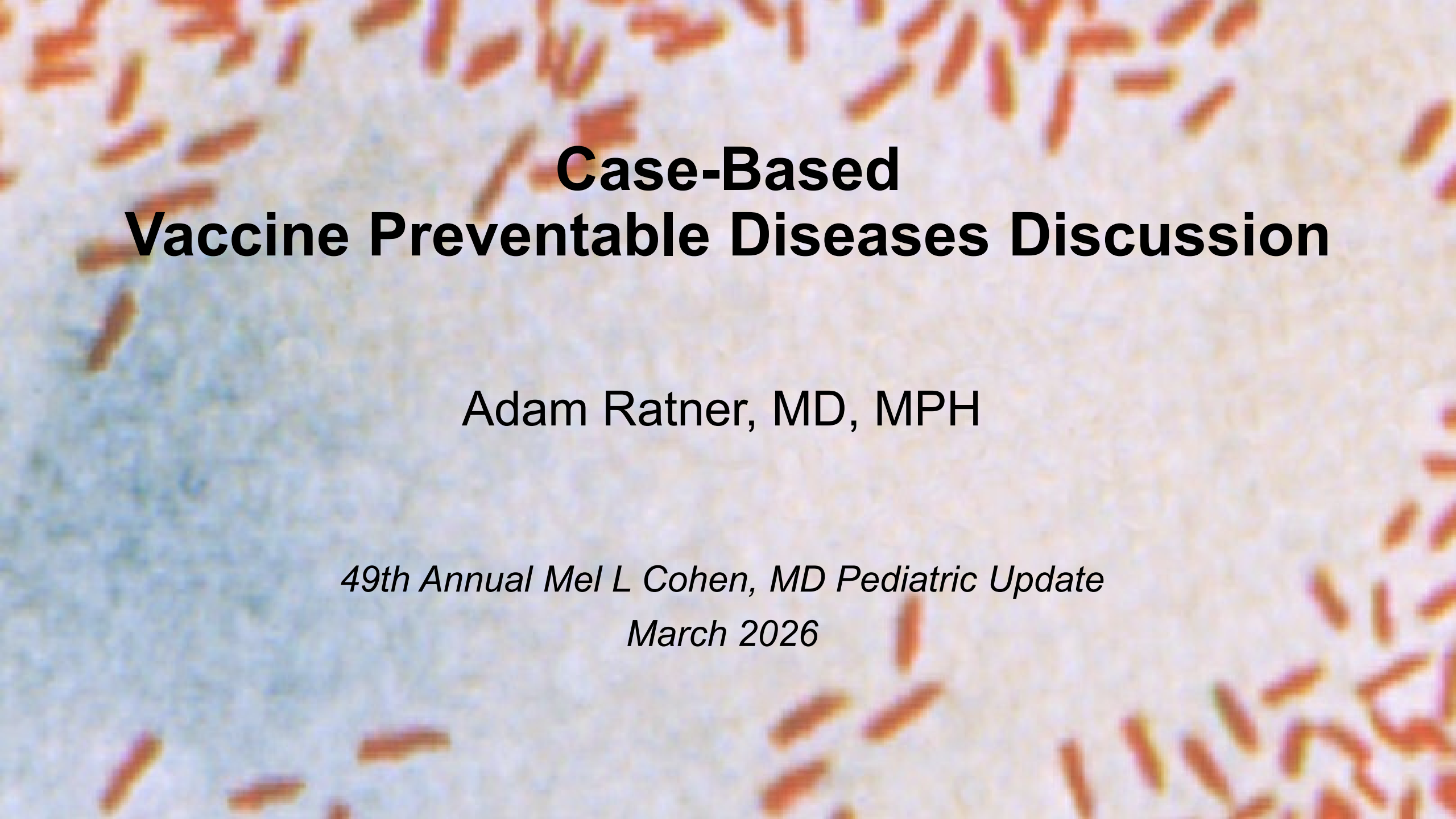


Case-Based
Vaccine Preventable Diseases Discussion

Adam Ratner, MD, MPH

49th Annual Mel L Cohen, MD Pediatric Update

March 2026

Learning Objectives

- Describe the epidemiology of vaccine-preventable diseases relevant to pediatric practice
- Discuss clinical presentations, differential diagnosis, practical testing strategies, and treatment for selected vaccine-preventable diseases

Case 1

Case 1

4-year-old female with a strange sounding cough

- **Olivia** is a healthy 4-year-old female child who has been your patient since birth. She has had no major medical issues. Her vaccines are up-to-date, and she takes no regular mediciations.

- **Oscar**, her brother, is a healthy 2-month-old ex-39-week male infant. He had a normal birth and immediate postnatal course. He has been feeding well and is due to see you next week for his first set of vaccinations.

- The children's mother calls because Olivia had about a week of sniffles but now has a **strange sounding cough**. Her only known ill contact is Oscar, who also has upper respiratory symptoms that started several days after Olivia's but is afebrile. Their mother holds the phone up Olivia, and you hear this: 

Audio: https://www.youtube.com/watch?v=YbGOP0NJOQw

Audience Response

You suspect that Olivia has pertussis and that Oscar may have it as well. What is the best next step in management?

A. **Clinical evaluation and testing for pertussis for both Olivia and Oscar, with the plan to give antibiotic therapy if the testing is positive.**

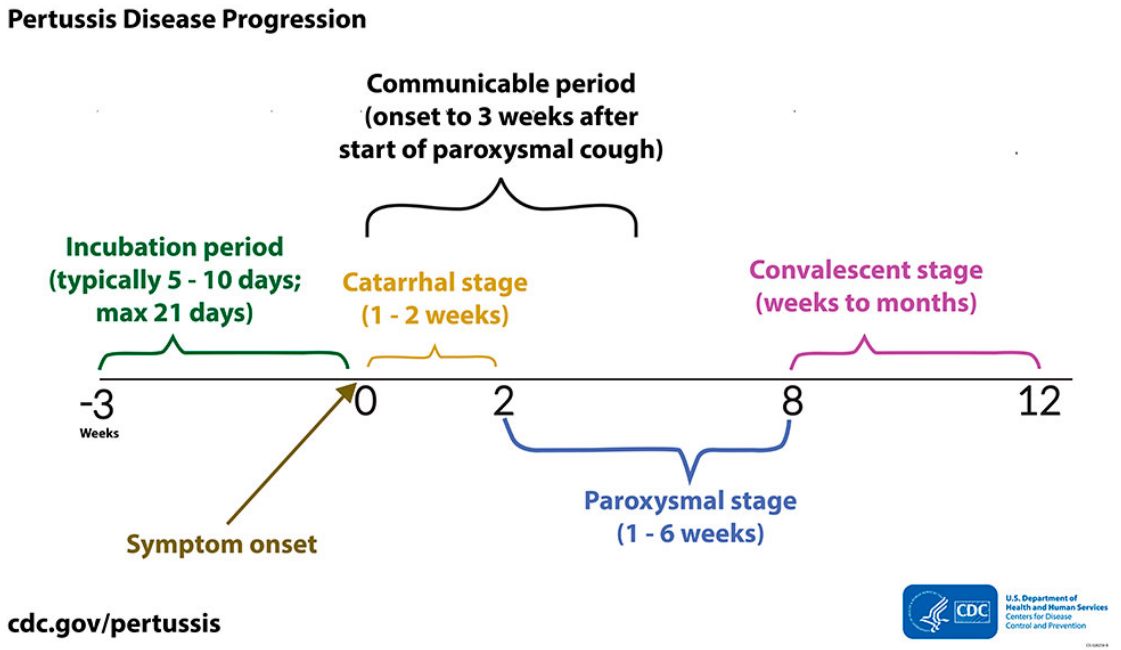
B. **Clinical evaluation and testing for pertussis for both Olivia and Oscar, starting both children on azithromycin, and giving post-exposure prophylaxis to all household members if either of the children tests positive.**

C. **Early dose of DTaP vaccine for Oscar. Antibiotics to cover both bacterial pneumonia and possible pertussis for Olivia.**

You suspect that Olivia has pertussis and that Oscar may have it as well. What is the best next step in management?

Pertussis ("Whooping Cough")

- Gram-negative bacteria – toxin-mediated disease
- Spreads through large respiratory droplets.
- Three stages of illness:
  - **Catarrhal** – non-specific respiratory symptoms
  - **Paroxysmal** – fits of coughing, "whoop"
  - **Convalescent** – gradual resolution of symptoms
- Illness can last 6-12 weeks or longer. ("**100-day cough**")
- Can cause severe disease or death, especially in **children ≤ 6 months of age**.
- Often transmitted from older siblings or adults (esp. grandparents) – many undiagnosed.
- Routine vaccination in childhood and during pregnancy.



