

Pertussis: Current Outbreak Trends and Vaccination Strategies



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Source



Disclosures

- University of Chicago receives funds for me to conduct research from Moderna, Sanofi, and Pfizer.
- In the past **24 months**, Morehouse School of Medicine received funds for me to conduct research from Merck, GSK, Novavax, Moderna, Pfizer, Affinivix, and Melinta
- Executive Advisory Board for American Academy of Pediatrics, Section on Infectious Diseases
- Scientific advisory board for North America- Moderna
- Funded by Pediatric Emergency Medicine Associates, LLC (through 2023)



Learning Objectives

As a result of attending this webinar, participants will be able to:

01

Understand the clinical features and symptoms of pertussis disease.

02

Summarize the latest information regarding the ongoing pertussis outbreak in U.S. and Illinois.

03

Identify the latest versions of pertussis-containing vaccines.

04

Describe the current recommendations for vaccinations against pertussis



What is Pertussis?

- Pertussis – also known as Whooping Cough – is caused by a type of bacteria called *Bordetella pertussis* (fastidious, gram negative, pleomorphic bacillus).
- Humans are only known hosts.
- Transmission is usually person to person through respiratory droplets or contact with airborne droplets; occurs year-round.
- Anyone, but especially infants and young children, may experience serious and potentially life-threatening complications from pertussis.
 - In 2018, pertussis incidence per 100,000 was 72.3 in infants younger than age 6 months and 32.7 in infants aged 6 to 12 months.





Pertussis Clinical Features

- **Incubation period:** 7 through 10 days (range, 4 through 21 days)
- **Catarrhal stage:** Insidious onset of coryza (runny nose), sneezing, and a mild cough, similar to the common cold.
 - 1-2 weeks
- **Paroxysmal stage:** More severe cough and may experience paroxysms of numerous, rapid coughs, and the classic whoop occurs. Usually when the diagnosis of pertussis is suspected.
 - 1-6 weeks
- **Convalescence stage:** Gradual recovery
 - Weeks to months





Note: Factors influencing length of communicability: age, immunization status or previous infection and receipt of appropriate antibiotic therapy


Whooping Cough (Pertussis)

Early symptoms may include:

 Slight fever.	 Mild or occasional coughing.
 Runny nose.	 A pause in breathing in babies.

After the first or second week, symptoms may include:

 Prolonged, repeated or violent coughing episodes.	 Whooping sound when inhaling.
 Vomiting.	 Exhaustion due to prolonged coughing.

 Cleveland Clinic



Transmission of Pertussis

- Vaccination immunity wanes over time (more pronounced if acellular vaccine used for entire prime/boost series)
 - ~80% of household contacts previously immunized in infants symptomatic were infected (classic pertussis to mild cough)
 - Natural immunity also wanes over time
 - Pertussis cases likely increase both in unvaccinated and vaccinated populations
- Most contagious: during catarrhal through ~3rd week after onset of paroxysms.
 - Factors influencing length of communicability: age, immunization status or previous infection and receipt of appropriate antibiotic therapy

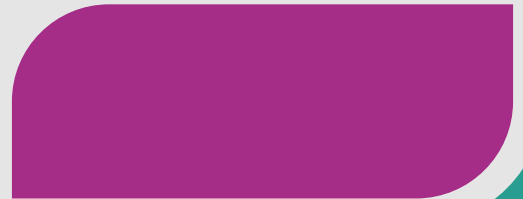


How does Pertussis spread?

The bacteria that cause whooping cough spread easily from person to person through the air, especially those in close contact.

Examples of close contact:

1. Living in the same household.
2. Sneezing or coughing.
3. Spending a lot of time close together in schools and daycares.





