

Real and Measurable

Burnout rates in pediatrics are HIGH and prolonged vaccine conversations contribute to moral distress

Burned-out providers are more likely to:

- Soften vaccine recommendations
- Accept deferral without rescheduling
- Skip strong clinical decision-making documentation

Implicit Bias

An Unconscious Pattern

Providers may "calibrate" recommendation strength to perceived family receptivity

The disparity this creates:

- Families perceived as "hesitant" receive weaker guidance
- Often the families who need the strongest, most consistent message
- Pattern can widen health equity gaps unintentionally

Self-Awareness Strategy

The Presumptive Default

Apply the presumptive format for ALL families, not just those perceived as receptive

Why this works:

- Interrupts unconscious calibration
- Removes implicit judgment from the interaction
- Ensures every family gets the same strong start

Provider recommendation is strongly associated with family acceptance of vaccination

1. Kaushik A et al. *Vaccines (Basel)*. 2025;13:115. 2. O'Leary ST et al. *Pediatrics*. 2026;157:e2025075754.

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Practice Tools: Chairside Scripts and Missed Opportunity Prevention[1]

1. **Every Visit = Vaccine Visit**
   Well, sick, sports physical all count
2. **Same-Day at Sick Visits**
   No contraindication? Vaccinate today
3. **CHIRP Check at Rooming**
   MA/RN initiates; provider addresses hesitancy
4. **Chairside Script Cards**
   Laminated in every exam room for quick reference
5. **Vaccine Quick Reference**
   Eligibility guide at point of care
6. **Standing Orders**
   Catch-up vaccines without a per-visit provider order
7. **Team-Based Delegation**
   MAs/RNs initiate; providers handle entrenched hesitancy
8. **Presumptive Approach**
   Same strong start for every family; no calibration

Highest-Yield Single Workflow Change

HAV Dose 2

Standalone Reminder-Recall

The single most actionable change to close the HAV dose 2 completion gap

Presumptive Script

"Now that your child is 12 years old, three vaccines are on the schedule to be administered today."

1. O'Leary ST et al. *Pediatrics*. 2026;157:e2025075754.

Practice Tools: VFC, Billing, Coding, and CHIRP[1,2]

VFC Program Eligibility

HAV | **HBV** | **MenACWY** | **MenB**

Eligible populations: Medicaid, uninsured, underinsured, American Indian/Alaska Native children

Vaccines for HAV, HBV, and meningococcus are available through VFC **through age 18**

June 25, 2025

Pentavalent MenABCWY adopted by HHS Secretary

→ **Now an official recommendation**

→ Federal VFC covers MenABCWY for ages 10-18 y

MenABCWY

New 2025 Recommendation

Billing and Coding

Immunization administration with counseling

CPT 90460/ 90461

MenB SCDM conversation: Separately documentable and billable

ACA-compliant plans + Medicaid/CHIP:
All 2026 schedule vaccines covered **without cost-sharing**

CHIRP Integration:
Active, current login used at **every patient encounter**

ACA Coverage + IIS

1. https://www.cdc.gov/vaccines-for-children/about/index.html 2. https://hhs.iowa.gov/media/2713/download?inline.

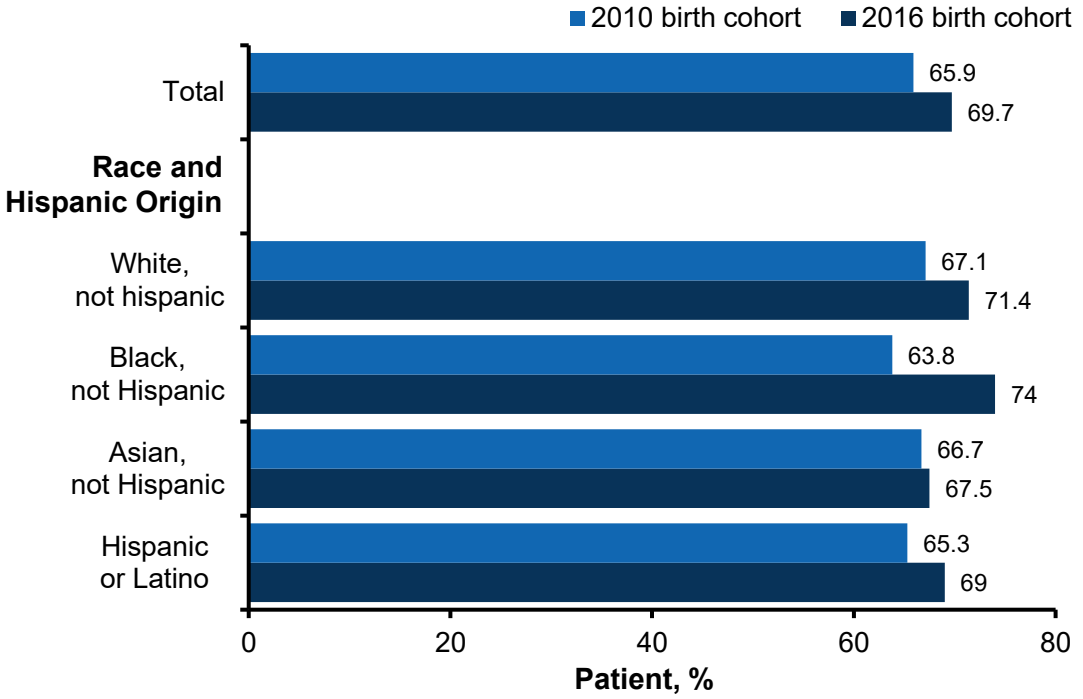
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Equity and SDOH: The Vaccination Disparity Data[1-3]

- Vaccination coverage is lower among:
  - Black, Hispanic, and American Indian/Alaska Native children
  - Children who are uninsured or insured by Medicaid or other nonprivate insurance
  - Children living in more rural areas
  - Children in families with incomes below the federal poverty level

These disparities reflect a combination of structural access barriers AND differential strength of vaccine recommendations; both are modifiable

Vaccination Coverage for Combined 7-Vaccine Series by Age 24 Mo, by Race and Hispanic Origin: United States, Birth Years 2010 and 2016



1. Hill HA et al. *MMWR Morb Mortal Wkly Rep.* 2024;73:844-853. 2. Seither R et al. *MMWR Morb Mortal Wkly Rep*. 2024;73:925-932.
3. https://www.cdc.gov/nchs/hus/topics/vaccination.htm.

Equity: Language Access, Refugee/Immigrant Families, and Community Partnerships[1,2]

Language Access

Use professional interpreters, not family members

- Professional interpretation required for SCDM (MenB) and HBV birth-dose conversations
- Family-member interpretation cannot guarantee fully informed consent
- Document interpreter use in every encounter where non-English counseling occurs



Refugee and Immigrant Families

Begin the series; do not wait for records

- Assume unvaccinated unless written documentation is in hand
- HBV is critical for families from high-endemicity regions (SE Asia, sub-Saharan Africa, Pacific Islands)
- A substantial share of U.S. chronic HBV burden is in foreign-born individuals



Community Partnerships

Meet families where they are

- FQHCs, mobile units, school-based health centers, after-hours and co-located services
- HAV equity: Hispanic persons had 2× the HAV rate of non-Hispanic White persons in 2023
- Community-level outreach in high-risk populations is particularly high-yield for HAV



1. https://www.cdc.gov/hepatitis-surveillance-2023/hepatitis-a/index.html. 2. https://www.aap.org/en/advocacy/immigrant-child-health.

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Putting SDOH Into Practice: A Framework

Barrier	Intervention	Who Leads
Language	Professional interpretation; translated materials	Front desk + MA
Insurance gaps	VFC enrollment; ACA navigation	Billing/admin
Transportation	Mobile unit partnerships; telehealth for counseling	Practice leadership
Mistrust	Continuity of care; community health workers	All staff
Provider bias	Consistent presumptive format; QI audit	Medical director
Missed opportunities	IIS check at every visit; standing orders	MA/RN + provider

The most equitable practice is the most consistent practice;
every family receives the same strong recommendation regardless of perceived hesitancy

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Conclusions

- Pediatric vaccination rates are declining; hepatitis A (HAV), hepatitis B (HBV), and meningococcal vaccines require proactive advocacy at every visit, regardless of visit type
- **HAV**: Young children are typically asymptomatic carriers, making the two-dose series essential to prevent silent community spread
- **HBV**: The birth dose within 24 hours is the single highest-stakes vaccine decision; it catches perinatal transmission missed by maternal screening gaps
- **MenACWY**: waning immunity makes the booster at age 16 years as essential as the primary dose
- **MenB**: SCDM is required and must be documented at every eligible visit
- Presumptive announcements applied consistently to all families reduce implicit bias and drive equitable vaccine uptake, while always welcoming parent/family questions to build trust
- Standing orders, IIS checks at rooming, and team-based delegation are the most scalable strategies to close missed-opportunity vaccination gaps

Ask Your Questions Now!



- *If a child or teenager needs catchup vaccinations, is there a limit to how many can be given in one visit?*
- *Can these vaccines be given at the same time as a flu or COVID vaccine?*
- *What is your most successful tactic for speaking with a vaccine-hesitant parent?*

Complete and submit your evaluation

Scan below or visit us at
PeerView.com/Vaccine-Education-Eval-BTQ

Vaccine-Education-Eval-BTQ

Thank you for joining us!

Interested in more education from PeerView?
Email meetings@peerview.com to request another meeting!

Abbreviations

AAP: American Academy of Pediatrics

ACA: Affordable Care Act

ACIP: Advisory Committee on Immunization Practices

anti-HBs/anti-HBsAg: antibody to hepatitis B surface antigen

CHIP: Children's Health Insurance Program

CHIRP: Children and Hoosier Immunization Registry Program

COVID-19: coronavirus disease 2019

CPT: Current Procedural Terminology

EHR: electronic health record

FQHC: Federally Qualified Healthcare Centers

HAV: hepatitis A virus

HBIG: hepatitis B immune globulin

HBV: hepatitis B virus

HBeAg: hepatitis B envelope antigen

HBsAg: hepatitis B surface antigen

HEDIS: Healthcare Effectiveness Data and Information Set

HepB: hepatitis B

HHS: US Department of Health and Human Services

HIV: human immunodeficiency virus

IIS: Immunization Information System

IMD: invasive meningococcal disease

L&D: labor and delivery

LFT: liver function tests

MA: medical assistant

MenABCWY: meningococcal ABCWY pentavalent vaccine

MenACWY: meningococcal ACWY vaccine

MenB: meningococcal B

MI: motivational interviewing

MMWR: Morbidity and Mortality Weekly Report

PEP: post-exposure prophylaxis

PVST: post-vaccination serologic testing

QALY: quality-adjusted life year

QI: quality improvement

RN: registered nurse

SCDM: shared clinical decision-making

SDOH: social determinants of health

SE: Southeast (as in SE Asia)

SHARE: seek, help, assess, reach, evaluate

VFC: Vaccines for Children

ADHD in Primary Care

The Basics of ADHD and How Best to Support





Kellina Lupas, PhD

Associate Professor of Pediatrics
Clinical Director of the Center for ADHD
Division of Behavioral Medicine Clinical Psychology
Cincinnati Children's Hospital Medical Center