PMID 41038623; AAP Red Book 2024-2027

Pertussis (“Whooping Cough”)

“tosse canina” – dog’s cough
(Italian)

“la coqueluche” – the rooster’s crow
(French)

“百日咳” – the hundred-day cough
(Mandarin)

PMID 41038623
Images: Wikimedia Commons

Pertussis in young infants

- Most severe in **first 6 months of life**.
  - Catarrhal phase indistinguishable from viral URI
  - Paroxysmal phase with bradycardia/apnea, absence of whoop
  - Prolonged recovery

- Some infants have extreme **lymphocytosis** (>100K cells/mm^3). Degree of lymphocytosis correlates with severity.

- Pulmonary hypertension, secondary bacterial pneumonia, sudden death can all occur.

- **Case fatality rate**
  - Age < 2 months: 1%
  - Age 2-11 months: ~0.5%

Pertussis is extremely contagious and can be hard to diagnose!

- **Diagnosis**: suspicion required
  - **Culture** (historical gold standard but slow, not optimally sensitive)
  - **PCR** (faster and more accurate; need good NP sample)
  - **Serology** (much less useful)
- **Close contact/droplet spread**
- **Most contagious in catarrhal, early paroxysmal stages** (i.e., often before diagnosis is made.)
- **Attack rate** ~80% among susceptible household contacts

PMID 41038623; AAP Red Book 2024-2027

Pertussis treatment

- **Antibiotics** are indicated for children with confirmed or suspected pertussis.
  - **Macrolides** (usually **azithromycin**) are mainstay of therapy, even for young children.
  - **TMP-SMX** is an alternative for children >2 months who cannot take azithromycin.

- Treatment during catarrhal phase can decrease severity. Treatment during paroxysmal phase does not shorten illness but can decrease shedding.

- Severe cases may require exchange transfusion, mechanical ventilation, ECMO.

Children treated for pertussis can return to school/daycare 5 days after starting effective therapy.

If untreated, isolation is for 21 days.

PMID 41038623; AAP Red Book 2024-2027

Pertussis post-exposure prophylaxis (PEP)

Household members and close contacts of an individual with pertussis should receive PEP.

- Prior vaccination does not affect need for PEP.
- Regimens are the same as for treatment of pertussis.
- Childcare contacts? Yes.
- All contacts in a school? Not necessarily – only those at risk for severe pertussis or in contact with infant or others at high risk.
- Healthcare personnel? Yes, if in contact with high-risk patients or if they are pregnant. Others may get PEP or monitor for symptoms for 21 days.

PMID 41038623; AAP Red Book 2024-2027

Pertussis vaccination

- Neither disease nor vaccination is 100% protective against subsequent pertussis.

- Previous vaccines: **whole-cell pertussis** (wP)
  - Whole, inactivated/detoxified *B. pertussis* bacteria
  - More reactogenic than current vaccines
  - Prominent Th1 response

- Current vaccines: **acellular pertussis** (aP)
  - Purified proteins given in combination with diphtheria and tetanus toxoids (as **DTaP** or **Tdap**).
  - All contain pertussis toxin (PT), filamentous hemagglutinin (PHA), pertactin (PRN), and some contain fimbriae (FIM).
  - Th2-predominant response
  - 75-90% effective after primary series, but protection wanes.

PMID 41038623; AAP Red Book 2024-2027

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PMID 41038623; AAP Red Book 2024-2027

Pertussis vaccination

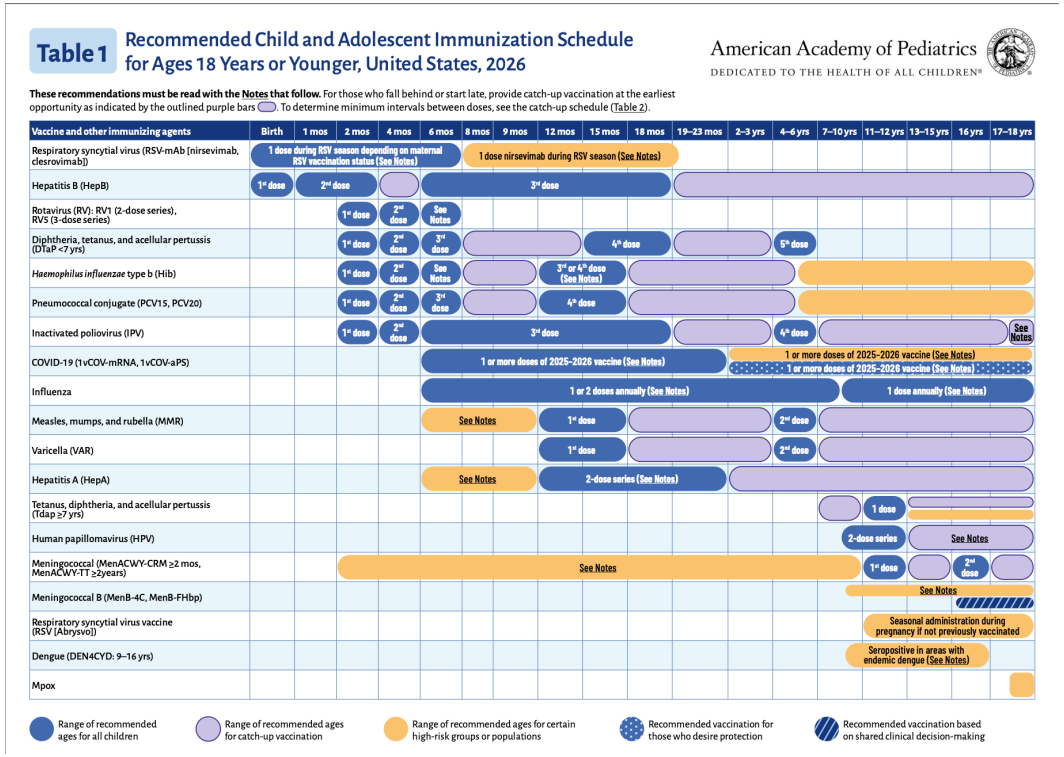


Table 1 Recommended Child and Adolescent Immunization Schedule for Ages 18 Years or Younger, United States, 2026

American Academy of Pediatrics
DEDICATED TO THE HEALTH OF ALL CHILDREN®

These recommendations must be read with the Notes that follow. For those who fall behind or start late, provide catch-up vaccination at the earliest opportunity as indicated by the outlined purple bars. To determine minimum intervals between doses, see the catch-up schedule (Table 2).

Vaccine and other immunizing agents	Birth	1 mos	2 mos	4 mos	6 mos	8 mos	9 mos	12 mos	15 mos	18 mos	19–23 mos	2–3 yrs	4–6 yrs	7–10 yrs	11–12 yrs	13–15 yrs	16 yrs	17–18 yrs
Respiratory syncytial virus (RSV-mAb [nirsevimab, clesrovimab])	1 dose during RSV season depending on maternal RSV vaccination status (See Notes)					1 dose nirsevimab during RSV season (See Notes)												
Hepatitis B (HepB)	1st dose	2nd dose			3rd dose													
Rotavirus (RV): RV1 (2-dose series), RV5 (3-dose series)			1st dose	2nd dose	See Notes													
Diphtheria, tetanus, and acellular pertussis (DTaP <7 yrs)			1st dose	2nd dose	3rd dose				4th dose				5th dose					
Haemophilus influenzae type b (Hib)			1st dose	2nd dose	See Notes			3rd or 4th dose (See Notes)										
Pneumococcal conjugate (PCV15, PCV20)			1st dose	2nd dose	3rd dose			4th dose										
Inactivated poliovirus (IPV)			1st dose	2nd dose			3rd dose						4th dose					See Notes
COVID-19 (1vCOV-mRNA, 1vCOV-aPS)					1 or more doses of 2025–2026 vaccine (See Notes)							1 or more doses of 2025–2026 vaccine (See Notes)						
Influenza					1 or 2 doses annually (See Notes)										1 dose annually (See Notes)			
Measles, mumps, and rubella (MMR)					See Notes			1st dose					2nd dose					
Varicella (VAR)								1st dose					2nd dose					
Hepatitis A (HepA)					See Notes			2-dose series (See Notes)										
Tetanus, diphtheria, and acellular pertussis (Tdap ≥7 yrs)															1 dose			
Human papillomavirus (HPV)															2-dose series	See Notes		
Meningococcal (MenACWY-CRM ≥2 mos, MenACWY-TT ≥2years)			See Notes												1st dose		2nd dose	
Meningococcal B (MenB-4C, MenB-FHbp)															See Notes			
Respiratory syncytial virus vaccine (RSV [Abrysvo])															Seasonal administration during pregnancy if not previously vaccinated			
Dengue (DEN4CYD: 9–16 yrs)															Seropositive in areas with endemic dengue (See Notes)			
Mpox																		

Range of recommended ages for all children
Range of recommended ages for catch-up vaccination
Range of recommended ages for certain high-risk groups or populations
Recommended vaccination for those who desire protection
Recommended vaccination based on shared clinical decision-making

- Routine DTaP at 2, 4, 6, 15-18 months and at 4-6 years
- Tdap booster at 11-12 years

- **Contraindications**
  - Severe allergic reaction to prior dose or component of vaccine
  - Encephalopathy not attributable to another cause within 7 days of prior DTwP, DTaP, or Tdap dose. More reactogenic than current vaccines
- **Precautions** – Guillain-Barré within 6 weeks of prior dose; moderate to severe illness at time of visit; evolving neurologic disorder.