Treatment of Pertussis

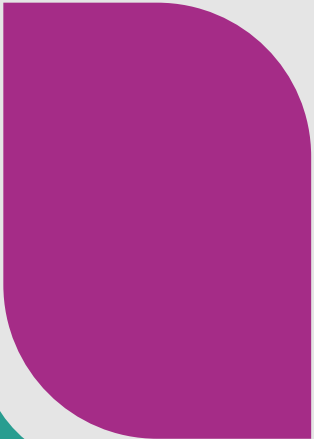
- **Treatment:** administering during catarrhal stage may 'ameliorate' disease
 - 5-day course of azithromycin for treatment and for postexposure prophylaxis (PEP)
 - After paroxysmal cough, no discernible effect on course of illness (but recommended to limit spread of organisms to others)
 - Rare reports of resistance to azithromycin
 - Alternative: TMP-SMX- for patients > 2 months who cannot tolerate or infected with macrolide-resistant strain
- **Isolation:** 21 days from onset of cough if appropriate antimicrobial therapy is not administered or for 5 days after initiation of effective therapy





Epidemiology of Pertussis

Current Outbreak





Surveillance of Pertussis, 2024

- CDC tracks pertussis cases using national surveillance network
 - **Emerging Infections Program (EIP):** CDC partners with seven states participating in the EIP-network. (Surveillance includes other *Bordetella* species)
 - **National Notifiable Diseases Surveillance System (NNDSS).**
 - **Weekly** cases of selected infectious national notifiable diseases, from the NNDSS data reported by the 50 states, New York City, the District of Columbia, and the U.S. territories are collated and published weekly in alphabetical order by condition.



Epidemiology in the United States

- In **2018**, pertussis incidence per 100,000 was 72.3 in infants younger than age 6 months and 32.7 in infants aged 6 to 12 months.
- In **2024**, reported cases of pertussis increased across the United States
- **The number of reported cases this year (2024) is higher than what was seen at the same time in 2019, prior to the pandemic.**
 - During the pandemic (e.g., masking, remote learning) likely lowered transmission of pertussis.
- Preliminary data show that more than **five times as many cases** have been reported as of week 43, reported on [October 26, 2024](#), compared to the same time in [2023](#)

Top States with most cases (October 16, 2024)



Reporting Area	Pertussis			
	Current week	Previous 52 weeks Max †	Cum YTD 2024 †	Cum YTD 2023 †
U.S. Residents, excluding U.S. Territories	462	817	20,791	4,559
New England	8	51	841	57
Connecticut	-	8	29	4
Maine	8	11	110	39
Massachusetts		34	541	10
New Hampshire		5	28	3
Rhode Island		6	68	1
Vermont		12	65	-
Middle Atlantic		190	4,847	997
New Jersey	-	37	423	193
New York (excluding New York City)	42	97	1,326	278
New York City	-	38	735	291
Pennsylvania	43	107	2,363	235
East North Central	126	238	4,725	1,237
Illinois	-	54	1,356	428
Indiana	-	17	255	114
Michigan	4	42	652	71
Ohio	88	92	1,032	589
Wisconsin	34	111	1,434	35
West North Central	36	61	1,169	246
Iowa	-	18	155	50
Kansas	-	12	144	52

In 2024, Illinois ranks #3 for highest number of cases YTD across the U.S.

Total Cum 2024 (Week 43):
20,824

Total Cum 2023 (Week 52):
4,589

#1: Pennsylvania

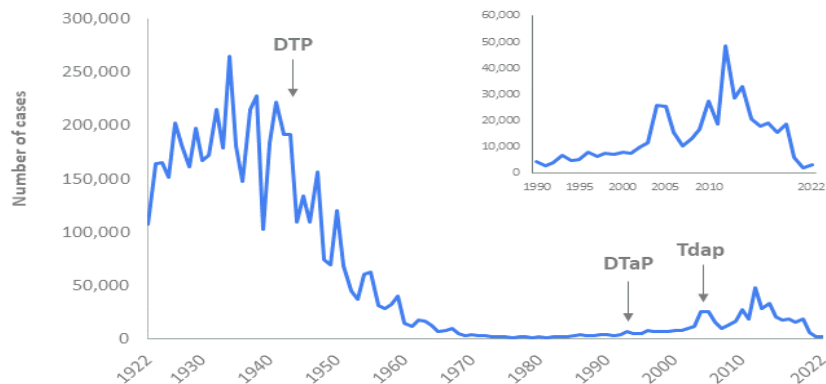
#3: Wisconsin

U.S. Distribution of Pertussis Cases



- Widespread use of the vaccine began with the introduction of the diphtheria, tetanus toxoid, and whole-cell pertussis (DTP) vaccine in 1948. Since then, the number of cases each year has decreased more than 90%, compared with the pre-vaccine era.