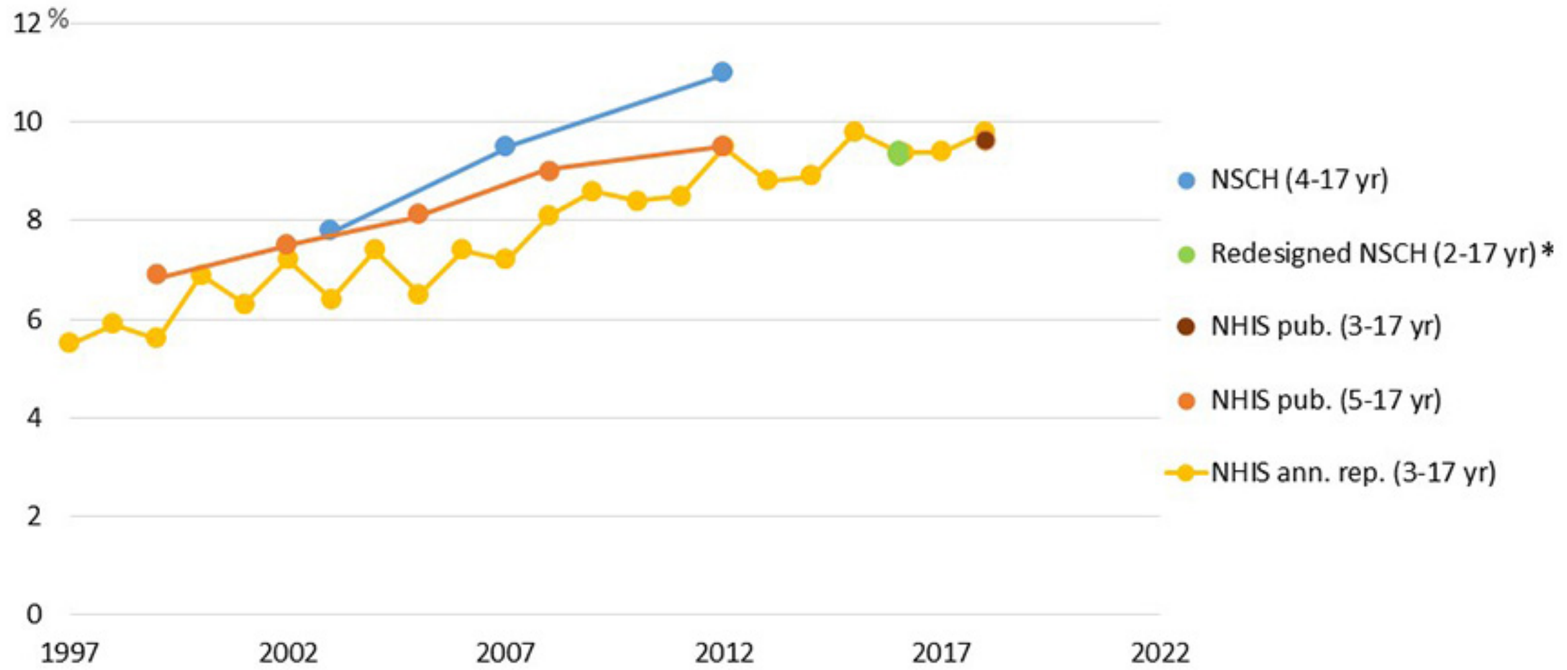
Disclosures

I have no financial disclosures related to the content of this presentation.

The materials presented represent a collection of evidence from my personal experience, colleagues, my research team, expert talks, peer reviewed journal articles, books, and my graduate training. My views and materials are not necessarily the official positions of Cincinnati Children’s Hospital.

I can give broad answers to questions on a topic, but I can’t comment on specific patients or cases.

ADHD is really common.



CDC, 2023



Diagnosis

ADHD is a consistent pattern of developmentally inappropriate levels of inattention, hyperactivity, or impulsivity. In the Center, we use a 4-part diagnostic process:

1. Rating forms completed over the MeHealth portal by **parents and teachers**
2. Parent diagnostic/clinical interview
3. Child diagnostic/clinical interview and behavioral observation
4. Feedback appointment, with report and treatment recommendations

TEST RESULTS - SUMMARY

DSM-5 ADHD Symptoms Endorsed on the Vanderbilt Rating Scales (score ≥ 2)

Inattentive Presentation					Hyperac				
[redacted] (PARENT)	[redacted] (LANGUAGE A...)	[redacted] (MATH)	[redacted] (SCIENCE)	Symptom	[redacted] (PARENT)	[redacted] (LANGUAGE A...)	[redacted] (MATH)	[redacted] (SCIENCE)	Symptom
x		x	x	Difficulty sustaining attention	x				Running about
x		x	x	Difficulty following through/finishing things	x				On the go, as i
x				Not seeming to be listening	x				Fidgeting/squir
x		x	x	Easily distracted	x			x	Difficulty remai
x		x		Inattention to details/making careless mistakes					Difficulty quieti
x		x		Absent-minded or forgetful					Talking excessi
x		x		Losing things					Blurting out ans
x		x		Disorganization					Difficulty waitin
x	x	x	x	Avoiding tasks of sustained attention					Interrupting or i
9	**1**	**8**	**4**	**total out of 9 items endorsed**	**4**	**0**	**0**	**1**	**total out of 9 i**

To explain diagnosis to parents -

Below 12 years old - “4 Major Criteria”

1. **6 symptoms occurring at a high level**
   a. Show the parents the Vanderbilts - bold the 2's and 3's
2. **Symptoms are present across settings**
   a. “They take their brain with them everywhere”
   b. Pull out examples from the parent interview or the rating form comments
3. **Symptoms cause impairment**
   a. “We measure this in about 6 ways…”
   b. Use impairment items on Vanderbilt
   c. Pull in examples from interview
4. “**Is there anything else going on that would be a better explanation**?”





Not Just ADHD

ADHD commonly occurs with other conditions.

- 60% of children with ADHD will also meet criteria for Oppositional Defiant Disorder (ODD)
- Approximately 1/3 have a co-occurring learning disability
- 20-30% will also meet criteria for anxiety/depression
- 20-30% will meet criteria for autism



What Causes ADHD?

ADHD is a brain-based, genetic condition. Like diabetes or high blood pressure, it can be managed through both **environmental** and **medical** ways.

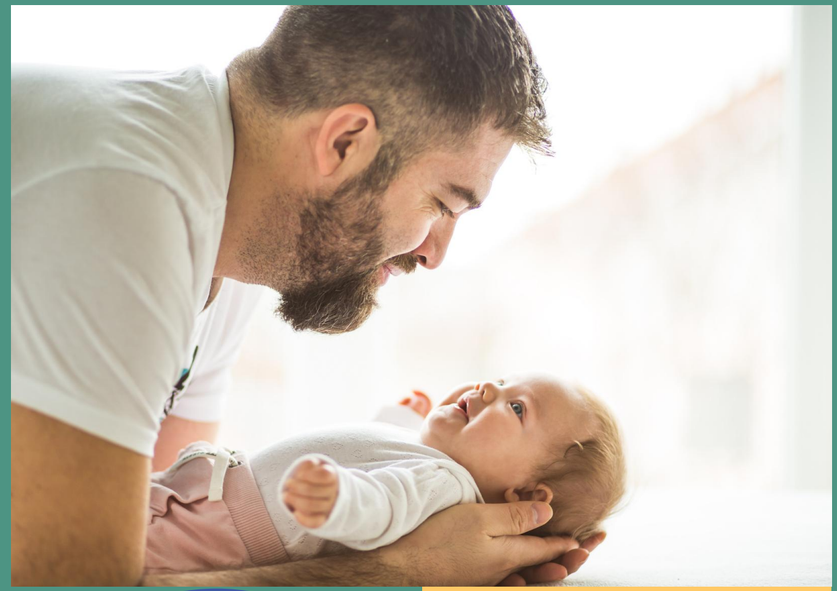
ADHD is not the result of poor parenting, bad classroom management, laziness, screens, or the stresses of modern life

Genetics

Twin and family studies demonstrate genetics play a strong role in the emergence of ADHD.

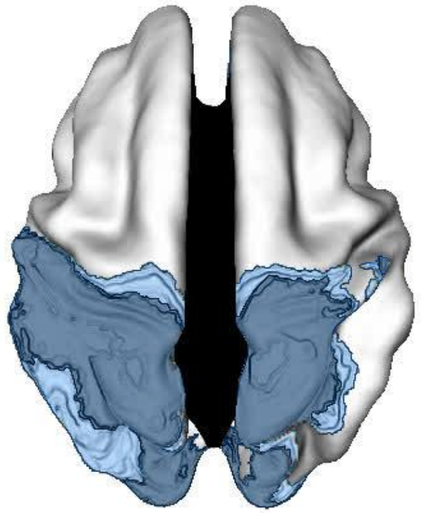
75-80% of variation in sevrity of ADHD is related to genetic factors.

30-50% of parents of children with ADHD also meet criteria for ADHD.

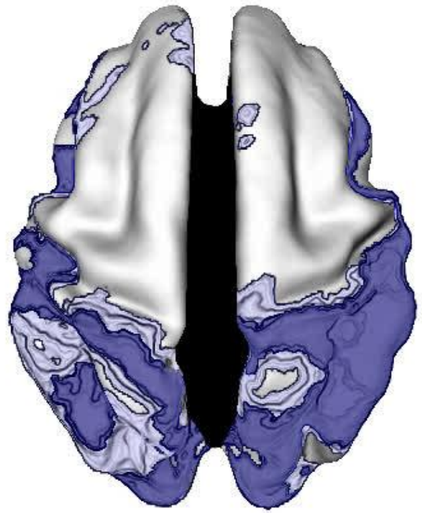


Structural

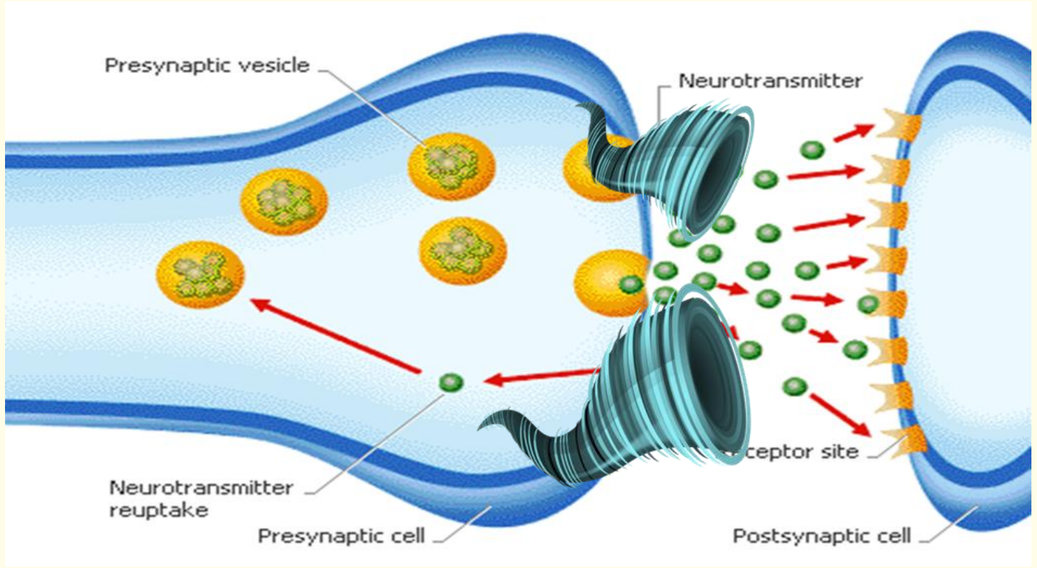
AGE: 5



ADHD



TYPICALLY DEVELOPING CONTROLS



Functional

The main neurotransmitter involved in ADHD is **dopamine.**

ADHD is associated with an attenuated and dysfunctional DA system in which the brain **does not have enough dopamine.**

Not enough DA = Broken:

Filters.

How you process sensory information.

She looks a little...irritated.
Body language is off.
He seems to think I'm funny!

Brakes.

Spatial awareness, handsyness, whether you keep talking or stop. Academically - picking up on context clues, re-engaging where you left off, remembering to hit "Submit"

"Competing for dopamine..."



Explaining ADHD to Parents

Distractibility - background noise; Party Conversation
Activity - Restlessness/Internal ”Itch”
Motivation: Dopamine seeking - video games/Mario coins are dopamine flush!
Executive Function - “Train conductor” analogy, “brake” or “filter” analogy - sliding down the hill unable to veer off
Medication: Insulin for Diabetes; “pills don’t teach skills” - parents more amenable to combined approach
Interventions: “Glasses/Ramps” - not everyone needs them, but using them is necessary for some!!

