



MEASLES PREVENTION AND CONTROL

April 3, 2024

Before We Start

- All participants will be muted for the presentation.
- You may ask questions using the Q&A box, and questions will be answered at the end of the presentation.
- Continuing education is available for nurses and medical assistants.
- If you're watching in a group setting and wish to claim CE credit, please make sure you register for the webinar and complete the evaluation as an individual.
- You can find more information here: [Measles Prevention and Control Webinar - April 3, 2024 | Washington State Department of Health](#)

Agenda

Welcome & Introductions

Clinical Overview & Treatment

Infection Prevention

Public Health Action

Testing

Surveillance

Continuing Education

- This nursing continuing professional development activity was approved by Montana Nurses Association, an accredited approver with distinction by the American Nurses Credentialing Center's Commission on Accreditation. Upon successful completion of this activity, 1.0 contact hours will be awarded.
- This program has been granted prior approval by the American Association of Medical Assistants (AAMA) for 1.0 administrative continuing education unit.

Disclosures

The planners and speakers of this activity have no relevant financial relationships with any commercial interests pertaining to this activity.

Learning Objectives

- Describe measles clinical features, transmission, and complications
- Discuss MMR vaccine recommendations
- Identify guidelines related to measles specimen collection, reporting and outbreak control

Presenters

Lucy Colville, MD

Resident | University of Washington Department of Pediatrics
Seattle Children's

Kimberly Carlson, MSN, RN, CCRN

Institutional Nursing Consultant, Vaccine Preventable Diseases
Washington State Department of Health

Esther Lam, MPH

Epidemiologist

Washington State Department of Health

Measles Clinical Overview

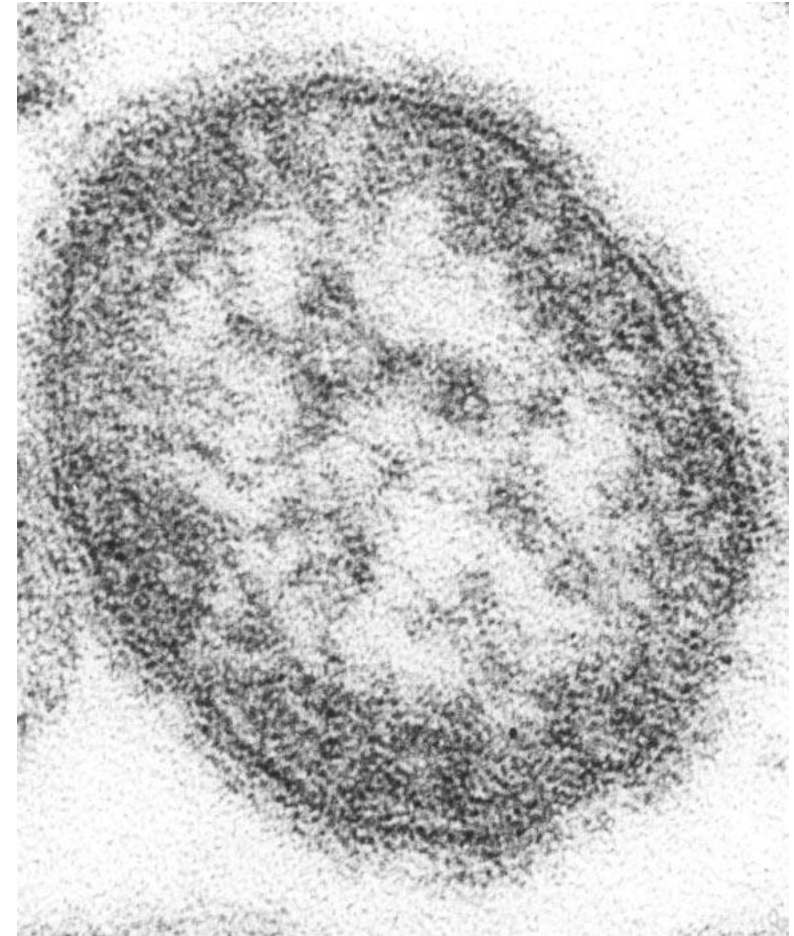


Measles

- An acute, infective, respiratory viral disease
- Pre-vaccines, childhood infection was a nearly universal
- Measles vaccinations in the US available since 1963
 - Current strain (Edmonston-Enders) since 1968
 - Combined MMR since 1971
 - Combined MMR-V since 2005
- Measles was declared 'eliminated' in the US in 2000
- Due to global prevalence of measles and unimmunized populations, cases and outbreaks in the US still occur

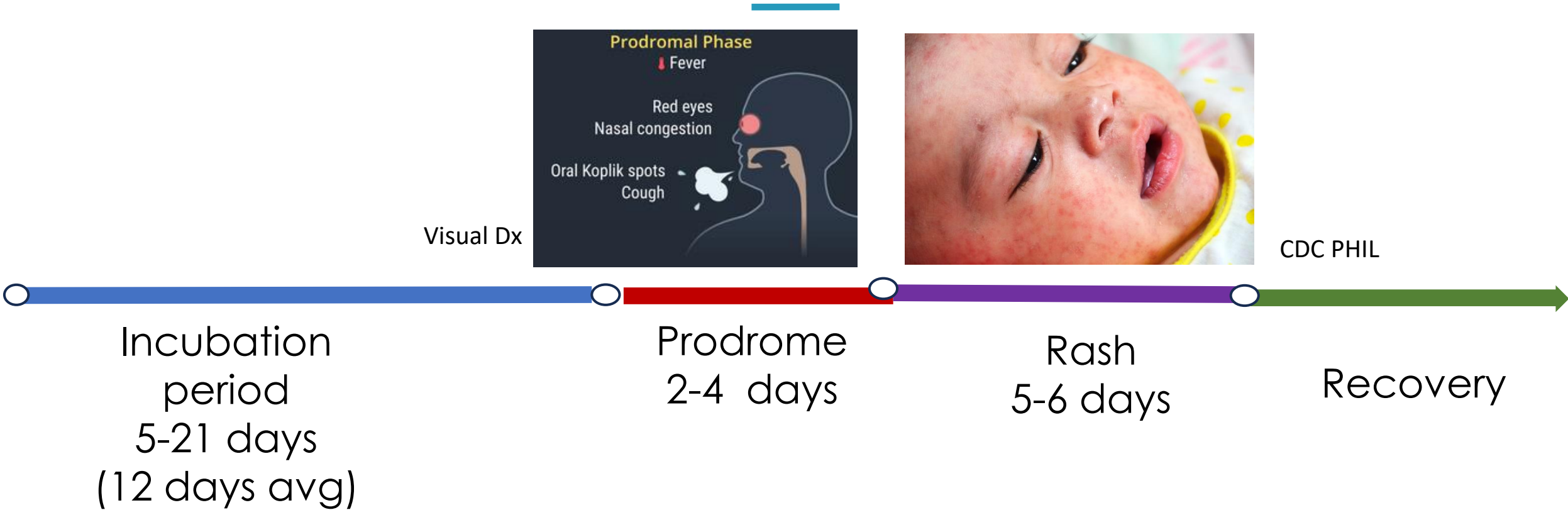
[Measles - StatPearls - NCBI Bookshelf \(nih.gov\)](#)