Reported NNDSS pertussis cases: 1922-2022

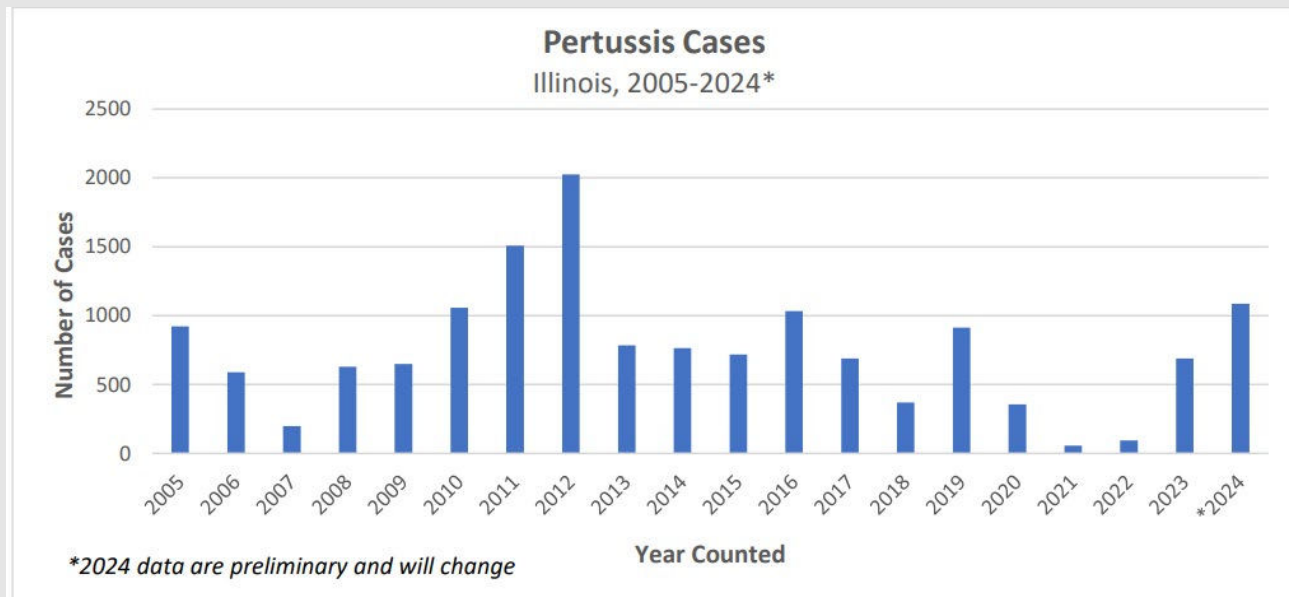


SOURCE: CDC, National Notifiable Diseases Surveillance System

Illinois (9.26.2024)



- **1,087** confirmed and probable cases of pertussis reported in Illinois in 2024.