Behavioral Treatment & Medication





For the core symptoms and impairment of ADHD - attention, focus, follow-through, organization, interruption

Well-Supported	Not Well Supported	**Potentially Harmful**
Behavioral Parent Training	School-based accommodations	Extended time on tests
Contingency Management (school, summer, home)	Individual, 1:1 therapy, including play therapy	Chelation, Sensory Deprivation
Stimulant/Non-Stimulant Medication Management	Supplements (Omega-3, etc), Diet changes	Non FDA-approved “focus” supplements
Organizational skills training	Brain-based therapies (e.g., Brain Balance)	Weighted vests, blankets, Isolation Rooms, Yoga Balls

What do you start with?

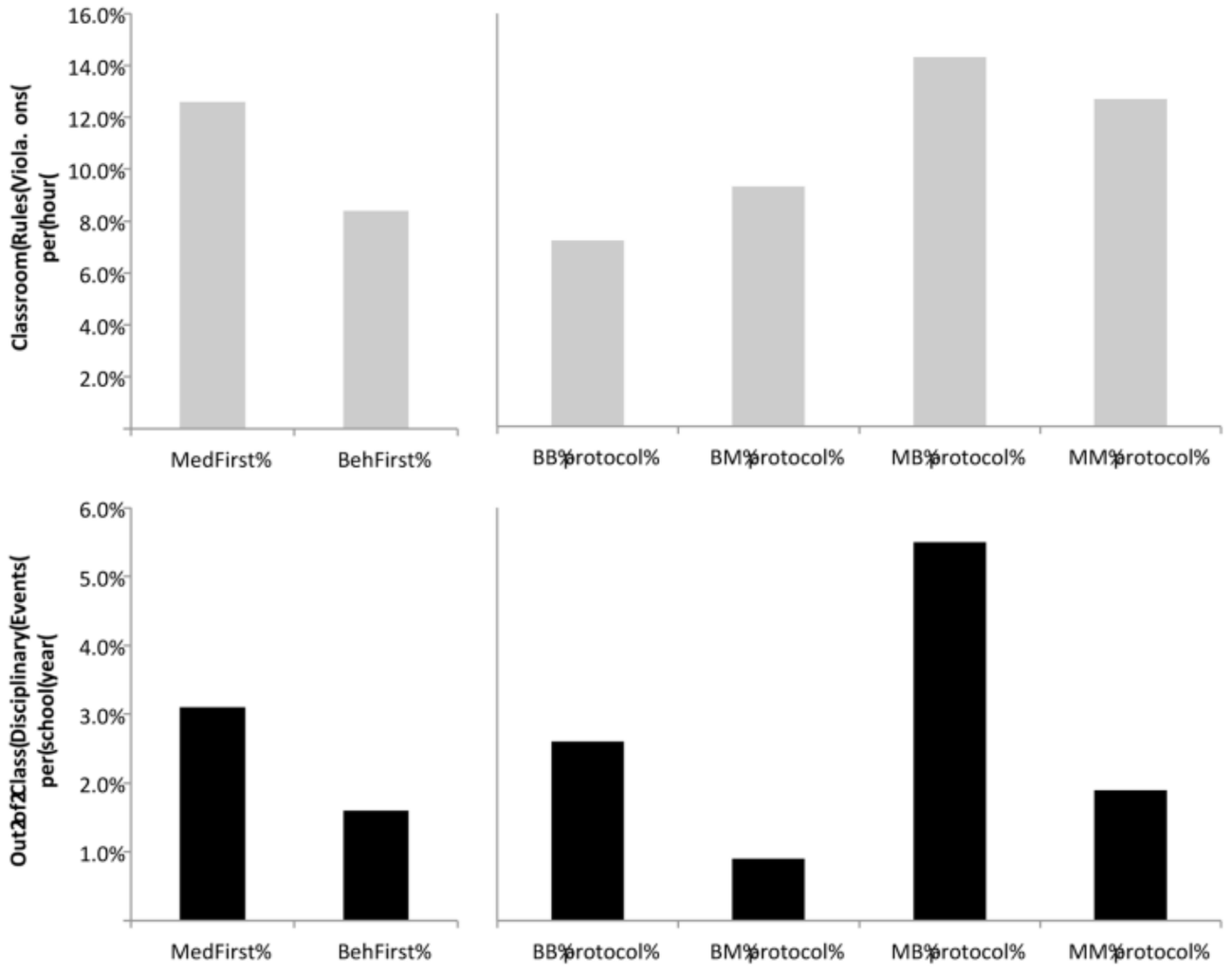


Figure 3.
Means on Observed Classroom Rules Violations and Out-of-Class Disciplinary Events as a Function of Treatment Decisions

Pelham et al., 2016

Med + Behavioral

Combined med and behavior management was better for:

- Oppositional/aggressive sxs
- Parent-child conflict
- Academic Difficulties
- Social Skills
- Anxiety Sxs

In their sequencing study, Pelham et al. showed behavior first before med = more improvement in oppositional sxs than med first

Behavior mgt is important for oppositional bxs

Pelham et al., 2016
MTA Cooperative Group

Center for ADHD

Assessment

1. Diagnostic Evaluations (4 Stages)

Group Treatments

1. Understanding and Managing ADHD Parent Group (Preschool and Elementary)
2. Academic Success In Middle/High School Groups

Individual/Family Therapy

1. Individual/Family Therapy
2. Parent-Child Interaction Therapy (limited)

Specialty Services

1. Cognitive disengagement syndrome service
2. FOCALPlus Driving Training

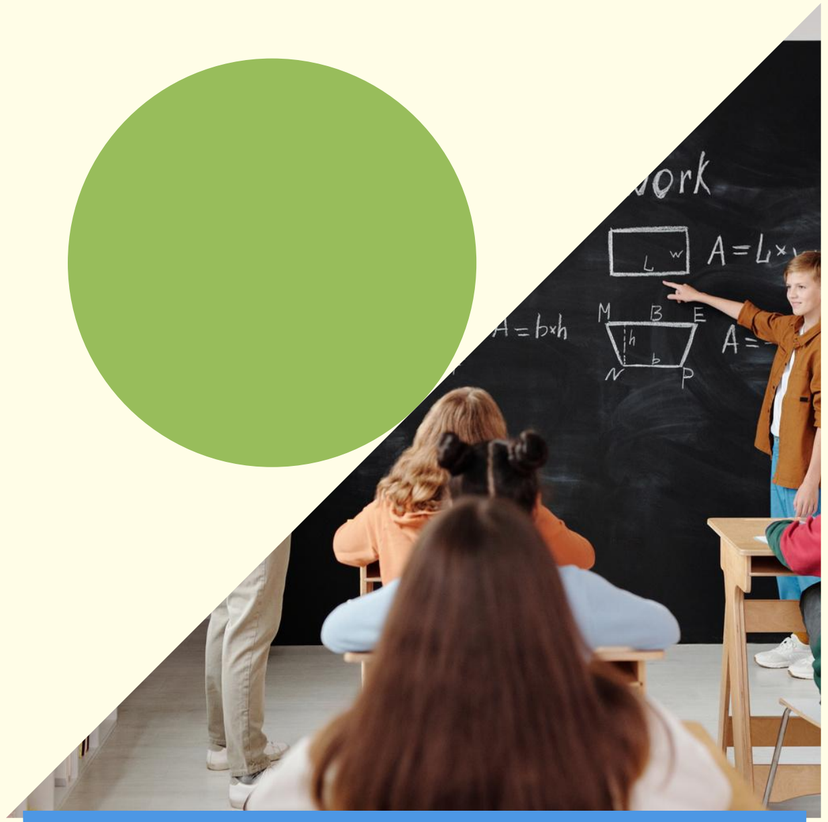
Options for PCPs

It can be hard to access our services. Alternatives:

Behavioral Parent Training
Positive Parenting Program - Triple P

Academic Success
Online collection of short, EF-focused videos - AIMS

Individual Therapy
We offer these over telehealth. We also offer ADHD Consult sessions for a quicker, one-off approach.



Knowledge vs. Performance

Knowing what to do is different from **doing it when you need to!**

Crossing the street
Parallel Parking
Turning in Homework
Studying for a Test

<u>Intervene at the point of performance</u>

Parent Groups

8 Sessions, Once a week, 90 Minutes Each



1. What is ADHD? (Psychoeducation)
2. Special time, labeled praise - “Catching our kids being good”
3. Effective directions
4. Planned ignoring
5. Contingency management systems (rewards for home goals)
6. Daily report cards (rewards for school goals)
7. Homework routine
8. Responding to more serious behaviors (physical aggression, destruction of property)



Adolescent Groups

Parent & Teen, 7-8 sessions, 90 minutes each

1. What is ADHD (psychoed)
2. Effective communication (stop nagging!)
3. Behavioral contracts
4. Organization systems (color-coded folders)
5. Time management (planning out evening schedule)
6. Study skills
    a. Flash cards
    b. Memorization techniques
    c. Written summaries

Direct instruction in executive/organizational skills is different than cognitive or EF training or coaching.

Busting Myths about ADHD Treatment

Accommodations have very little support

And the research that does exist suggests that things like extended time make performance **worse** (Lovett et al., 2015)

You do NOT need an IEP or 504 plan to get interventions in place.

Most schools use a “tiered” approach that provides interventions **sooner,** so that we do not wait for the child to fail

Individual counseling is NOT a supported approach

Children with ADHD do not benefit from individual counseling or social skills groups - **knowledge vs. performance!**



Medication Management

Stimulants



Stimulants

Primary Treatment Method.
Methylphenidates or Amphetamines

70-75% will have a beneficial response to any stimulant

25-40% may respond to only one class and not the other

Nonstimulants

Atomoxetine

e.g., Strattera

Can take 4-6 weeks to show benefit

Side effects include fatigue/drowsiness and increased irritability

cannot be stopped suddenly (no drug holidays)

Alpha Agonist

e.g., Guanfacine and Clonidine

Help more with hyperactivity

Can be used to treat tics

Max effect seen at 1 month full dose

Cannot be stopped suddenly (no med holidays)



“I already have a good home life. I only want meds”

If they only want to address ADHD symptoms, meds may be sufficient.

If they want to address parent-child conflict, oppositional behavior, or social skills, combined is better.

Combining treatment (or sequencing behavior first) may allow better results at lower doses.

(MTA Cooperative Group)





“Can I take a genetic test to know which one will work best?”

In general, these are not prime time ready for ADHD.

Studied very little in relation to specific effects of medication on ADHD-related symptoms and side effects

Study findings inconsistent

Effects have been consistent but are so small, there is no clinical utility

(Elsayed et al., 2020; ADHD Clinical Practice Guideline, 2019)





“Which class first?”

In general, MPH first.

A recent meta-analysis showed that on average, youth with ADHD treated with amphetamines (AMPH) or methylphenidate (MPH) do improve
•Marginally larger improvement in clinician ADHD sx ratings for AMPH compared to MPH observed (Cortese et al., 2018)

Teacher ratings indicated improvement with MPH but not AMPH

Note that 25-40% may respond to only MPH or AMPH but not both

50% who do not respond to one class (MPH or AMPH) will respond to the other





“What are some common side effects?”

-Decreased appetite (14-22% vs 2-6% placebo)

-Trouble falling asleep (8-17% vs 2-7% placebo)

-Stomachaches (11-14% vs 7-10% placebo)

-Headaches (15% vs 8% placebo)

-Nervousness (8-17% vs 2-7% placebo)

-Irritability (17%)





“What about if my child has tics?”

Little evidence that stimulants worsen tics on average in clinical trials (Castellanos et al., 1997; McDonagh et al., 2009; NIH Drug Class Review)

SDBP 2020 guidelines recommend trying stimulants first in comorbid ADHD/Tic disorders

Atomoxetine and Alpha-Agonist are alternatives





“Are nonstimulants safer?”

