Measles Update & More

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49th Annual Mel L Cohen, MD Pediatric Update

March 2026

Learning Objectives

- Discuss the epidemiology and re-emergence of measles in the United States and globally
- Review the clinical features, pathophysiology, and management of children with suspected or confirmed measles

2025: A Big Year for Measles

Highest total number of U.S. measles cases in more than 30 years!

N=2255
(preliminary)

Data: https://www.cdc.gov/measles/data-research/index.html

2025: A Big Year for Measles

2-dose MMR Recommendation

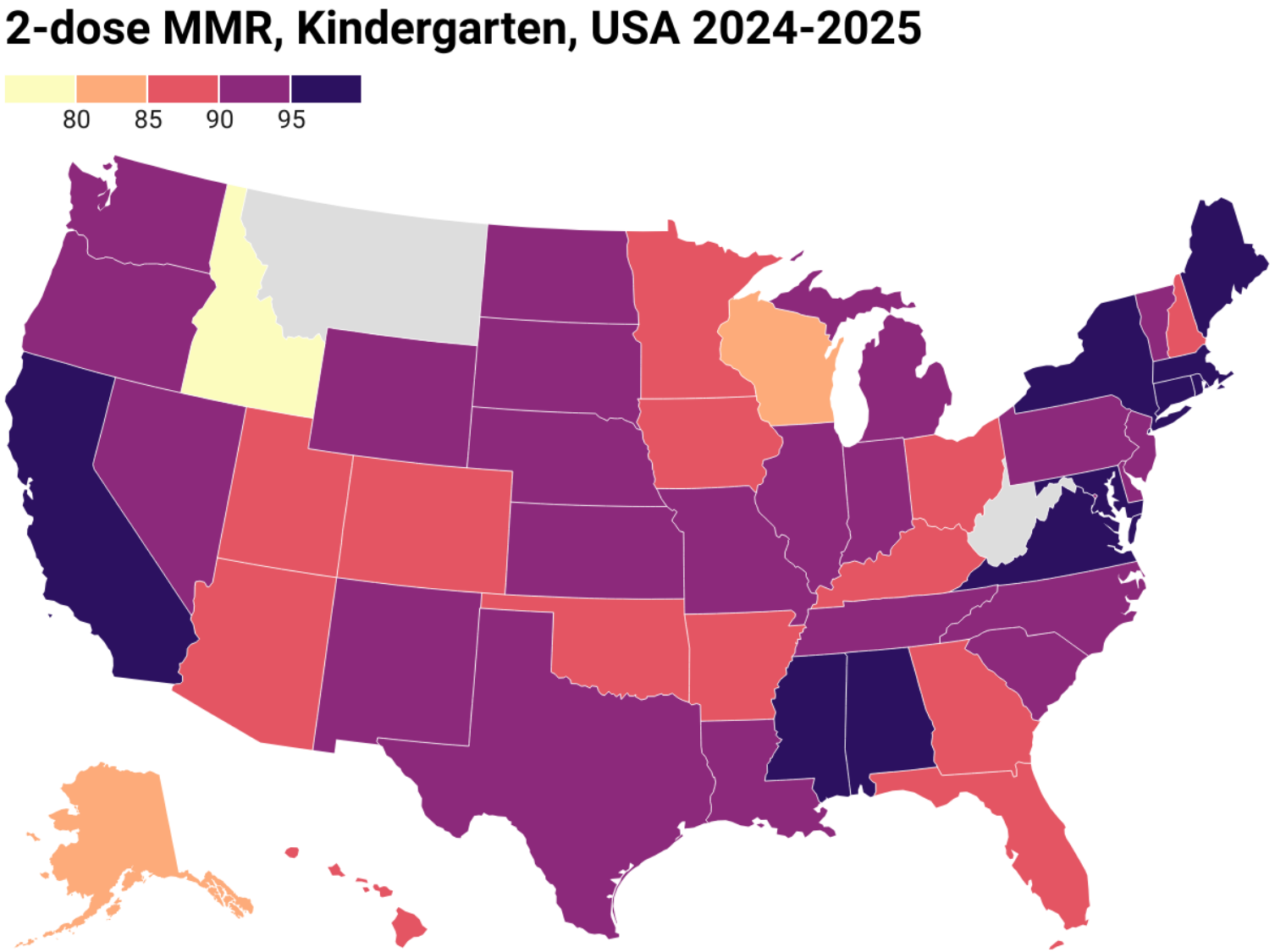
N=2255 (preliminary)

