Massachusetts Measles Update

May 1, 2025

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Presenter Disclosure Information

I, Angela Fowler, have been asked to disclose any relevant relationships with commercial entities that are either providing financial support for this program or whose products or services are mentioned during my presentation.

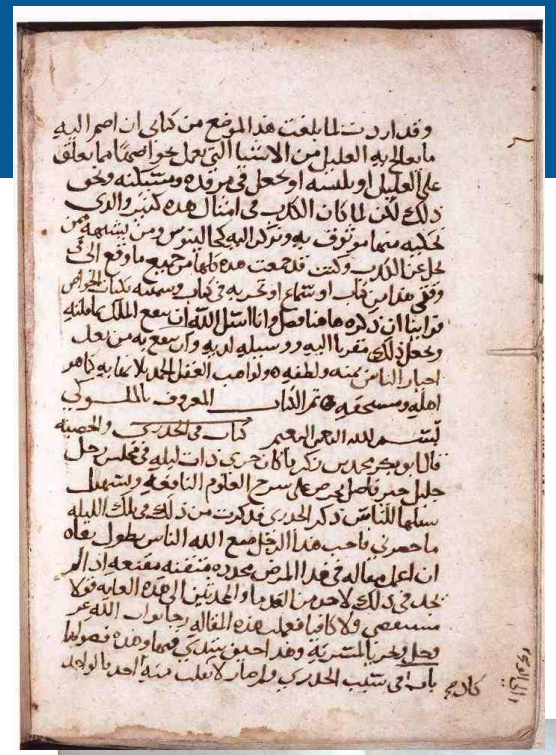
I have no relationships to disclose.

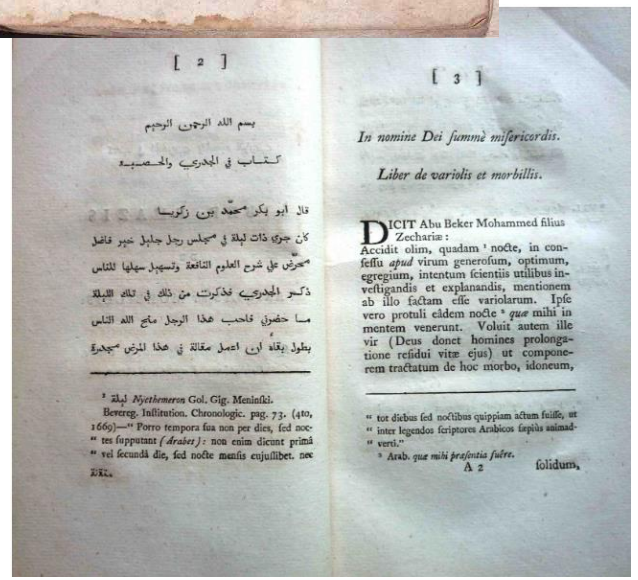
I may discuss the use of vaccines in a manner not approved by the U.S. Food and Drug Administration, but in accordance with ACIP recommendations.

Background and Microbiology

- Ancient disease with zoonotic origins
  - Evolved from Rinderpest (cattle plague)
  - Sporadically infected humans in 4th Century BC
  - Evolved to become a distinct virus that infected humans.

- In the 10th century Persian physician and scholar Abu Bakr Muhammad ibn Zakariya al-Razi provided the first documented description of measles in his book called “Treatise on Smallpox and Measles.”
  - The book was translated several times into Latin and other European languages and published several times in Europe from the 15th to the 19th centuries





[2]

بسم الله الرحمن الرحيم

كتاب في الجدري والحصبة

قال ابو بكر محمد بن زكريا

كان جرى ذات ليلة في مجلس رجل جليل خير فاضل

محرض على شرح العلوم النافعة وتسهيل سبلها للناس

ذكر الجدري فذكرت من ذلك في تلك الليلة

ما حضرني فاحب هذا الرجل منح الله الناس

بطول بقاه ان اعمل مقالة في هذا المرض مجردة

[3]

In nomine Dei fummè misericordis.

Liber de variolis et morbillis.

DICIT Abu Beker Mohammed filius Zechariæ: Accidit olim, quadam [1] nocte, in conſeſſu *apud* virum generoſum, optimum, egregium, intentum ſcientiis utilibus inveſtigandis et explanandis, mentionem ab illo factam eſſe variolarum. Ipſe vero protuli eâdem nocte [2] *quæ* mihi in mentem venerunt. Voluit autem ille vir (Deus donet homines prolongatione reſidui vitæ ejus) ut componerem tractatum de hoc morbo, idoneum,

[1] لية *Nyctemeron* Gol. Gig. Meninſki. Beveregi. Inſtitution. Chronologic. pag. 73. (4to, 1669)—" Porro tempora ſua non per dies, ſed noctes ſupputant (*Arabes*): non enim dicunt primâ " vel ſecundâ die, ſed nocte menſis cujuſlibet. nec

[2] Arab. *quæ mihi præſentia fuêre.*

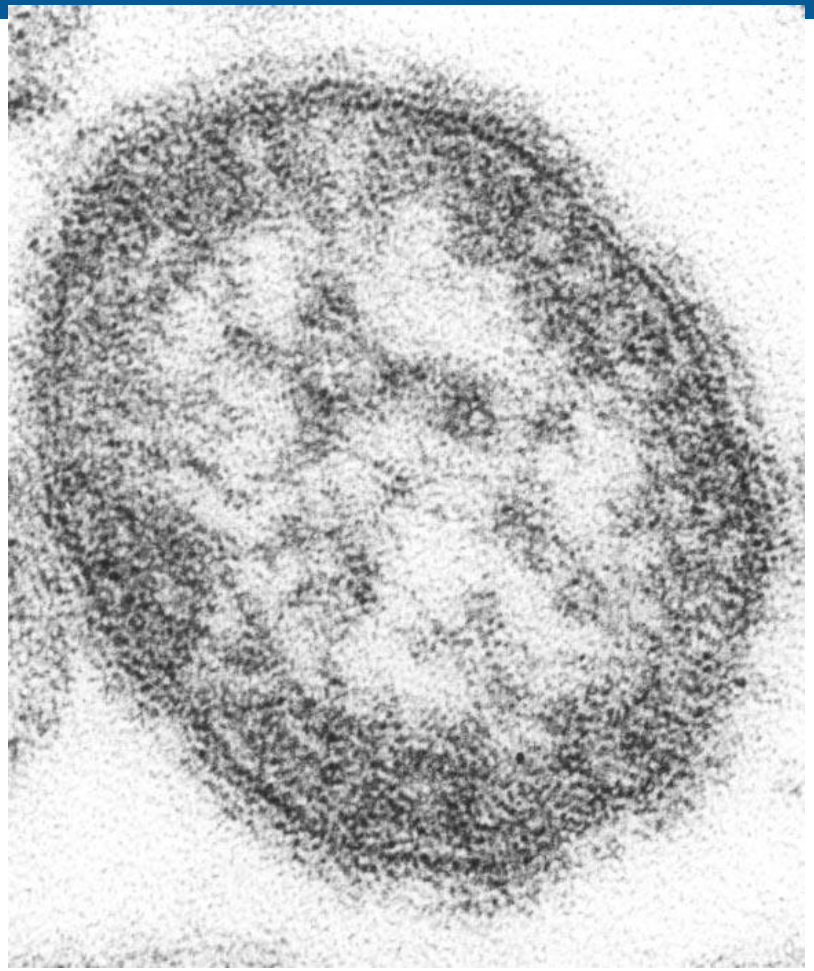
A 2 ſolidum,

Background and Microbiology

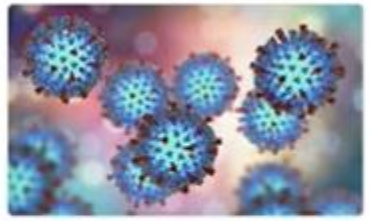
- In 1912, measles became a nationally notifiable disease in the US. In the first decade of reporting, an average of 6,000 measles-related deaths were reported each year
- In 1954, a measles outbreak at Fay School in Southborough MA provided an opportunity for doctors led by Dr. John Enders at Boston Children's Hospital to try and isolate the measles virus for vaccine development.
- Able to isolate measles virus from a 11-year-old student, David Edmonston's blood samples.
- The culture obtained from the student led to the virus' cultivation and→ enabled the team to create the first vaccine against measles. Developed the measles vaccine from the 'Edmonston-B' strain, named after David and used as the basis for most live-attenuated vaccines to this day

Background and Microbiology

- Enveloped singe stranded RNA virus.
- Primary site of infection is alveolar macrophages or dendritic cells.
- Humans are the only natural hosts of measles virus.
- Transmitted by direct contact with infectious droplets from coughing, sneezing, or breathing, or less commonly by airborne spread.
- Virus can remain in the air for 2 hours.
- One of the most contagious diseases - 90% susceptible contacts will get measles.