Atomoxetine (Strattera) - response rate appears lower than for stimulants (36-53% vs. >70%)

Effect size for ADHD sxs is lower for atomoxetine

Same or similar side effects - nausea, diminished appetite, headache, irritability, fatigue



Guanfacine and Clonidine -

Decrease hyperactive symptoms

Effects on attention may not be as robust. If trying to address attention sxs, guanfacine may be better choice

Same/similar side effects - sedation, dizziness, irritability, headache, abdominal pain

(AAP Guidelines, 2019, Connor et al., 1999; Biederman et al., 2008; Sallee et al., 2009; Posey & McDougle, 2007)





“Is my child going to have heart problems?”

Mild increases in heart rate

on average, <10 bpm
systolic BP (avg <5 mmg Hg)
and diastolic BP (avg <5 mmg Hg)

AMPH, MPH, or Atomoxetine





“I don’t want to delay his brain growth”

No evidence that stimulants caused any adverse effects on cortical growth

Shaw at al., 2009

Actually…

Untreated adolescents with ADHD **lost** cortical volume at a faster rate

Adolescents with treated ADHD looked like typical controls in cortical volume changes





“I don’t want this to lead to addiction”

Long-term, treating ADHD with stimulants may serve protective roles:

Lower substance use
Higher earnings
Lower likelihood of risky behavior, incarceration

(MTA Cooperative Group)





“He’s too young…right?”

Preschool medication management is possible, and appropriate in several circumstances

Large body of safety and efficacy for MPH

MPH is considered 1st line med treatment for ADHD in AAP guidelines for preschool age



- Effect sizes (amount of symptom change) less for MPH in preschool vs. school-age children

- Rate of metabolizing MPH slower in preschoolers

- Start low, go slow

- Side effects in preschoolers more prominent than in school agers

- Higher rate of emotional side effects – crabbiness, irritability, crying



Questions!



Prevention of Common Pediatric Sports Injuries

Jonathan Wilhite MD
Pediatric Orthopedic Surgery
Peyton Manning Children’s Hospital

Disclosures

- Johnson and Johnson

Objectives

- Describe conservative treatment options for common apophyseal injuries
- Describe proper xrays orders for adolescents presenting with knee pain

Common Pediatric Sports Injuries

- ACL Tears
- Medial Tibial Stress Syndrome
- SCFE
- Apophyseal Injuries
  - Little League Shoulder
  - Little League Elbow
  - Gymnast Wrist
  - Osgood Schlatters
  - Severs Disease

Common Pediatric Sports Injuries

- ACL Tears
  - True incidence in pediatric population is unknown, but the rate at ACL tear in pediatric population increasing at 2% yearly



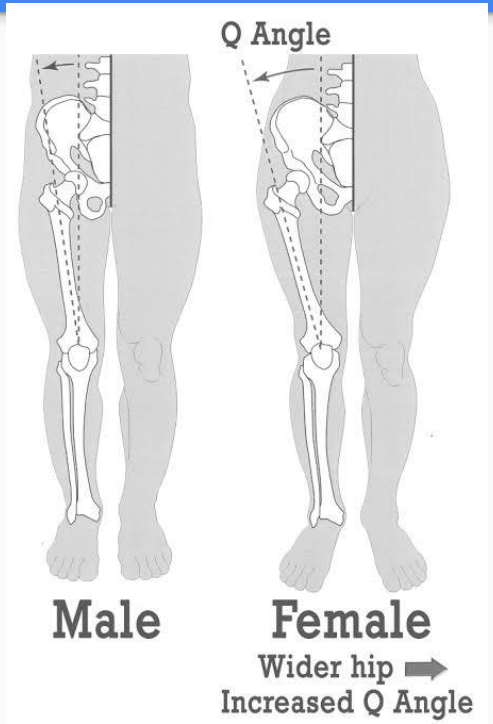
Common Pediatric Sports Injuries

- ACL Tears
  - Increased specialization
  - Year round sport participation
  - Better recognition
  - 2 x more common in females



Common Pediatric Sports Injuries

- ACL Tears
  - Anterior pelvic tilt, femoral anteversion, increased Q angle, decreased intracondylar notch width, increased posterior slope



Common Pediatric Sports Injuries

- ACL Tears
  - Increased quadriceps dominance leads to anterior tibial displacement increased valgus moment during landing / cutting
  - Relaxin receptors present in female ACLs



https://www.sportsmed.org/membership/sports-medicine-update/summer-2026/the-acl-female-athlete-crisis

Common Pediatric Sports Injuries

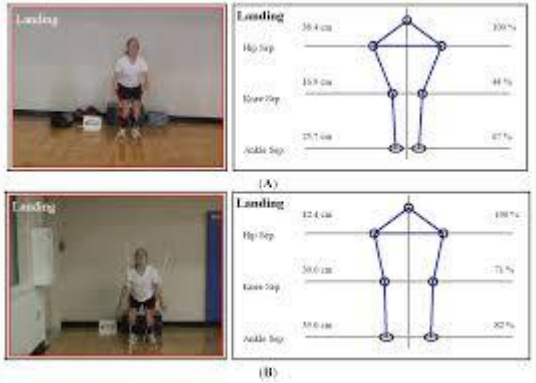
- ACL Tear Prevention
  - Neuromuscular training programs have been shown to decrease the risk of ACL tear by 50-60%



Padua DA, DiStefano LJ, Hewett TE, Garrett WE, Marshall SW, Golden GM, Shultz SJ, Sigward SM. National Athletic Trainers' Association Position Statement: Prevention of Anterior Cruciate Ligament Injury. J Athl Train. 2018 Jan;53(1):5-19. doi: 10.4085/1062-6050-99-16. Epub 2018 Jan 9. PMID: 29314903; PMCID: PMC5800728.

Common Pediatric Sports Injuries

- ACL Tear Prevention
  - Neuromuscular training programs strongly recommended for all females 13 and older participating in jumping/cutting sports



Reduce Injuries Improve Performance

https://www.riipreps.com

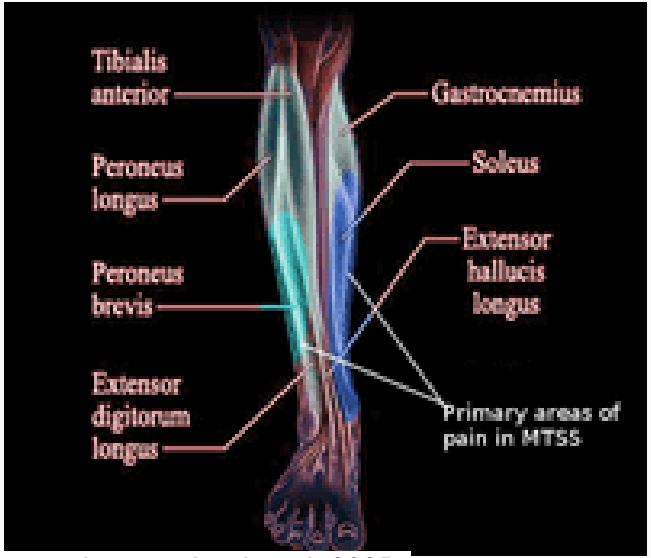
Common Pediatric Sports Injuries

- Medial Tibial Stress Syndrome
  - Tibia accounts for majority of bone stress injuries
  - Incidence in adolescent population has increased 4x since 2005
  - Most common age 15-24 yo



Common Pediatric Sports Injuries

- Medial Tibial Stress Syndrome
  - Flat feet
  - Poor core strength
  - Poor foot intrinsic muscle strength
  - Change in training intensity



Larson A, McClure CJ, May T, et al. Medial Tibial Stress Syndrome. [Updated 2025 Dec 30]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2025 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK538479/

Common Pediatric Sports Injuries

- Medial Tibial Stress Syndrome
  - No significant difference between custom orthotics and OTC orthotics
  - $25 vs > $200
  - https://kidsole.com/



Stark SD, Hewitt MA, Buckley SE, Alpert T, Will
Custom Foot Orthoses vs Prescription-grade Pref
2023 Dec 25;8(4):24730114235S00265. doi: 10.1177/24730114235S00265. PMCID: PMC10750551.

Common Pediatric Sports Injuries

- Slipped Capital Femoral Epiphysis
  - Average age
    - 12-13 boys
    - 11- 12 girls
  - Secondary to axial and rotational forces during puberty



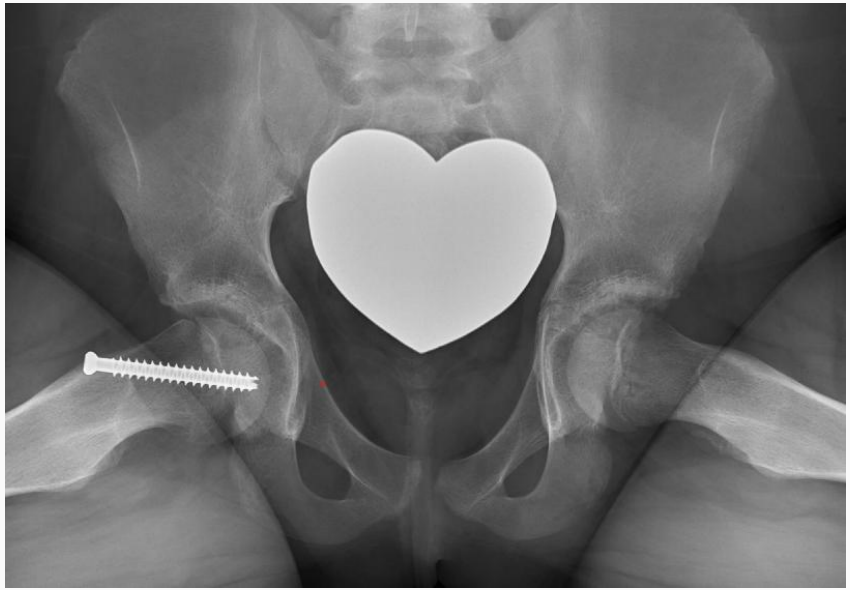
Common Pediatric Sports Injuries

- Slipped Capital Femoral Epiphysis
  - Up to 50% present with “knee” pain
  - Typically foot is externally rotated
  - **Important to check a hip xray in adolescents with knee/thigh pain**



Common Pediatric Sports Injuries





Common Pediatric Sports Injuries



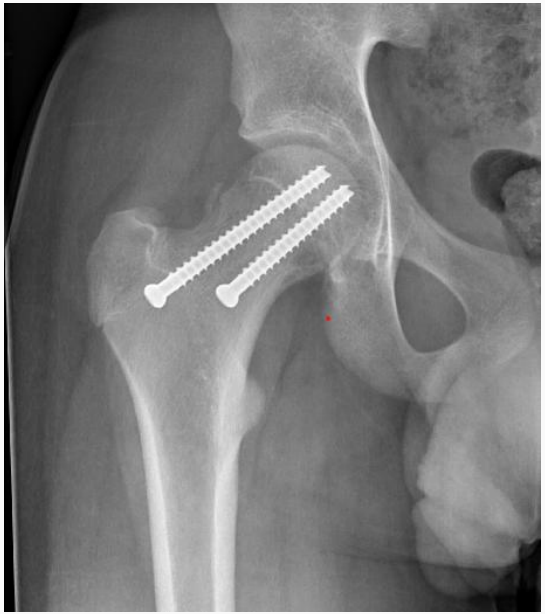


Common Pediatric Sports Injuries





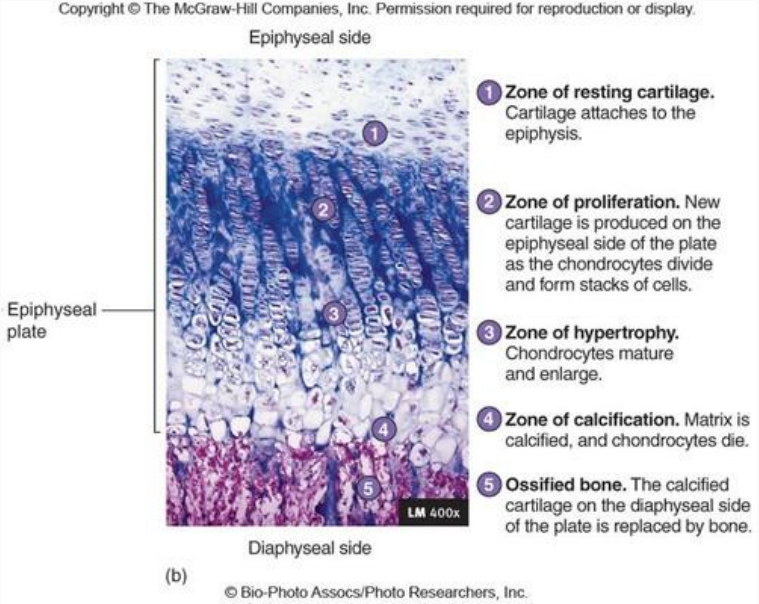
Common Pediatric Sports Injuries





Common Pediatric Sports Injuries

- Apophyseal Injuries
  - Occurs in hypertrophic zone of growth plate
  - Weakest portion of physis