[Measles – CDC Pinkbook](#)



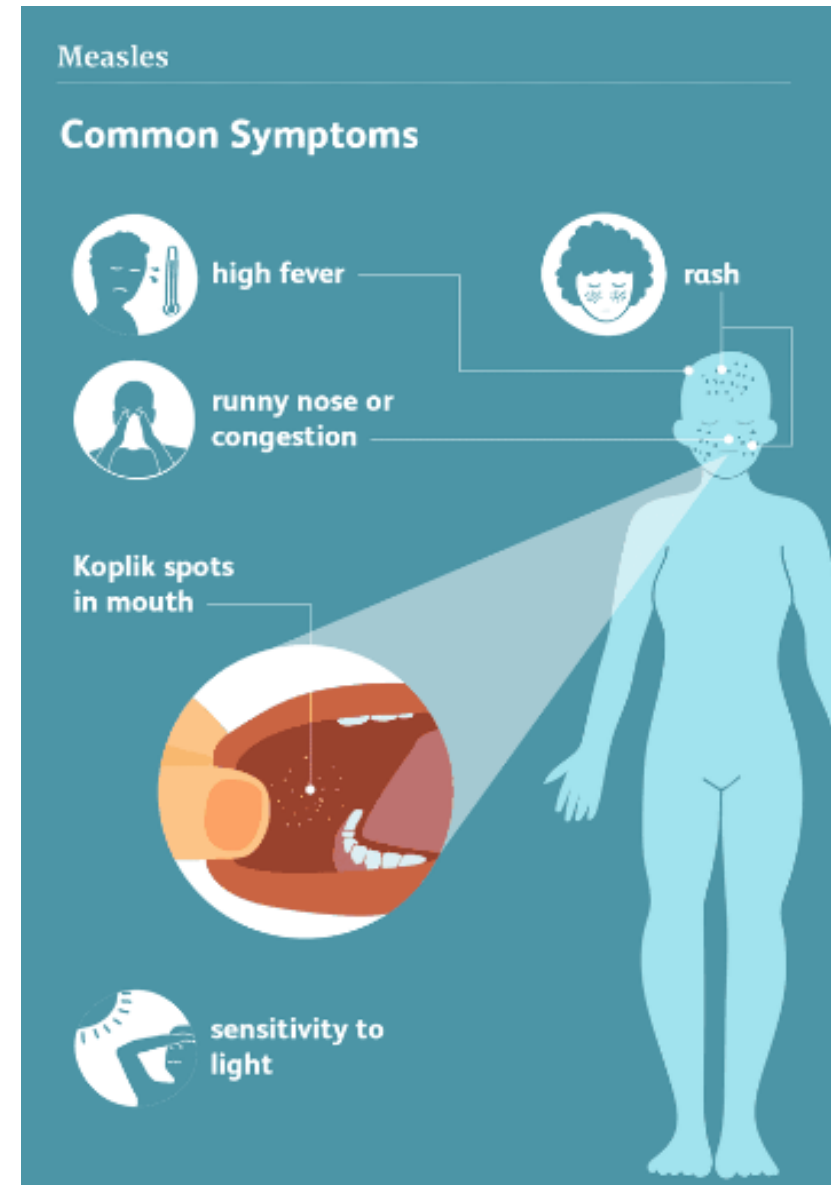
CDC PHIL

Clinical Presentation Timeline

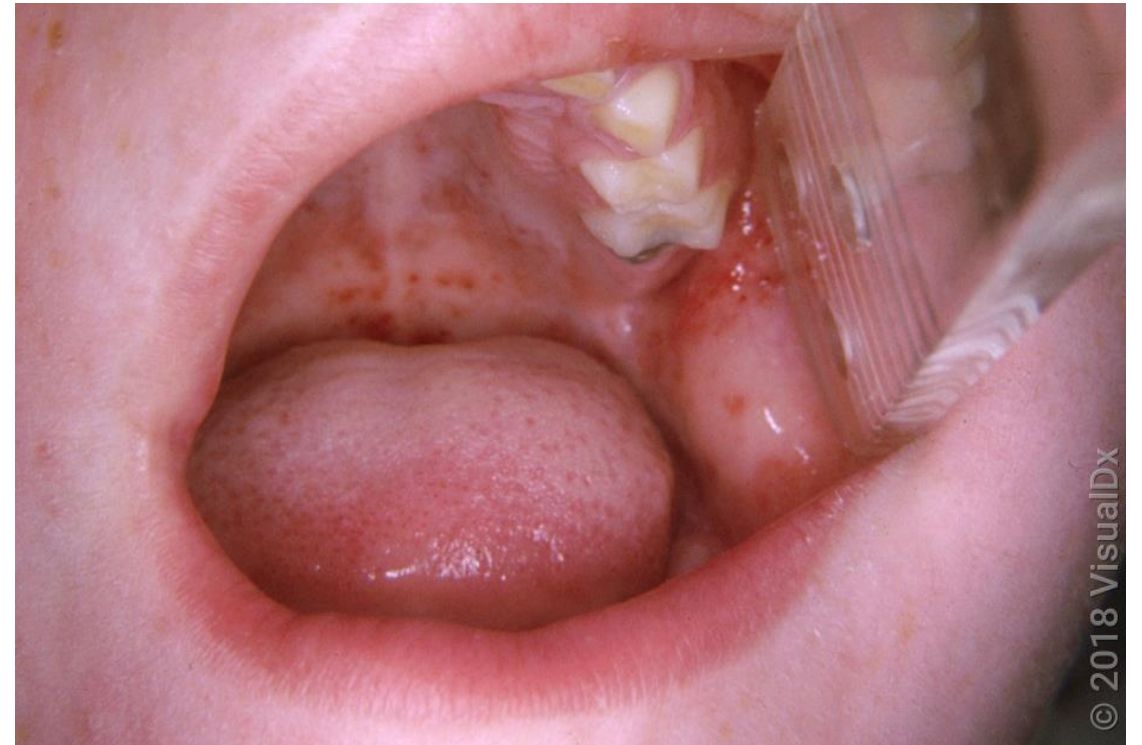
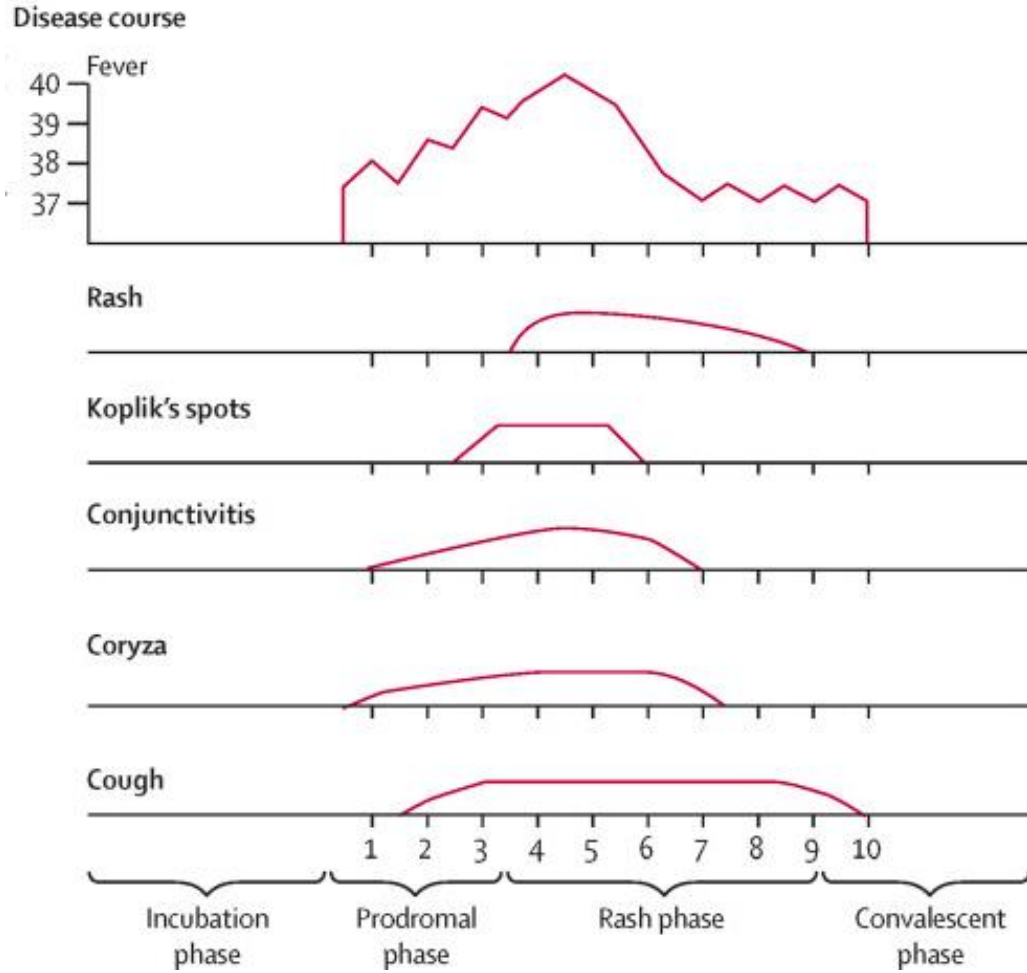


Prodromal Phase

- Respiratory Viral Illness
 - Runny nose (coryza)
 - Red, watery eyes (conjunctivitis)
 - Cough
- Fever which increases in a stepwise fashion peaking as high as 103°F-105° F (39.4 °C – 40.5 °C)
- Tiny white spots inside the mouth (Koplik spots)
 - 2 -3 days after symptoms begin



Fever & Koplik Spots



CDC PHIL

© 2018 VisualDx

Moss, W.J. (2017) 'Measles', *The Lancet*, 390(10111), pp. 2490–2502.
doi:10.1016/s0140-6736(17)31463-0.

Febrile Rash

- Rash is concurrent with high fever, typically 2-4 days after symptom onset
- The rash usually begins as flat red spots at the **hairline** and spreads down the body



Differential Diagnosis

Enterovirus with Exanthem

Adenovirus

Parvovirus B19

Kawasaki Disease

Rubella

Drug Reaction

Streptococcus (Sore Throat)

Roseola (HHV6)

Vector Borne Illness

Mononucleosis

Acute HIV

Pay attention to...