Clinical Features – Symptom Timeline



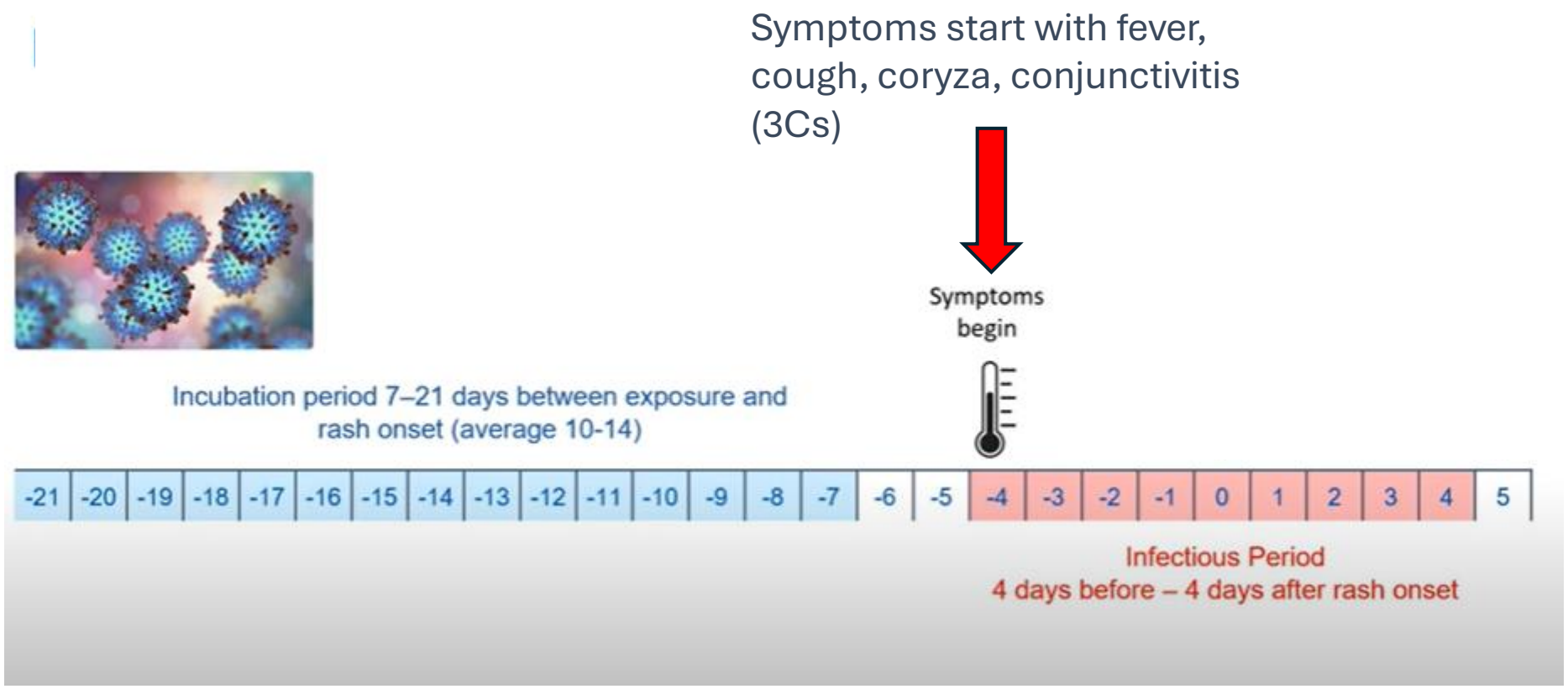
Incubation period 7–21 days between exposure and rash onset (average 10-14)

-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5

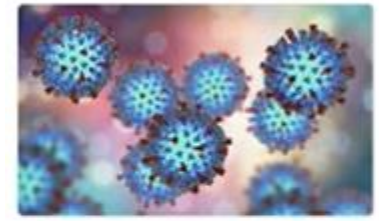
Infectious Period
4 days before – 4 days after rash onset

Clinical Features – Symptom Timeline

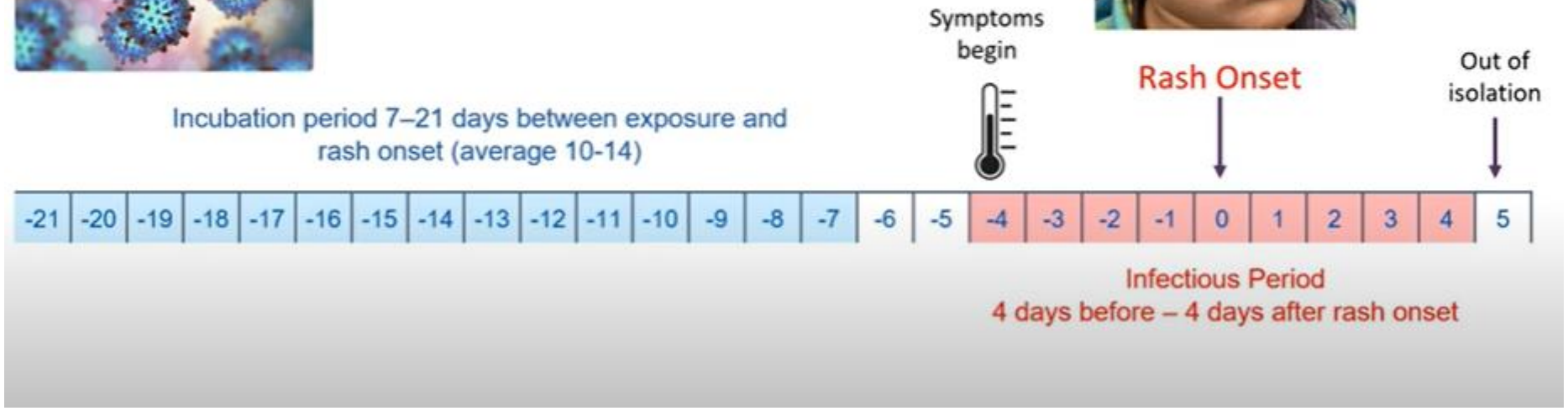
Symptoms start with fever, cough, coryza, conjunctivitis (3Cs)



Clinical Features – Symptom Timeline



Maculopapular rash starts 3 to 4 days after symptom onset



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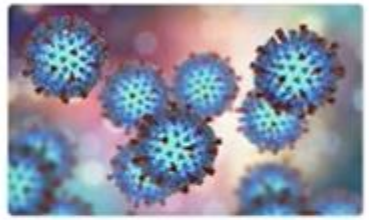

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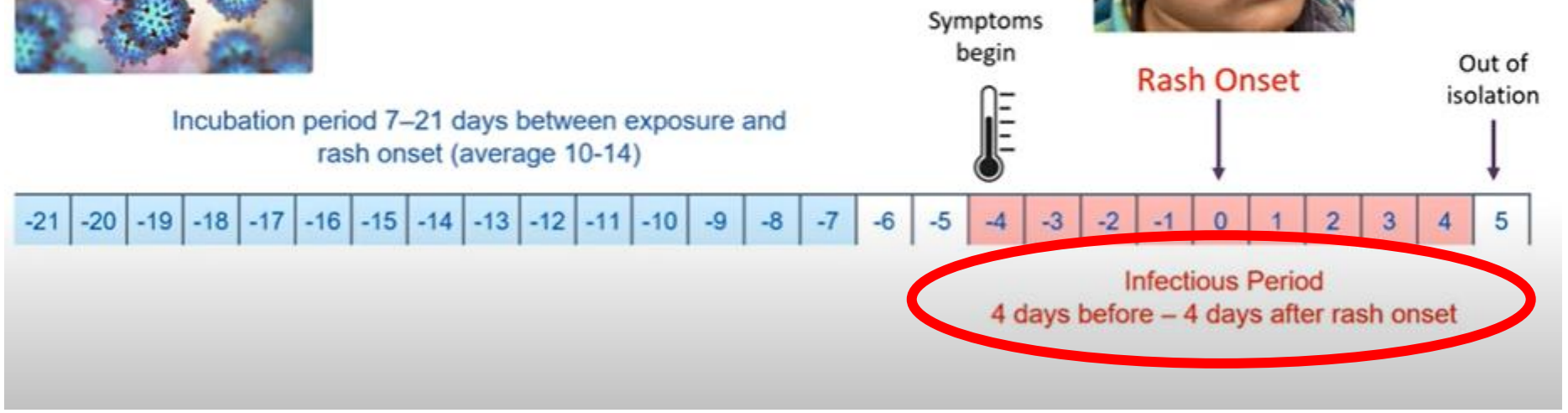
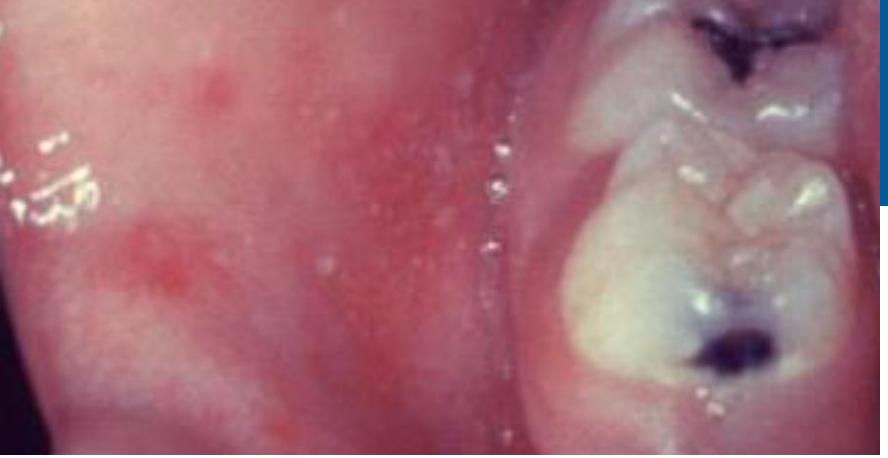




Measles Skin Findings

- **Koplik spots -** Tiny punctate white spots may appear on the buccal mucosa 1 to 2 days before rash onset.