Vaccines for Children Program

Endemic Measles Elimination

Data: https://www.cdc.gov/measles/data-research/index.html

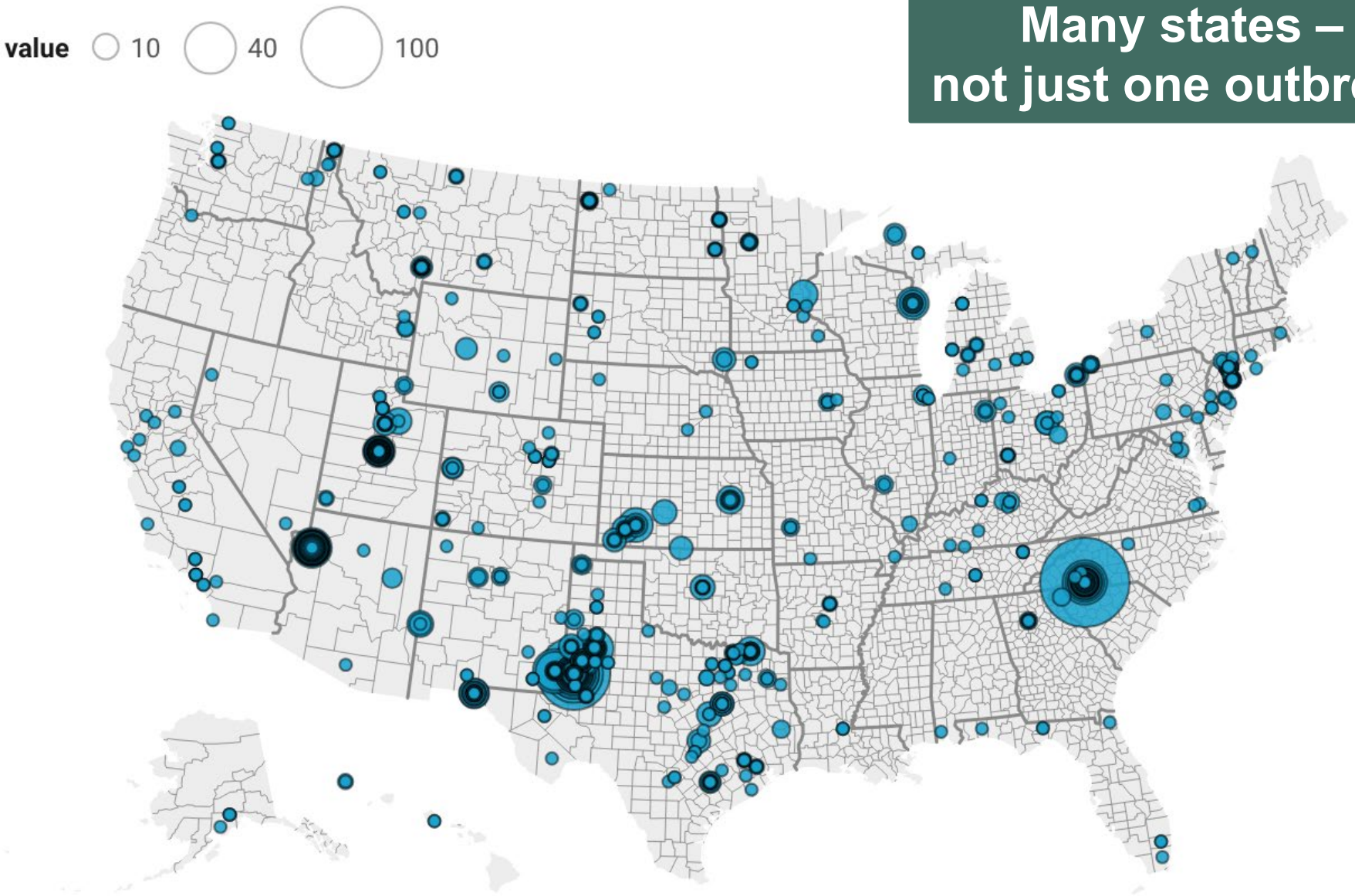
Decreasing MMR Rates



	U.S. kindergarten 2-dose MMR coverage
2019-2020	95.2%
2020-2021	93.9%
2021-2022	93.0%
2022-2023	93.1%
2023-2024	92.7%
2024-2025	92.5%

Data: https://www.cdc.gov/schoolvaxview/index.html

Measles, United States 2025



**Many states –
not just one outbreak**

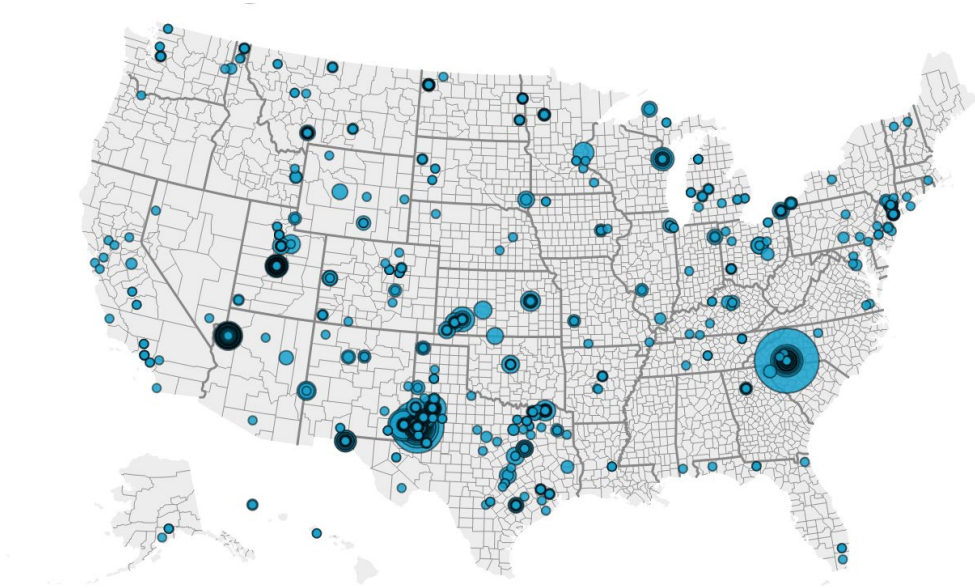
Source: JHU Measles Tracking Team Data Repository at Johns Hopkins University • Created with Datawrapper

Data: https://github.com/CSSEGISandData/measles_data

2025: A Big Year for Measles

2255 total cases (preliminary)

- 93% of cases unvaccinated/unknown
- 11% of cases hospitalized
- 3 deaths (~1.3 per 1000 reported cases)