- Fever pattern
- Timing of fever with rash
- Immunization status
- Risk factors for exposure
- Associated symptoms

Complications

About 1 in 5 unvaccinated people in the U.S. who get measles is hospitalized

Children <5 years old and adults are more likely to suffer from measles complications

Common complications include

- Diarrhea and vomiting
- Ear infection
- Croup
- Pneumonia
- Encephalitis
- Pregnancy complications
- Immune suppression

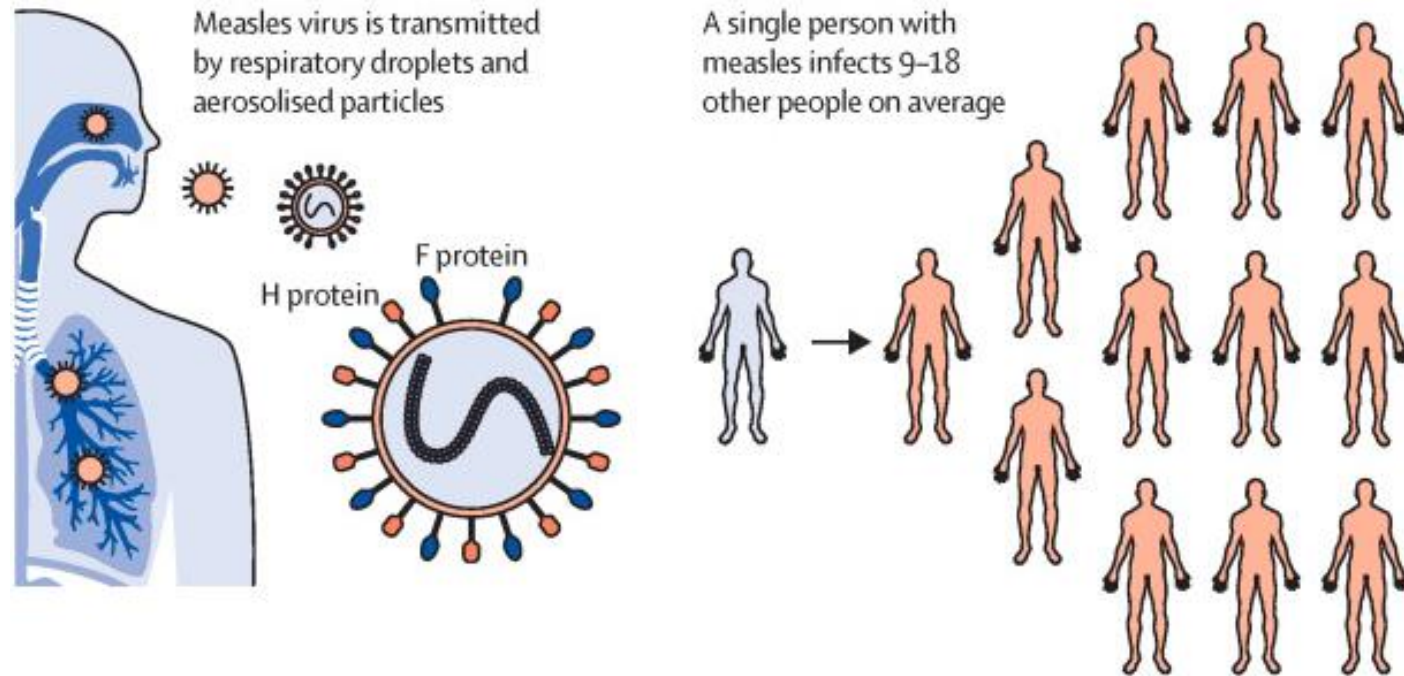


Images: CDC PHIL

Transmission



Transmission



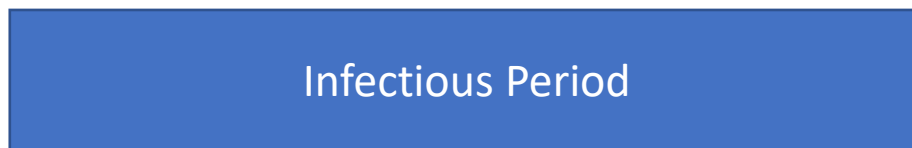
Droplets of live virus can remain suspended for up to 2 hours

Transmission



4 days prior
to rash

4 days after
rash appears



Infectious Period



Incubation
period
10-13 days

Prodrome
2-4 days

Rash
5-6 days

Recovery

Measles Prevention



Vaccination is the best protection

Two doses of MMR (measles-mumps-rubella) vaccine are 97% effective at protecting against measles



Recommended Vaccine Schedule

Children

- 1st dose MMR: Age 12 – 15 months
- 2nd dose MMR or MMRV: Age 4-6 years

Adults

- 2 doses are recommended for
 - International travelers
 - Healthcare personnel
 - School-aged students, post high school
 - Close contacts of immunocompromised persons (including parents)
 - People living with HIV



Minimum interval between doses is 28 days.

Special Populations

Infants 6-11 months

- Should receive 1 dose prior to international travel.
- Still follow standard vaccine schedule with 2 doses after 12 months of age.

Adults

- People born before 1957 considered immune
- People who received inactivated vaccine between 1963 and 1967 need re-vaccination

Contraindication to Vaccination

- Pregnancy
- Immunocompromised Persons





When should you suspect measles?

Measles

ASSESSMENT AND PUBLIC HEALTH ACTION

Is Measles Suspected?

Does the person meet the clinical case definition?

- An acute illness characterized by:
 - Generalized, maculopapular rash lasting ≥ 3 days; and
 - Temperature $\geq 101^\circ\text{F}$ or 38.3°C ; and
 - Cough, coryza, or conjunctivitis
 - Prodrome precedes rash onset

Measles vaccination history?

Exposure or travel history in the prior 21 days?