- **Measles rash -** It usually begins three to five days after symptoms begin - flat red spots that appear at the hairline and spread downward to the neck, trunk, arms, legs, and feet.
  - Macules may appear pink on light skin and purple/dark/not seen on dark skin.
  - Small papules may also appear on top of the macules.
  - The macules may become joined together as they spread from the head to the rest of the body

Measles Skin Findings

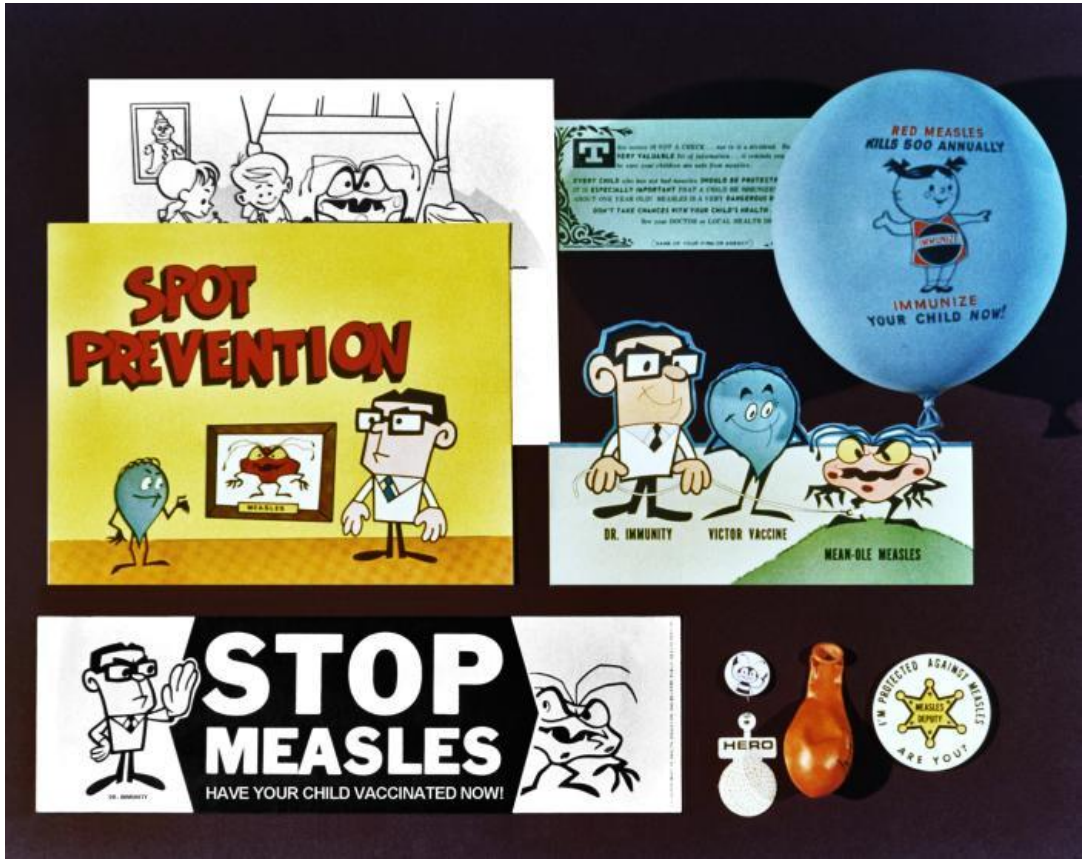
Acute Sequelae of Measles

- Highly contagious, potentially very serious illness

- ~20% children hospitalized during infection with measles

- Diarrhea (10%)
- Pneumonia (1–6%)
- Encephalitis (1 in 1,000) - can leave the child
- with deafness or with intellectual disability.
- Death (1–3 in 1,000)

In the US, every year in the pre vaccine era - 400 to 500 people died, 48,000 were hospitalized, and 1,000 suffered encephalitis from measles



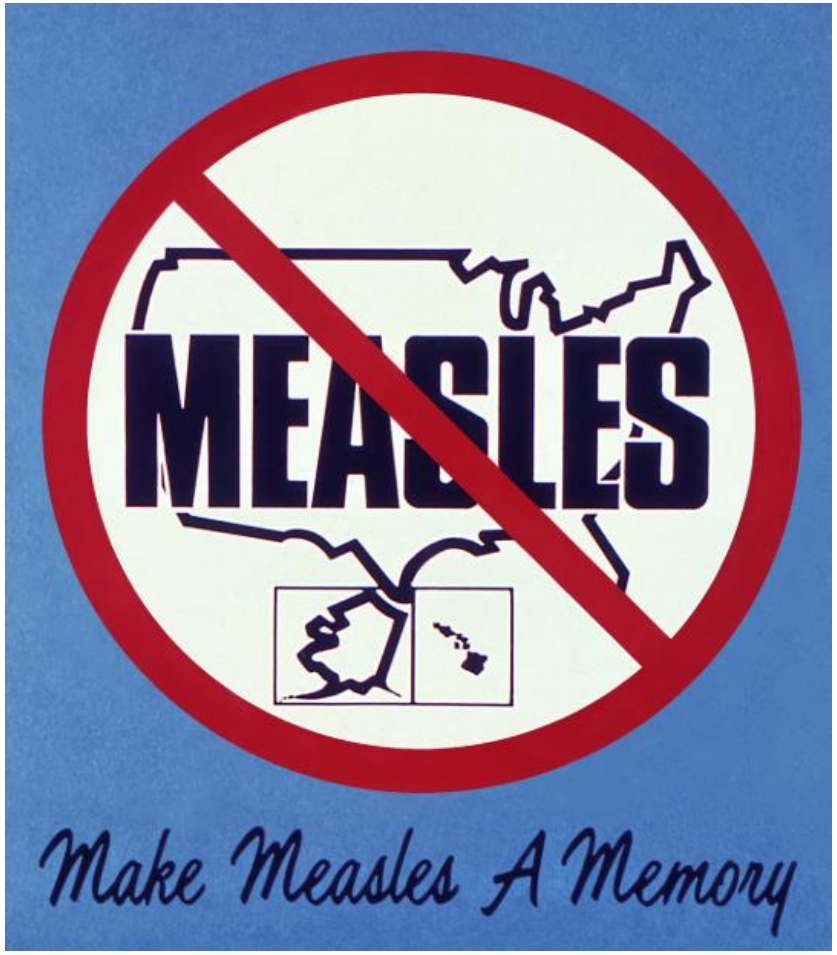
Measles, Mumps, Rubella (MMR) Vaccine

MMR is an attenuated live virus vaccine.

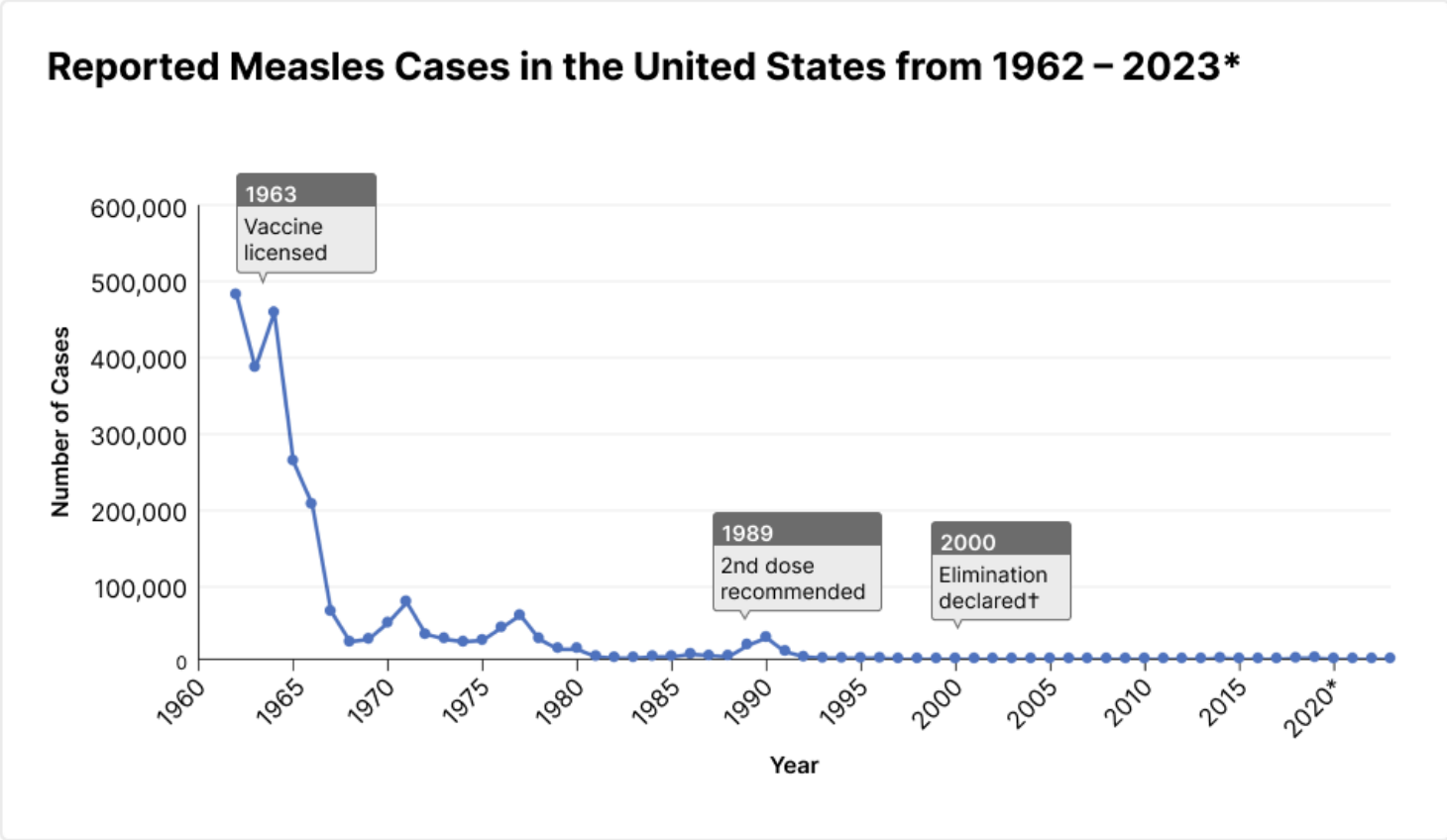
- **Routine vaccination schedule**
  - Dose 1: age 12–15 months
  - Dose 2: age 4–6 years