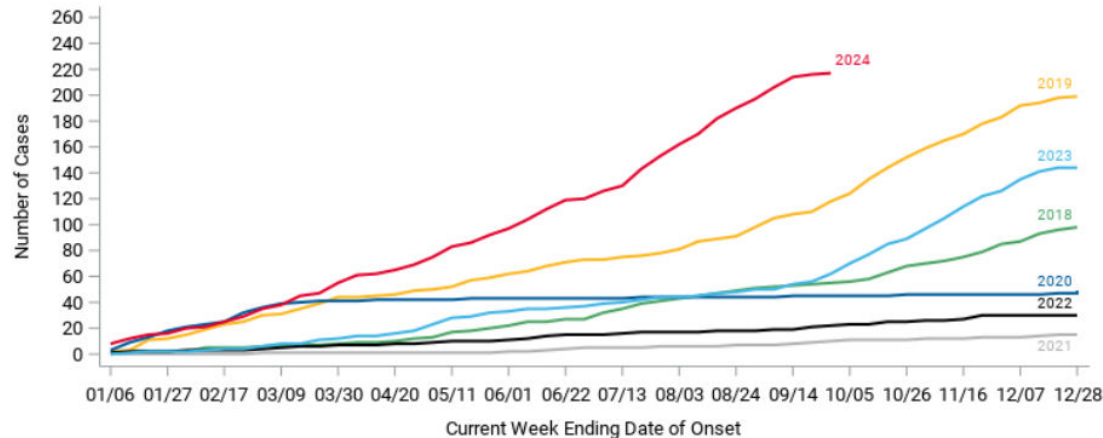


Chicago (10.1.2024)



- A total of **217** cases among Chicagoans have been reported in 2024 as of October 1.
 - **3.5 increase in cases** compared to the same time period in 2023 and is the highest total in the last 6 years

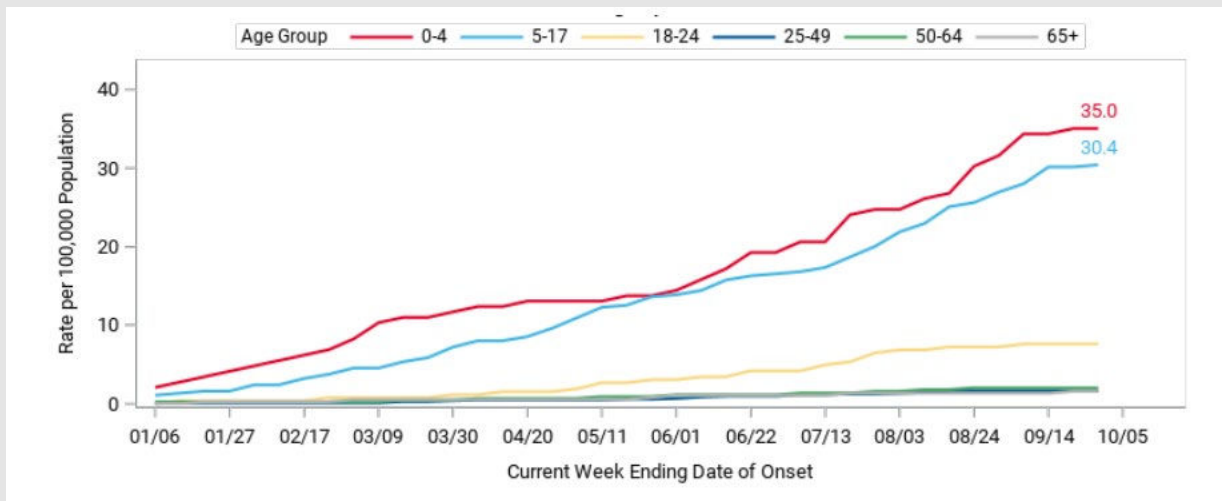
Figure 1. Weekly Cumulative Number of Pertussis Cases by Year of Illness Onset, 2018–2024



Chicago (cont.)



- Incidence rates have been highest among young children ages 0 to 4 years followed by school-age children 5 to 17 years.
- Nineteen cases have been among infants less than 1 year of age who are at highest risk for severe pertussis outcomes.