AAP Vaccination Schedule 2026
AAP Red Book 2024-2027

Maternal vaccination

- Infants are at highest risk of death from pertussis in the first 2 months of life – before their first dose of DTaP!

- **Maternal vaccination** provides protection in early life via transplacental antibody transfer.
  - First tried in 1930s/1940s!
  - Current recommendation (since 2012): Tdap in every pregnancy, ideally between 27-36 weeks

- Confers **>90% reduction in hospitalization**; **95% reduction in death** from pertussis in early life.

- **Protection decreases quickly** and is negligible after 8 months of age.

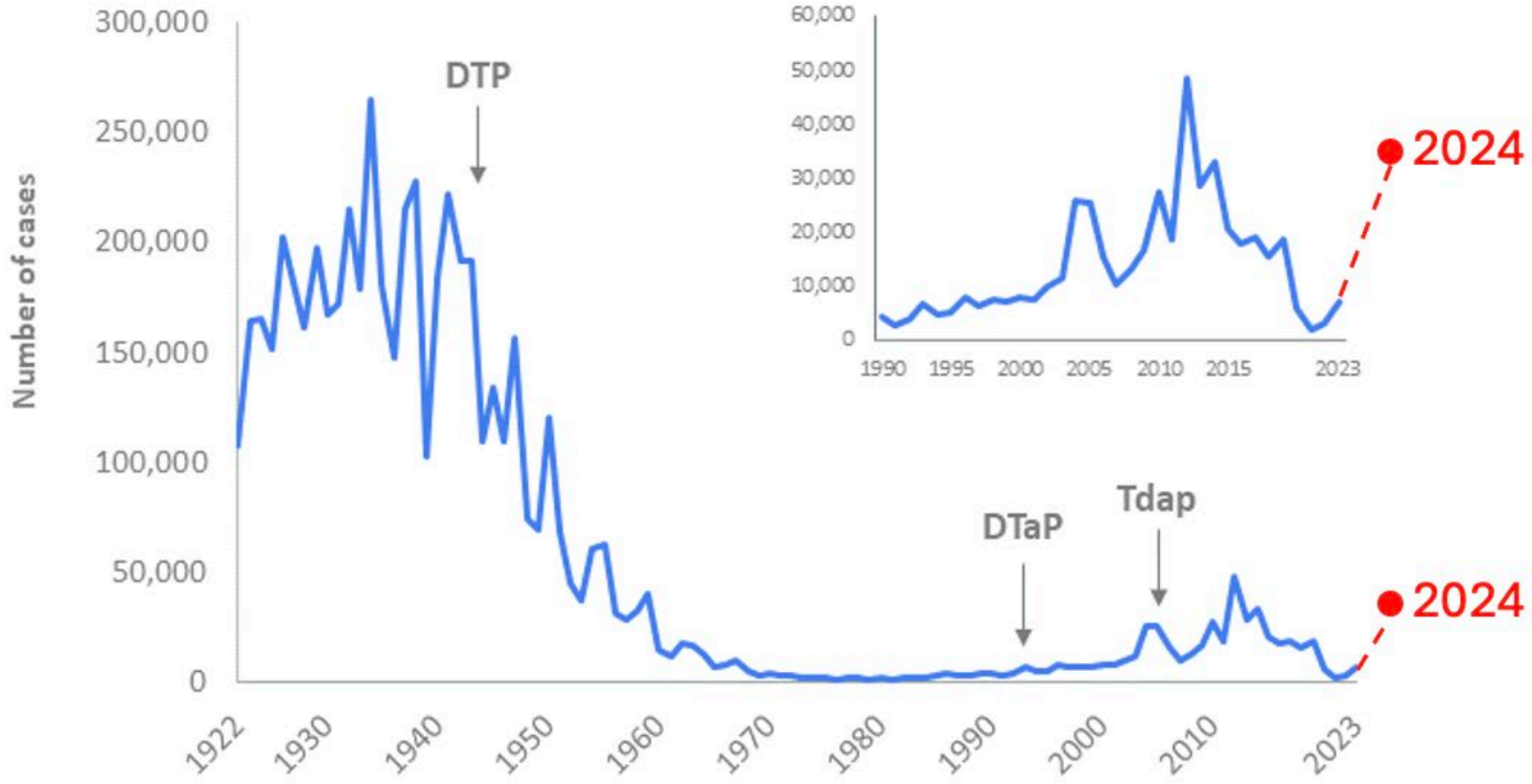
- **Decreased height of immune response to early doses of DTaP, but no decrease in protection**. Response to later doses preserved.

PMID 41038623

DTaP vaccination coverage is suboptimal among U.S. children.

Data from: https://www.cdc.gov/childvaxview/about/index.html

Reported NNDSS pertussis cases: 1922-2023



SOURCE: CDC, National Notifiable Diseases Surveillance System

2024 (provisional)	35,435 cases; 10 deaths (6 were children <1 year)
2025 (provisional)	28,958 cases; at least 13 deaths (9 children <1 year)

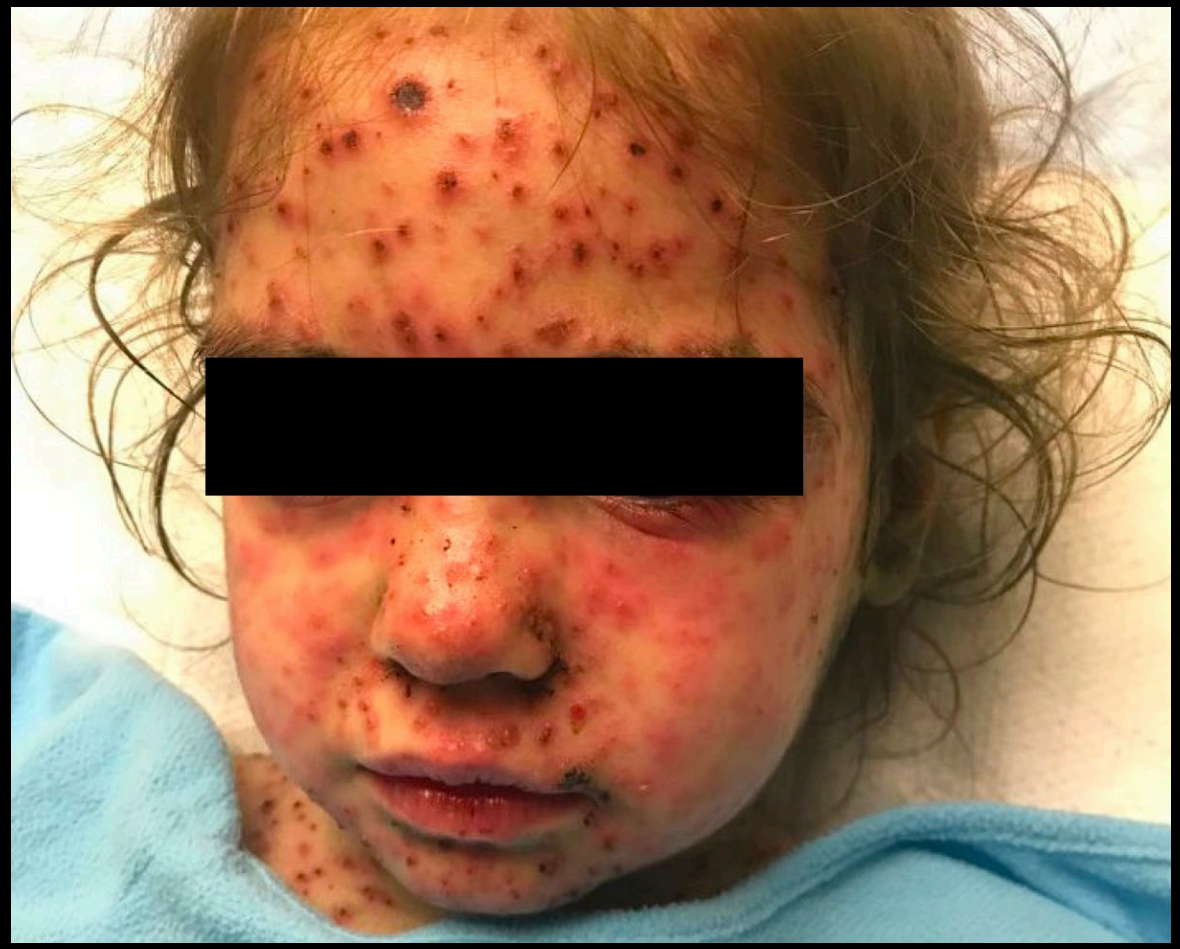
https://www.paho.org/en/documents/epidemiological-update-pertussis-whooping-cough-americas-region-8-december-2025