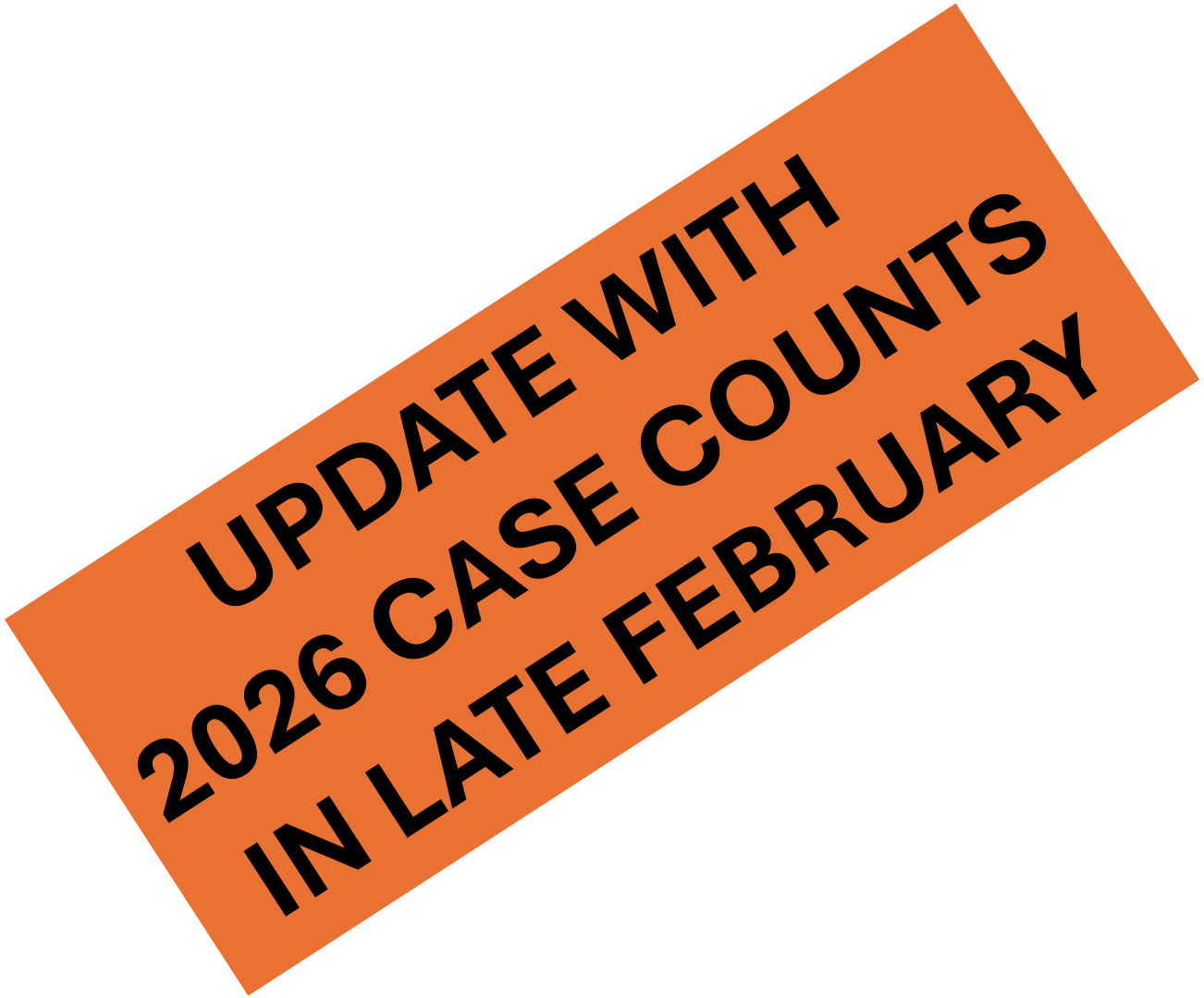


Source: JHU Measles Tracking Team Data Repository at Johns Hopkins University • Created with Datawrapper

U.S. outbreaks in the context of high case numbers in Canada, Mexico, and other countries.

Data: https://www.cdc.gov/measles/data-research/index.html

How is 2026 looking?



MEASLES VIRUS

- RNA virus
- Spreads through the air
- Infects humans (only)
- Incredibly contagious (R_0 ~12-18)
- Ancestor came from cattle (spillover)

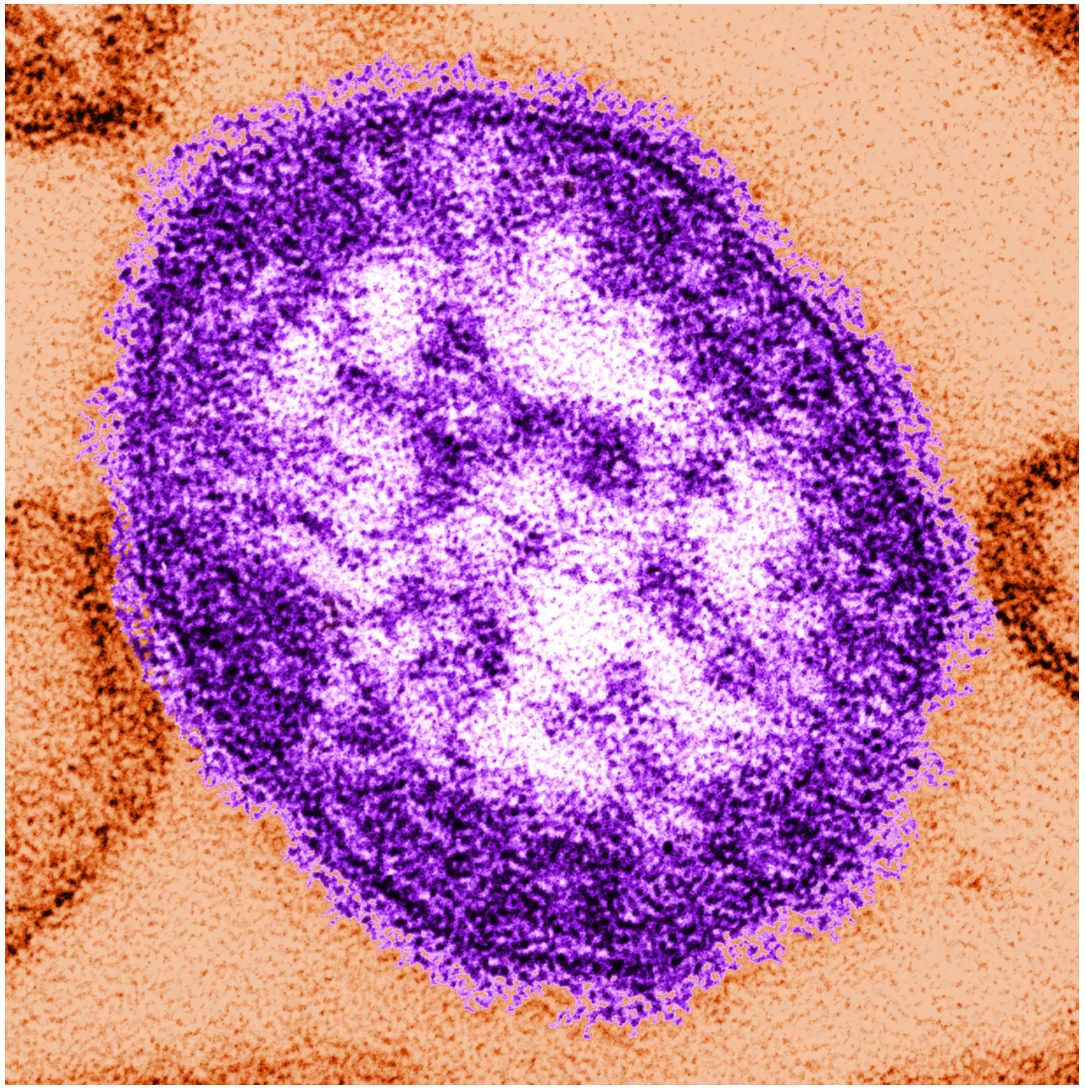


Image: CDC PHIL
Ref: PMID 40561553

Audience Response

Penelope, a healthy 11-month-old who is up-to-date on her routine immunizations, is brought to your office by her mother. Ten days earlier, Penelope and her family drove two hours to a family birthday party and returned home the same day. No one at the party appeared ill. Penelope has been afebrile and her normal, playful self since that time. A physical examination is unremarkable.