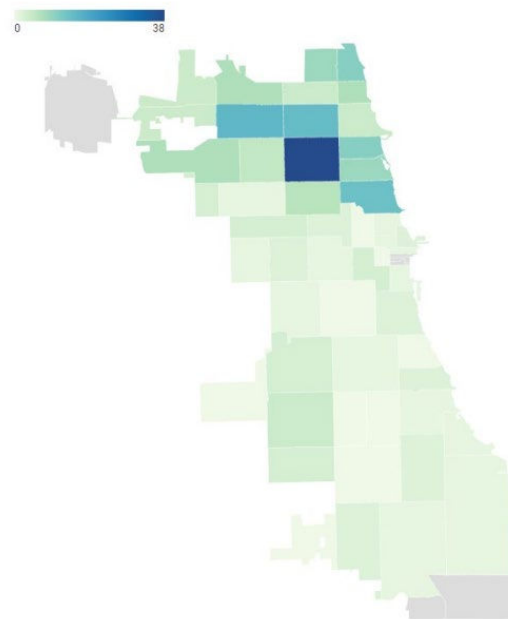


Chicago (cont.)



- Cases have been reported in ZIP Codes across Chicago, but most have been among residents of the northside of Chicago.

Figure 3. Map of Pertussis Cases by ZIP Code, 2024





Chicago - Pertussis

- Most cases have been mild,
- 13 (6%) of cases were hospitalized
- 26 (12%) visited the emergency room
- **Four outbreaks** have been identified this year:
 - School settings (N=3)
 - Childcare center (N=1)
- **Demographic Race-Ethnicity:**
 - White (Non-Latinx)- (63%) followed by
 - Latinx (21%), 7% among
 - Asian, non-Hispanic (7%)
 - Black, Non-Latinx (5%)

Reporting of Pertussis in Chicago



- **Chicago:** Pertussis cases should be reported electronically to CDPH within 24 hours through I-NEDSS.
 - Outpatient providers without an I-NEDSS account may report via CDPH's secure online report form:
<https://redcap.link/ChicagoVPDReport>.
- **Illinois:** Schools and healthcare providers should notify their local health department if they become aware of a suspected or confirmed case of pertussis in both students, patients, or staff within 24 hours of diagnosis.



Vaccination

About The Vaccines Against Pertussis



- **DTaP (in children who received 5 shots), protection against disease:**
 - Nearly all children (98 in 100) within a year of the last shot.
 - About 7 in 10 children five years after getting the last DTaP shot.
 - The other 3 in 10 children are partially protected. (so, if illness, less severe form)
- **Tdap (1 booster, in protection against disease):**
 - 7 in 10 people in the first year after getting it.
 - 3 or 4 in 10 people four years after getting it.
- **Women get Tdap during pregnancy, the vaccine protects:**
 - More than 3 in 4 babies younger than 2 months old from whooping cough.
 - About 9 in 10 babies from being hospitalized from whooping cough.



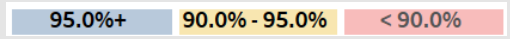
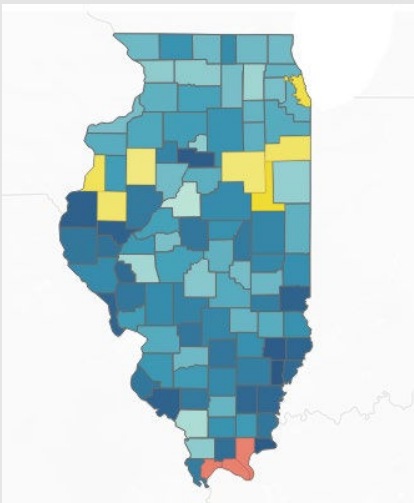
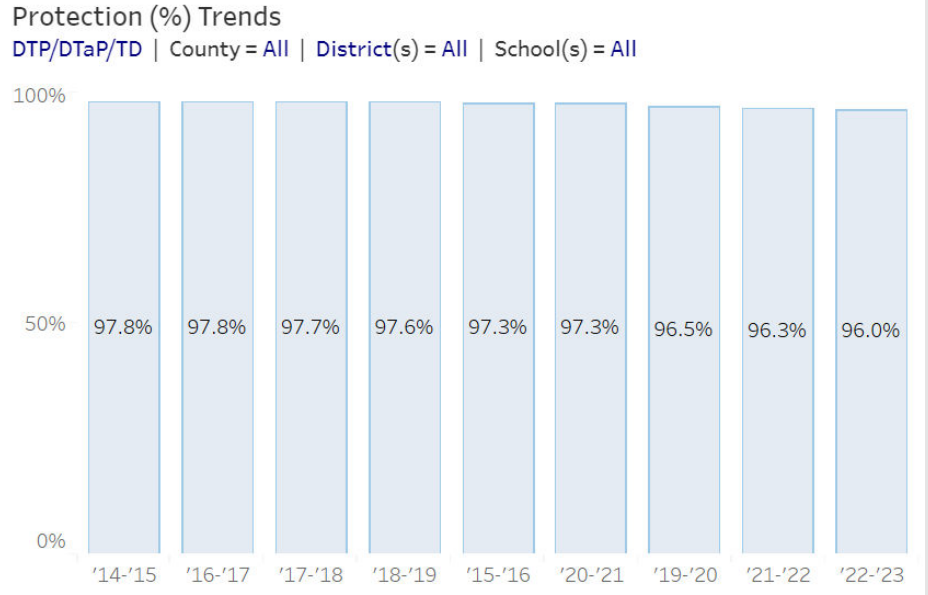
Vaccination Immunity