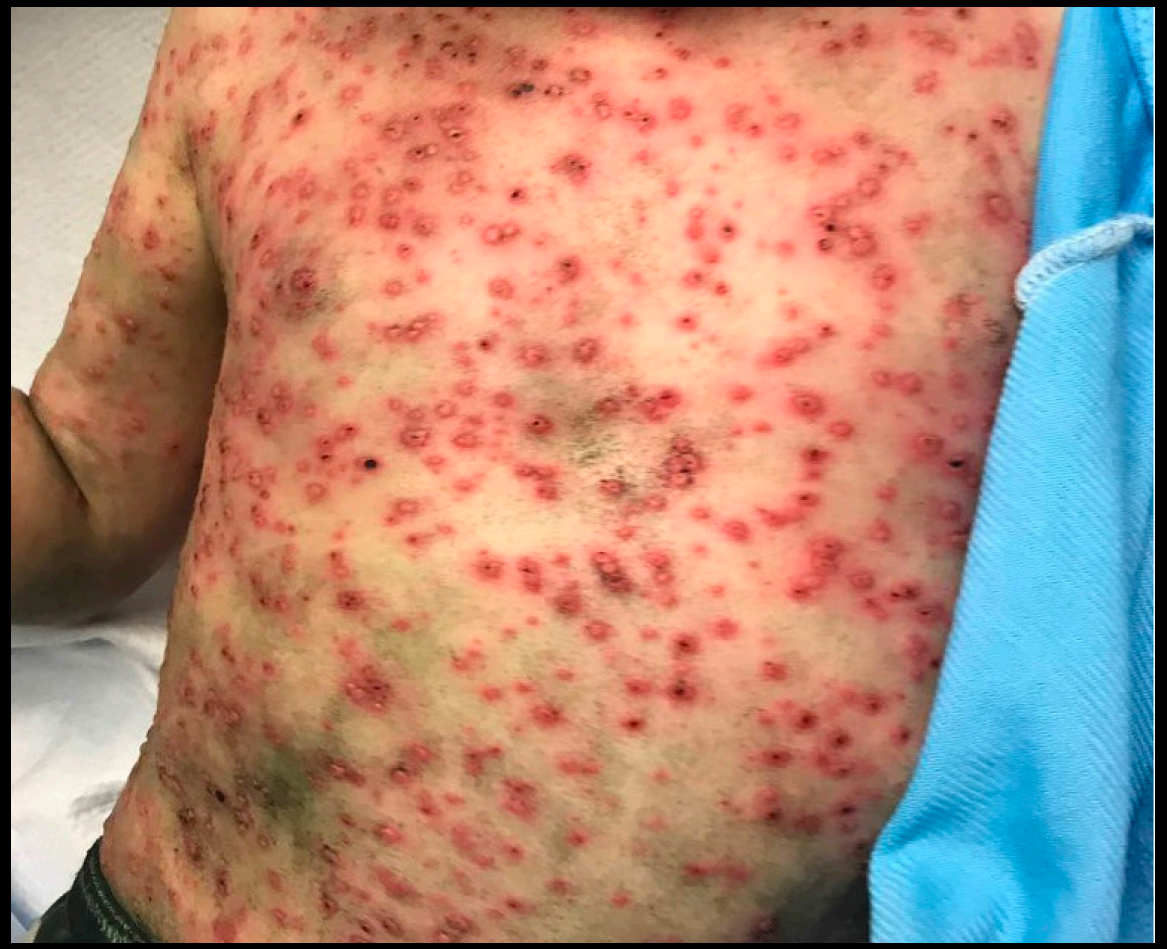
Case 2

Case 2

3-year-old with fever, diffuse rash, altered mental status

- Previously healthy 3-year-old female child
- ”Partially immunized” per her parents’ description
- Several days of feeling unwell, acting cranky. Low-grade fever.
- Develops truncal rash, which spreads to neck, face, extremities.
- Fever rises to >105°F (40.5°C); mother using "topical chlorophyll" and homeopathic medications.
- Day of admission: **high fevers** continue, child is **irritable**; episode of **eye-rolling, non-responsiveness, seizure-like activity.**
- ED: Febrile, tachycardic, intermittent unresponsive episodes and extremity shaking





Varicella-zoster virus encephalitis

- Respiratory PCR panel (incl. SARS-CoV-2): negative
- CSF PCR panel: **Varicella-zoster virus (VZV)**
- Blood VZV PCR: **positive**
- Lesion VZV PCR: **positive**
- IV acyclovir x 14 days
- Slow recovery; neurological outcome unclear
- Did not return for immunodeficiency workup
- No additional vaccine doses to date

Varicella-zoster virus

- Highly contagious viral disease.
- **Prodrome**: fever, malaise, headache occurs 1-2 days prior to rash
- **Crops of lesions** (3 or more in unvaccinated) – successive days
  - Macules -> papules -> vesicles -> pustules -> crusting
  - Lesions in **different stages** seen at same time
  - Lesions start face/trunk, then spread to extremities
  - 200-500 lesions in unvaccinated
  - Crusting within 1 week
- All features milder in vaccinated people with breakthrough varicella
- Risk of severe disease higher in immunocompromised

Contagious from 1-2 days before rash until all lesions crusted.
Incubation period: 14-16 days; 10-21 days from exposure to rash.

Varicella (“chickenpox”) was a universal infection prior to vaccine availability

- **Varicella (“chickenpox”) pre-vaccine epidemiology**
  - Essentially universal infection in childhood (**~4M cases/yr** in US)
  - **10,000-15,000 hospitalizations/yr** (most in young children)
  - **~150 deaths/yr;** ~50 cases of congenital varicella syndrome/yr

- 1995: **Live-attenuated varicella vaccine** licensed
  - Marked reductions in severe disease
  - Some breakthrough cases (almost universally mild) but enough circulation that occasional outbreaks still occurred

- 2007: Routine **two-dose series** recommended (12-15 mo.; 4-6 yrs)
  Dose 1: 82% effective against all varicella (98% for severe)
  Dose 2: 92-95% effective for clinical varicella (>98% for severe)

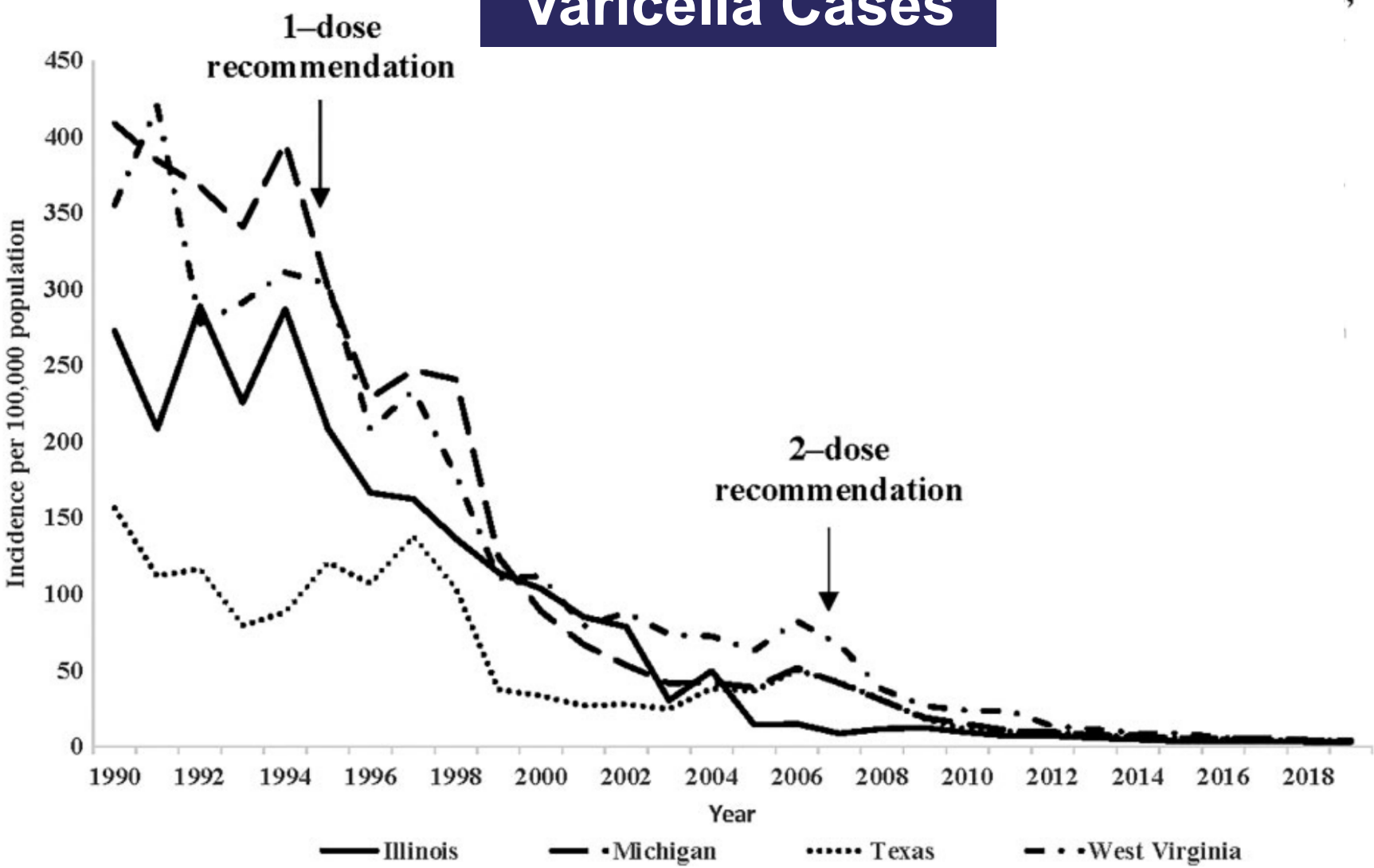
- **Sustained decrease in cases**, near-elimination of severe disease