- One dose of MMR vaccine is 93% effective against measles.

- Two doses of MMR vaccine are 97% effective against measles.

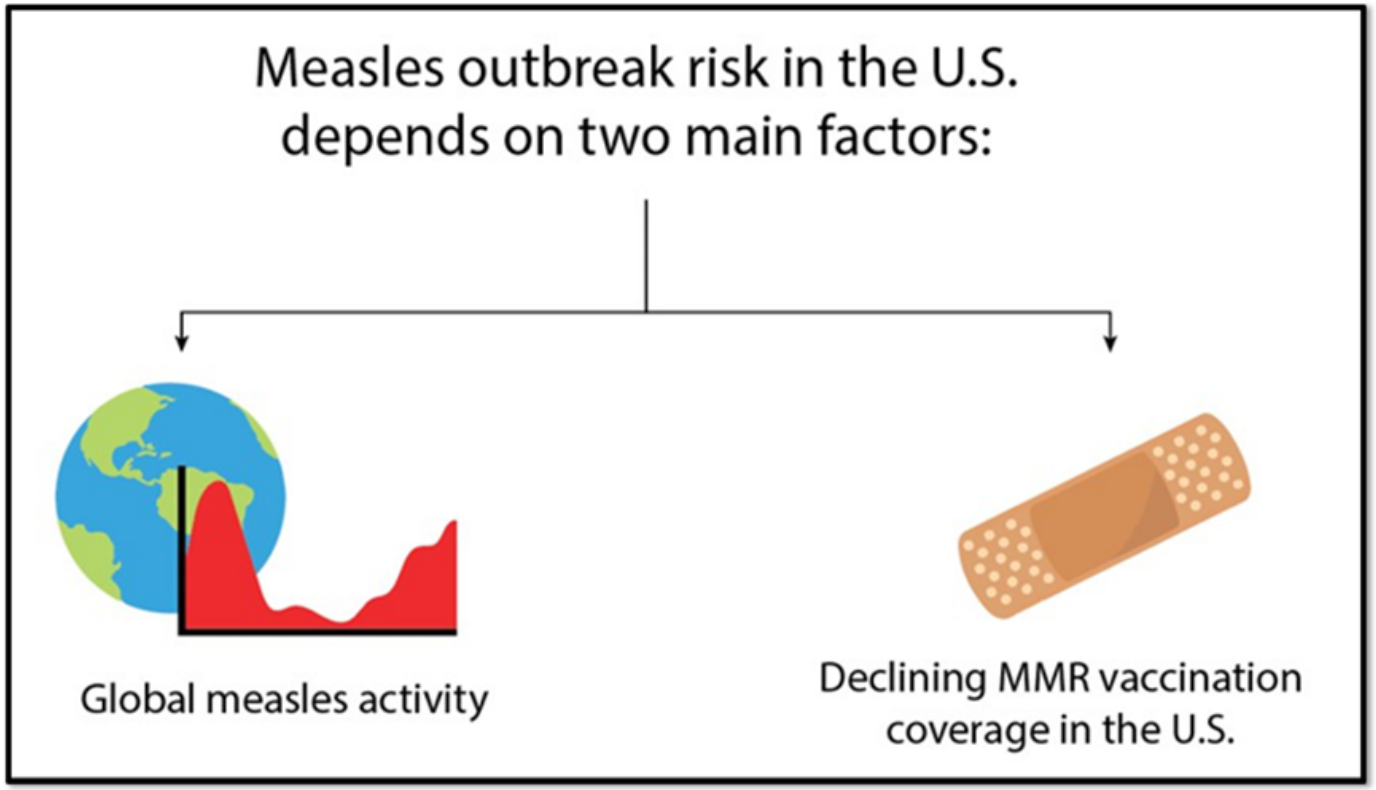


Rapid decrease in incidence of measles cases after introduction of vaccination

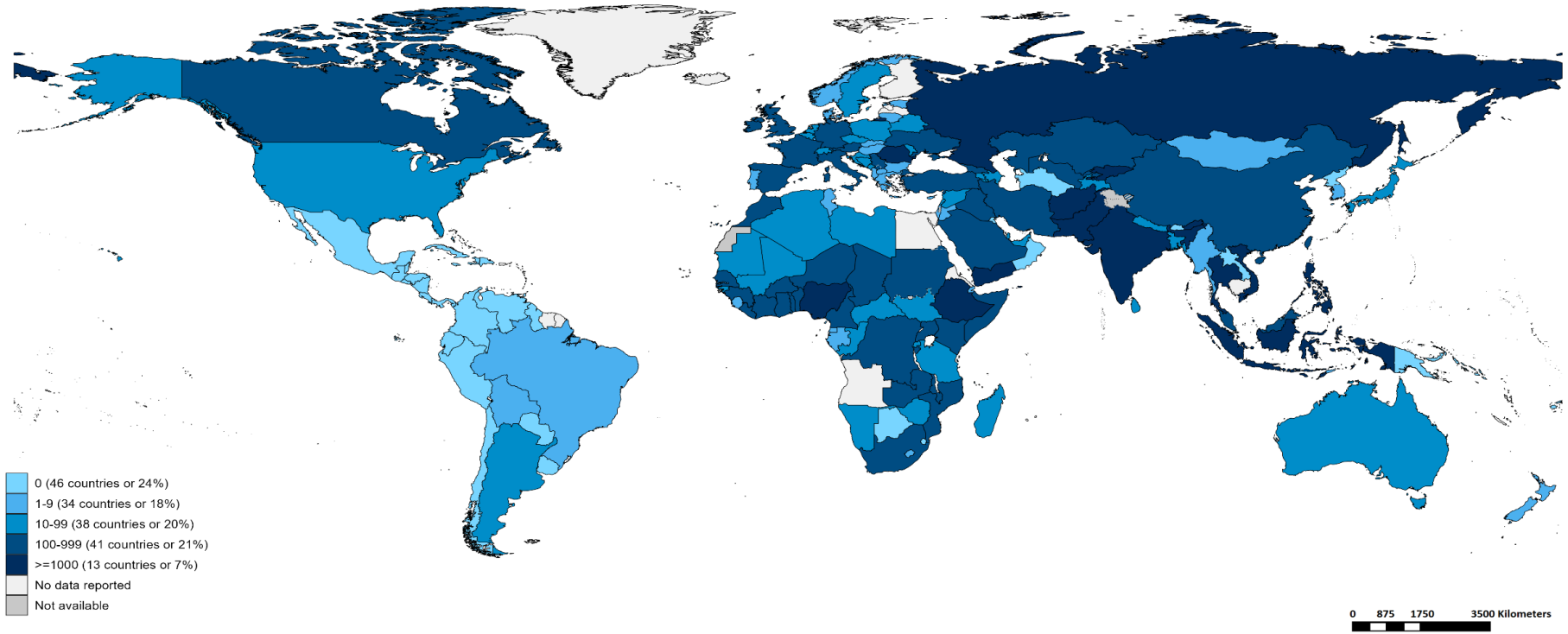


In 2000, measles was declared eliminated from the United States - the absence of endemic measles virus transmission for at least 12 months

Assessing Measles Outbreak Risk in the United



Reported Measles Cases Worldwide (August 2024 – January 2025)



Country	Cases*
Yemen	7,584
Pakistan	6,661
India**	6,532
Thailand	6,224
Ethiopia	4,596
Romania	4,478
Afghanistan	4,358
Indonesia	3,346
Kyrgyzstan	2,966
Viet Nam	1,835

World Health Organization

Data source: IVB Database

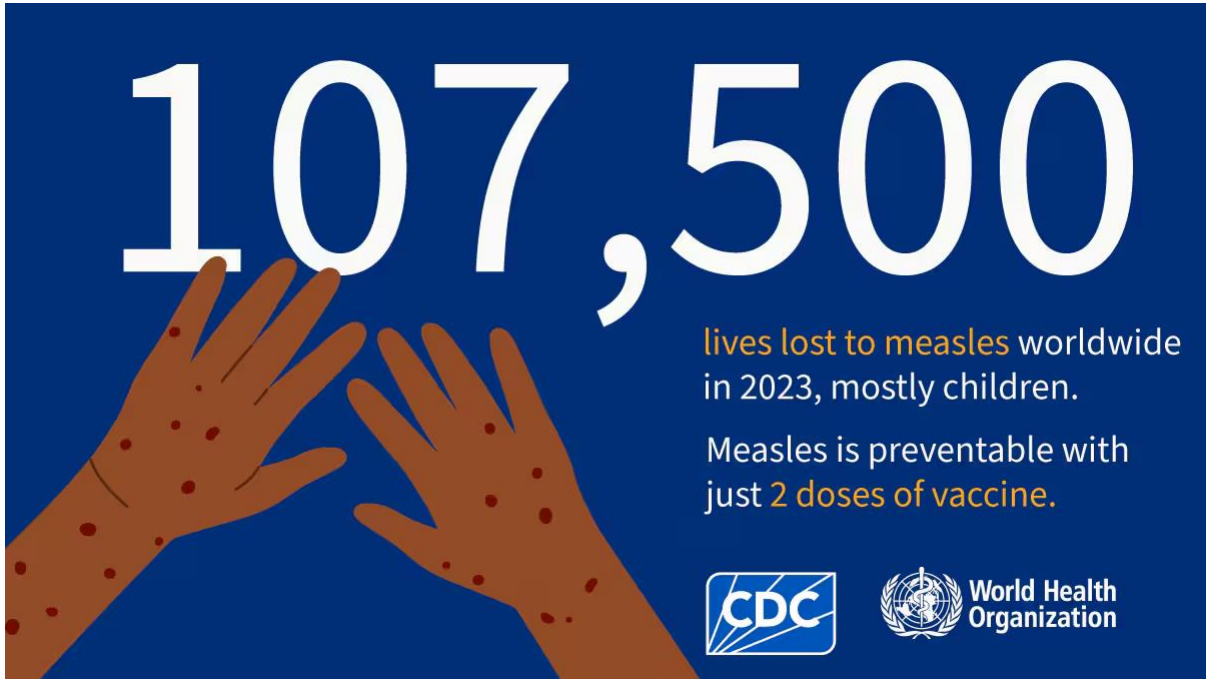
Disclaimer: The boundaries and names shown and the designations used on this map do notimply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Notes: Based on data received 2025-03 - Surveillance data from 2024-08 to 2025-01 - * Countries with highest number of cases for the period - **WHO classifies all suspected measles cases reported from India as measles clinically compatible if a specimen was not collected as per the algorithm for classification of suspected measles in the WHO VPD Surveillance Standards. Thus numbers might be different between what WHO reports and what India reports.

Global Measles Deaths

A Yemeni family with their young daughter, who lost her twin sister to measles.

©UNICEF/U.S.CDC/UN0684493/Hayyan.



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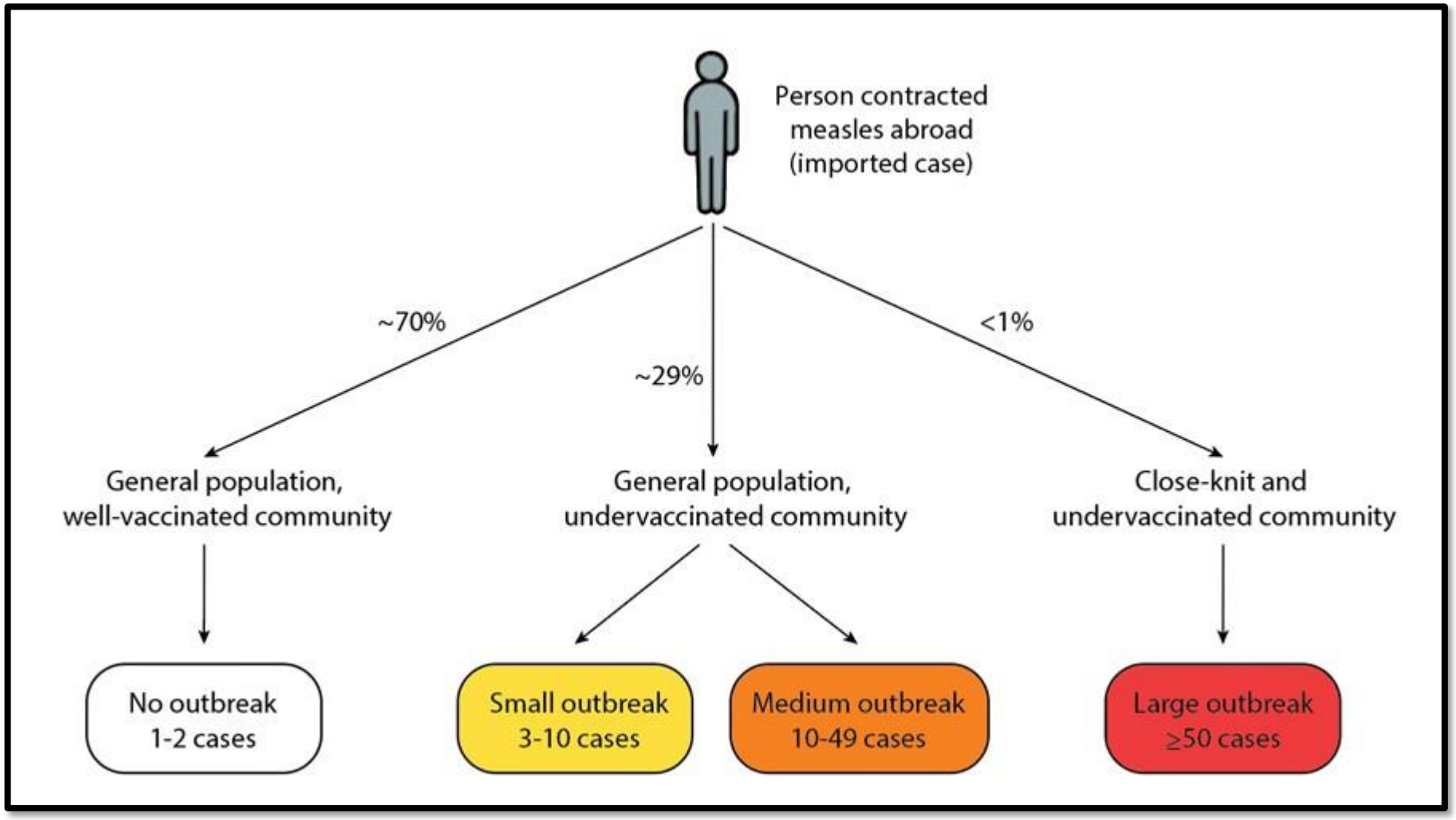


Current Outbreak

As of April 25, 2025, a total of 884 confirmed* measles cases were reported by 30 jurisdictions

U.S. Cases in 2025

Total cases

884

Age
Under 5 years: **266 (30%)**
5-19 years: **338 (38%)**
20+ years: **261 (30%)**
Age unknown: **19 (2%)**

Vaccination Status
Unvaccinated or Unknown: **97%**
One MMR dose: **1%**
Two MMR doses: **2%**

U.S. Hospitalizations in 2025

11%

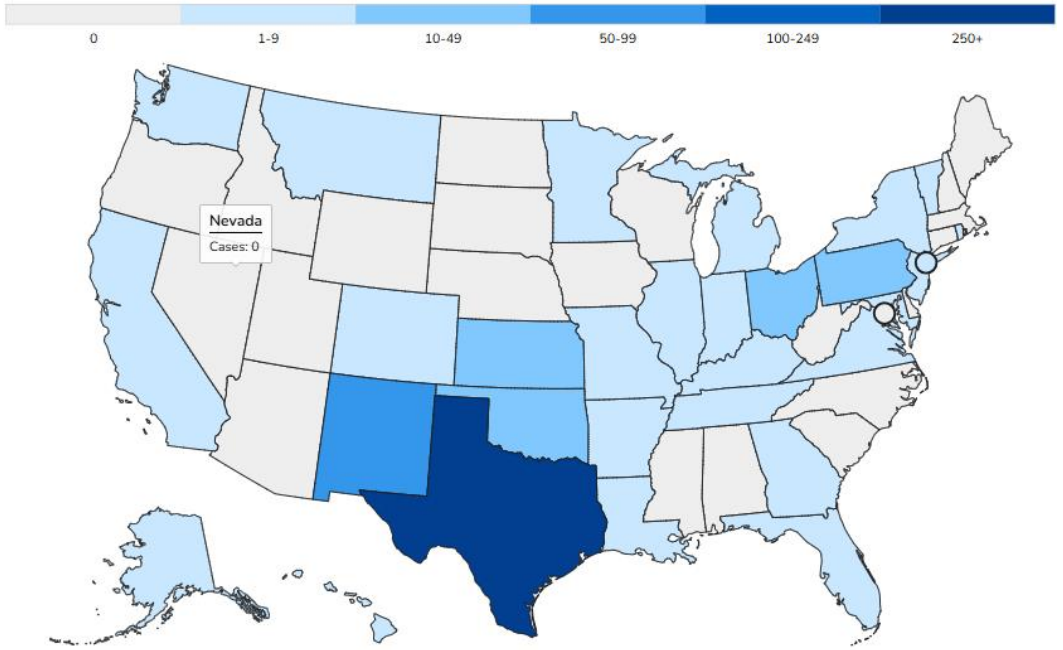
11% of cases hospitalized (94 of 884).

Percent of Age Group Hospitalized
Under 5 years: **20% (53 of 266)**
5-19 years: **7% (22 of 338)**
20+ years: **7% (17 of 261)**
Age unknown: **11% (2 of 19)**

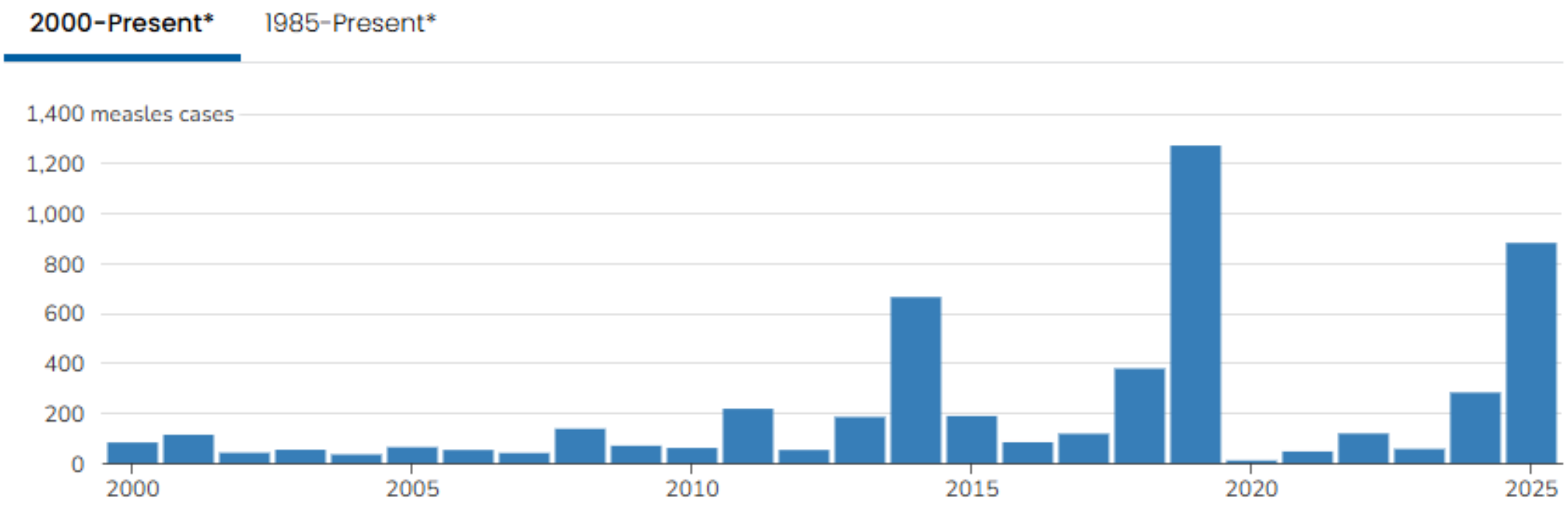
U.S. Deaths in 2025

3

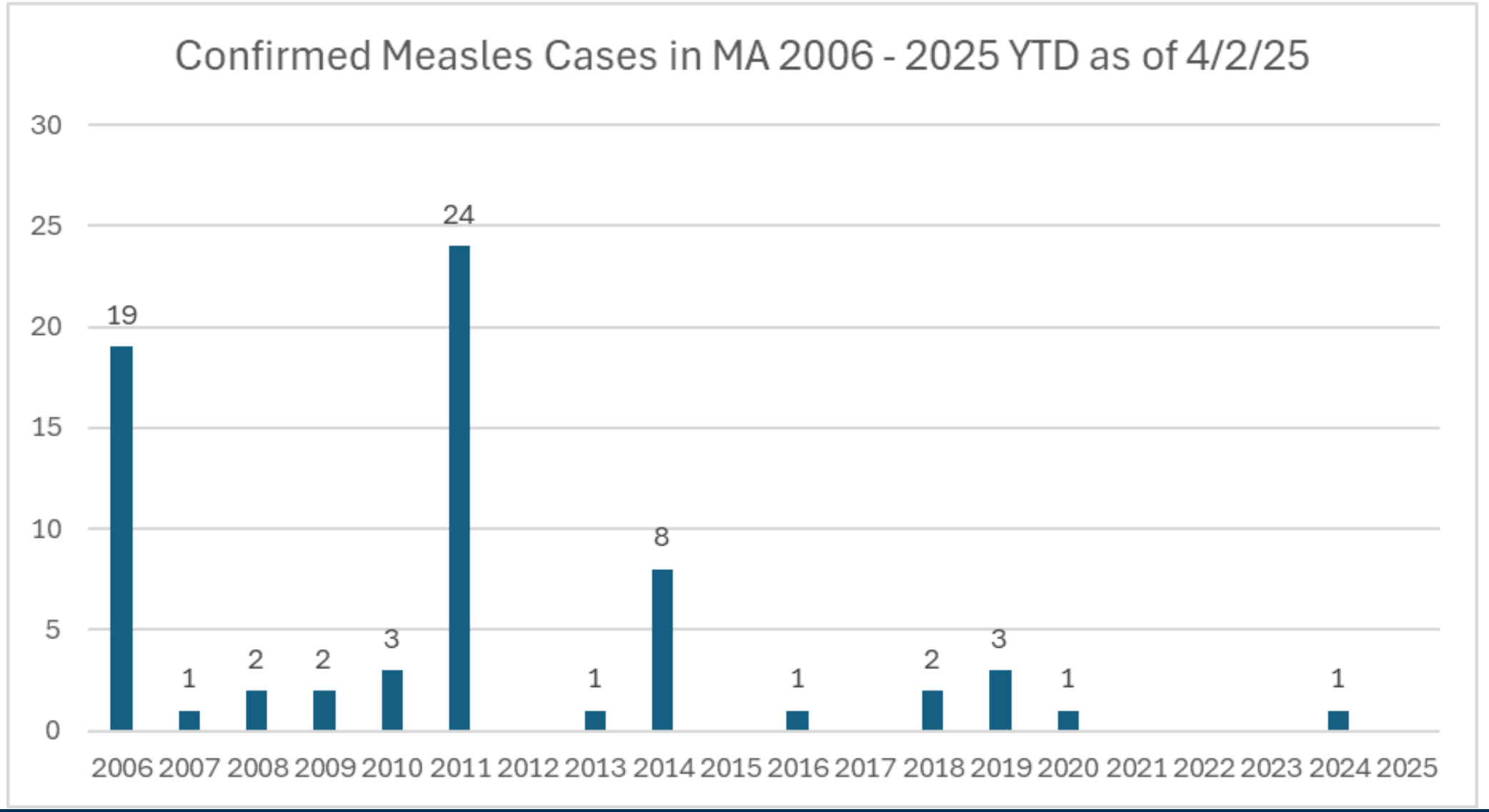
There have been 3 confirmed deaths from measles.



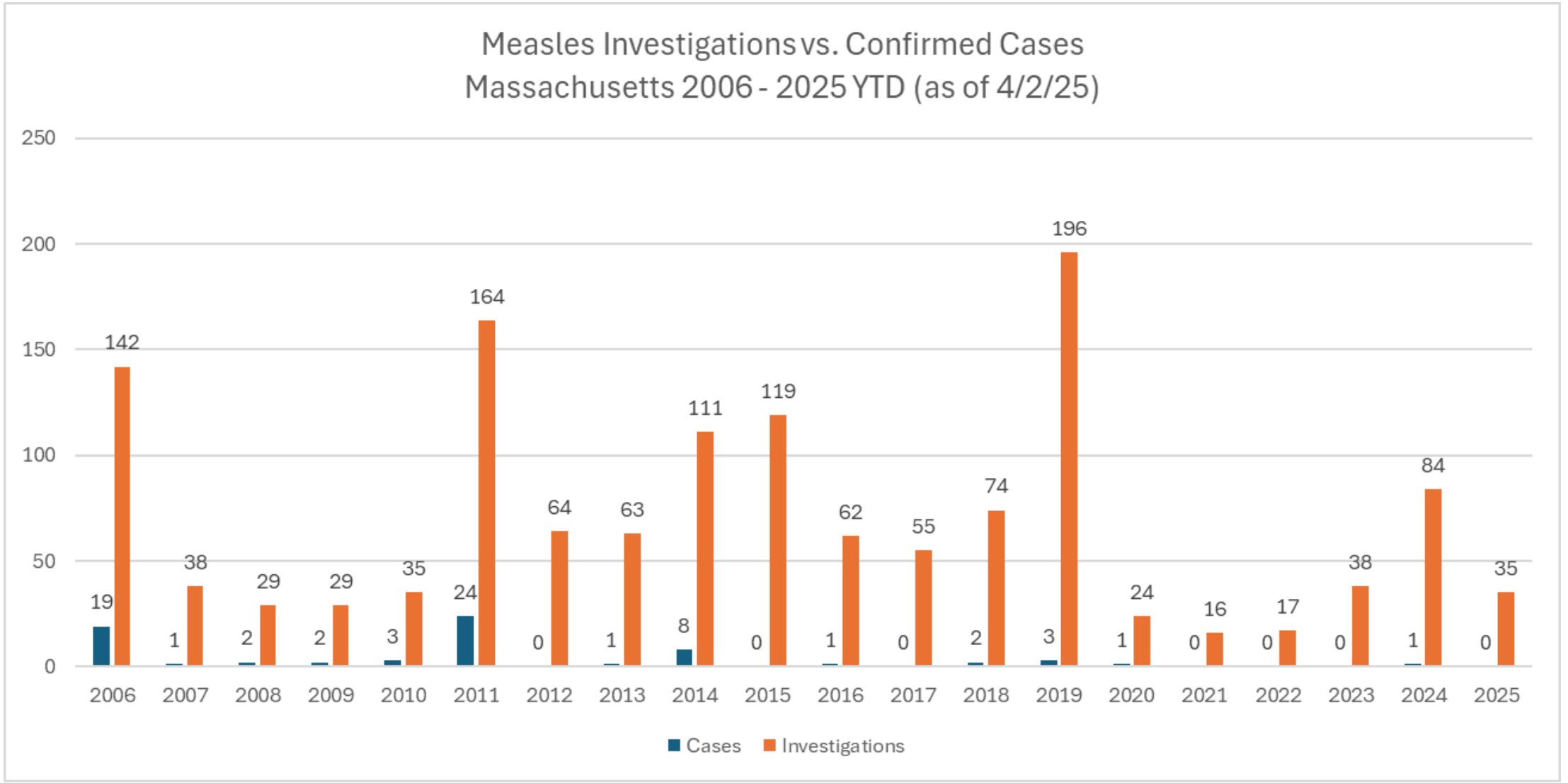
Measles Cases by Year in the US



Confirmed Measles in MA 2006 – 2025 YTD



Measles Investigations vs. Confirmed Cases



What can clinicians do? Vaccinate!

- **Routine MMR vaccination schedule**
  - Dose 1: age 12–15 months
  - Dose 2: age 4–6 years
- **International travelers and travel to domestic destinations with active measles transmission aged ≥ 6 months**
  - Age 6–11 months: 1 dose prior to departure (Will need 2 more doses)
  - Age ≥ 12 months: 2 doses prior to departure, separated by at least 28 days

Should we vaccinate 6-month-old children with an early dose of MMR?

Should we vaccinate 6-month-old children with an early dose of MMR?

Only give early dose of MMR to children 6-11 months of age if:

- Traveling to international destinations or domestic destinations with ongoing measles transmission
- Living in areas of the US with active measles transmission as directed by state and local public health officials

What can clinicians do? Vaccinate!

For adults, presumptive evidence of immunity includes at least one of the following:

- Written documentation of 1 dose of MMR (except for adults in settings at high risk for measles transmission)
- Birth before 1957
- Laboratory evidence of immunity (positive IgG)
- Prior laboratory confirmed measles diagnosis

→Adults without evidence of immunity should get at least one dose of MMR

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- Birth before 1957
- Laboratory evidence of immunity (positive IgG)
- Prior laboratory confirmed measles diagnosis

→Adults without evidence of immunity should get at least one dose of MMR

Two doses are recommended for adults in settings that pose a high risk for measles transmission:

- Healthcare personnel
- International travelers
- Postsecondary school students
- Contact of someone with severe immunocompromise

Do adults need additional doses of MMR?

Do adults need additional doses of MMR?

No – history of one dose of measles vaccine for people born after 1957, is sufficient to be considered protected from measles for most adults, unless in a setting that poses a high risk for measles transmission (high risk of transmission- two doses recommended, 28 days apart).

Do adults need additional doses of MMR?

No - one dose of measles vaccine is sufficient to be considered protected from measles for most adults, unless in a setting that poses a high risk for measles transmission (high risk settings two doses recommended, 28 days apart).

What if they were vaccinated between 1963-1968?

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What if they were vaccinated between 1963-1968?

A very small number of people, representing less than 5% of Americans, may have received the inactivated measles vaccine during childhood, which may not have offered sufficient protection against the virus. If the inactivated vaccine was received – should receive one MMR dose.

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Unsure of measles immunity?

Do adults need additional doses of MMR?

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What if they were vaccinated between 1963-1968?

A very small number of people, representing less than 5% of Americans, may have received the inactivated measles vaccine from 1963 through 1967 during childhood, which may not have offered sufficient protection against the virus. If the inactivated vaccine was received – should receive a MMR dose.

Unsure of measles immunity? Try to find vaccination records. If written documentation can not be found, there is generally no harm in receiving another dose of the MMR vaccine. Can also test blood to determine whether someone is immune, but this is generally not recommended.

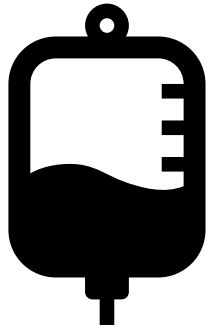
MMR contraindications

- Severe immunocompromise (chemotherapy, hematologic malignancy, long-term immunosuppressive therapy)
- Pregnancy
- Family history suggestive of inherited immunodeficiency
- History of severe allergic reaction to MMR (egg allergy is not a contraindication)

Vaccine and Immunoglobulin - Post exposure prophylaxis

- Post exposure treatments can prevent or modify measles

MMR should be given within 72 hours of exposure



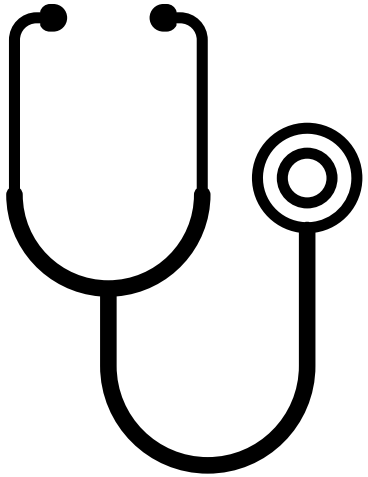
Immunoglobin should be given within 6 days of exposure

MMR can cause measles-like rash

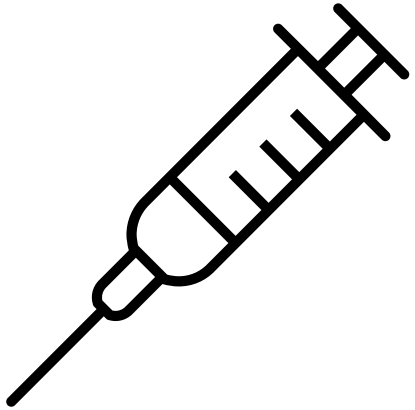
- MMR can cause transient measles-like rash (with or without fever)
- Occurs about 5% of the time
- 7-12 days post vaccination
- More likely to occur after 1st dose
- Non-infectious
- If post-MMR rash occurs and there are no exposures/travel, i.e. routine vaccination→ no testing needed
- If post-MMR rash occurs with history of possible exposure → testing is needed

MMR reaction (not contagious)

What can clinicians do? Use clinical, vaccination and travel history to assess probability of measles



Compatible clinical symptoms

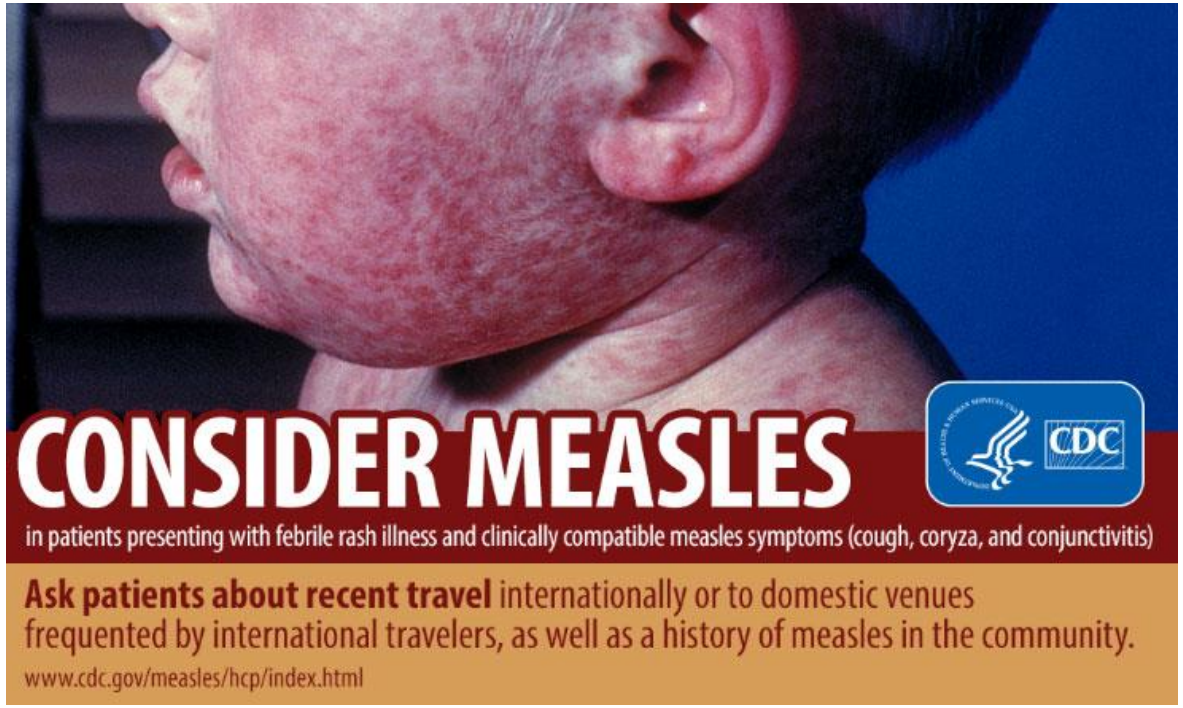


Vaccination history

Travel or exposure history in the past 21 days

What can clinicians do?

Consider measles as a diagnosis in anyone with fever (≥101°F or 38.3°C) and a generalized maculopapular rash with cough, coryza, or conjunctivitis who has recently traveled, especially in places with ongoing outbreaks and especially if unvaccinated.



Diagnostic testing for measles

Obtain both a serum sample and a throat swab (or nasopharyngeal swab) from patients suspected to have measles

Measles RNA by RT-PCR in a respiratory specimen.

- Ideally tested within 3 days of rash onset, but positive for up to 10 days after rash onset.
- Much higher sensitivity and specificity than serology

Detection of measles-specific IgM antibody in serum.

- Detected 3 days after rash onset through up to 8 weeks
- False positives can occur

Testing is done at the MA SPHL

Measles Control Takes Collaboration - Reporting to DPH

Local Boards of Health – School Nurses – Childcare – Hospitals – Providers – Labs

Contact an Epidemiologist 24/7 at 617-983-6800

Report suspected and confirmed cases of measles!

- Notify patient of diagnosis/suspected diagnosis
- Provide key information to the LBOH/DPH to complete investigation

Early involvement of public health departments can help prevent measles outbreaks.

Public health departments:
Help advise on the need for testing and on appropriate routing for specimens

Advise on control measures:

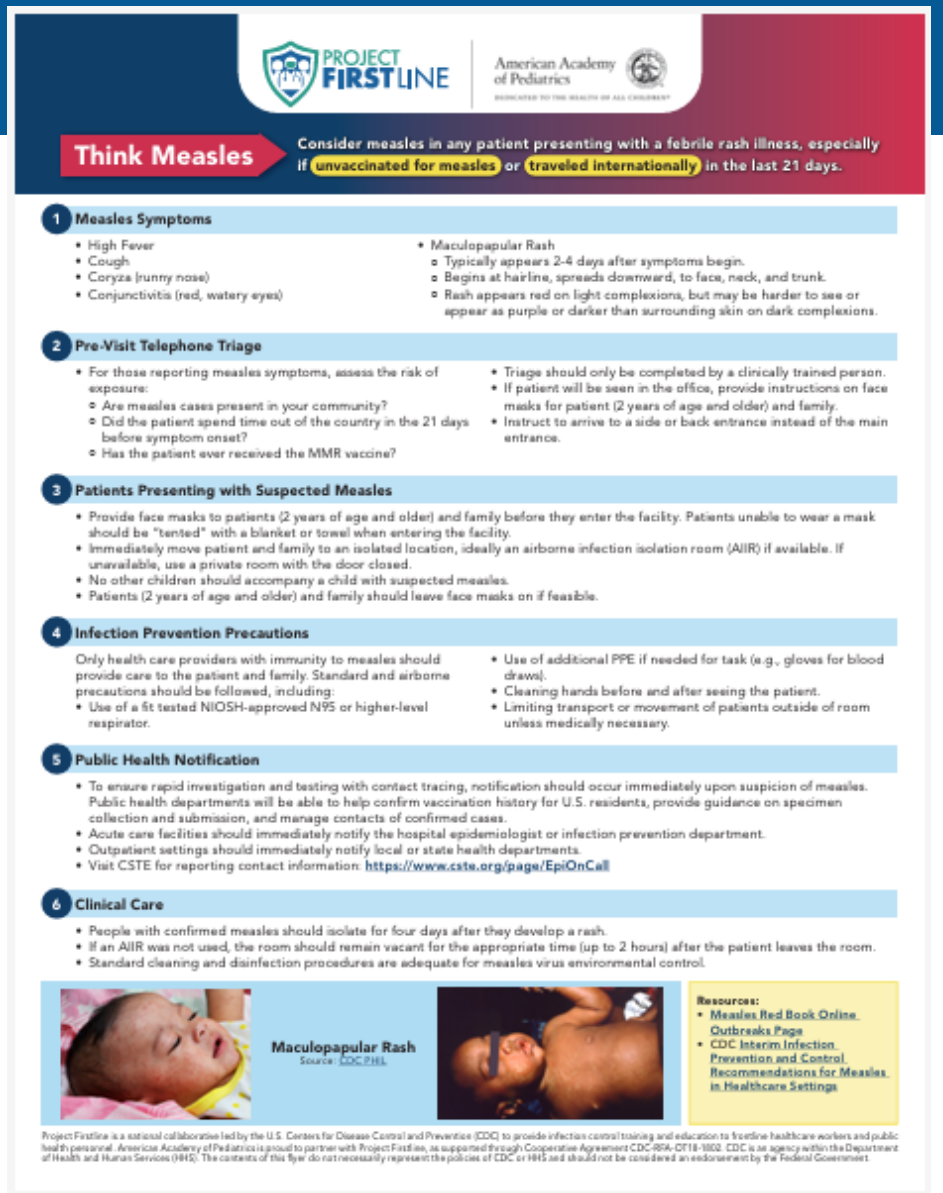
- Isolate patient if still infectious
- Educate patient about protecting their family and close contacts
- Inform patient that the LBOH/DPH may be calling
- Assist with notification, vaccine/vaccine recommendations
- Exclude susceptible individuals (staff, students, etc.)

Control in clinical spaces

Interim Infection Prevention and Control Recommendations for Measles in Healthcare Settings

Updated July 2019

https://www.cdc.gov/infectioncontrol/pdf/guidelines/Measles-Interim-IC-Recs-H.pdf



PROJECT FIRSTLINE | American Academy of Pediatrics

Think Measles Consider measles in any patient presenting with a febrile rash illness, especially if unvaccinated for measles or traveled internationally in the last 21 days.

1 Measles Symptoms

- High Fever
- Cough
- Coryza (runny nose)
- Conjunctivitis (red, watery eyes)
- Maculopapular Rash
  - Typically appears 2-4 days after symptoms begin.
  - Begins at hairline, spreads downward, to face, neck, and trunk.
  - Rash appears red on light complexions, but may be harder to see or appear as purple or darker than surrounding skin on dark complexions.

2 Pre-Visit Telephone Triage

- For those reporting measles symptoms, assess the risk of exposure:
  - Are measles cases present in your community?
  - Did the patient spend time out of the country in the 21 days before symptom onset?
  - Has the patient ever received the MMR vaccine?
- Triage should only be completed by a clinically trained person.
- If patient will be seen in the office, provide instructions on face masks for patient (2 years of age and older) and family.
- Instruct to arrive to a side or back entrance instead of the main entrance.

3 Patients Presenting with Suspected Measles

- Provide face masks to patients (2 years of age and older) and family before they enter the facility. Patients unable to wear a mask should be "tented" with a blanket or towel when entering the facility.
- Immediately move patient and family to an isolated location, ideally an airborne infection isolation room (AIIR) if available. If unavailable, use a private room with the door closed.
- No other children should accompany a child with suspected measles.
- Patients (2 years of age and older) and family should leave face masks on if feasible.

4 Infection Prevention Precautions

Only health care providers with immunity to measles should provide care to the patient and family. Standard and airborne precautions should be followed, including:

- Use of a fit tested NIOSH-approved N95 or higher-level respirator.
- Use of additional PPE if needed for task (e.g., gloves for blood draws).
- Cleaning hands before and after seeing the patient.
- Limiting transport or movement of patients outside of room unless medically necessary.

5 Public Health Notification

- To ensure rapid investigation and testing with contact tracing, notification should occur immediately upon suspicion of measles. Public health departments will be able to help confirm vaccination history for U.S. residents, provide guidance on specimen collection and submission, and manage contacts of confirmed cases.
- Acute care facilities should immediately notify the hospital epidemiologist or infection prevention department.
- Outpatient settings should immediately notify local or state health departments.
- Visit CSTE for reporting contact information: https://www.cste.org/page/EpiOnCall

6 Clinical Care

- People with confirmed measles should isolate for four days after they develop a rash.
- If an AIIR was not used, the room should remain vacant for the appropriate time (up to 2 hours) after the patient leaves the room.
- Standard cleaning and disinfection procedures are adequate for measles virus environmental control.

Maculopapular Rash
Source: CDC PHIL

Resources:
- Measles Red Book Online Outbreaks Page
- CDC Interim Infection Prevention and Control Recommendations for Measles in Healthcare Settings

Project Firstline is a national collaborative led by the U.S. Centers for Disease Control and Prevention (CDC) to provide infection control training and education to frontline healthcare workers and public health personnel. American Academy of Pediatrics is proud to partner with Project Firstline, as supported through Cooperative Agreement CDC-RFA-OT18-1802. CDC is an agency within the Department of Health and Human Services (HHS). The contents of this flyer do not necessarily represent the policies of CDC or HHS and should not be considered an endorsement by the Federal Government.

https://downloads.aap.org/AAP/PDF/ThinkMeasles-final.pdf

- **CDC HAN Advisory**

Expanding Measles Outbreak in the United States and Guidance for the Upcoming Travel Season

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HAN HEALTH ALERT NETWORK

This is an official CDC HEALTH ADVISORY

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- **MDPH Clinical Advisory**

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Clinical Advisory - 11 March 2025
Update regarding the spread of measles in the United States

Thank you!

Questions

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