Call your [Local Health Department](#) immediately for all suspect cases



Measles Assessment

Report all SUSPECT measles cases immediately to your local health department.

www.doh.wa.gov/ForPublicHealthandHealthcareProviders/NotifiableConditions/Measles

✓ Consider measles in the differential diagnosis of patients with fever and rash:

	Yes	No	Comments
A) What is the highest temperature recorded?			Fever onset date: ___/___/___ °F
B) Does the rash have any of the following characteristics?			Rash onset date: ___/___/___
Was the rash preceded by one of the symptoms listed in (C) by 2-4 days?			Measles rashes are red, maculopapular rashes that may become confluent – they typically start at hairline, then face, and spreads rapidly down body.
Did fever overlap rash?			
Did rash start on head or face?			
C) Does the patient have any of the following?			Rash onset typically occurs 2-4 days after first symptoms of fever (≥101°F) and one or more of the 3 C's (cough, conjunctivitis, or coryza).
Cough			Dates of measles vaccine: #1 ___/___/___ #2 ___/___/___
Runny nose (coryza)			
Red eyes (conjunctivitis)			
D) Unimmunized or unknown immune status?			
E) Exposure to a known measles case?			Date and place of exposure:
F) Travel, visit to health care facility, or other known high-risk exposure in past 21 days?			See local health department for potential exposure sites.

• [Measles Assessment Quicksheet for Providers](#)

✓ Measles should be highly suspected if you answered YES to at least one item in B and C, PLUS a YES in D or E or F. IMMEDIATELY:

- Mask and isolate the patient (in negative air pressure room when possible) AND
- Call your local health department to arrange testing at the WA State Public Health Laboratories (WAPHL). All health care providers must receive approval from [name of local health jurisdiction] prior to submission.
 - [LHJ phone number] during normal business hours
 - [after hours phone number] after hours (duty officer)

Infection Control Considerations in a Healthcare setting

1. Ensure that all HCP Have Presumptive Evidence of Immunity to Measles
2. Ensure all healthcare personnel have been appropriately fitted for an appropriate respirator
3. If possible, schedule appointments by phone
 1. Allow for preparation and staff notification
 1. End of the day is preferred
 2. Give instructions for patient arrival including the entrance and necessary precautions
 3. Masking ((surgical or procedural masks)
4. Unexpected arrival to a healthcare setting
 1. Use existing triage areas for rapid identification and isolation
 2. Isolate and mask the patient as soon as possible
 1. A private room with the door closed, and use Standard plus Airborne precautions
 2. An airborne infection isolation room (AIIR) is preferred
 3. If AIIR not available, use a private room and the patient should keep the mask on
 3. Upon leaving the room, it should remain vacant for up to 2 hours
 1. This allows for 99.9% of airborne-contaminant to be removed
 2. If the patient was in the waiting room, have staff document all those were waiting with them and for 2 hours after the patient left.

Isolation

Separation of those with suspected or confirmed illness from those without illness

- self-isolate at home
 - Away from non-household members and unimmunized contacts
 - Hospitalized cases use Standard plus Airborne precautions
- Confirmed measles cases are isolated during their infectious period
 - Four days before rash onset through four days after rash onset
 - **Day of rash onset is day 0**
- Suspect measles cases
 - Isolate until measles is ruled out
 - Or until their presumed infectious period is over
 - Consult with LHJ about ending isolation

Low-risk Measles Contacts and Settings

- Low-risk contact
 - Not at high risk of having severe illness
 - Transmission potential is not high
 - Examples include:
 - Immunocompetent and immune people
 - >12 months of age

High-risk Measles Contacts

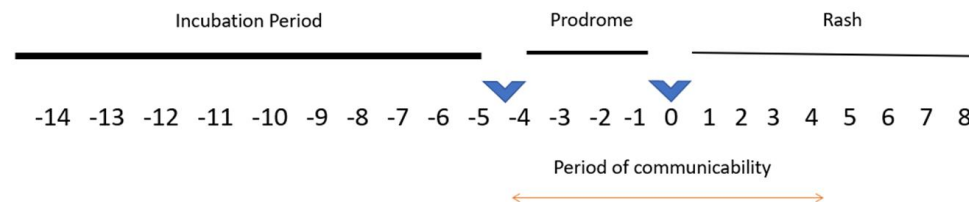
- High-risk contact
- Higher risk for severe illness if they become infected
- Transmission potential is high
- Examples include:
 - include infants up to 11 months of age,
 - immunocompromised persons
 - pregnant persons,
 - household contacts,
 - contacts with prolonged exposure
 - healthcare workers
 - persons in settings with known unvaccinated persons

High-risk Measles Settings

- Transmission risk is high
- Examples include:
 - A setting with a large number of measles-susceptible people
 - Infant care settings
 - Healthcare setting

Public Health Action

- Identify and notify close contacts regardless of immune status
 - Verify measles immunity status
 - Recommend exclusion or quarantine guidance
 - Identify the need for immunoglobulin or prophylactic MMR
- Identify public exposures and high-risk settings, provide consultation as needed
- Consider any flight exposures and out-of-state/international exposures
 - Division of Global Migration Health, a division of the CDC is responsible for identifying and alerting potentially exposed during travel



Postexposure Prophylaxis

- MMR vaccine can be given within 72 hours of exposure
 - May attenuate or completely prevent disease
 - For individuals with no evidence of immunity or only 1 dose of MMR
 - Age \geq 12 months. Must be eligible for MMR vaccine without contraindications.
- Immune globulin may also be used within six days of exposure
 - May provide protection or attenuate the disease. May lengthen incubation period to 28 days.
 - For susceptible household contacts and persons at increased risk
 - Children < 1 year old, pregnant persons, immunocompromised persons

Immunization Status →	Birth before 1957	2 doses	1 dose [Ⓐ]	0 doses		Unknown	
Risk assessment:	Presumed immune	Presumed immune	~95% effective	Susceptible!		Presume susceptible	
Prophylaxis:	None	None	MMR within 72 hours of exposure	MMR within 72 hours of exposure; Consider IG (if indicated ¹) within 6 days of exposure*		MMR within 72 hours of exposure; Consider IG (if indicated ¹) within 6 days of exposure*	
Recommendations:	No recommendations or restrictions	No recommendations or restrictions	Second MMR recommended even if >72 hours after exposure (but MMR within 72 hours preferred)	Close Contacts[Ⓔ] (Asymptomatic)	Public Callers[Ⓕ] (Asymptomatic)	Close Contacts[Ⓔ] (Asymptomatic)	Public Callers[Ⓕ] (Asymptomatic)
				Do not vaccinate if too late for prophylactic MMR (i.e. >72 hours after exposure) ²	Get a dose of MMR	Draw blood for serum IgG titer and then give a dose of MMR.	Get a dose of MMR. Strongly encourage drawing blood for serum IgG titer.
Symptom Watch:	Yes Discuss date of exposure and symptom watch times.	Yes Discuss date of exposure and symptom watch times.	Yes Discuss date of exposure and symptom watch times. Adverse event a possibility 5-12 days after MMR received ³ <ul style="list-style-type: none"> • 5% get rash • 15% get fever 	Yes Discuss date of exposure and symptom watch times. Explain what to do if symptoms: i.e. stay home Call PH/HC provider before going to HCF.	Yes Discuss date of exposure and symptom watch times. Explain what to do if symptoms: i.e. stay home Call PH/HC provider before going to HCF.	Yes Discuss date of exposure and symptom watch times. Explain what to do if symptoms: i.e. stay home Call PH/HC provider before going to HCF.	Yes Discuss date of exposure and symptom watch times. Explain what to do if symptoms: i.e. stay home Call PH/HC provider before going to HCF.
Exclusion:	None unless symptoms develop.	None unless symptoms develop.	None unless symptoms develop.	Yes! Quarantine ⁴ at home with no non-immune visitors and avoidance of all public settings from 7- 21 days after exposure regardless of whether they received vaccine within 72 hours or IG within 6 days of exposure.	None unless symptoms develop If becomes symptomatic, during the 7-21 days after exposure, isolate ⁴ and test for measles if rash develops.	Stay home from day 7 after exposure until titer results available. If titer positive: no further restrictions and no MMR needed. If titer negative or not done: Quarantine at home ⁴ for 7-21 days after exposure.	None unless symptoms develop If becomes symptomatic, during the 7-21 days after exposure, isolate ⁴ and test for measles if rash develops. If titer positive: no further restrictions.
Follow-up:	None	None	None	Vaccinate after 21 days if measles did not develop.	None	Vaccinate after 21 days if no MMR was given and measles did not develop.	None

Measles Testing at WA PHL

Measles Testing at WA PHL



PCR Specimens (NP/OP swab and Urine)

- Days 0-5 from rash onset: collect NP, OP, or throat swab in VTM
- >5 days from rash onset: collect NP, OP, or throat swab in VTM should be accompanied by a urine sample
- *Respiratory specimens are preferred, urine specimens reach their maximum sensitivity between ≥ 72 hours and 10 days after rash onset*



IgM and IgG Specimen (Serum)

- Measles specific IgM antibody may not be present until ≥ 72 hours after rash onset but persists for about 30 days after rash onset

Testing at WA PHL: Measles PCR Specimen Handling

- [Measles PCR Specimen Collection and Submission Instructions](#)
- [Measles Specimen Shipping Guide](#)

Measles RT-PCR testing turn-around times*:

* A more specific resulting time can be provided when the specimen arrives and is received by our virology lab

RT-PCR Specimen Arrival Time	Expected Turn-around Time
Monday-Friday, non-holiday, before 11am	Same Day
Monday-Thursday, non-holiday after 11am	Next Day
Friday after 11am, Weekend, Holiday	Discuss with LHJ

Shipping & Handling (S&H)**

- **Transport device:** Sterile leak-proof container.
- **Rejection Criteria:** Not transported in VTM. Swab on wooden shaft. Insufficient sample for urine or leaky specimen.
- **Transport:** Ship cold (2 - 8°C) on ice packs to arrive at WAPHL during business hours **within 72 hrs** of collection. Otherwise or if previously frozen, ship on dry ice. Ship as Category B.
- **Storage:** Refrigerate. If arriving at WAPHL after 72 hrs of collection, or if testing will not be completed within 72hrs, freeze at $\leq -70^{\circ}\text{C}$.

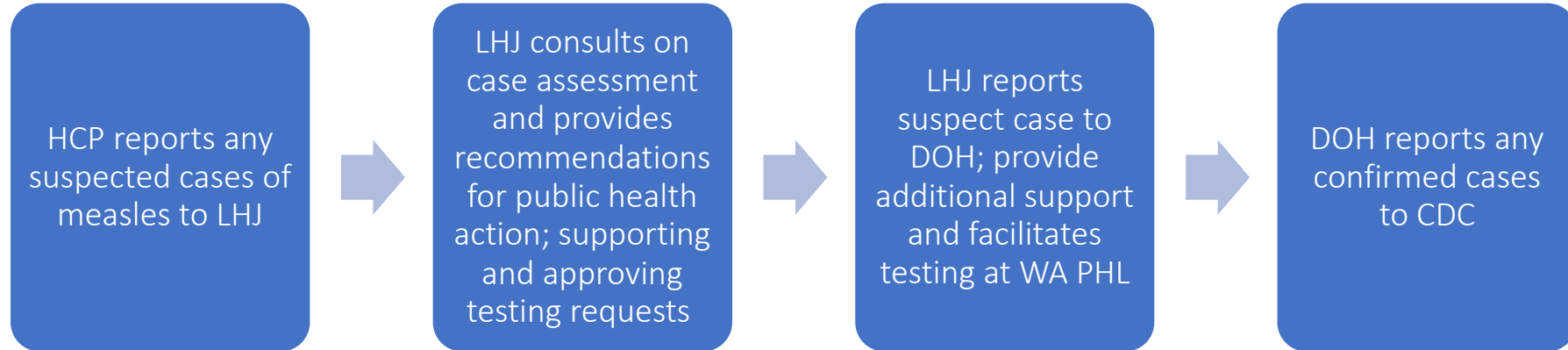
Testing at WA PHL: Measles Serum Specimen Handling

- [Measles Serology Specimen Collection and Submission Guidance](#)
- As of April 2024, all measles serum specimens at WA PHL are submitted to CDC for testing due to IgM test kit shortage. CDC has a 7-day turnaround for measles IgM testing.
 - **Storage:** Serum can be refrigerated at 2-8°C for up to 48 hours after collection. For long-term storage, freeze at -20°C.
 - **Transport:** Refrigerate and ship cold (2-8°C) on ice packs to arrive at WAPHL during business hours within 48 hours of collection. If previously frozen, ship on dry ice.