Today, Penelope's mother received a call from the parent of an unvaccinated cousin who was at the party to say that the cousin developed a rash yesterday and has been diagnosed with measles.

What can you tell this mother about Penelope's risk of measles due to exposure to her cousin at the party?

Audience Response

What can you tell this mother about Penelope's risk of measles due to exposure to her cousin at the party?

A. **There is essentially no risk that Penelope will develop measles as the result of exposure to her cousin 9 days ago.**

B. **Penelope probably did not contract the measles from her cousin but should stay home from daycare just in case.**

C. **Because she has not received her routine MMR vaccination and had a prolonged exposure to her cousin, there is a more than 90% chance that Penelope will develop a measles rash in the coming days.**

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What can you tell this mother about Penelope's risk of measles due to exposure to her cousin at the party 9 days ago?

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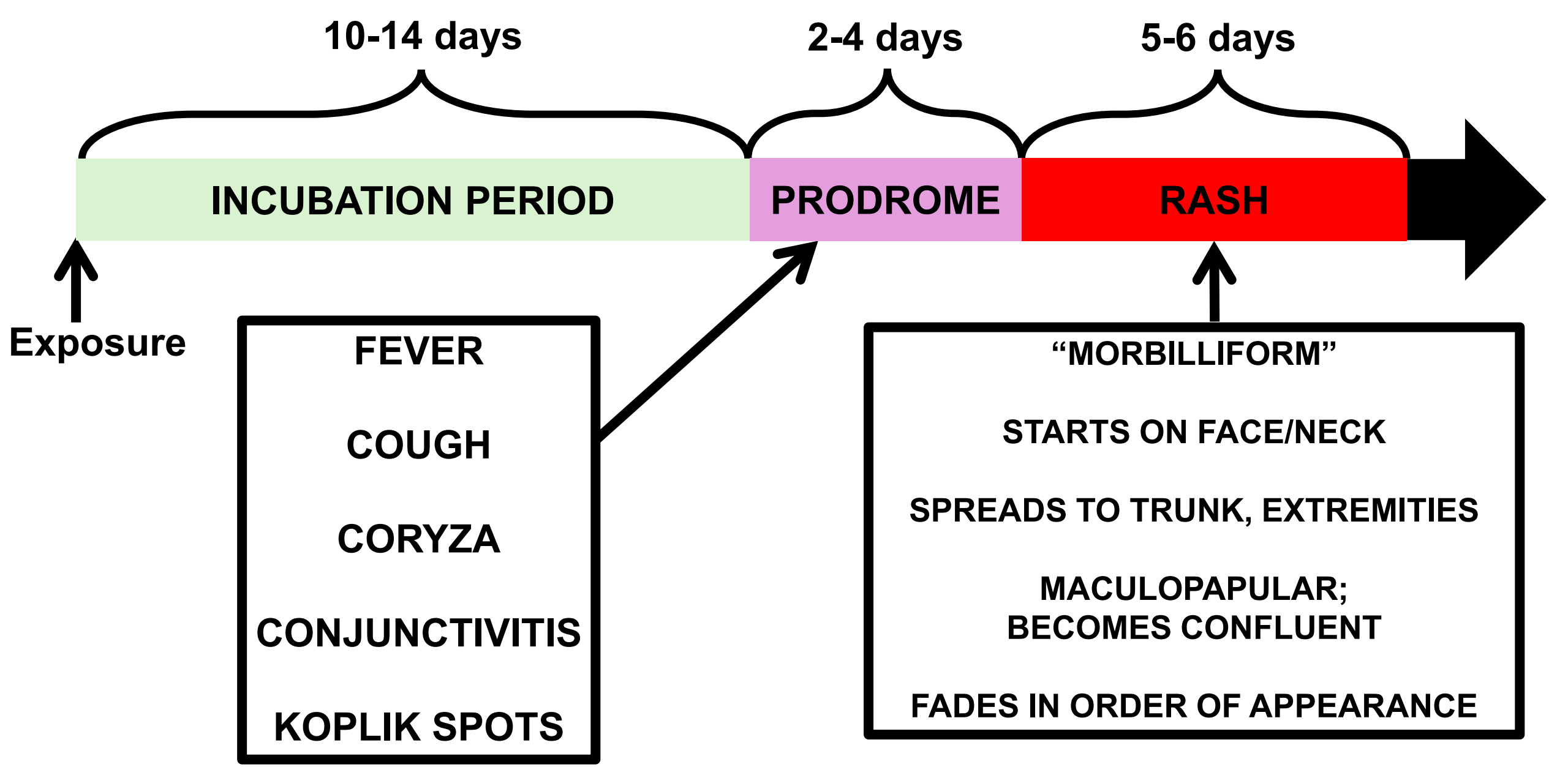

Contagious from 4 days before until 4 days after rash onset.

Ref: PMID 40561553

Clinical Features of Measles

FEVER
COUGH
CORYZA (snotty nose)
CONJUNCTIVITIS
RASH

Image: CDC PHIL

Clinical Features of Measles

Koplik spots on buccal mucosa (A) and palate (B)