Common Pediatric Sports Injuries

- Little League Shoulder
  - Repetitive rotational and distractive injury
  - Pain over proximal humerus, pain with ER
  - Continued use can cause growth arrest/angular deformity



Common Pediatric Sports Injuries

- Little League Shoulder
  - Treat like a fracture (rest for 4-6 weeks)
  - PT for IR deficit
  - Gradual return to throwing



Common Pediatric Sports Injuries

- Little League Elbow
  - Repetitive rotational and distractive injury
  - Pain over medial epicondyle



Common Pediatric Sports Injuries

- Little League Elbow
  - Treat like a fracture (rest for 4-6 weeks)
  - Brace or cast if necessary
  - Gradual return to throwing



Common Pediatric Sports Injuries

- Little League Elbow
  - Treat like a fracture (rest for 4-6 weeks)
  - Brace or cast if necessary
  - Gradual return to throwing



Common Pediatric Sports Injuries

Maximum Pitch Count Recommendations

Age	Pitches/Game
7–8	50
9–10	75
11–12	85
13–16	95

Weekly Rest Recommendations

Ages 7–14 # of Pitches	Ages 15–18 # of Pitches	Required Rest
66+	76+	4 calendar days
51–65	61–75	3 calendar days
36–50	46–60	2 calendar days
21–35	31–45	1 calendar day
1–20	1–30	None

Source: littleleague.org/learn/rules/pitch-count (American Sports Medicine Institute)

Common Pediatric Sports Injuries

- Little League Elbow
  - Take at least 3 months off from throwing per year
  - Do not play for multiple teams
  - On rest days, do not play positions that require repetitive throwing (catcher)
  - Never throw with a sore elbow

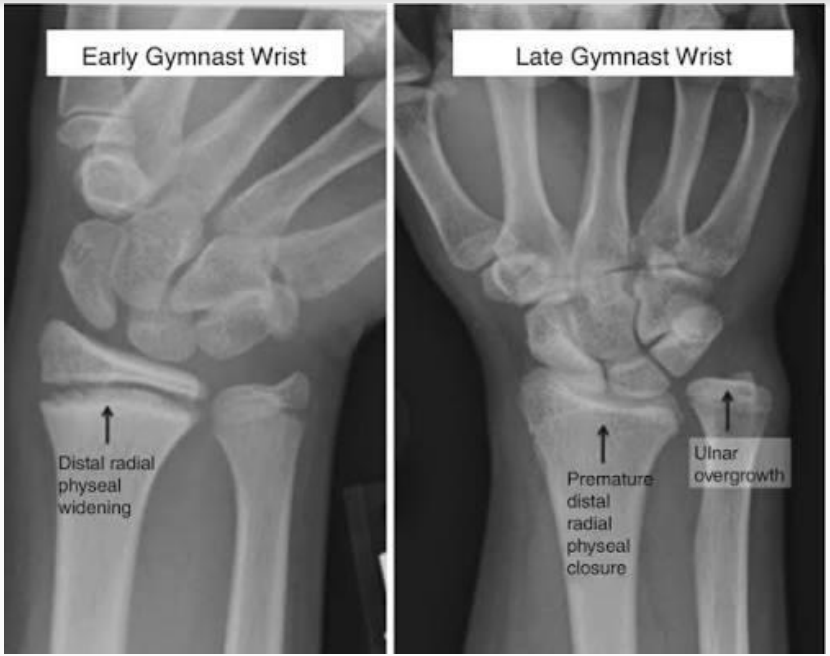
Common Pediatric Sports Injuries

- Gymnast Wrist
  - Repetitive compressive force
  - Treat with immobilization



Common Pediatric Sports Injuries

- Gymnast Wrist
  - Continued use can cause angular deformity / growth arrest



Common Pediatric Sports Injuries

- Osgood Schlatters Disease
  - Apophysitis of tibial tubercle
  - Common sprinting / jumping sports



Common Pediatric Sports Injuries

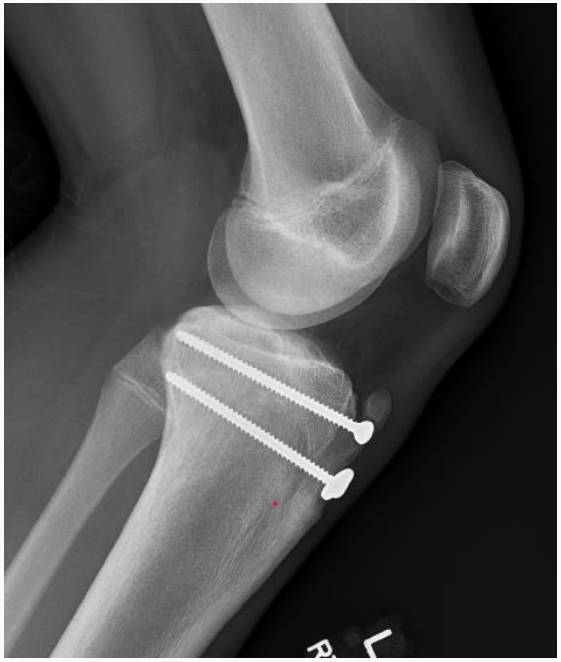
- Osgood Schlatters Disease
  - Treatment with rest, activity modification
  - Cho Pat strap



Common Pediatric Sports Injuries

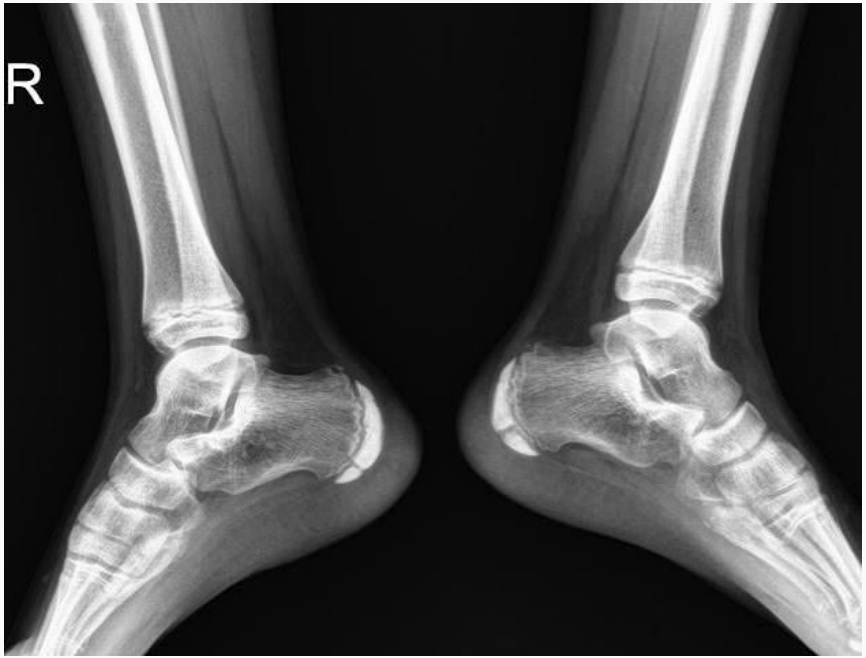
- Osgood Schlatters Disease
  - 1 year tibial tubercle fracture rate 0.62%
  - 0.04% chance without Osgood Schlatters Disease





Common Pediatric Sports Injuries

- Severs Disease
  - Calcaneal apophysitis



Common Pediatric Sports Injuries

- Severs Disease
  - Rest
  - Heel Cups
  - Shoes with a slight heel
  - Boot/cast



Take Home Points

- Avoid specialization
- Take 3-4 month break from single activity
- Check hip xray when presenting complaint is nonspecific thigh/knee pain



Resources

- Reduce Injuries Improve Performance https://www.riipreps.com
- STOP (Sports Trauma and Overuse Prevention) https://www.sportsmed.org/about-us/patient-resources/stop
- Pedatric Orthopedic Society Orthokids https://orthokids.org/

PedID Update 2026

Christopher Belcher MD FAAP

Peyton Manning Children's Hospital

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Outline

- **Recent developments in:**
  - **HIV PrEP**
  - **Resistant UTIs**
  - **Influenza Guidelines**

Disclosures

I have been a consultant / speaker to several vaccine / immunization manufacturers including:

Sanofi, Merck, Pfizer

I am presenting data and recommendations unrelated to vaccinations and immunizations

I will not be making my own proactive recommendations on vaccine and immunization topics

HIV PrEP

The Pediatrician's Role in HIV

AAP Clinical Report: Adolescents and Young Adults: The Pediatrician's Role in HIV Testing and Pre- and Postexposure HIV Prophylaxis



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PEDIATRICS Volume 149, number 1, January 2022:e2021055207

Epidemiology

- Of the 1.2 million people over 13 in US living with HIV
  - 4% are adolescents and young adults 13-24
  - Around 50,000 individuals
  - About 45% undiagnosed (highest percentage across ages)
  - In 2018 this group made up 21% of new diagnoses
  - 88% male
- In that 1.2 million
  - 14% were not diagnosed
    - Account for 38% of the the transmission
  - Those diagnosed but untreated were 43% of transmission
- 37% of 12th graders report sexual activity
  - Only 13% report having an HIV test
  - “Because I’m not at risk” and “My doctor did not recommend”



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Epidemiology

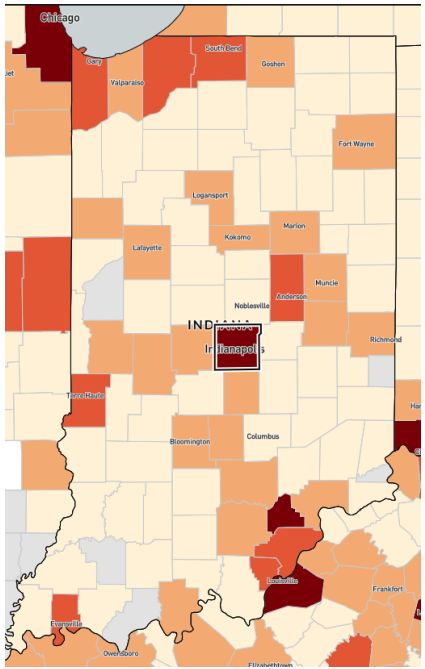
- HIV infection shows disproportionate distribution
  - 11x higher in African American and Black youth
  - 3.4x higher in Hispanic or Latinx
- MSM and men who have sex with both men and women have more risk behaviors:
  - 28% with more than four lifetime partners
  - 14% with IV drug use
  - Less likely to have used a condom 53%
- 44% of Black/AA transgender women are HIV infected
  - 26% Hispanic/Latinx
  - 7% white
- ⅔ of transgender individuals have never been HIV tested