Ship as Category B.

Measles Surveillance

Reporting

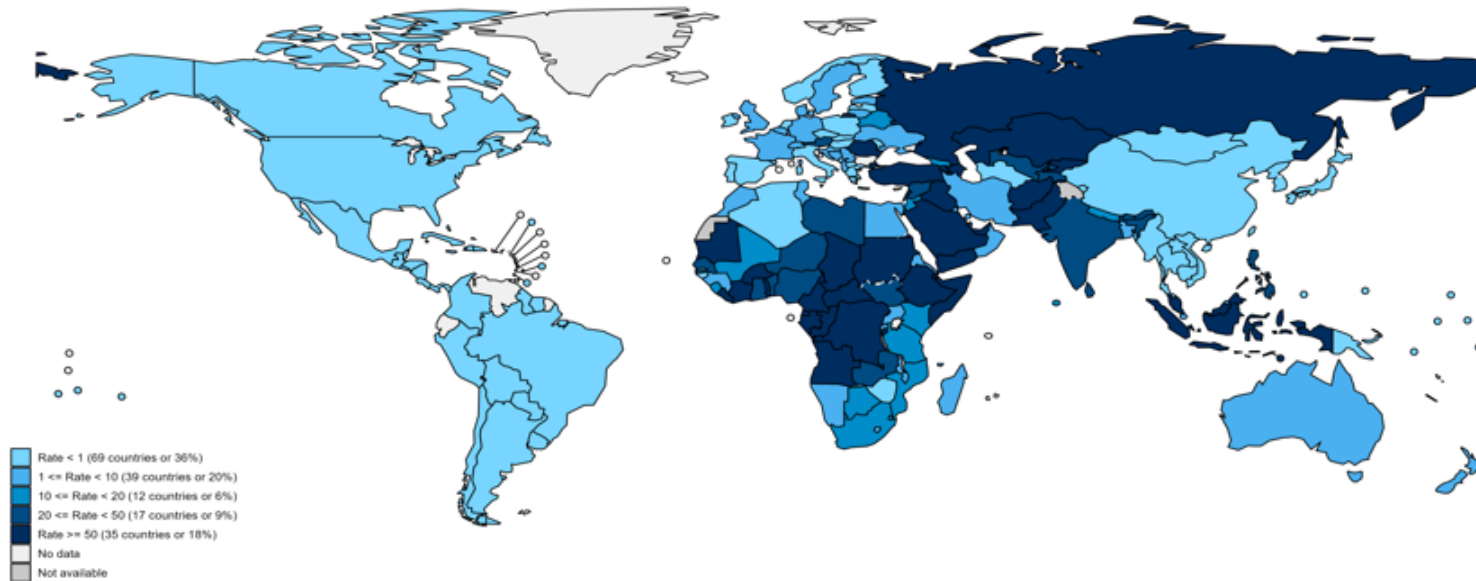


B. Legal Reporting Requirements

1. Health care providers and Health care facilities: **immediately notifiable to local health jurisdiction**
2. Laboratories: **immediately notifiable to local health jurisdiction**; specimen submission required - isolate or clinical specimen associated with positive result (2 business days)
3. Local health jurisdictions: **immediately notifiable to Washington State Department of Health (DOH) Communicable Disease Epidemiology (CDE)**

Global Measles

Measles Incidence Rate per Million (12M period)



Highest incidence rates

Country	Cases	Rate
Kyrgyzstan	9447	1,402.60
Azerbaijan	13728	1,318.40
Yemen	43998	1,277.18
Kazakhstan	24621	1,255.75
Liberia	3442	635.25
Iraq	14336	315.05
Gabon	733	300.83
Central African Republic	1499	281.04
Armenia	605	217.78
Cameroon	5635	196.70



Map production: World Health Organization, 2024. All rights reserved
Data source: IVB Database

Disclaimer: The boundaries and names shown and the designations used on this map do not imply 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.

0 875 1750 3500 Kilometers

[Notification rate of measles \(per million\), February 2023 - January 2024 \(europa.eu\)](https://europa.eu)

[Latest measles statistics published - GOV.UK \(www.gov.uk\)](https://www.gov.uk)

[Global Measles Outbreaks \(cdc.gov\)](https://www.cdc.gov)

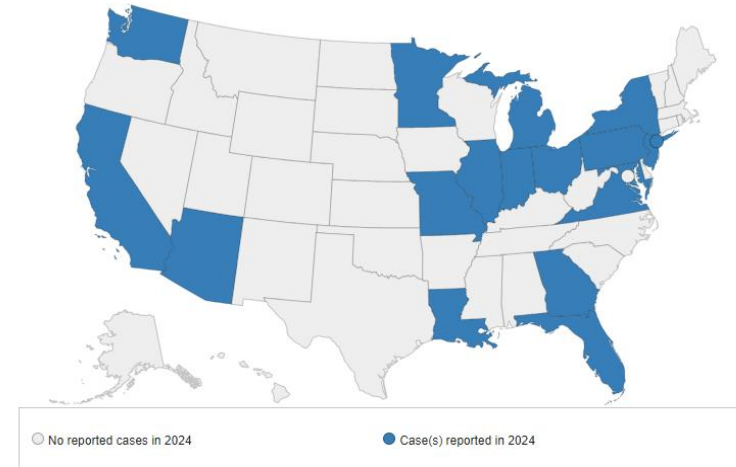
Measles in the US

- Total of 97 confirmed cases in the US reported as of March 28, 2024
 - 7 outbreaks (≥ 3 cases)
 - 72% of cases are outbreak related
 - 74% of cases have been ≤ 19 years old
 - 59% of cases have been unvaccinated
 - 24% of cases have unknown vaccination status