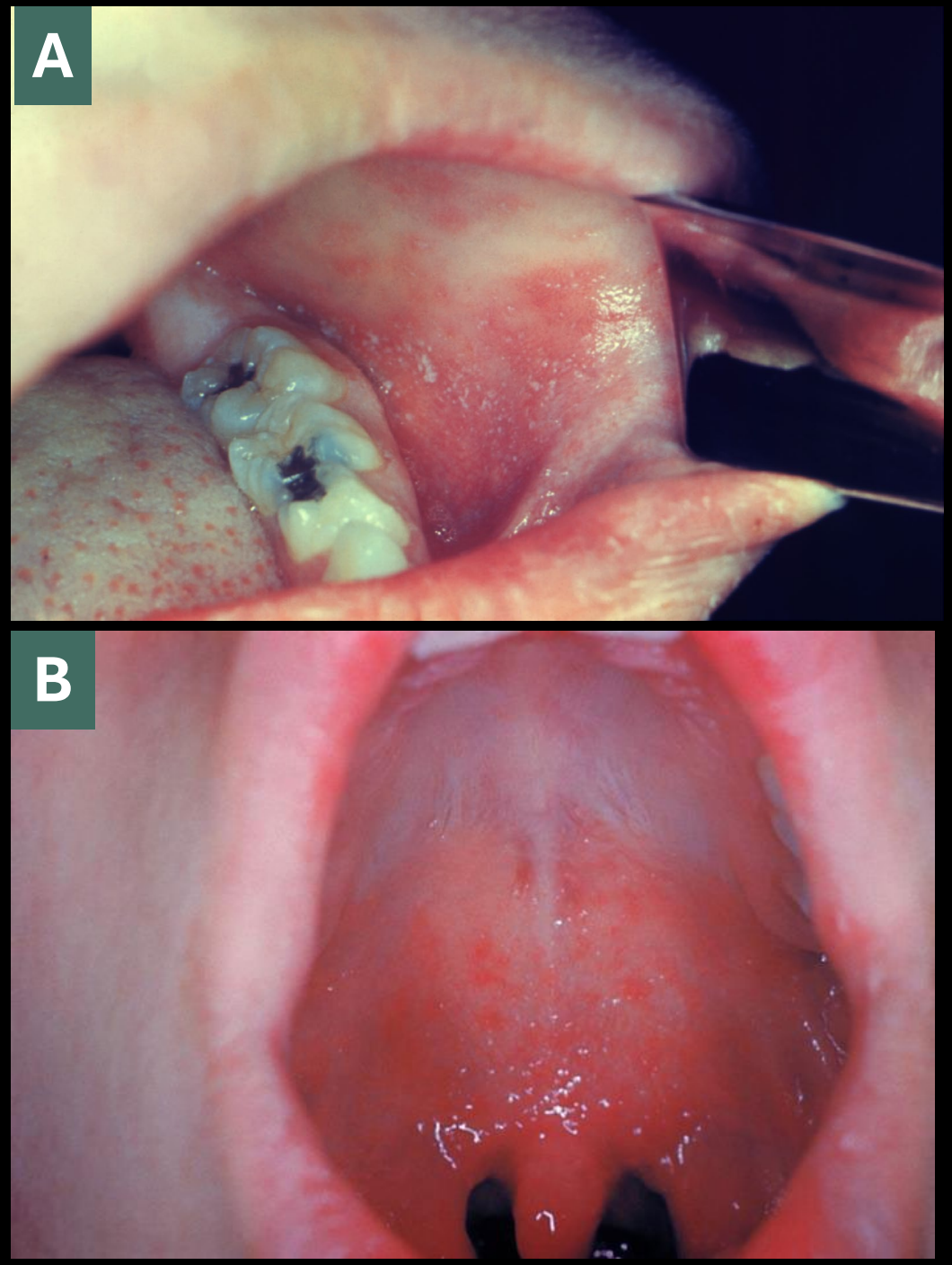

Image: CDC PHIL

Measles Complications

Complication	Approx. Rate
Diarrhea	5-10%
Otitis media	5-10%
Pneumonia	5-15%
Seizures	0.6%
Death	0.2%
Primary measles encephalitis	0.2%
Postinfectious encephalomyelitis	0.1%
Subacute sclerosing panencephalitis (SSPE)	0.01% (1:10,000)

~1:600 for children under age 2 years

Complications more common in children under age 5, adults over age 20, and immunocompromised people.

Refs:
PMID 27695849
PMID 28387784

Recent (September 2025) death of a school-aged child in Los Angeles from SSPE due to measles acquired before 1 year of age.

For Immediate Release:

September 11, 2025

Public Health Reminds Residents About the Importance of Measles Vaccination Following the Death of a Child from a Measles-Related Complication

The Los Angeles County Department of Public Health encourages residents to make sure that all members of their families are protected against measles following the recent tragic death of a school-aged LA County resident from a complication of measles infection acquired during infancy. The child was originally infected with measles as an infant before they were eligible to receive the measles vaccine which is routinely recommended to be administered between 12 and 15 months. Although they recovered from the initial measles illness, the child developed and ultimately died from subacute sclerosing panencephalitis (SSPE)—a rare but universally fatal complication that can occur in individuals who had measles early in life.

http://publichealth.lacounty.gov/phcommon/public/media/mediapubhpdetail.cfm?prid=5135

SSPE

- Rare, degenerative disease of the central nervous system
- Generally **occurs 7-10 years after primary measles infection**
  - Higher rates and faster onset with early life infection (before age 2)
  - Only caused by wild-type (not vaccine) measles virus
- Behavioral and intellectual deterioration; seizures; visual disturbances
- Death usually within 1-3 years of symptom onset
- Ongoing production of **defective (non-contagious) measles viruses** in brain tissue – diagnosed by biopsy and PCR.
- **No proven treatment**.
- **Prevention** through vaccination.

Ref: AAP Red Book 2024-2027; PMID 28387784

Diagnosing Measles

Diagnosis requires clinical suspicion and laboratory confirmation.

- **Differential diagnosis** includes parvovirus, rubella, HHV-6, Kawasaki disease, scarlet fever, dengue, and others.
  - Rash may be atypical or absent in immunocompromised patients
  - History (vaccination; exposures) is crucial!

- **Serology**
  - IgM most common – may be negative early (before rash) or late (after 1 month)
  - Four-fold rise in IgG (acute/convalescent titers)

- **RT-PCR** – nasopharyngeal and/or oral swabs; urine PCR in some settings

- **Viral culture** – now rarely used

Your local public health department can assist with testing.

Ref: AAP Red Book 2024-2027

Infection Prevention/Control

- **Assess clinical status and epidemiologic risk**
  - **Exposure risk** – local epidemiology, travel, visitors from area with active outbreak, timing of potential exposure
  - **Host status** – immunocompromise, medications (eg, steroid use)
  - **Measles immune status** – vaccination history; measles history
- **Isolate immediately!**
  - Mask patient on arrival; individual room / closed door (ideally airborne isolation room); providers: measles immune and in N95 respirators
  - Infectious measles virions may remain in air for ~2 hours
- **Notify local public health department**
- **Test**

Suspected measles is an epidemiologic emergency.

Ref: AAP Red Book 2024-2027

Audience Response

Despite rising local cases of measles, a family in your practice adamantly refuses the MMR vaccine for their young children, choosing instead to give them each a daily vitamin A supplement to prevent measles and its complications.

What can you tell this family about the role of vitamin A in treatment or prevention of measles?

Audience Response

What can you tell this family about the role of vitamin A in treatment or prevention of measles?