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Geography



- At 660/100,000 or 0.7% Marion county is just below the high prevalence cutoff

https://map.aidsvu.org/prev/county/rate/none/none/marion-county-in-indiana?geoContext=national

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The Assessment

- 50% of patients with acute HIV infection see a healthcare provider
- Acute HIV-1 infection should be considered in individuals with signs or symptoms described below and recent (within 2 to 6 wk) high risk of exposure to HIV-1.
- Signs, symptoms, or laboratory findings of acute HIV-1 infection may include but are not limited to one or more of the following:
  - Fever, myalgia, arthralgia, headache, diarrhea
  - Lymphadenopathy, skin rash, oral ulcers
  - Leukopenia, thrombocytopenia, transaminase elevation



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PEDIATRICS Volume 149, number 1, January 2022:e2021055207

The Assessment

- High-risk exposures include:
  - Sexual contact with a person who has HIV-1 infection or a person at risk for HIV-1 infection
  - Sharing of injection drug use paraphernalia
  - Any exposure in which an individual's mucous membranes or breaks in the skin come in contact with bodily fluid potentially infected with HIV.
- Differential diagnosis (not limited to):
  - Viral illnesses such as EBV and non-EBV (eg, cytomegalovirus) infectious mononucleosis syndromes
  - Influenza
  - Viral hepatitis
  - Streptococcal infection
  - Syphilis



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PEDIATRICS Volume 149, number 1, January 2022:e2021055207

Testing Strategy

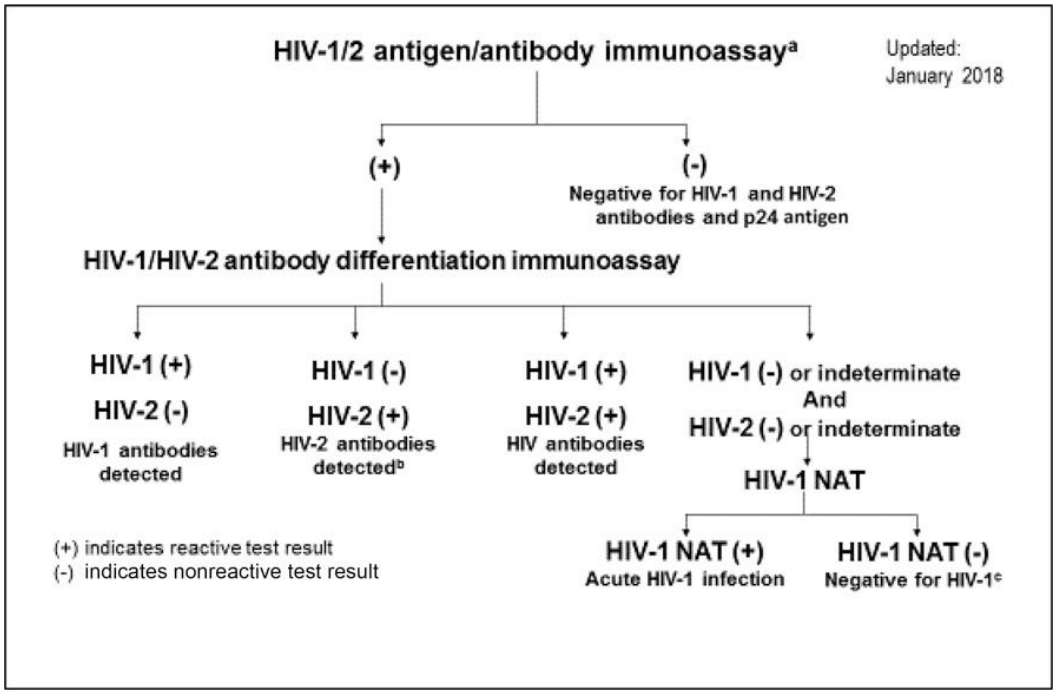
- USPSTF recommendation
  - Routinely screen all individuals 15-65
  - And those at higher risk outside those age groups
- USPSTF suggests:
  - Initial screening of youth
  - Annually for those sexually active
  - Frequently (3 months) for high risk



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Testing



If signs of acute infection or recent exposure, send HIV-1 nucleic acid test

https://stacks.cdc.gov/view/cdc/50872

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PrEP - Pre Exposure Prophylaxis

- Preexposure Prophylaxis to Prevent Acquisition of HIV US Preventive Services Task Force Recommendation Statement 2023
- The USPSTF recommends that the following persons be considered for PrEP:
  - Sexually active adults and adolescents weighing at least 35 kg (77 lb) who have engaged in anal or vaginal sex in the past 6 months and have any of the following:
    - A sexual partner who has HIV (unknown or detectable viral load).
    - A bacterial sexually transmitted infection (STI) (syphilis, gonorrhea, or chlamydia for MSM and transgender women; gonorrhea and syphilis for heterosexual women and men) in the past 6 months.
    - A history of inconsistent or no condom use…
  - Persons who inject drugs and share injection equipment or have a drug-injecting partner who has HIV.



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JAMA. 2023;330(8):736-745. doi:10.1001/jama.2023.1446

PrEP - Pre Exposure Prophylaxis

- The CDC recognizes 3 FDA-approved medications for PrEP
  - Emtricitabine (F) 200 mg in combination with tenofovir disoproxil fumarate (TDF) 300 mg (F/TDF—brand name Truvada® or generic equivalent).
  - Emtricitabine (F) 200 mg in combination with tenofovir alafenamide (TAF) 25 mg (F/TAF—brand name Descovy®).
  - Cabotegravir (CAB) 600 mg injection (brand name Apretude®)
- As of Sept 7, Lenacapavir (LEN) oral/injection(brand name Yeztugo®) FDA
- All are recommended for adolescents and at least 35kg
  - F/TDF - given orally daily to prevent HIV from sex or ivdu
  - F/TAF - given orally daily to prevent HIV from sex (non vaginal receptive)
  - CAB given IM at 0,1, then every 2 months to prevent HIV
  - LEN given day 1 injections and 2 tabs, day 2-2tabs, then injects q6months
- Decreased bone density in young gay and bisexual men during F/TDF
  - Larger declines in those ages 15–19 years than in those ages 20–22 years
  - Men younger than 18 had persistence off therapy.

https://www.cdc.gov/hivnexus/hcp/prep/index.html



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Prep for PrEP

- Negative HIV Ag/Ab (and RNA if needed)
- Renal function
  - F/TDF eCrCl > 60 ml/min
  - F/TAF eCrCl > 30 ml/min
- HBV serology for F/TDF or F/TAF
  - If stopped, HepB rebound can damage liver
- Lipid profile
  - For F/TAF



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https://www.cdc.gov/hivnexus/hcp/prep/index.html

Follow Up of PrEP

- 3 Months
  - HIV Ab/Ag and follow up, look for HIV symptoms
  - Medication adherence, risk reduction
  - Screen or test STI, IVDU risk reduction
- 6 Months
  - Consider renal function
  - Screen or test for STI
- 12 Months
  - eCrCl all
  - Lipids if F/TAF
  - Chlamydia screen



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https://www.cdc.gov/hivnexus/hcp/prep/index.html

Testing - Consent and Confidentiality

Table. Age of Majority and Youngest Age of Legal Capacity of Mentally Competent Minors to Consent to STI and HIV Services and Confidentiality Protections for Minors' STI and HIV Information in the US, 2021[a,b]

State	Age of majority, y	Youngest age of legal capacity to consent, y/confidentiality protections					
		STI			HIV		
		Testing	Treatment	Prevention	Testing	Treatment	Prevention, including HIV PrEP
Alabama[c]	19	All/No	All/No	14/No	All/No	All/No	14/No
Alaska	18	All/No	All/No	18/-	All/No	All/No	18/-
Arizona	18	All/No	All/No	18/-	All/No	All/No	18/-
Arkansas	18	All/No	All/No	All/No	All/No	All/No	All/No
California	18	12/No	12/No	12/No	12/No	12/No	12/No
Colorado	18	All/MC[d]	All/MC[d]	All/MC[d]	All/MC[d]	All/MC[d]	All/MC[d]
Connecticut	18	All/MC	All/MC	18/-	All/MC	All[e] or 13/MC	All[e] or 13/MC
Delaware	18	All[e,f] or 12[g]/CD	All[e,f] or 12[g]/CD	12[g]/CD	All[e,f] or 12/CD	All[e,f] or 12[g]/CD	12[g]/CD
District of Columbia	18	All/CD	All/CD	All/CD	All/CD	All/CD	All/CD
Florida	18	All/MC	All/MC	18/-	All/MC	All/MC	18/-
Georgia	18	All/No	All/No	18/-	All/No	All/No	18/-
Hawaii	18	14/No	14/No	18/-	14/No	14/No	18/-
Idaho	18	All/No	All/No	All/No	All/No	All/No	All/No
Illinois	18	12/MC	12/MC	12/MC	12/MC	12/MC	12/MC
Indiana	18	All/No	All/No	18/-	All/No	All/No	18/-
Iowa	18	All/No	All/No	All/No	All/No	All/No	All/No
Kansas	18	All/No	All/No	All/No	All/No	All/No	All/No

Minor Consent Laws for Sexually Transmitted Infection and HIV Services; Kimberly M. Nelson, PhD, MPH; Alexandra Skinner, MPH; Kristen Underhill, DPhil, JD; JAMA Published Online: August 16, 2022 2022;328;(7):674-676. doi:10.1001/jama.2022.10777 CD clinician discretion, MC mandatory confidentiality, - minors cannot consent



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Resistant UTIs

Pediatric UTI in the USA

- There is no USA national guideline on what to treat with at what dose or what duration.
- Most decisions on therapy are made at the time of presentation before there is culture data.
- The great majority - about 85-90% are due to *E coli*



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Diagnosis

TABLE 2 Accuracy of Widely Available Bedside Tests for UTI in a Hypothetical Cohort of 1000 Children Tested for UTI

	Sensitivity, %	Specificity, %	No. Unnecessary Antibiotic Prescriptions[a]	No. With Delayed or Missed Diagnosis[a]
Leukocyte esterase	79	87	120	16
Nitrite	49	98	18	38
Leukocyte esterase or nitrite	88	79	194	9

[a] Assuming a prevalence of 7.5% (ie, 75 with UTI and 925 with no UTI).[2,45]

- Some pathogens may not cause a lot of pyuria
  - *Enterococcus spp*
  - *Pseudomonas aeruginosa*
  - *Klebsiella spp*

Contemporary Management of Urinary Tract Infection in Children Tej K. Mattoo, MD, DCH, FRCP, FAAP, Nader Shaikh, MD, Caleb P. Nelson, MD, MPH https://doi.org/10.1542/peds.2020-012138



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UTI Calculator

- https://uticalc.pitt.edu
- Over 2000 children 2-23 months with fever and suspected UTI were studied
  - 1686 in the training for multivariate logistic regression
  - 284 in validation database
  - All in ED with u/a and catheterized urine culture
  - No genitourinary abnormalities

- Results
  - Detects 95-100% of UTI for children 2-23 months
  - About 10 urine specimens obtained / 1 UTI