- Vaccination immunity wanes over time (more pronounced if acellular vaccine used for entire prime/boost series)
 - **~80% of household contacts previously immunized in infants symptomatic were infected (classic pertussis to mild cough)**
 - **Natural immunity also wanes over time**
 - **Pertussis cases likely increase both in unvaccinated and vaccinated populations**



Vaccinations Declining

- Decrease in school vaccination coverage over time
- For 2022-23 school year, Illinois school protection % ranged from 88.84% - 99.52% across all counties





Vaccination - DTaP/Tdap

- DTaP: 5-dose series (3-dose primary series at age 2, 4, and 6 months, followed by a booster doses at ages 15–18 months and 4–6 years)
 - Prospectively: Dose 4 may be administered as early as age 12 months if at least 6 months have elapsed since dose 3
 - Retrospectively: A 4th dose that was inadvertently administered as early as age 12 months may be counted if at least 4 months have elapsed since dose 3
- Tdap: Age 11–12 years: 1 dose Tdap (adolescent booster)
- Pregnant people need a Tdap booster each pregnancy
- Catch-Up Vaccination:
 - DTaP: Dose 5 is not necessary if dose 4 was administered at age 4 years or older and at least 6 months after dose 3
 - Tdap: Dependent on age and DTaP vaccination history

People of all ages need **WHOOPING COUGH VACCINES**



DTaP

for young children

- ✓ 2, 4, and 6 months
- ✓ 15 through 18 months
- ✓ 4 through 6 years

Tdap

for preteens

- ✓ 11 through 12 years

Tdap

for pregnant women

- ✓ During the 27-36th week of each pregnancy

Tdap

for adults

- ✓ Anytime for those who have never received it

www.cdc.gov/whoopingcough





Illinois School Requirements

- **For children enrolling in a childcare facility, preschool, early childhood or pre-kindergarten program:** Three doses of diphtheria, tetanus, pertussis (DTP or DTaP) by 1 year of age, and one additional dose by the second birthday.
- **For children entering kindergarten or first grade:** Four or more doses of diphtheria, tetanus, pertussis (DTP or DTaP) vaccine with the last dose being a booster and having been received on or after the fourth birthday.
- **For children entering sixth grade:** one dose Tdap vaccine at age ≥ 11 years, regardless of interval since the last dose of DTP, DTaP, or Td.

Vaccine Confidence



- Includes the trust that patients, their families, and providers have in:
 - Recommended vaccines.
 - Providers who administer the vaccines.
 - The processes and policies that lead to vaccine development, licensure, or authorization.
 - Manufacturing.
 - Recommendations for use.

Health literacy is important!