[Health Alert Network \(HAN\) - 00504 | Increase in Global and Domestic Measles Cases and Outbreaks: Ensure Children in the United States and Those Traveling Internationally 6 Months and Older are Current on MMR Vaccination \(cdc.gov\)](https://www.cdc.gov/measles/cases-outbreaks.html)
<https://www.cdc.gov/measles/cases-outbreaks.html>

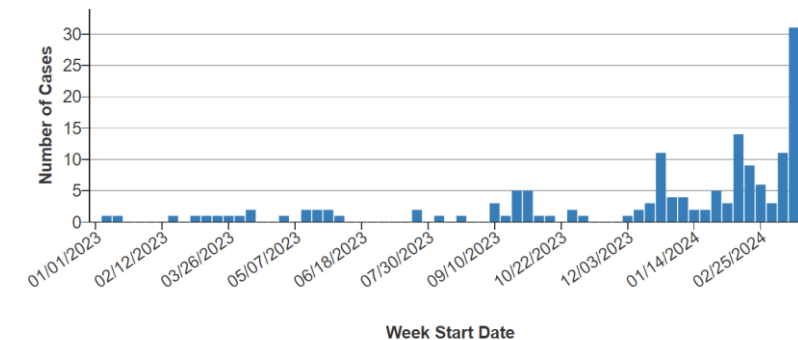
Jurisdictions Reporting Cases in 2024

As of March 28, 2024



Number of measles cases reported by week

2023-2024* (as of March 28, 2024)



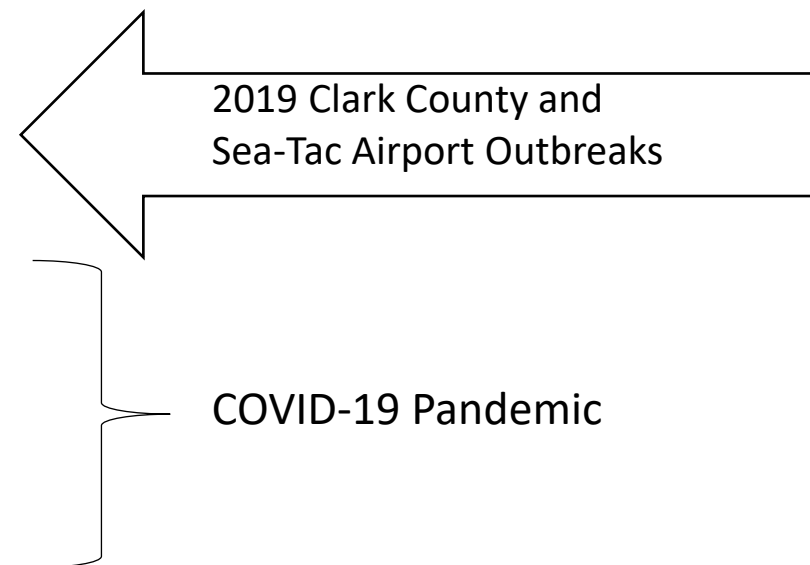
Statewide by Year

Year	Cases	Rate*	Deaths
1983	43	1	0
1984	178	4.1	0
1985	178	4	0
1986	176	3.9	0
1987	47	1	0
1988	7	0.2	0
1989	56	1.2	0
1990	357	7.3	2
1991	67	1.3	0
1992	11	0.2	0
1993	0	0	0
1994	5	0.1	0
1995	17	0.3	0
1996	38	0.7	0
1997	2	0	0
1998	1	0	0
1999	5	0.1	0
2000	3	0.1	0
2001	15	0.3	0
2002	1	0	0
2003	0	0	0
2004	7	0.1	0
2005	1	0	0
2006	1	0	0
2007	3	0	0
2008	19	0.3	0
2009	1	0	0
2010	1	0	0
2011	4	0.1	0
2012	0	0	0
2013	4	0.1	0
2014	33	0.5	0
2015	10	0.1	1
2016	0	0	0
2017	3	0	0
2018	8	0.1	0
2019	90	1.2	0
2020	1	0	0
2021	0	0	0
2022	1	0	0

Measles in WA

Year	Case Count
2019	90
2020	1
2021	0
2022	1
2023	11*
2024 (Jan-April 02)	3*

*Preliminary case counts



Contact Info

Lucy Colville, UW Pediatrics Resident:
lucy.colville@seattlechildrens.org

WA DOH OCDE VPD Team:

Esther Lam, VPD Surveillance
Coordinator: esther.lam@doh.wa.gov

Kim Carlson, VPD Nurse
Consultant: kim.carlson@doh.wa.gov

Team inbox: vpd-cde@doh.wa.gov



Thank You

Measles Resources

- [WA DOH Measles Guideline](#)
- [WA DOH Measles Assessment Tool](#)
- [WA PHL Measles Testing](#)
- [CDC Pink Book – Measles](#)
- [CDC Pink Book Series \(webinar\) – Measles, Mumps, Rubella](#)
- [CDC – Measles for Public Health Professionals](#)
- [CDC – Global Measles Outbreaks](#)
- [ACIP – MMR Vaccination Recommendations](#)
- [WHO – Measles Fact Sheet](#)

Obtaining Continuing Education

- Continuing education is available for nurses and medical assistants
- There is no cost for CEs
- Expiration date is 07/03/24
- Successful completion of this continuing education activity includes the following:
 - Attending the entire live webinar or watching the webinar recording, and completing the evaluation
 - **On the evaluation, please specify which type of continuing education you wish to obtain**
- **Please note:** CE certificates are NOT generated after evaluation completion—CE certificates will be sent by DOH via email within a few weeks after evaluation completion
- If you have any questions about CEs, contact Trang Kuss at trang.kuss@doh.wa.gov





To request this document in another format, call 1-800-525-0127. Deaf or hard of hearing customers, please call 711 (Washington Relay) or email civil.rights@doh.wa.gov.