A. **Vitamin A deficiency is rare in the United States, so vitamin A supplementation has no role in the prevention or treatment of measles.**

B. **Vitamin A can prevent measles, but only when started early and given at very high doses.**

C. **Vitamin A can decrease the risk of measles complications but is only recommended in low- and middle-income country settings.**

D. **Vitamin A supplementation can decrease the risk of complications in children who already have measles, but specific dosing recommendations need to be followed.**

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What can you tell this family about the role of vitamin A in treatment or prevention of measles?

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Treatment / Prevention of Measles

- **No specific antiviral therapy** available
  - Ribavirin has some in vitro activity
  - Antibiotics for bacterial superinfection (otitis media; pneumonia)

- **Vitamin A**
  - Deficiency → increased rates of complications
  - Short-term supplementation → better outcomes
  - Underused in real-world settings
  - **Does <u>not</u> work for prevention of measles!**

- **Vaccination** is the cornerstone of prevention

- **Post-exposure** vaccine or immune globulin

Ref: AAP Red Book 2024-2027; PMID 40561553

Vitamin A and Measles

Current AAP guidance:

The WHO currently recommends vitamin A for all children with measles, regardless of their country of residence. Many US experts concur with administering vitamin A to all children in the United States with measles, regardless of hospitalization status.

Ref: AAP Red Book 2024-2027

Vitamin A and Measles

- 1932: J.B. Ellison publishes data suggesting that **vitamin A decreases risk of pneumonia and death** in hospitalized children with measles.
- **Vitamin A deficiency increases measles mortality** among children.
- Multiple randomized controlled trials demonstrate that **vitamin A supplementation decreases measles mortality in low- and middle-income settings**.
- U.S. data suggest that **measles infection can lower circulating vitamin A levels in children**.
- No sufficiently powered trials have assessed vitamin A for measles treatment in high-income settings.

Refs: PMID 20777111; 1625097; 2194128; 8502524; 1285727
AAP Red Book 2024-2027; https://www.nfid.org/resource/vitamin-a-for-the-management-of-measles-in-the-us/

Vitamin A and Measles

- **Vitamin A dosing**
  - **Once daily for 2 days** (on diagnosis and 24 hrs. later)
  - Third dose 2-6 weeks later *only* if there are clinical signs of vitamin A deficiency (eg, xerophthalmia)
  - No role for measuring vitamin A levels unless there are signs of deficiency

- **Age-based dosing (per dose)**
  - < 6 months: 50,000 IU (15,000 µg retinol activity equivalent [RAE])
  - 6-11 months: 100,000 IU (30,000 µg RAE)
  - ≥ 12 months: 200,000 IU (60,000 µg RAE)

- **No role of vitamin A in prevention of measles. Risk of vitamin A toxicity in children treated with high doses or for long periods.**

Ref: AAP Red Book 2024-2027

Measles Vaccination

Situation in flux.

MMRV may be unavailable for children under age 4 years.

- **Routine MMR vaccination (minimum age 12 months)**
  - 2 dose series at 12-15 months, age 4-6 years
  - MMR or MMRV may be administered
- **AAP recommendations re: MMRV**
  - No preference for MMR + varicella vs. MMRV for first dose.
  - MMRV generally preferred for second dose.
- **Discuss rare possibility of febrile seizure 1-2 weeks after MMRV for first dose (1 additional seizure per ~2000-3000 first doses of MMRV compared to MMR. No difference at dose 2).**

Ref: AAP Immunization Schedule 2026

Measles Vaccination

Lots of questions about this.

- **Catch-up vaccination**
  - 2 dose series at least 4 weeks apart
  - Maximum age for MMRV is 12 years.

- **International travel or local outbreak (per public health dept.)**
  - Infants age 6-11 months
    - Early dose (“MMR 0”) at least 2 weeks before travel
    - Still need 2 dose series after age 12 months.

  - Age ≥ 12 months
    - If unvaccinated, 2 dose series separated by at least 4 weeks (if MMRV, minimum interval between doses is 3 months).
    - If previously received 1 dose, give dose 2 at least 4 weeks after dose 1.

Ref: AAP Immunization Schedule 2026

Audience Response

On the first day back from winter break, a kindergarten teacher notices that one of her students hasn't looked well all morning and has a rash on her neck and bright red eyes. The student is sent to the nurse's office and then to her pediatrician, who diagnoses her with measles. RT-PCR done on a swab sample from the child's nasopharynx confirms the diagnosis.

The mother of an unvaccinated child in the same class brings her daughter to your office the next morning (~24 hours after exposure) and asks what she can do to prevent her daughter from getting the measles.

What is the next step in management of this child who has been exposed to measles?

Audience Response

What is the next step in management of this 5 y/o child who has been exposed to measles ~24 hours ago?

A. **No intervention, as the exposure has already occurred.**

B. **Post-exposure vaccination with MMR.**

C. **Immune globulin prophylaxis and home quarantine.**

D. **Prophylactic antibiotic therapy (high-dose amoxicillin) to prevent bacterial superinfection.**

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Measles Post-Exposure Prophylaxis

Age Measles Immune Status	Time Since Initial Exposure

Ref: 2024-2027 *AAP Red Book*

Measles Post-Exposure Prophylaxis

Not pregnant or immunocompromised

Age	Immune status	≤ 3 days from initial exposure	4-6 days from initial exposure	> 6 days from initial exposure
≥ 6 months	*Immune*	PEP not indicated		
≥ 12 months	*1 dose of MMR*	Administer second dose of MMR if not up-to-date and if ≥ 28 days from first dose		
< 6 months	*Nonimmune*	Immune globulin Quarantine		PEP not indicated Quarantine
6-11 months	*Nonimmune*	MMR vaccine No quarantine	Immune globulin Quarantine	PEP not indicated Quarantine
≥ 12 months	*Nonimmune*	MMR vaccine No quarantine	PEP usually not administered Quarantine	PEP not indicated Quarantine

Remember: Delay subsequent MMR in recipients of IG.

Ref: 2024-2027 *AAP Red Book*

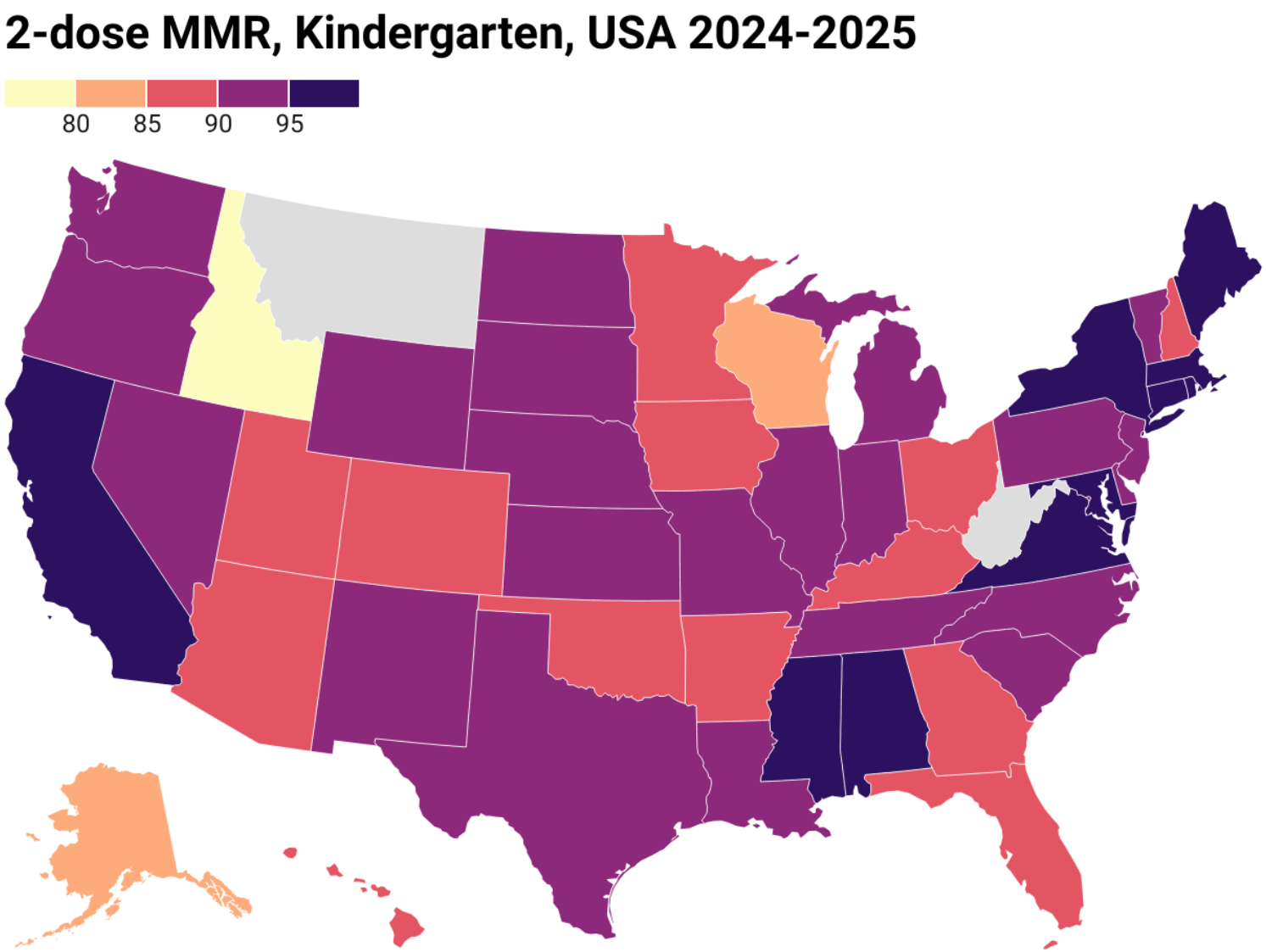
Measles Post-Exposure Prophylaxis

Pregnant or immunocompromised				
	Immune status	**≤ 3 days from initial exposure**	**4-6 days from initial exposure**	**> 6 days from initial exposure**
Severely immunocompromised	*Immune/ nonimmune*	Immune globulin Quarantine		PEP not indicated Quarantine
Pregnant	*Immune*	PEP not indicated		
	Nonimmune	Immune globulin Quarantine		PEP not indicated Quarantine

Remember: Delay subsequent MMR in recipients of IG.

Ref: 2024-2027 *AAP Red Book*

What does the future hold?



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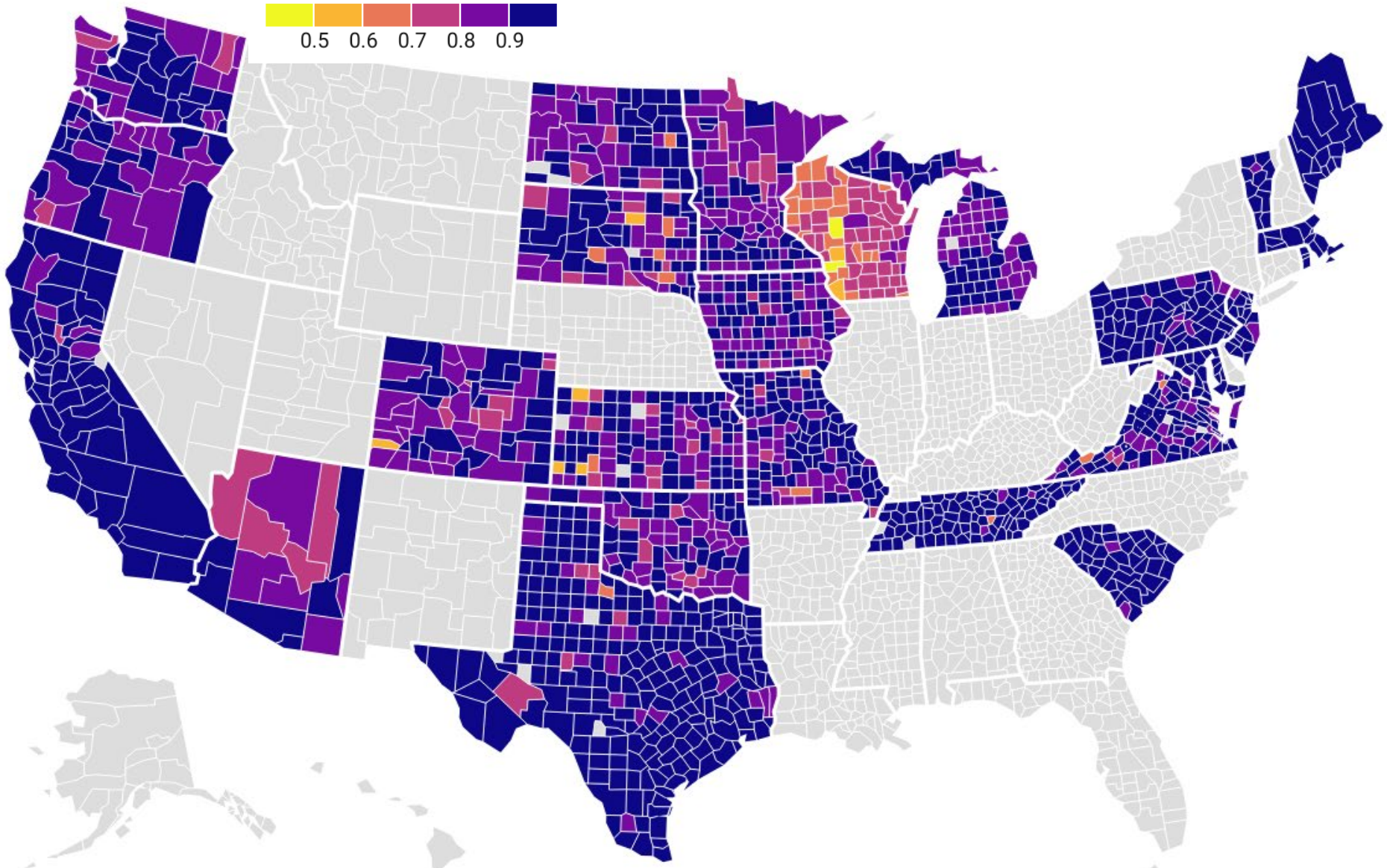
Data: https://www.cdc.gov/schoolvaxview/index.html