- **Peak age** now 10-14 years

- **Marked decrease in herpes zoster** in vaccinated age cohorts

Varicella vaccine decreased the burden of disease in the U.S.

Varicella Cases



Monitoring Varicella Vaccine Impact on Varicella Incidence in the United States: Surveillance Challenges and Changing Epidemiology, 1995–2019

Mona Marin, Jessica Leung, Tara C. Anderson, and Adriana S. Lopez
Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

PMID 36265855

Varicella vaccine decreased the burden of severe disease in the U.S., even among those too young to be vaccinated.

Varicella Hospitalizations

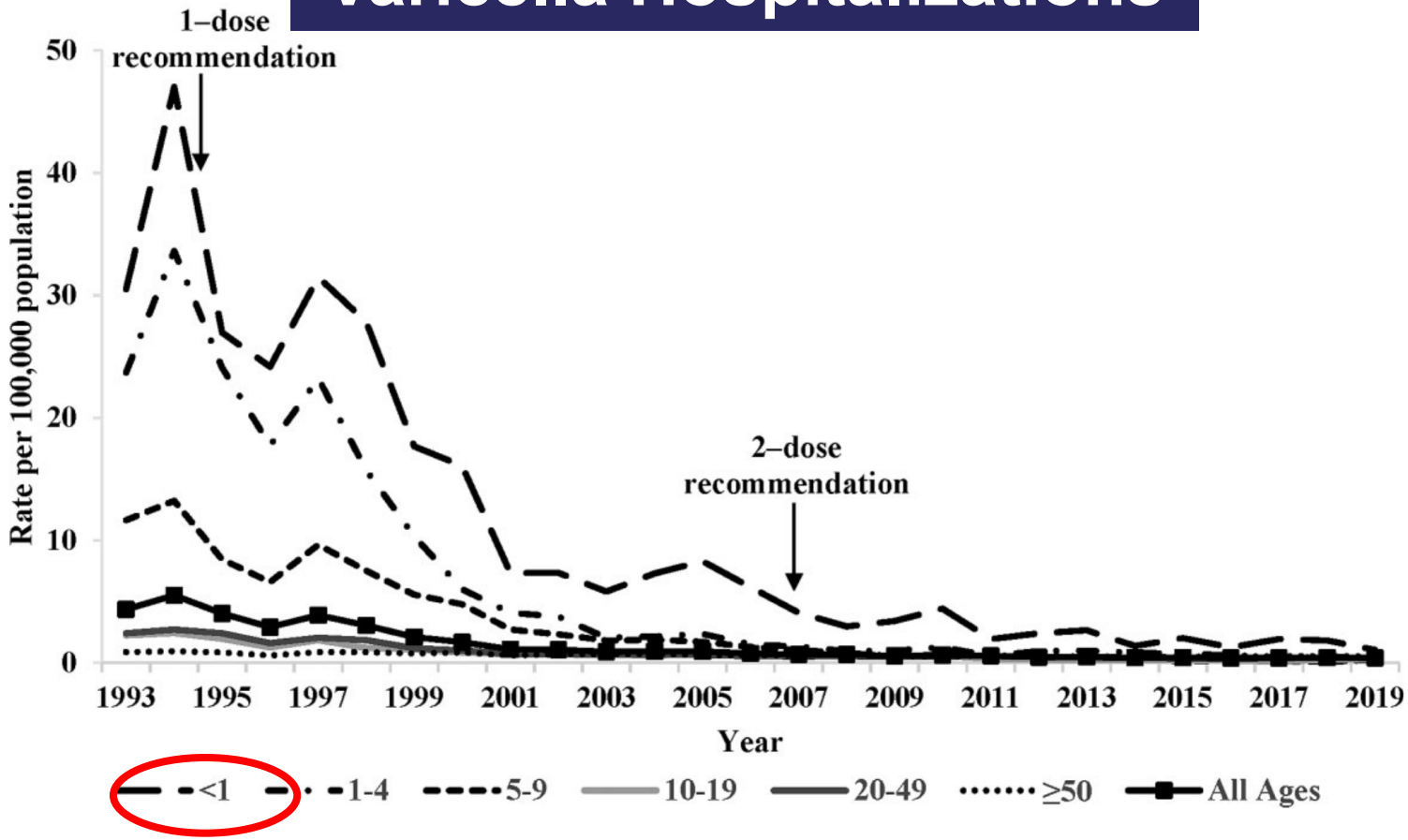


Figure 1. Varicella hospitalization rates by age group—United States, 1993–2019. The inset presents decline in hospitalization rates during the 2-dose program using the logarithmic scale.

Vaccines provide both direct and indirect protection.

ed
States Varicella Vaccination Program: Hospitalizations and Deaths, 1990–2019

PMID 36265852

Mona Marin, Adriana S. Lopez, Michael Melgar, Kathleen Dooling, Aaron T. Curns, and Jessica Leung
Division of Viral Diseases, National Center for Immunization and Respiratory Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

CHICKENPOX VACCINE SAVES LIVES AND PREVENTS SERIOUS ILLNESS

During the first 25 years,* the U.S. chickenpox vaccination program has PREVENTED an estimated:

- **91 million** CASES
- **238,000** HOSPITALIZATIONS
- **2,000** DEATHS

*The U.S. chickenpox vaccination program started in 1995.

*The U.S. chickenpox vaccination program started in 1995.

THEN	EACH YEAR	NOW
MORE THAN **4 million** chickenpox cases		FEWER THAN **150,000** chickenpox cases
MORE THAN **10,000** hospitalizations		FEWER THAN **1,400** hospitalizations
UP TO **150** deaths		LESS THAN **30** deaths

Hospitalizations and deaths have become rare.

VACCINATE YOUR CHILD AGAINST CHICKENPOX.

Talk to your doctor to make sure your child is up to date on both doses.

Learn more:
www.cdc.gov/chickenpox/vaccination-program-impact

Diagnosing varicella

- **Clinical suspicion**
  - Rash may be atypical in breakthrough cases
  - Many clinicians have not seen varicella
- **Nucleic acid amplification tests (NAATs)**
  - Usually from swab of lesion base or scraping
  - Sensitive, accurate, fast
- **Direct fluorescent antibody (DFA)**
  - Usually from swab of lesion base or scraping
  - Less sensitive than NAAT but accurate and fast
- **Serology**
  - **IgM** has both false positives and false negatives
  - **Four-fold rise in IgG** (acute/convalescent titers) – takes 2-3 weeks, immunocompromised may not seroconvert.
- **Viral culture** – now rarely used. Accurate but inefficient.

Audience Response

Another 3-year-old healthy child who attends daycare with this patient develops a varicella rash and is brought to your office. He is well-appearing with a low-grade fever and an unremarkable physical examination (other than the rash). What is the best next step in management?

A. No specific therapy. Instruct the parents on monitoring for signs of severe disease.

B. Oral valacyclovir for 5-7 days

C. Post-exposure varicella immune globulin (VariZIG)

D. IV acyclovir until lesions begin to crust

3 y/o healthy child who attends daycare with this patient develops a varicella rash. He is well-appearing with a low-grade fever and an unremarkable physical examination (other than the rash). What is the best next step in management?

VZV treatment

- **Antiviral therapy (oral acyclovir or valacyclovir)**
  - Not routinely used for healthy children under about age 12.
  - Should be considered for **healthy people at higher risk for moderate/severe varicella**
    - Unvaccinated children over age 12
    - Chronic skin or pulmonary disorders
    - Long-term salicylate use
    - Receiving steroid courses
    - Possibly for household cases

- **Antiviral therapy (IV acyclovir)**
  - Severe disease
  - Immunocompromised patients including those receiving steroids for more than 14 days.
  - Some evidence for oral valacyclovir for lower-risk immunocompromised.