Increasing Vaccine Confidence

- Take time to walk through complicated concepts – what do new terms mean and why do they matter.
- Make a strong recommendation for routinely recommended vaccines and immunizations.
- Discuss why regular vaccinations are important.
- Take time to respond to questions and concerns.
- Educate and encourage; use motivational interviewing.



Reminder Recall



- Strategies can include social media, patient portal communications, texts and phone calls, or auto-dialers.
- Sample messages:
 - **Needing Catch-up vaccine:** [PRACTICE NAME] is contacting you as our records indicate that your child is overdue for a vaccine. Please call [PRACTICE PHONE NUMBER] today to schedule your child’s vaccination.
 - **Routine, on-time vaccinations:** “Hi! [Practice Name] is offering a friendly reminder that your child’s wellness visit and/or vaccinations are due. It is very important to stay on track with these appointments. Please call our office at [PRACTICE PHONE NUMBER] to schedule your child’s appointment. See you soon!”
 - More information on [Reminder and Recall](#) strategies.

Resources

- [Immunize.org's Pertussis Clinical Resources](#)
- [CDC Manual for the Surveillance of Vaccine-Preventable Diseases: Pertussis](#)
- [CDPH Pertussis in Schools Webpage](#)
- <https://www.cdc.gov/acip-recs/hcp/vaccine-specific/dtap-tdap-td.html>
- <https://www.cdc.gov/pertussis/php/surveillance/>
- Centers for Disease Control and Prevention. National Notifiable Diseases Surveillance System, Weekly Tables of Infectious Disease Data. Atlanta, GA. Office of Public Health Data, Surveillance, and Technology. Available at: <https://www.cdc.gov/nndss/data-statistics/index.html>.



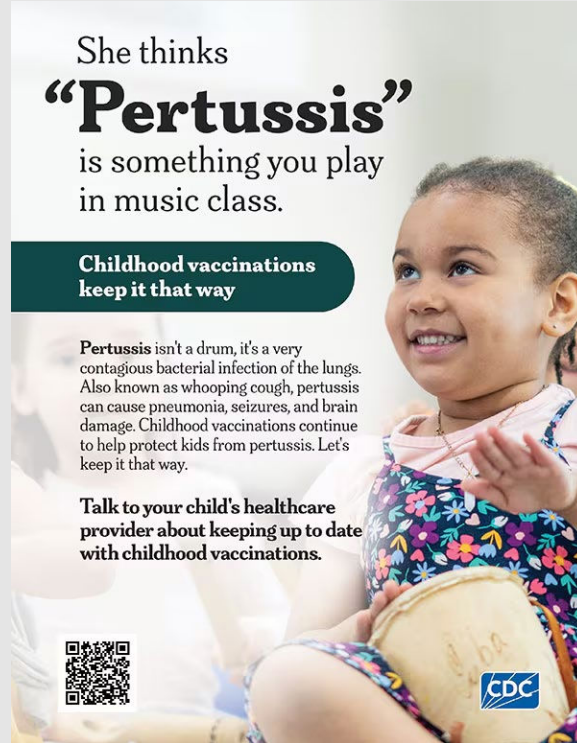


She thinks
“Pertussis”
is something you play
in music class.

**Childhood vaccinations
keep it that way**

Pertussis isn't a drum, it's a very contagious bacterial infection of the lungs. Also known as whooping cough, pertussis can cause pneumonia, seizures, and brain damage. Childhood vaccinations continue to help protect kids from pertussis. Let's keep it that way.

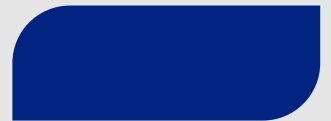
Talk to your child's healthcare provider about keeping up to date with childhood vaccinations.





Thanks!

Questions?



Upcoming Events



**Immunizations Webinar – AAP Immunizations Update and
Best Practices from Other States**

Wednesday, December 4th at 12pm CT



Register at illinoisaap.org/upcoming-events or scan the QR code:

