Hawai‘i Health Partners Webinar: Vaccine Preventable Diseases 1.0 How to Diagnose and Manage Measles

Thursday, May 8, 2025

12:30pm – 1:30pm

Disclosures

- Except as noted below, the planners and presenters of this activity report no relationships with companies whose products or services (may) pertain to the subject matter of this meeting:

CREATING A HEALTHIER HAWAIʻI

HHP Webinars

Vaccine Preventable Diseases Can You Spot and Manage Them

CONFERENCE INFORMATION

TOPIC OBJECTIVES:

- Review measles.
- Manage and treat measles.
- Prevent the spread of infection of this most contagious disease.
- Apply core strategies in preventing communicable disease exposures while providing care to patients in the healthcare setting.
- Apply infection prevention core strategies to measles.

CONTINUING EDUCATION

In support of improving patient care, Hawai'i Pacific Health is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Accreditation Council for Pharmacy Education (ACPE), and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

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TO CLAIM CE:

- Claim credit commensurate with the extent of your participation in the activity.
- Complete and submit the evaluation survey that will be emailed to you within one week of the offering.
- Speakers cannot claim credit for their own presentations.
- Your CE certificate will be immediately available to you upon completion of your evaluation.

Webinar Information

- You have been automatically muted
  - You cannot unmute yourself

- You will be able to submit questions via the Q&A section

- As a friendly reminder, per 2025 HQIP measure, “HHP Network Engagement”, this webinar counts for HQIP credit

CREATING A HEALTHIER HAWAIʻI

Vaccine Preventable Diseases 1.0
How to Diagnose and Manage Measles

Marian Melish, MD FAAF, FIDSA
Medical Director Infection Control, KMCWC

Objectives

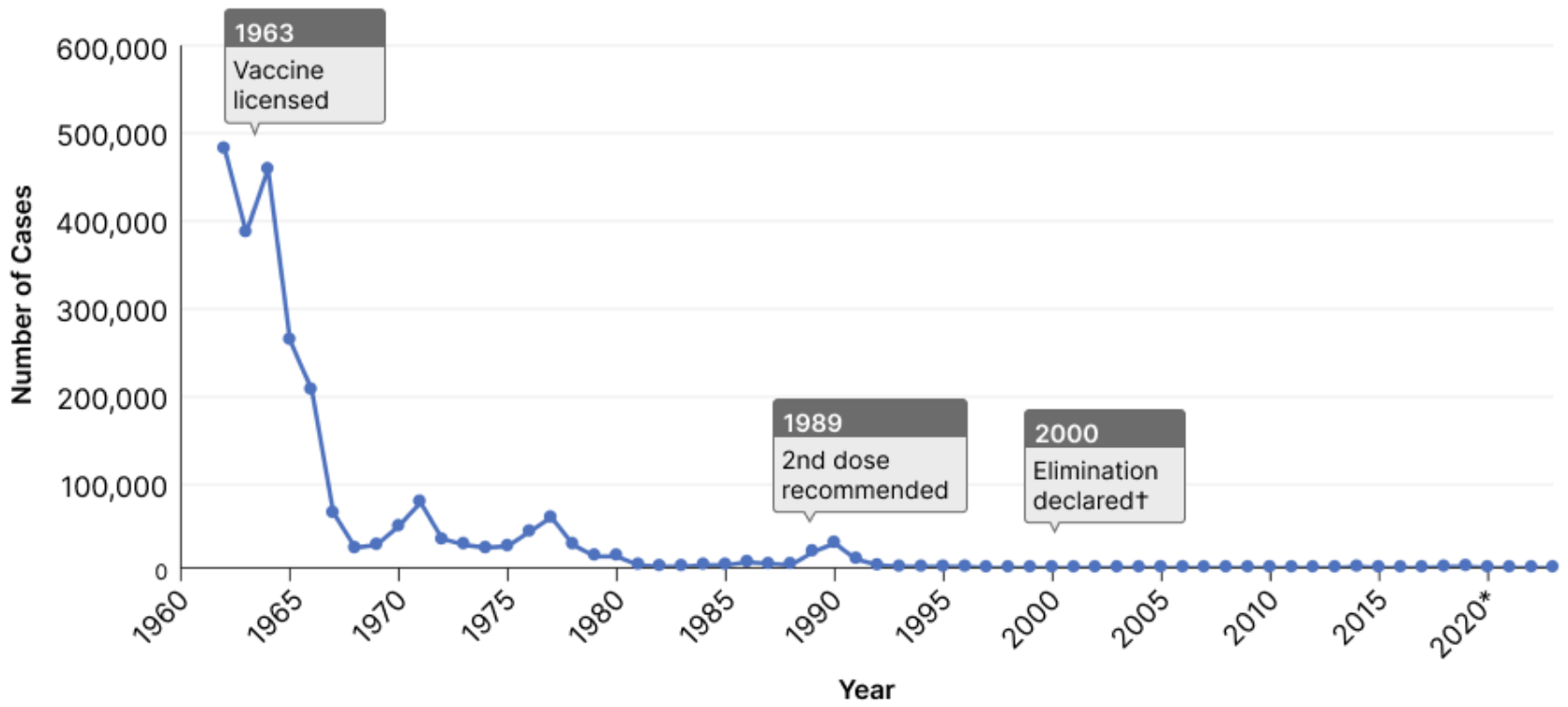
#1 Review Measles, now unfamiliar to many clinicians.

#2 Manage and treat measles.

3 Prevent spread of infection of this most contagious disease

I have no conflicts of interest to declare.

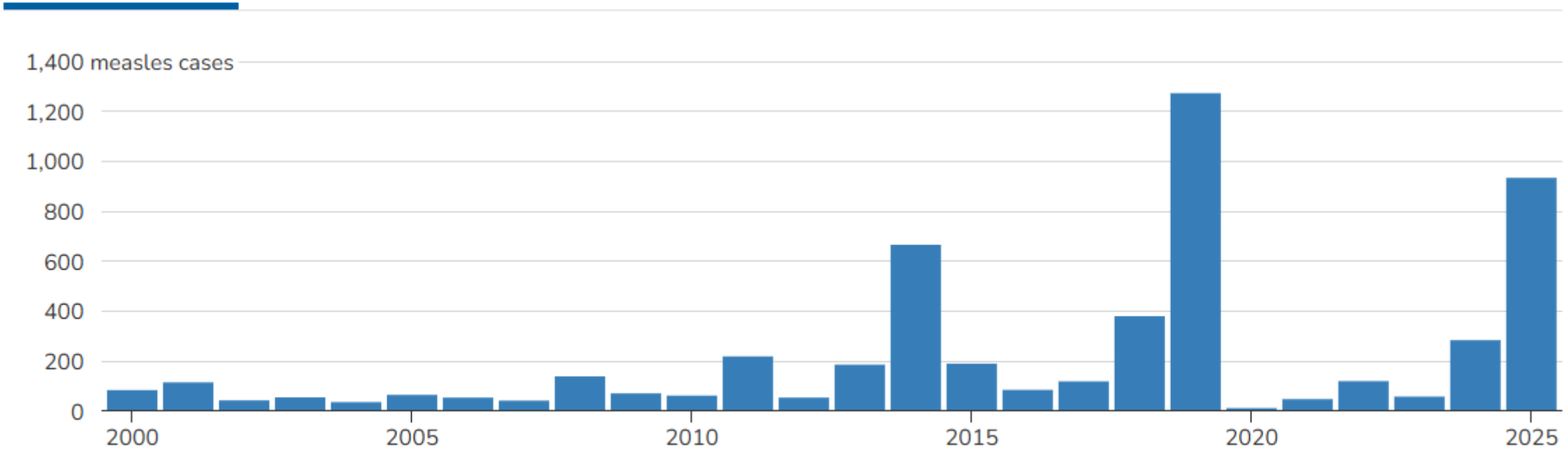
Reported Measles Cases in the United States from 1962 – 2023*



Yearly measles cases

as of May 1, 2025

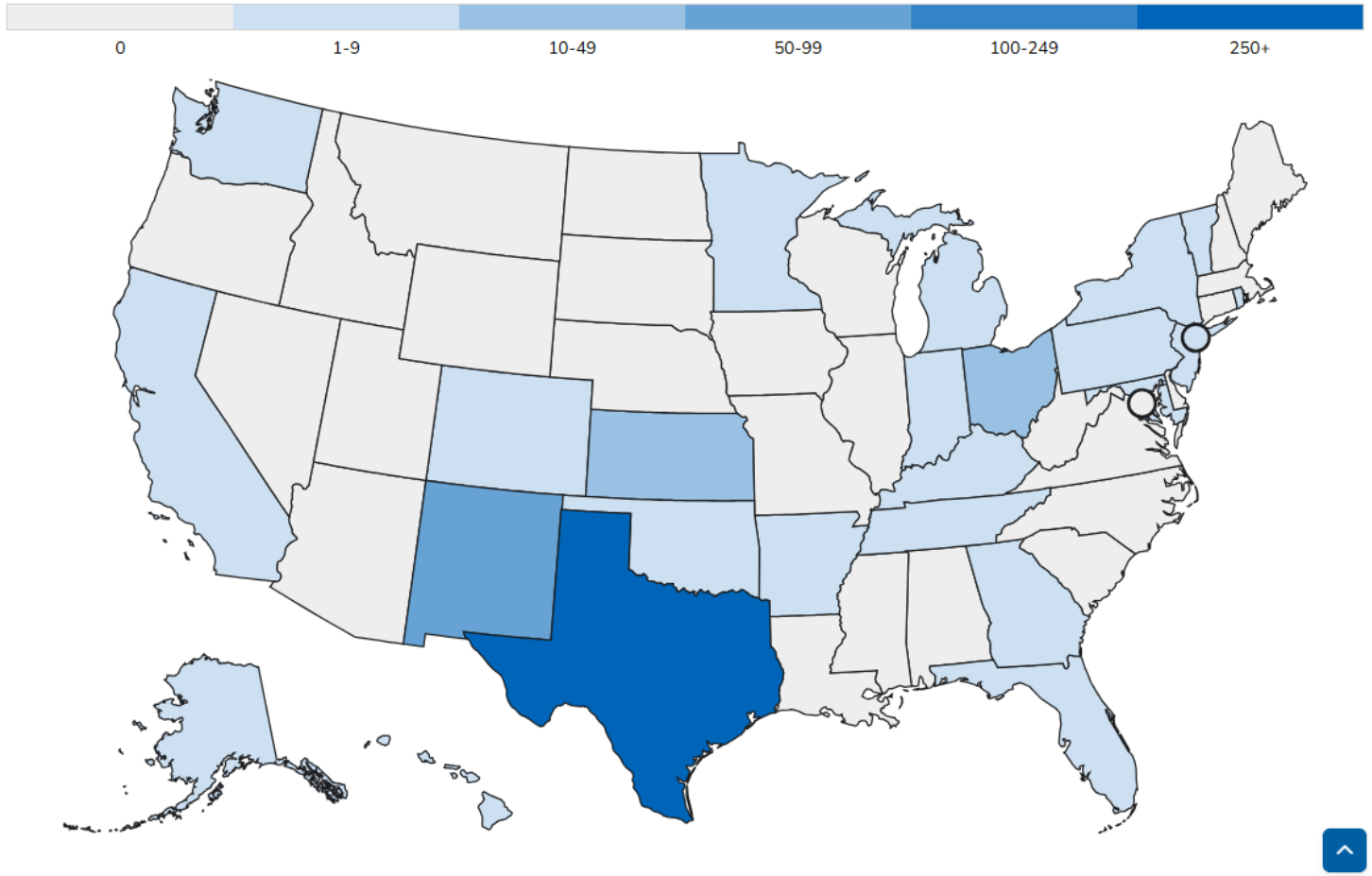
2000-Present* 1985-Present*



Map of measles cases in 2024 & 2025

as of April 17, 2025

2025 2024



U.S. Cases in 2025

Total cases

935

Age
Under 5 years: **285 (30%)**
5-19 years: **353 (38%)**
20+ years: **284 (30%)**
Age unknown: **13 (1%)**

Vaccination Status
Unvaccinated or Unknown: **96%**
One MMR dose: **2%**
Two MMR doses: **2%**

U.S. Hospitalizations in 2025

13%

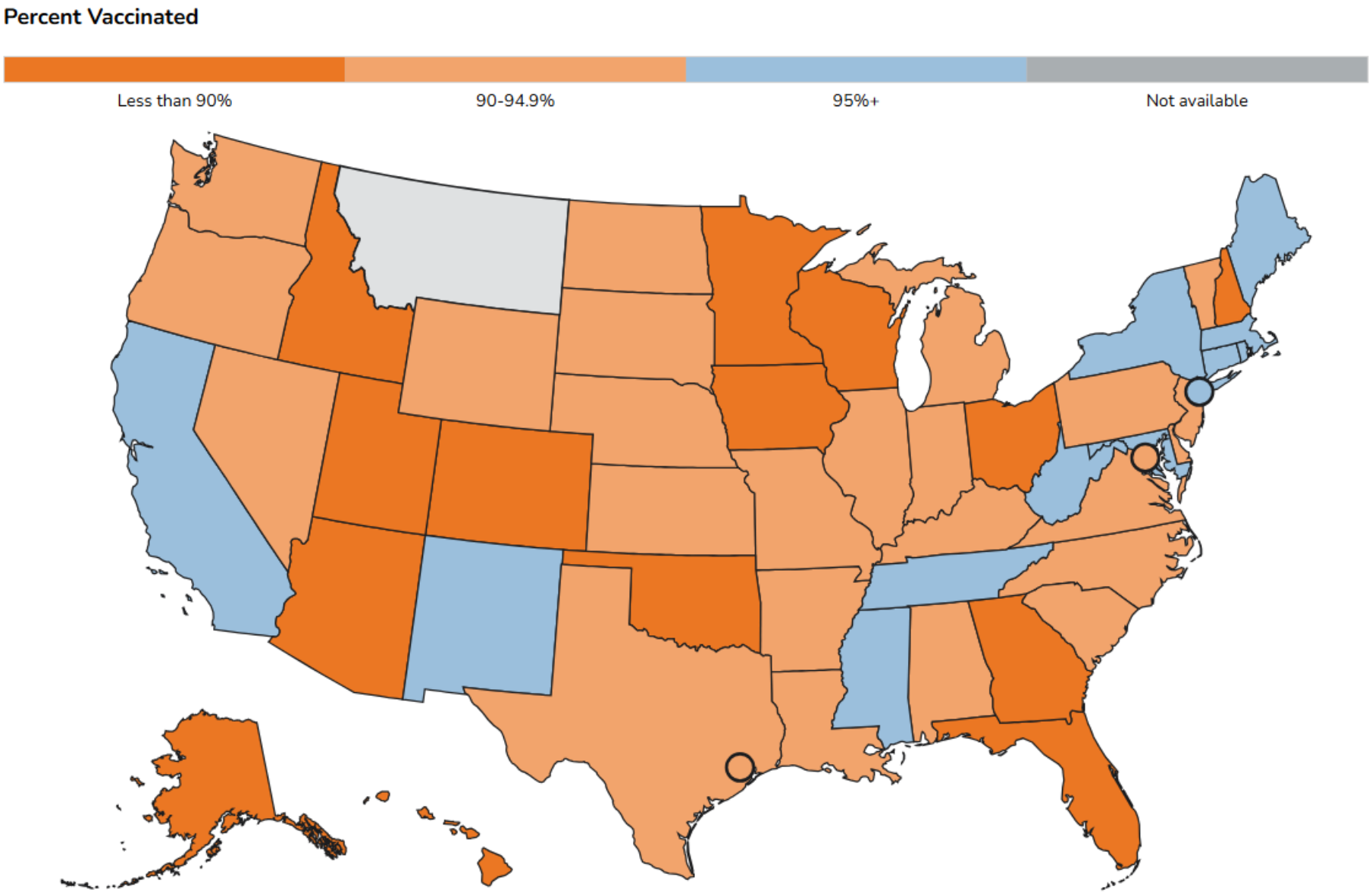
13% of cases hospitalized (121 of 935).

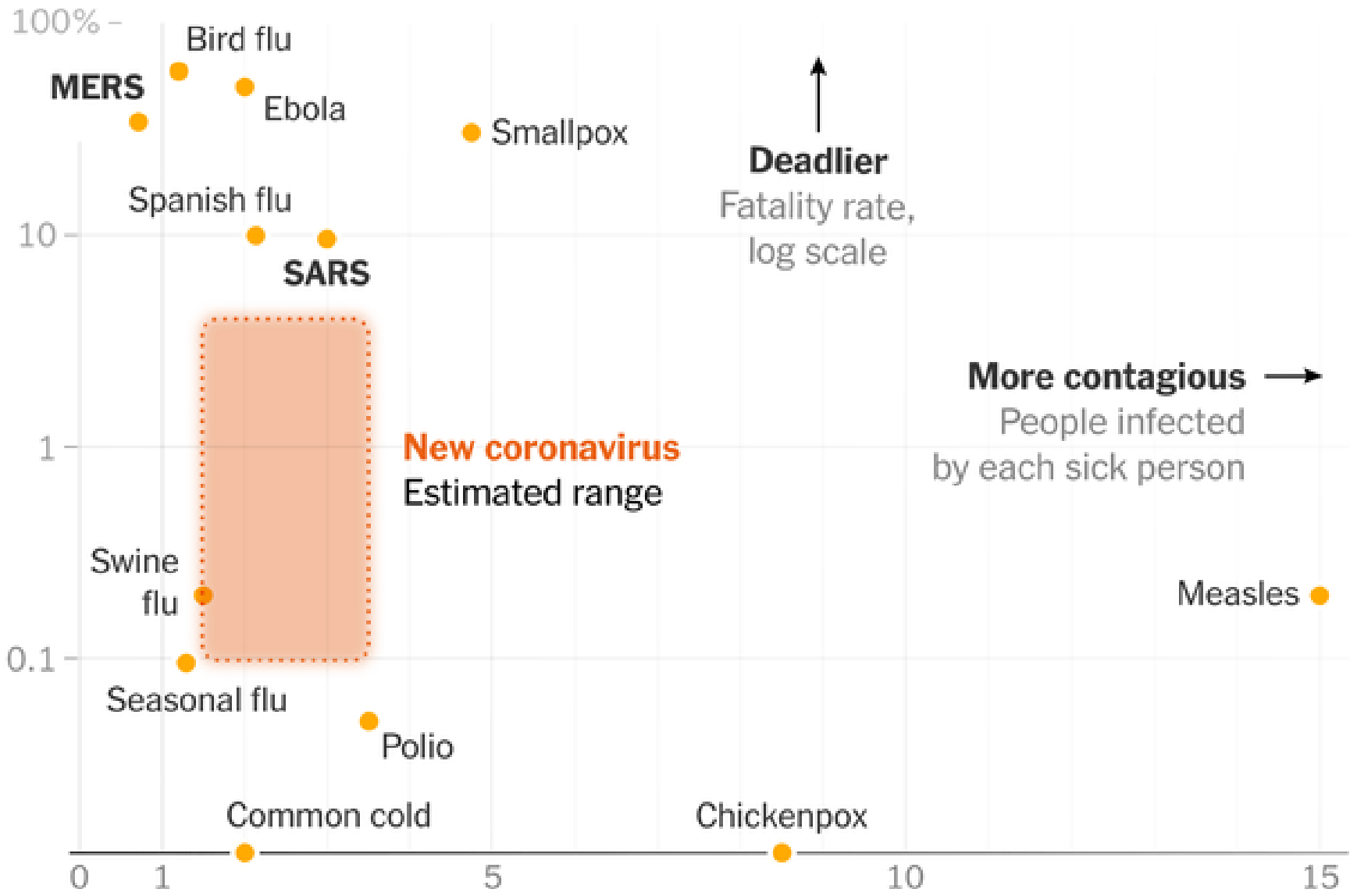
Percent of Age Group Hospitalized
Under 5 years: **23% (66 of 285)**
5-19 years: **8% (30 of 353)**
20+ years: **8% (23 of 284)**
Age unknown: **15% (2 of 13)**

U.S. Deaths in 2025

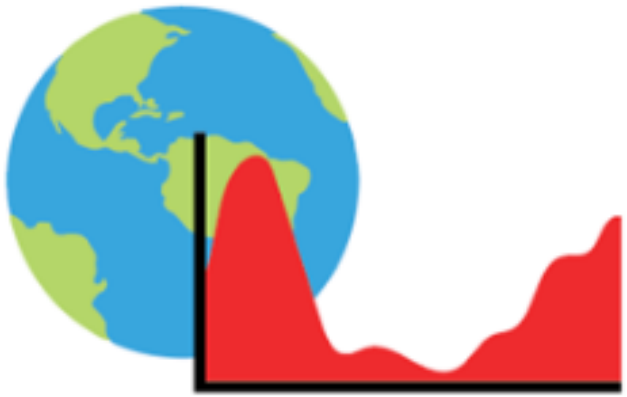
3

There have been 3 confirmed deaths from measles.

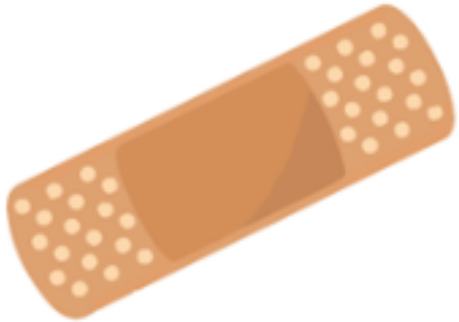

Percent Vaccinated
Less than 90%
90-94.9%
95%+
Not available


100%
10
1
0.1
Bird flu
MERS
Ebola
Smallpox
Spanish flu
SARS
Deadlier
Fatality rate,
log scale
More contagious
People infected
by each sick person
New coronavirus
Estimated range
Swine
flu
Measles
Seasonal flu
Polio
Common cold
Chickenpox
0
1
5
10
15

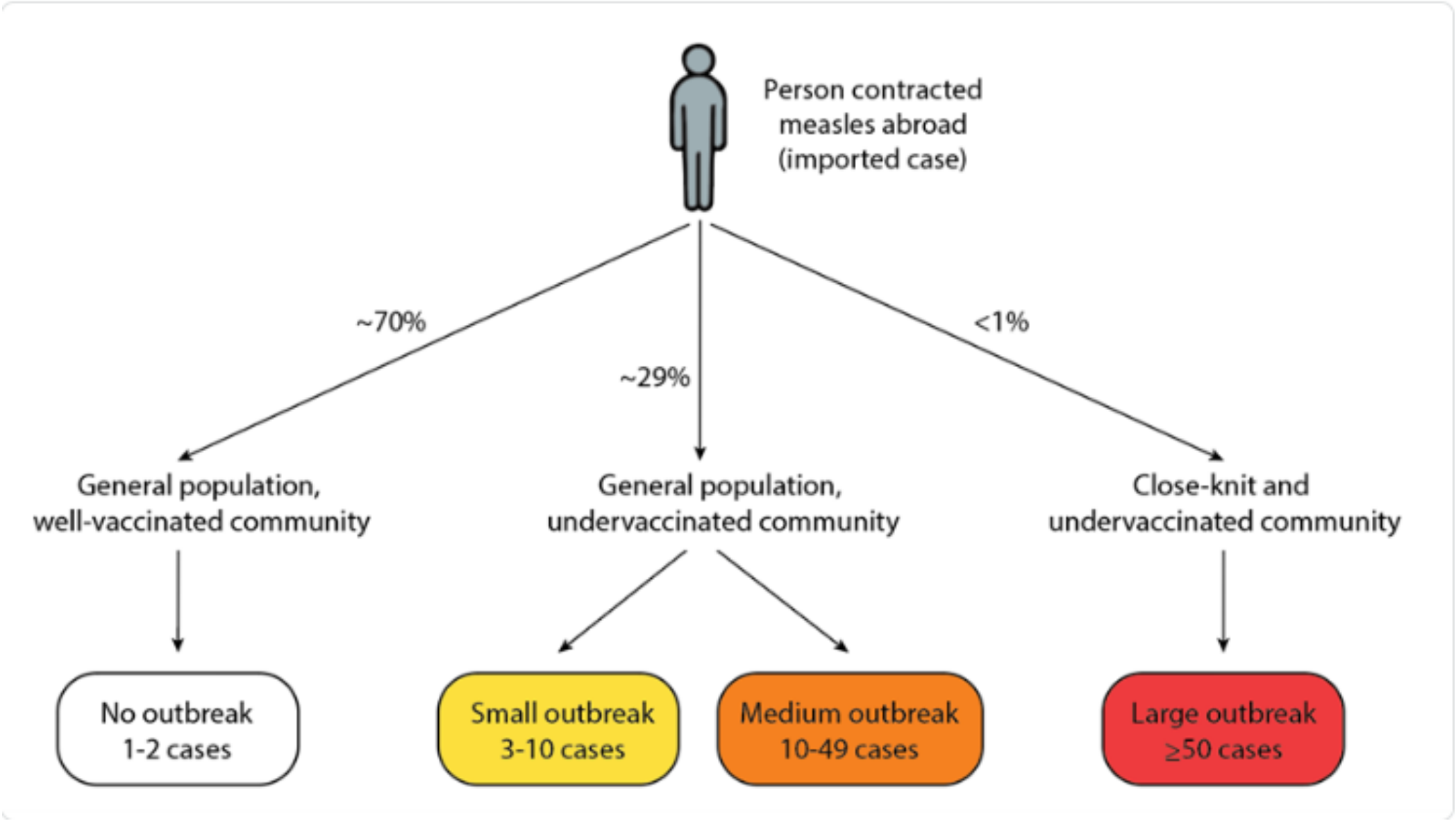
Measles outbreak risk in the U.S. depends on two main factors:



Global measles activity

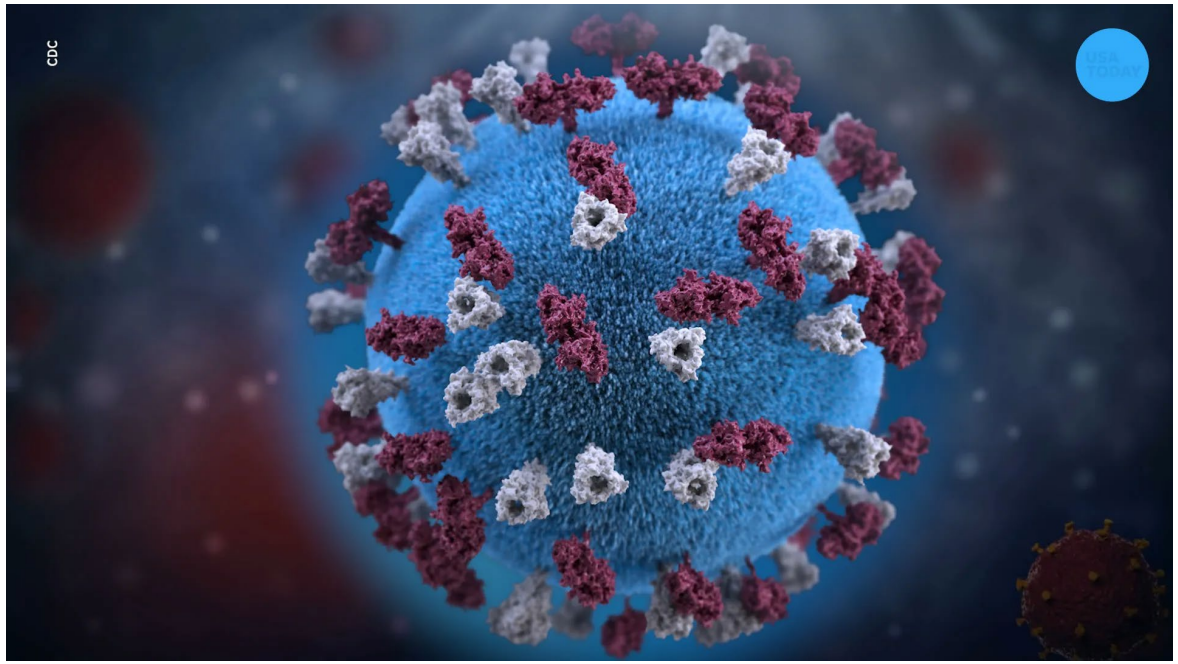


Declining MMR vaccination coverage in the U.S.


Person contracted measles abroad (imported case)
~70%
~29%
<1%
General population, well-vaccinated community
General population, undervaccinated community
Close-knit and undervaccinated community
No outbreak 1-2 cases
Small outbreak 3-10 cases
Medium outbreak 10-49 cases
Large outbreak ≥50 cases

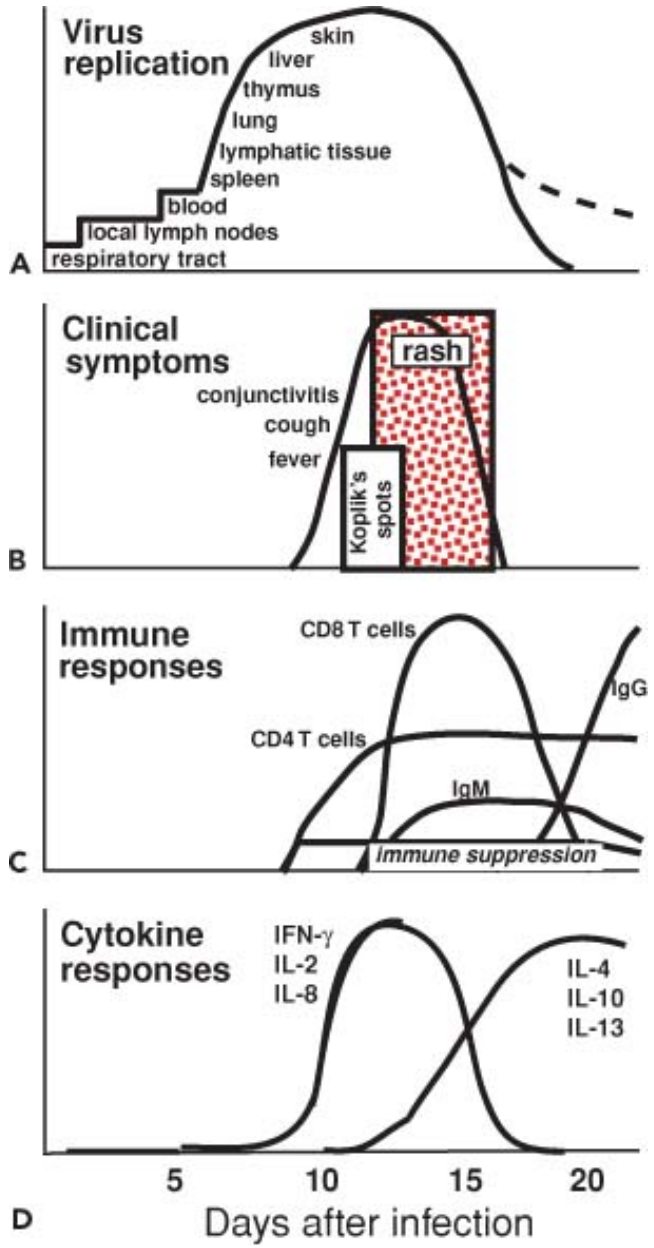
Measles is a Paramyxovirus

- Enveloped, single stranded negative-sense RNA viruses
  - Parainfluenza viruses 1 –4
  - Respiratory Syncytial Virus (RSV)
  - Human Metapneumovirus (hMPV)
  - Measles
  - Mumps
- Virus fuses to plasma membrane
- Genome enters cytoplasm of host cell
- Cytoplasmic replication
- Viruses bud from cell plasma membrane
- Infected cell may fuse > giant cells
- **Illnesses caused by these viruses are very different**

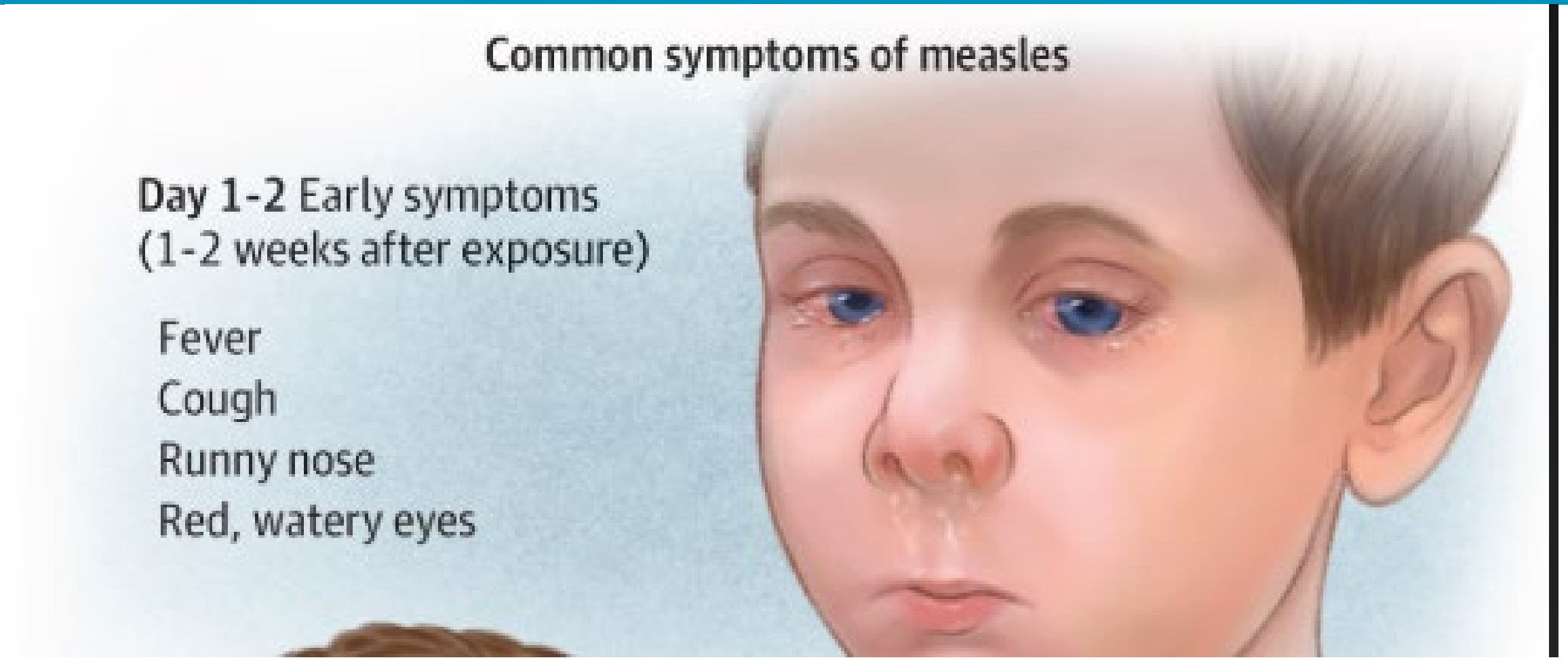


Measles – Clinical Course

- Severe Illness in all infected
- Stereotyped course – No occult infections
- Often fatal in developing countries
- Incubation Period 7 – 18 days
- Cough, coryza, conjunctivitis, photophobia, fever Days 1-4
- Koplik Spots appear Day 3-4
- Rash appears Day 5-7 Fever persists 3-4 d
- Fever falls, rash fades Symptom Days 10-14



Time Course of Measles



Office or ED Patient: Differential Diagnosis at this stage?

Conjunctival Injection in Measles & Kawasaki Disease

Measles

Diffuse Vascular suffusion with Tearing

Kawasaki Disease

Discrete Vascular Injection without Discharge

There’s Measles in your State!

There’s a patient in your office!