AAP Red Book 2024-2027

VZV post-exposure prophylaxis

- For patients with both:
  - **Significant exposure** (e.g., household, playmate, newborn, hospital exposure)
  - **No evidence of immunity**

- **<u>Healthy patient</u> AND <u>within 5 days of exposure</u>**
  - If < 12 months old: **no prophylaxis**
  - If ≥ 12 months old: **post-exposure vaccination**

- **<u>High-risk</u>** (immunocompromised, pregnant, newborn, hospitalized preterm) **AND <u>within 10 days of exposure</u>**
  - **Varicella-zoster immune globulin** (if it can be given by the 10-day mark)
  - If varicella-zoster immune globulin not available: **oral valacyclovir or acyclovir**.

See AAP Red Book Algorithm (Fig. 3.22 in 2024-2027 Red Book)

Case 3

Case 3
3-month-old female infant with fever and seizures

- 3-month-old ex-38-week female infant
- Medical history notable only for a brief NICU stay after birth for mild respiratory distress. Otherwise well.
- Unvaccinated by parental choice. 7 siblings at home, several have received some vaccines. Next oldest child is a 3-year-old who has only received one dose of routine vaccines (including Hib at 2 months).
- **Fever** x 1 day. No respiratory, gastrointestinal or other symptoms.
- Overnight, she became lethargic. Fevers continued. Emesis x 1.
- Pediatric ED: tachycardic, lethargic, significant respiratory distress.
  - **Bulging anterior fontanelle**
  - **Bilateral coarse rhonchi**
  - **Seizure-like movements of LUE**
- Admitted, started on broad antibiotic therapy.

Case 3

Laboratory studies consistent with diagnosis of Hib meningitis

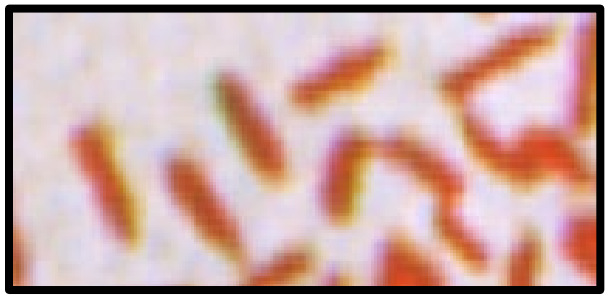
- CBC: WBC 3.5 (30% PMNs, **10% bands**)
- **CRP >300 mg/L** (normal is <5 mg/L)

- Respiratory PCR panel (including SARS-CoV-2): negative

- CSF studies: **WBC 2500** (65% PMN, 10% lymph, 25% mono)

  RBC 200 Glucose <20 Protein >200

- CSF gram stain: **innumerable WBC; few gram-negative coccobacilli**



- CSF PCR panel: ***Haemophilus influenzae* type b**

- Blood and CSF cultures: ***Haemophilus influenzae* type b**

Case 3

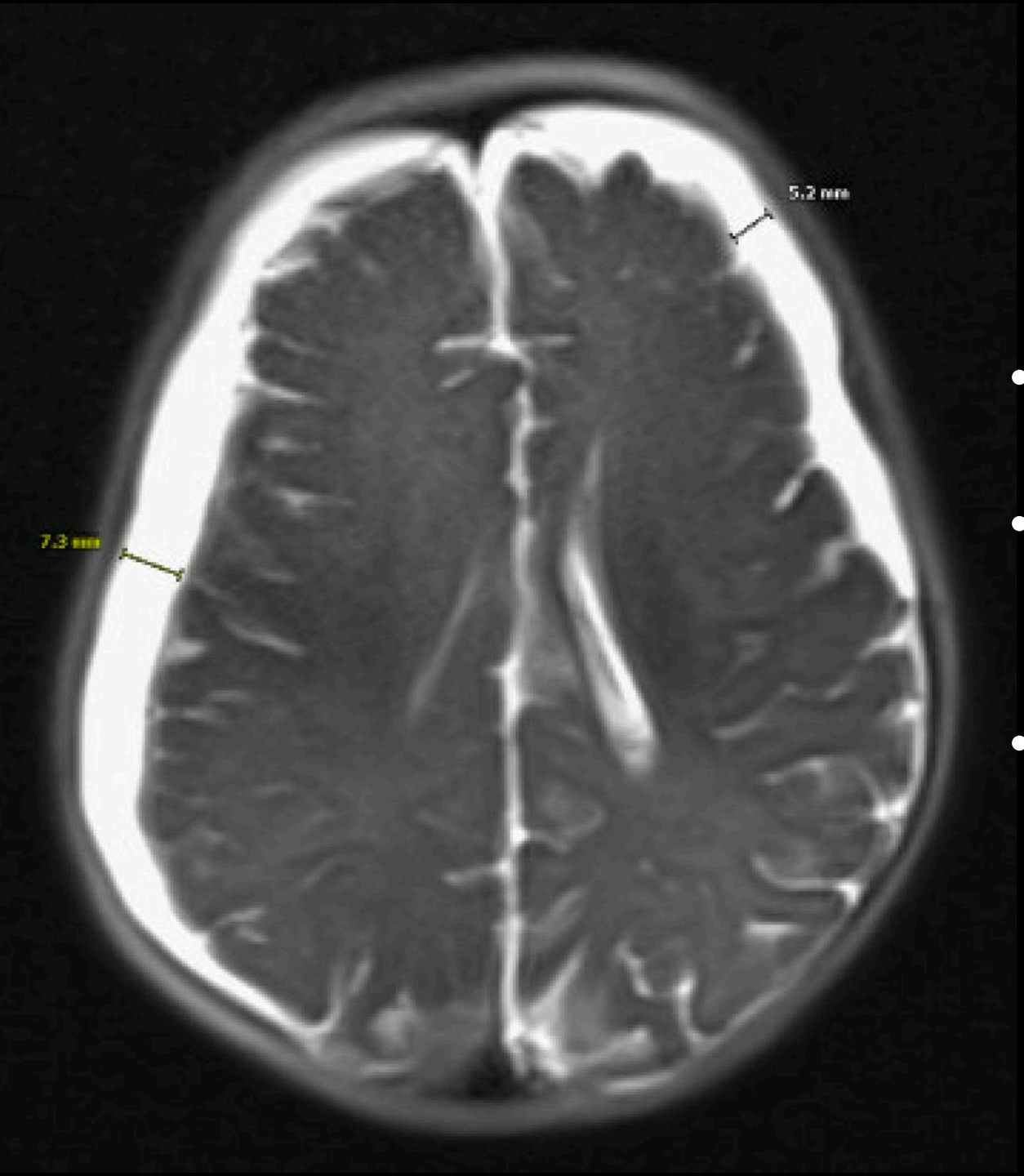
Laboratory studies consistent with diagnosis of Hib meningitis

Specimen Description

Specimen Source	Specimen Type	Comments
Lumbar Puncture	Cerebrospinal Fluid	

Specimen Information: Lumbar Puncture; Cerebrospinal Fluid

Component	Value	Flag	Ref Range	Units	Status
ESCHERICHIA COLI K1 PCR (CSF)	Not-Detected		Not-Detected		Final
HAEMOPHILUS INFLUENZAE PCR (CSF)	Detected	!	Not-Detected		Final
LISTERIA MONOCYTOGENES PCR (CSF)	Not-Detected		Not-Detected		Final
NEISSERIA MENINGITIDIS PCR (CSF)	Not-Detected		Not-Detected		Final
STREPTOCOCCUS AGALACTIAE (CSF)	Not-Detected		Not-Detected		Final
STREPTOCOCCUS PNEUMONIAE (CSF)	Not-Detected		Not-Detected		Final
CYTOMEGALOVIRUS PCR (CSF)	Not-Detected		Not-Detected		Final
ENTEROVIRUS PCR (CSF)	Not-Detected		Not-Detected		Final
HERPES SIMPLEX VIRUS 1 PCR (CSF)	Not-Detected		Not-Detected		Final
HERPES SIMPLEX VIRUS 2 PCR (CSF)	Not-Detected		Not-Detected		Final
HUMAN HERPES VIRUS 6 (CSF)	Not-Detected		Not-Detected		Final
HUMAN PARECHOVIRUS (CSF)	Not-Detected		Not-Detected		Final
VARICELLA ZOSTER VIRUS PCR (CSF)	Not-Detected		Not-Detected		Final
CRYPTOCOCCUS NEOFORMANS/GATTII PCR (CSF)	Not-Detected		Not-Detected		Final



Brain MRI findings

- Diffuse leptomeningeal enhancement
- Bilateral enhancing subdural collections (0.5-0.8 cm)
- Midline shift

Case 3

Hospital course and follow-up

- Temperature instability, oxygen requirement
- Seizure activity -> **status epilepticus**
- Required **neurosurgical procedures for drainage of subdural effusions**
- **4-week inpatient course of IV antibiotics (ceftriaxone)**
- **Long-term antiepileptic drugs**
- **uncertain neurodevelopmental outcome**

Audience Response

Other than catch-up vaccination for the incompletely immunized children in the family, what is the best next step to decrease the risk of Hib disease in contacts of this patient?