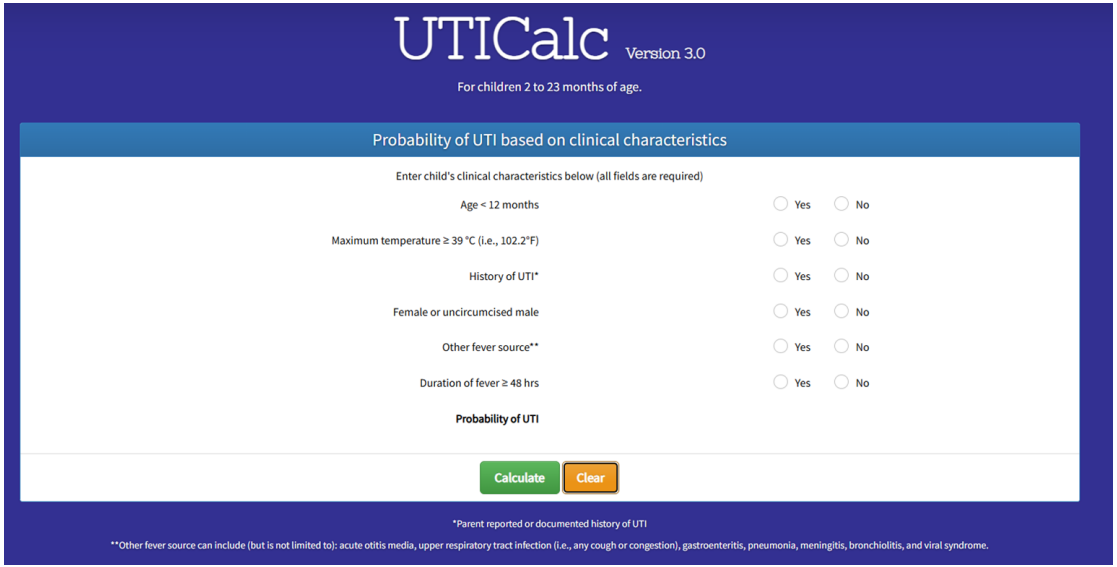
Shaikh N, Hoberman A, Hum SW, et al. Development and validation of a calculator for estimating the probability of urinary tract infection in young febrile children. JAMA Pediatr. 2018;172(6):550–556



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UTI Calculator

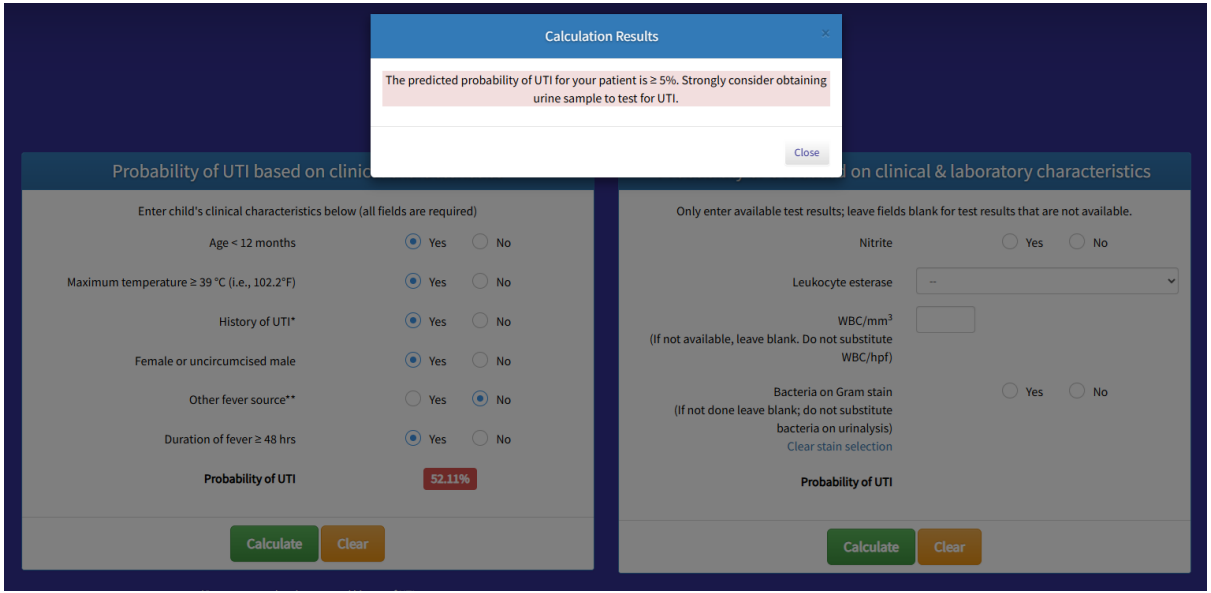


Shaikh N, Hoberman A, Hum SW, et al. Development and validation of a calculator for estimating the probability of urinary tract infection in young febrile children. JAMA Pediatr. 2018;172(6):550–556

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UTI Calculator

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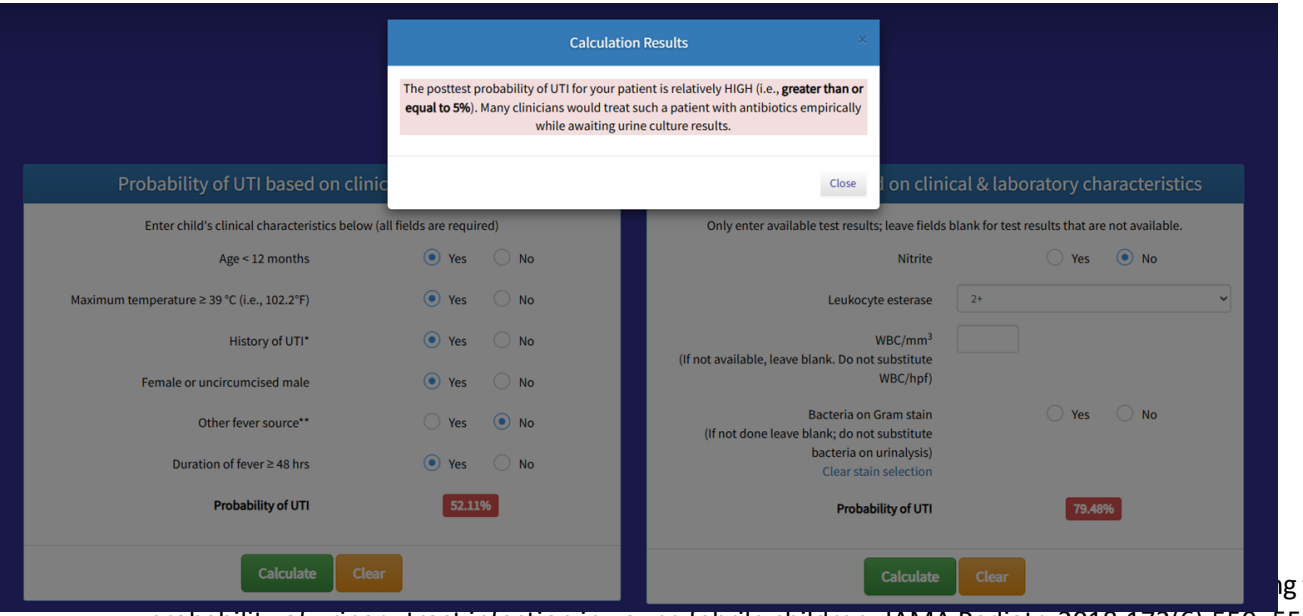


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UTI Calculator

- https://uticalc.pitt.edu



ng the probability of urinary tract infection in young febrile children. JAMA Pediatr. 2018;172(6):550–556

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UTI Calculator

- AAP Criteria (lower stringency) Urinary tract infection: clinical practice guideline for the diagnosis and management of the initial UTI in febrile infants and children 2 to 24 months
  - test female infants if 2 of the following: white race, aged <12 months, temperature 39°C, fever 48h +no other fever source
  - test male infants if uncircumcised or if 3 of the following: nonblack, temperature 39°C, fever >24 h +no other fever source
- Comparison to UTICalc
  - AAP would collect urine in 81 more children / 1000
  - This model reduces testing by about 8%
  - Decreased number of missed UTI from 3 to 0 in validation



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Pediatrics. 2011 Sep;128(3):595-610. doi: 10.1542/peds.2011-1330
JAMA Pediatr. 2018;172(6):550–556

2025 Antibiogram - E coli

Meropenem	100	Ertapenem	88
Piperacillin / Tazobactam	97	Amox/Clavulanate	86
Nitrofurantoin	97	Ciprofloxacin	76
Cefepime	95	TMP-SMX	72
Ceftriaxone	94	Cefazolin	70
Tobramycin	90	Amp/Sulbactam	59
Gentamicin	88	Ampicillin	46



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2025 Antibiogram - E coli

- CLSI makes cefazolin the surrogate marker for all oral cephalosporins.
  - Therefore it does not make one better than the other
  - Ceftriaxone is NOT the marker for cefdinir susceptibility
- Cephalexin is less likely to lead to Clostridiodes difficile
- Cephalexin is more narrow spectrum and can lead to less antimicrobial resistance
- Cephalexin is ½-⅓ the cost of cefdinir



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Cefdinir vs Cephalexin

- Cephalexin
  - First generation cephalosporin
  - Oral bioavailability 90%
  - Unchanged excretion in urine 90%
- Cefdinir
  - Third generation cephalosporin
  - Oral bioavailability 20%
  - Unchanged excretion in urine <=20%



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Cefdinir Versus Cephalexin for the Treatment of Uncomplicated Urinary Tract Infections
https://doi.org/10.1093/ofid/ofaf501

The Study

- Multicenter retrospective cohort study in Michigan 2020-24
- Outpatient uncomplicated UTI
- Females >18 years N=367
- Cefdinir 300mg bid vs cephalexin 500mg bid x 5-7 days
- Excluded those with organism resistant to cephalexin >16
- ~80% were E coli, ~15% were Klebsiella species



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Cefdinir vs Cephalexin- Results

- Adult females given cefdinir were twice as likely to have treatment failure as those treated with cephalexin (23.4% vs 12.5% p=0.006) when followed for 30 days post treatment
- Recurrences were more likely to be resistant to first and third generation cephalosporins (like ceftriaxone!)
- Higher number of failures also seen in: Am J Health Syst Pharm. 2024 May 24;81(Suppl 2):S55-S60. doi: 10.1093/ajhp/zxae026.



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Results of Cefdinir vs Cephalexin

- Decreasing the Use of Cefdinir for Pediatric Urinary Tract Infections in a Rural Health Care System: A Quasi-experimental Study
  - Showed that education can decrease utilization of cefdinir while increasing that of cephalexin

Journal of the Pediatric Infectious Diseases Society, Volume 13, Issue 12, December 2024, Pages 643–646, https://doi.org/10.1093/jpids/piae114

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Drugs that May Be Useful for Resistant UTIs

Enterobacterales	Uncomplicated UTI	Complicated UTI
ESBL	Nitrofurantoin, Gent x1, Fosfomycin for E coli, TMP-SMX, Ciprofloxacin	IV, may step down
Amp-C	Gent x1,TMP-SMX, Ciprofloxacin	IV, may step down
Carbapenem resistant	Gent x1, Fosfomycin for E coli, TMP-SMX, Colistin	IV, may step down
P aeruginosa	Ciprofloxacin	IV
CRAB / Acinetobacter	IV	IV

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Treatment



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Drugs that May Be Useful for Resistant UTIs

- Nitrofurantoin
  - Came into use in 1953, broad disruption of ribosomes
  - Treats gram negatives but not Klebsiella or Proteus (and others!)
  - Very high urinary concentration - very little in tissue and serum
  - AAP says do not use for complicated UTI / pyelonephritis
  - Contraindicated in neonates(hemolysis), warning with renal dysfunction
- Fosfomycin
  - Isolated 1969 from Streptomyces sp.
  - Inhibits cell wall synthesis of peptidoglycan
  - Broad gram positive and gram negative spectrum
  - Only enterally in US as 3g sachet
  - Not indicated under 18, much less data under 12

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Treatment

- Afebrile children
  - Cephalexin, trimethoprim-sulfamethoxazole, nitrofurantoin
  - Generally as outpatient
- Febrile young children - higher risk of acute pyelonephritis
  - Cefixime or cefpodoxime (NOT CEFDINIR)
  - Admission for those who cannot tolerate oral therapy
  - Imaging if fever persists beyond 72h
  - Generally treat 7-10 days



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Contemporary Management of Urinary Tract Infection in Children Tej K. Mattoo, MD, DCH, FRCP, FAAP, Nader Shaikh, MD, Caleb P. Nelson, MD, MPH
https://doi.org/10.1542/peds.2020-012138

Influenza Updates

AAP 2026-2027 Influenza Recommendations

- 1. All licensed vaccines available in the United States this season are trivalent.
- 2. The compositions of influenza vaccines for the 2026–2027 season have been updated
- 3. Afluria is no longer available.
- 4. Recommendations for influenza immunization of immunocompromised hosts have been updated
- 5.FDA febrile seizure warning
- 6. Recommendations for influenza treatment and prophylaxis have been clarified, emphasizing that chemoprophylaxis is not generally indicated for infants younger than 3 months.
- 7. Baloxavir tablets are available as a generic formulation beginning with the 2026-2027 season

https://www.aap.org/en/news-room/news-releases/aap/2026/american-academy-of-pediatrics-issues-recommendations-for-influenza-prevention-

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AAP 2026-2027 Influenza Recommendations

- 1. All licensed vaccines available in the United States this season are trivalent.
  - Began with 2024-25 season, no sign of Yamagata lineage
- 2. Composition:
  - A/Missouri/11/2025 (H1N1)pdm09-like virus
  - A/Darwin/1454/2025 (H3N2)-like virus
  - B/Tokyo/EIS13-175/2025 (B/Victoria lineage)-like virus (egg-based)
    - - OR -
  - B/Pennsylvania/14/2025 (B/Victoria lineage)-like virus(cell culture-based or recombinant)

AAP Committee on Infectious Diseases. Recommendations for Prevention and Control of Influenza in Children, 2026–2027: Policy Statement.