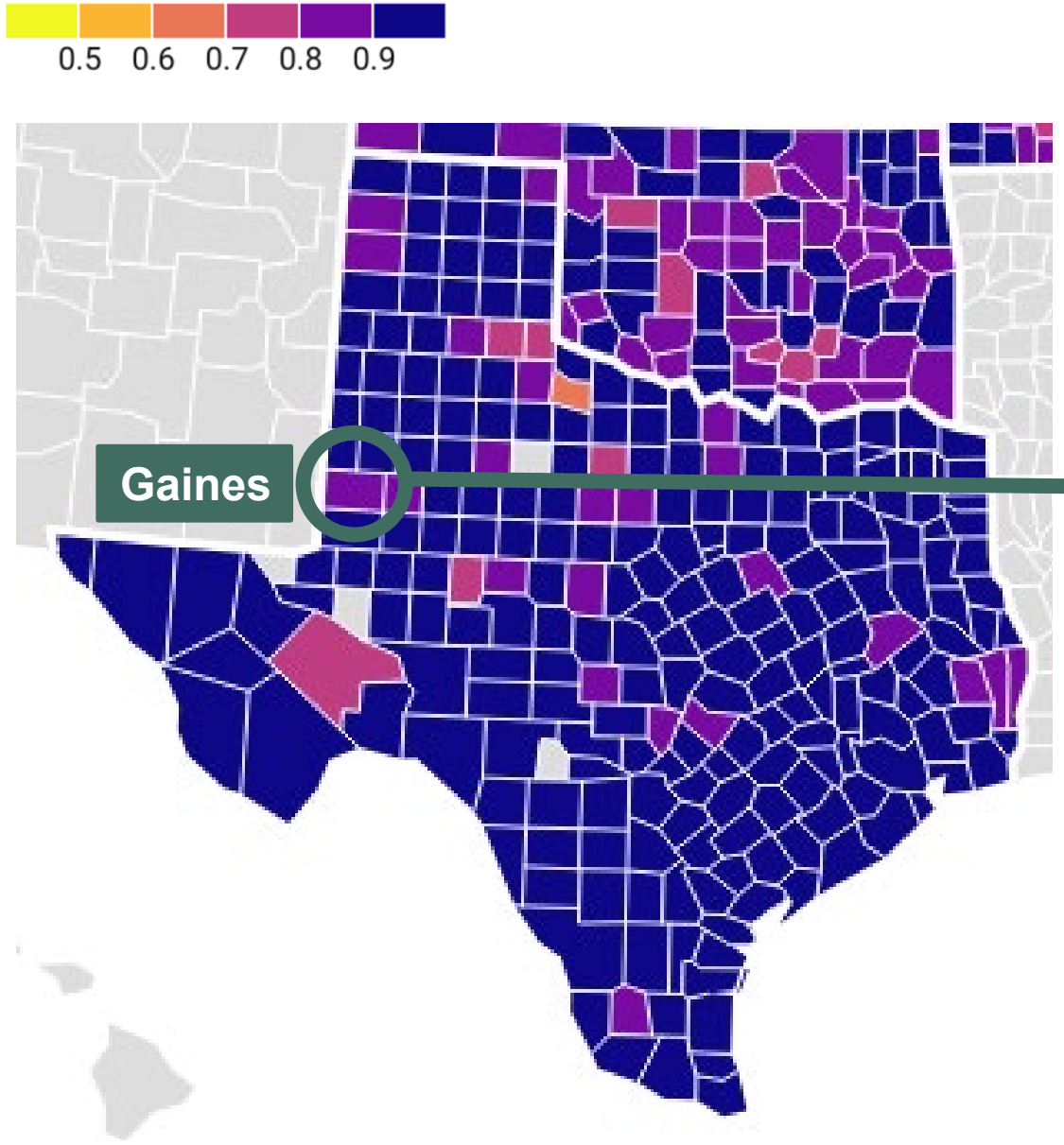
County-level 2-dose MMR rates 2023-2024



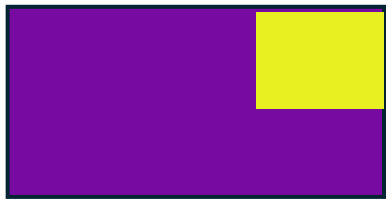
Source: Data from JHU. • Created with Datawrapper

Ref: PMID 40455620

County-level 2-dose MMR rates



Sub-county (school district) level differences in vaccination rates may drive outbreaks.



Know your local epidemiology!

Work with school officials, local public health groups to encourage vaccination.

Ref: PMID 40455620; 41052443

Take-Home Points

- Measles is **highly contagious** and **can cause severe disease and death**, especially in unvaccinated children.

- **Falling vaccination rates** at the national, state, and (especially) local levels are driving outbreaks across the U.S.

- **Suspecting measles early** helps with:
  - Prompt isolation and diagnostic testing
  - Early consideration of vitamin A therapy
  - Timely use of post-exposure prophylaxis for eligible contacts
  - Alerting local public health agencies

- **Advocacy for vaccination** is the only way out of this mess!

Thank you!