A. Post-exposure vaccination for all contacts under age 5, regardless of prior immunization history.

B. Nasal decolonization of the index case with mupirocin.

C. Rifampin prophylaxis for all household contacts, regardless of age or vaccination status.

D. Rifampin prophylaxis for household contacts under age 5

Other than catch-up vaccination for the incompletely immunized children in the family, what is the best next step to decrease the risk of Hib disease in contacts of this patient?

Hib chemoprophylaxis

Hib Chemoprophylaxis Recommended

- **All household contacts in the following settings:**
  - Household with at least one unimmunized or incompletely immunized member under age 4 years
  - Household with a child < 12 months who has not completed the primary Hib immunization series
  - Household with an immunocompromised child (regardless of Hib immunization status)

- **School / childcare contacts** (only if multiple cases with 60 days and unvaccinated or undervaccinated children in the school)

- **Index patient** only if age < 2 years or member of household with susceptible contact AND treated with a regimen not including cefotaxime or ceftriaxone.

Rifampin eradicates Hib from the pharynx in ~95% of carriers.

See AAP Red Book (Table 3.10 in 2024-2027 Red Book)

Hib chemoprophylaxis

Hib Chemoprophylaxis Not Recommended

- Households with no children <4 years old other than the index patient
- Households in which all contacts are immunocompetent, all age 12-48 months have completed their Hib series, and all < 12 months have completed their primary Hib series
- Preschool and childcare contacts of one index case
- Index patients ≥ 2 years of age or treated with a full course of cefotaxime or ceftriaxone for invasive Hib
- Pregnant people

See AAP Red Book (Table 3.10 in 2024-2027 Red Book)

Haemophillus influenzae type b (Hib)

Pre-vaccine Hib epidemiology (US)

- Upper respiratory colonization in **3-5% of children** (and some adults)
- **1:200 children** had Hib bacteremia before age 5
- **~10,000 cases** of Hib meningitis/yr
- Major cause of **focal bacterial infections** (epiglottitis, septic arthritis/osteomyelitis, cellulitis, pericarditis, etc.)

PMID 40205699

Hib meningitis has important short-term and long-term sequelae.

Acute complications

- Lab abnormalities: anemia, coagulopathy
- Rapid neurological decline
- Respiratory failure, shock
- SNHL, hemiparesis

Long-term neurological sequelae

- SNHL (5-20%) – some effect of **early dexamethasone**
- Motor deficits
- Impaired cognition

- More common in patients with acute complications and/or low CSF glucose on initial testing

PROGRESS NOTES

Journal of Hospital Medicine shm Society of Hospital Medicine

PMID 40205699

Clinical progress note: *Haemophilus influenzae* type b

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Risk factors for invasive Hib disease

Factors Conferring Increased Risk for Invasive Hib

- Unvaccinated / undervaccinated status
- Socioeconomic factors, including American Indian/Alaska Native individuals
- Asplenia (functional or anatomic)
- Sickle cell disease
- HIV infection
- Immunodeficiency (including immunoglobulin or subclass deficiency, complement deficiency, complement inhibitors)
- Chemotherapy, radiation, hematopoietic stem cell transplantation

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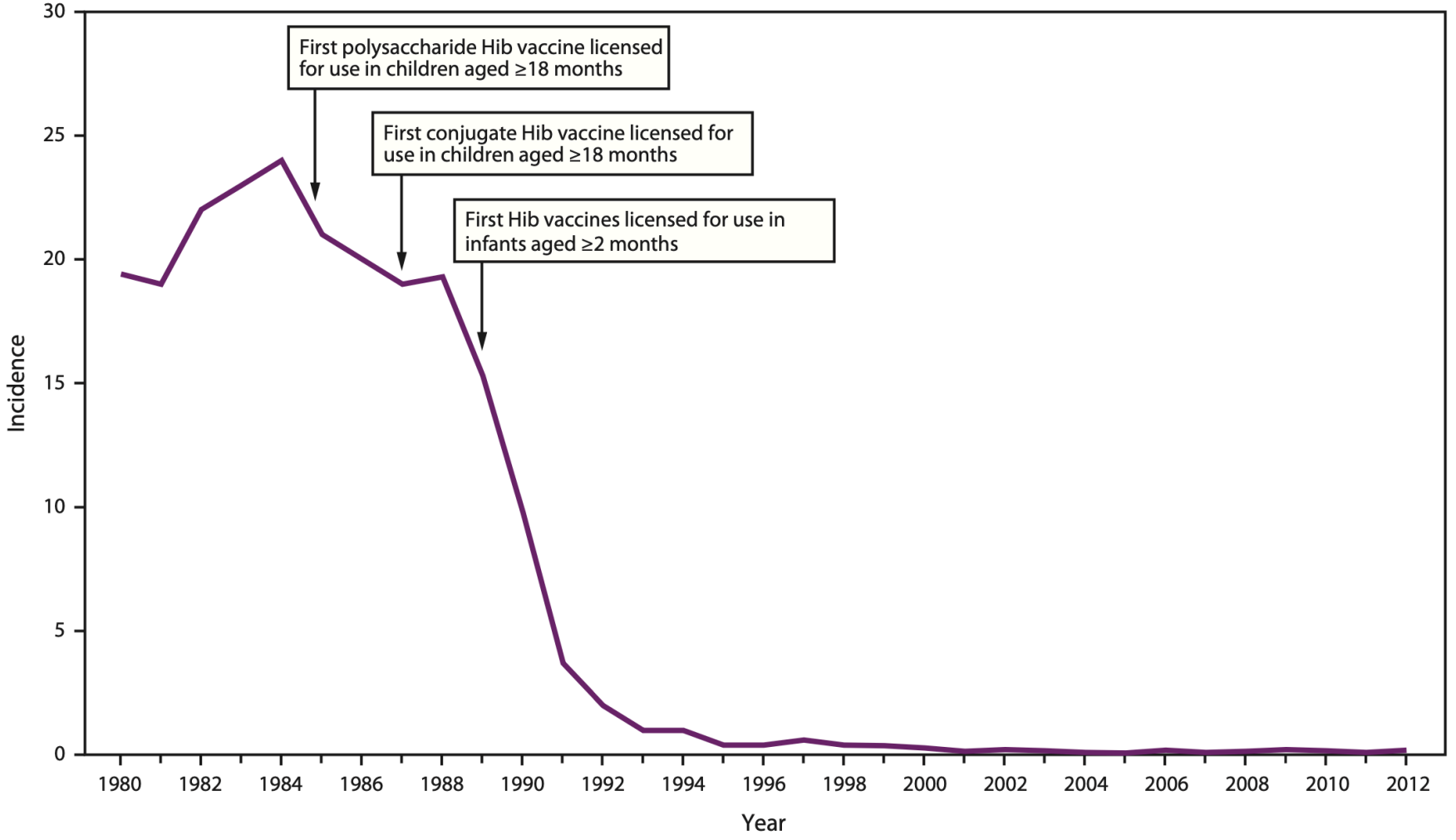
Conjugate Hib vaccines caused a rapid and sustained decrease in invasive Hib disease in the U.S.