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AAP 2026-2027 Influenza Recs - Immunocompromised

- For moderate/severely compromised children give IIV or RIV pre-season
- Give IIV or RIV at least 2 weeks before:
  - Cytotoxic chemotherapy
  - Immunosuppression for autoimmune / autoinflammatory disease
  - anti-B cell therapies (rituximab, alemtuzumab)
- For children who received anti-B cell therapies wait 3-6 months
- For children who received CAR-T wait 3-6 months if not going to chemo/HCT
- For children who are HCT recipients give IIV or RIV at least 3 months later
- Consider 2 doses of HD-IIV3 in 3-17 year old HCT recipients in the first year after transplant (off label)
- In children 6mo-17y post SOT consider IIV or RIV at least 1 month later
- Children living with HIV should be vaccinated before the season
- Household and close contacts should be up to date as well

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FDA Seizure Warning

- January 9, 2026 FDA sent letters to Pediatric Influenza Vaccine Mfs
  - 5 WARNINGS AND PRECAUTIONS
    - 5.x. Febrile Seizures
    - In two postmarketing observational studies, an increased risk of seizures was observed in the first day following vaccination among children 6 months to <5 years of age [see Adverse Reactions (6.2)].
- Self-controlled case series analyses - 2023-2025
  - Compared the risk of febrile seizures within a risk window of 0-1 day postvac to a control window of 8-63 days postvac
  - Significantly increased risks of febrile seizures in the first day following influenza standard dose quadrivalent and trivalent vaccinations
  - (IRR: 2.94 [95% CI: 1.72, 5.01]) for the trivalent vaccine
  - AAP calculates 1 excess febrile seizure per 22,264 doses of trivalent

https://www.fda.gov/vaccines-blood-biologics/safety-availability-biologics/2026-safety-and-availability-communications



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AAP 2026-2027 Influenza Recommendations

Vaccine	Trade Name (Manufacturer)	Age Group
Trivalent Standard Dose – Egg-Based Vaccines		
	Fluarix (GlaxoSmithKline)	≥6 mo
	FluLaval (GlaxoSmithKline)	≥6 mo
	Fluzone (Sanofi Pasteur)	≥6 mo
	Afluria (Sequiris) **UNAVAILABLE**	
Trivalent Standard Dose – Cell Culture-Based Vaccines		
ccIIV3	Flucelvax (Seqirus)	≥6 mo
Recombinant Vaccine		
RIV3	Flublok (Sanofi Pasteur)	≥9 y
Live Attenuated Vaccine – Egg-Based Vaccine		
LAIV3	FluMist (AstraZeneca)	2–49 y

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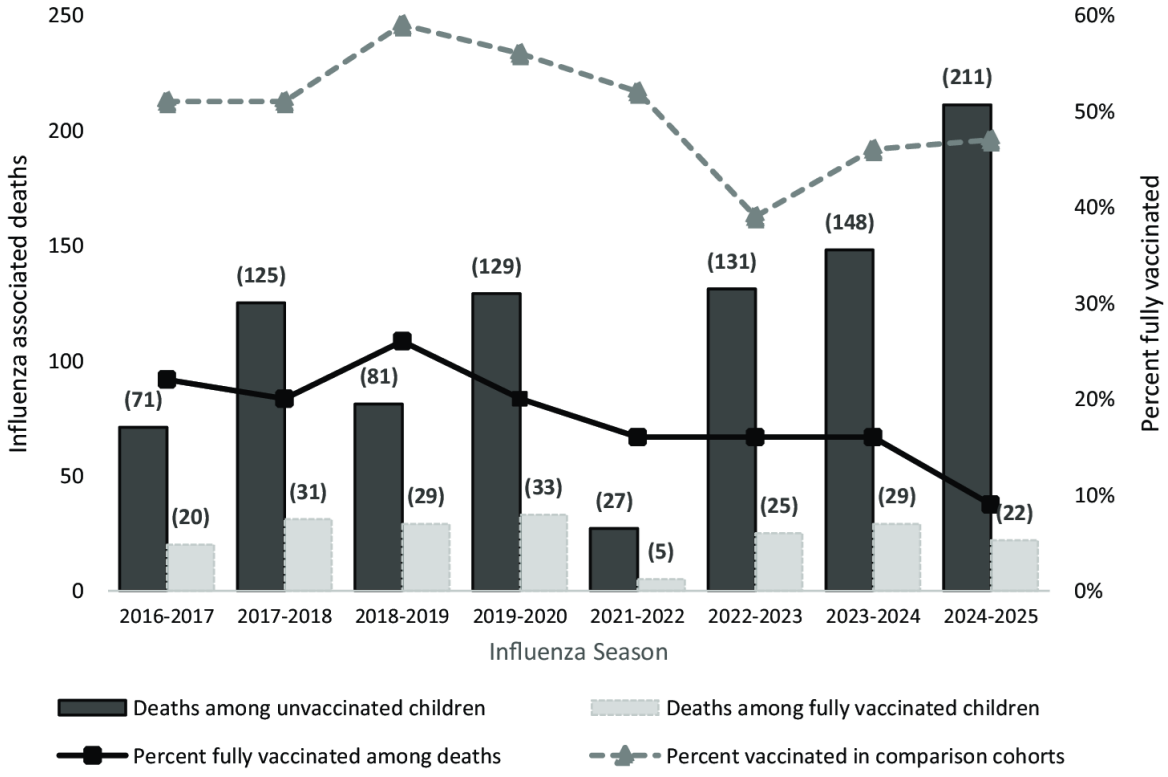
AAP Committee on Infectious Diseases. Recommendations for Prevention and Control of Influenza in Children, 2026–2027: Policy Statement.



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But Does it Even Work?
Why Would My Child Need It?



Pediatrics (2026) 158 (2): e2026076453. https://doi.org/10.1542/peds.2026-076453

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But Does it Even Work?
Why Would My Child Need It?

- Influenza vaccination was complete in 49% in the cohort overall, but
  - 23% of 530 children with underlying medical conditions who died with influenza
  - 13% of 556 children without known conditions who died with influenza
- Vaccine effectiveness was 80% (95% CI 75–84) in preventing death from influenza
  - 77% (95% CI 71–82) among children with underlying medical conditions
  - 87% (95% CI 84–89) among children without known conditions
- CDC reported that in 2024-25, in children and teens, influenza vaccination prevented:
  - Almost 15,000 hospitalizations
  - 245 deaths



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Pediatrics (2026) 158 (2): e2026076453. https://doi.org/10.1542/peds.2026-076453

AAP 2026-2027 Influenza Recs - Treatment and Prophylaxis

Treatment for Symptomatic Disease			
Symptomatic Child	• Hospitalized children • Children with severe, complicated, or progressive illness • Children at higher risk for complications (Table 2)	No time limit on starting, although treatment should ideally be started as soon as possible after symptom onset	Recommend treatment
	• Children with household contacts at high risk because of underlying medical condition • Children with household contacts younger than 6 months		Consider treatment
	• Children with mild to moderate influenza-like symptoms without other risk factors	Within 48 hours of symptoms starting	Consider treatment

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AAP 2026-2027 Influenza Recommendations

Table 2. High-Risk Groups for Influenza Complications

Category	Description
Demographic characteristics	Children <5 y, especially those <2 y[a]
	Children born preterm or early term[b]
	Residents of a chronic care facility or nursing home
Underlying Condition or Treatment with Common Examples[c]	
Chronic pulmonary disease	Asthma[19]
	Cystic fibrosis Bronchopulmonary dysplasia[19]
	Compromised respiratory function (eg, requiring mechanical ventilation, tracheostomy)
Cardiovascular disease	Hemodynamically significant conditions (excluding hypertension alone)
Kidney disease	Chronic kidney disease, including end-stage kidney disease Dialysis
Hepatic disease	Chronic liver disease Cirrhosis[20,21]
Hematologic disease	Sickle cell disease
	Other hemoglobinopathies
Metabolic disorders	Diabetes mellitus
Neurologic and neurodevelopmental conditions	Cerebral palsy
	Epilepsy
	Stroke
	Intellectual developmental disorder
	Moderate to severe developmental delay
	Neuromuscular disorders, including muscular dystrophy
	Spinal cord injury
Extreme obesity	BMI ≥40 for adults; BMI ≥the 95th percentile in children[d]
Immunosuppression	Receipt of immunocompromising medications
	Receipt of hematopoietic cell transplant or solid organ transplant
	Congenital or acquired immune deficiency, including HIV
	Asplenia
Receiving treatment with aspirin or salicylate-containing therapies[e]	
Pregnancy and up to 2 weeks postpartum	

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Effectiveness of Oseltamivir in Hospitalized Children

- US FluSurv-NET study across 13 states (2014-2023) (not 20-21)
- 6044 Children hospitalized with influenza / 4240 received oseltamivir
  - Median age 3 years
  - 49% had a comorbidity (26% had asthma)
- Cohort study - can't randomize
- Oseltamivir decreased the risk of ICU admission 31%
  - (aHR, 0.69; 95% CI, 0.60-0.80)
  - Decreased length of stay
  - Effect was seen even when oseltamivir started 5 or more days from symptoms
  - If you consider patients who started oseltamivir on day of ICU as untreated, the risk of ICU drops by 70% (aHR, 0.30; 95% CI, 0.26-0.34)

https://jamanetwork.com/journals/jamapediatrics/fullarticle/2852671



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AAP 2026-2027 Influenza Recs - Treatment and Prophylaxis

Chemoprophylaxis[a] for Asymptomatic Exposures			
Exposed, Asymptomatic Child	• Unvaccinated or incompletely vaccinated children at high risk of complications • Vaccinated children at high risk of complications who may have not mounted an immune response • Vaccinated children at high risk of complications when vaccination strain does not match or is ineffective against circulating strains • Unvaccinated children with a family member or close contact at high risk for influenza complications and is unable to be otherwise effectively protected	Within 48 hours of exposure	Consider chemoprophylaxis
Exposed Close Contact	• Unvaccinated family members and close contacts of unvaccinated children at high risk of complications • Vaccinated family members and close contacts of children at high risk of complications when vaccination strain does not match or is ineffective against circulating strains	Within 48 hours of exposure	Consider chemoprophylaxis

[a] Chemoprophylaxis is not generally indicated for children <3 months of age.

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PedID Update 2026

Christopher Belcher MD FAAP

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