FIGURE 1. Estimated annual incidence* of invasive *Haemophilus influenzae* type b (Hib) disease in children aged <5 years — United States, 1980–2012



2023 rate: 0.03 cases/100,000 population

Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Recommendations and Reports / Vol. 63 / No. 1
February 28, 2014

Prevention and Control of *Haemophilus influenzae* Type b Disease
Recommendations of the Advisory Committee on Immunization Practices (ACIP)

PMID 24572654

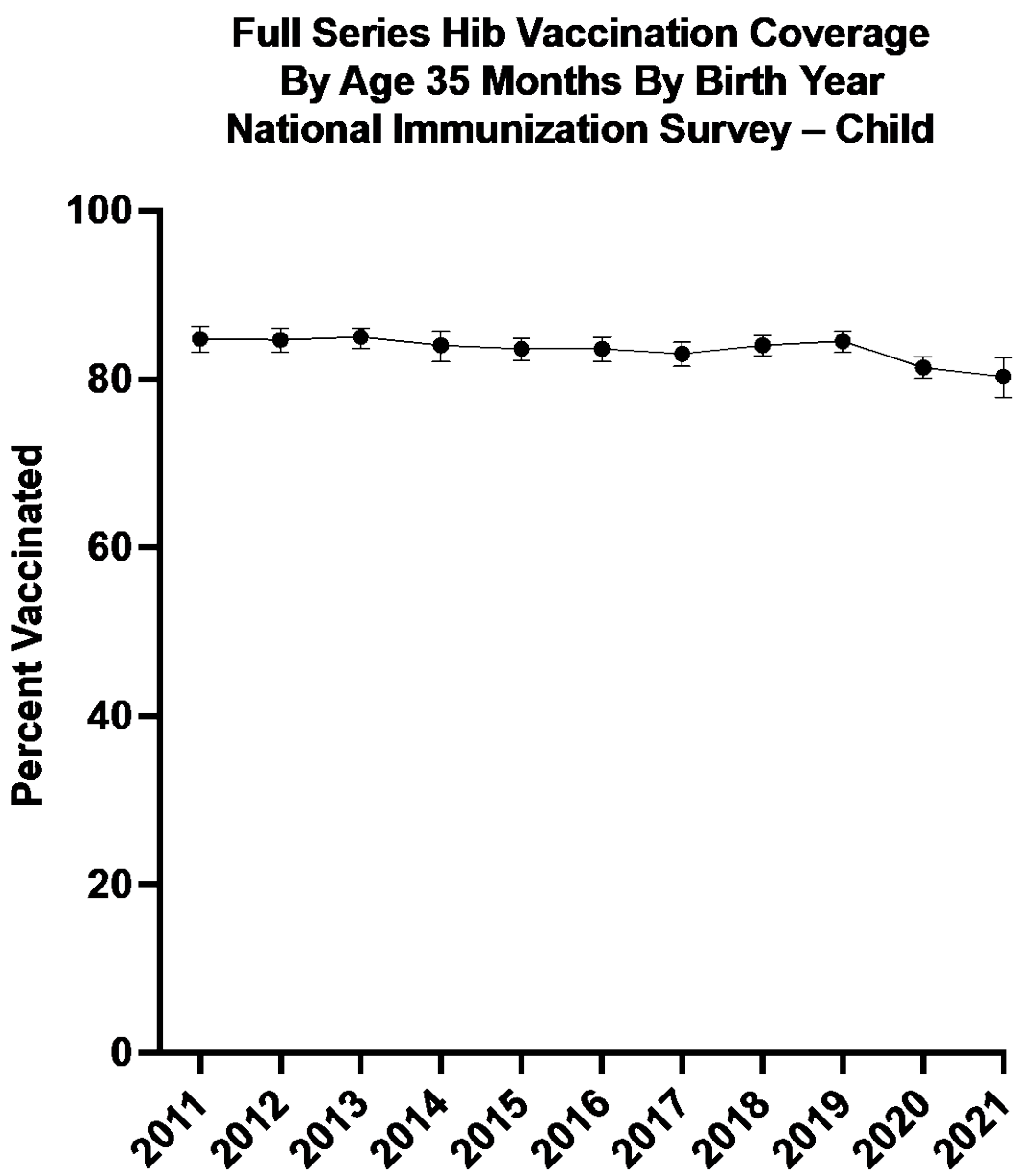
Hib vaccines prevent disease in two ways.

- Vaccines provide **direct protection against invasive Hib** disease.
  - >99% decrease in invasive Hib among vaccinated
  - Vast majority of cases are in unvaccinated or incompletely vaccinated individuals.

- Vaccinated children have **decreased Hib colonization rates**.
  - Colonization in **0.2-0.5%** of vaccinated children
  - Decreased chance of spread to infants too young to be vaccinated or to immunocompromised adults.

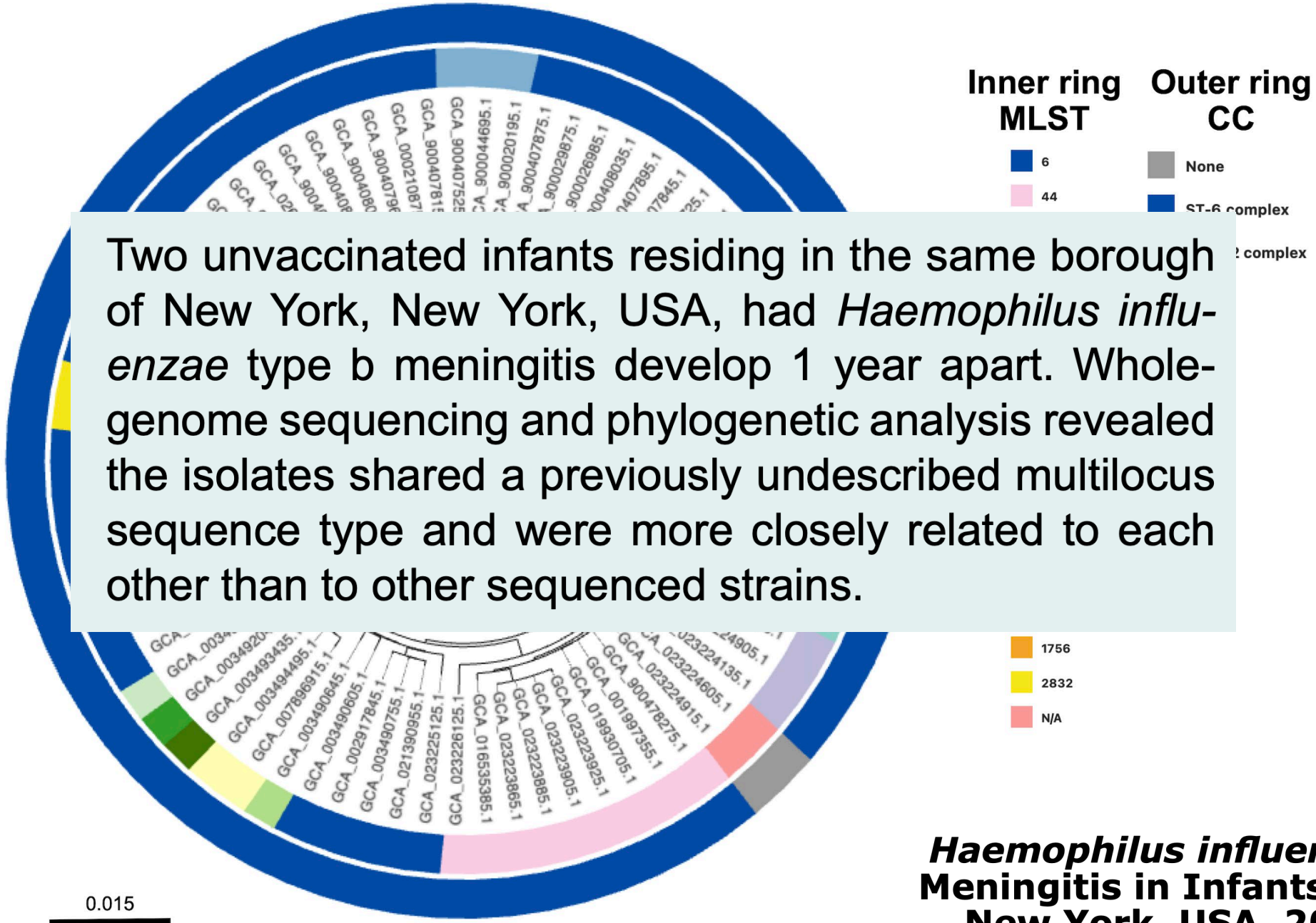
Vaccines provide both direct and indirect protection.

Hib vaccination coverage is incomplete (and may be falling).



PMID 40205699

Data from: https://www.cdc.gov/childvaxview/about/index.html



Two unvaccinated infants residing in the same borough of New York, New York, USA, had *Haemophilus influenzae* type b meningitis develop 1 year apart. Whole-genome sequencing and phylogenetic analysis revealed the isolates shared a previously undescribed multilocus sequence type and were more closely related to each other than to other sequenced strains.

***Haemophilus influenzae* Type b Meningitis in Infants, New York, New York, USA, 2022–2023**

PMID 40023813

Anne Ewing, Sydney Haldeman, Megan J. Job, Caitlin Otto, Adam J. Ratner

Take-Home Points

- **Pertussis** is highly contagious and can be life-threatening, especially in young infants.
  - Acellular vaccine provides good protection but wanes over time.
  - Adolescent booster doses help prolong protection.
  - Maternal vaccination provides short-term protection for young infants.
  - Post-exposure prophylaxis can prevent secondary cases.

- Routine **varicella** vaccination prevents thousands of hospitalizations and hundreds of deaths each year.
  - The routine two-dose series is highly effective.
  - Post-exposure immunoglobulin can protect high-risk contacts.

- The conjugate *Haemophilus influenzae* type b (Hib) has greatly decreased invasive Hib disease, including meningitis, in the U.S.
  - Hib remains a concern in undervaccinated communities.
  - Falling vaccination levels raise the possibility that Hib may reemerge in additional places.

Thank you!