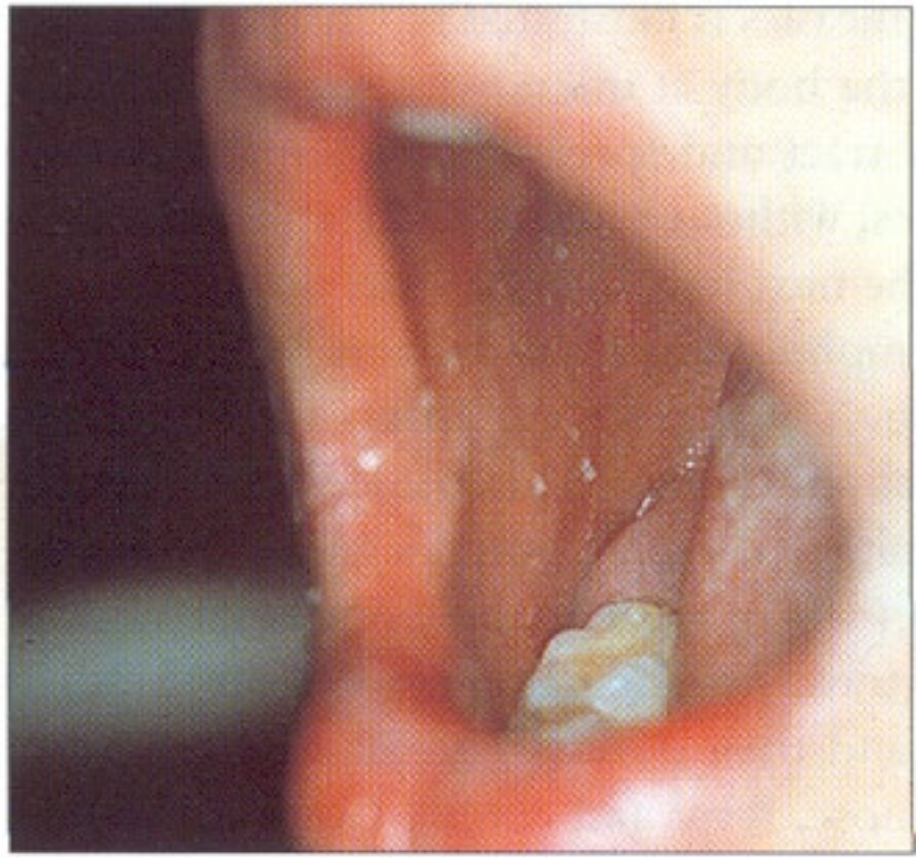
Sudden onset 1-4 days ago

Looks particularly sick

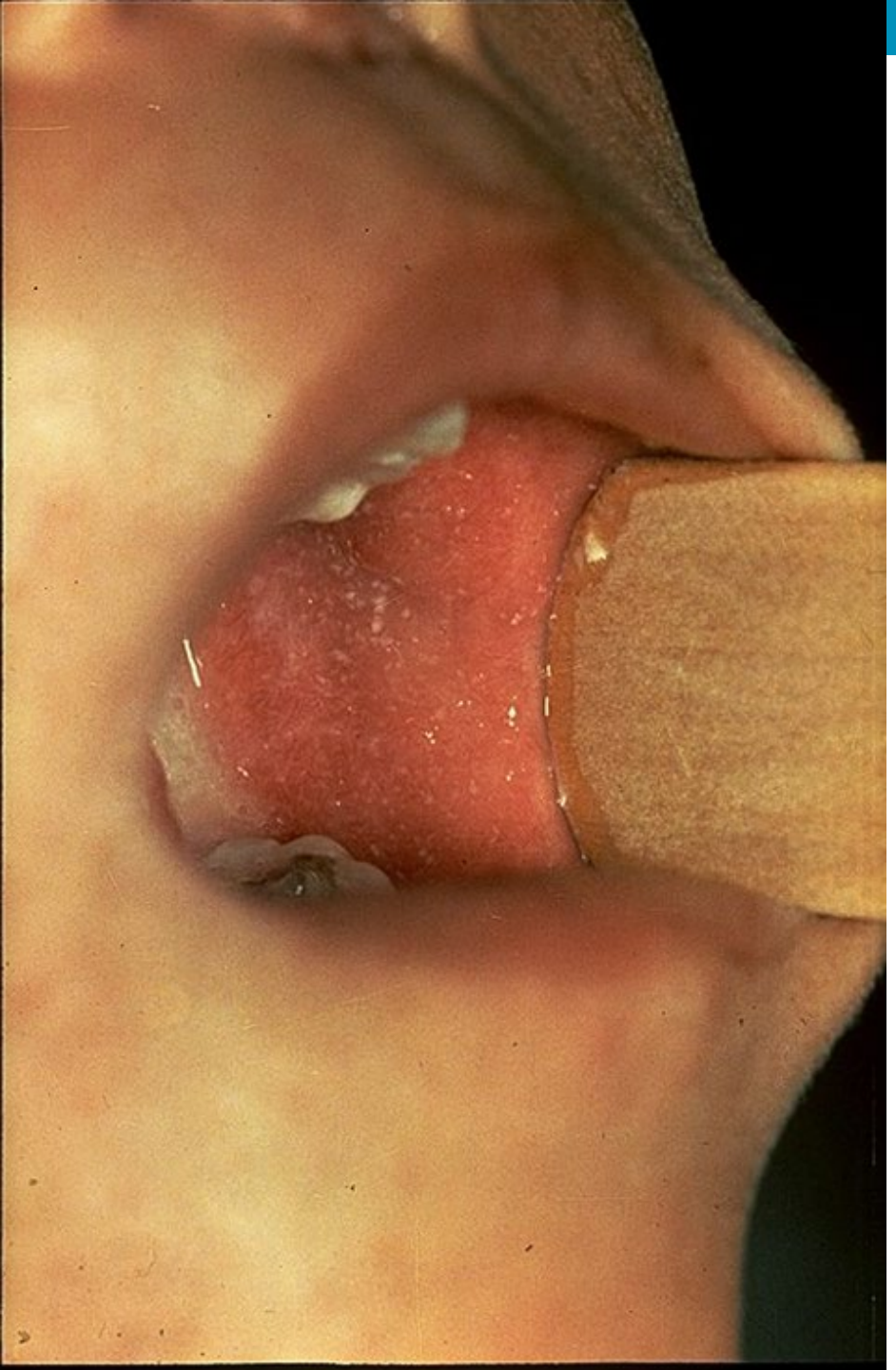
High fever

Runny eyes, dripping nose, cough

You consider Influenza

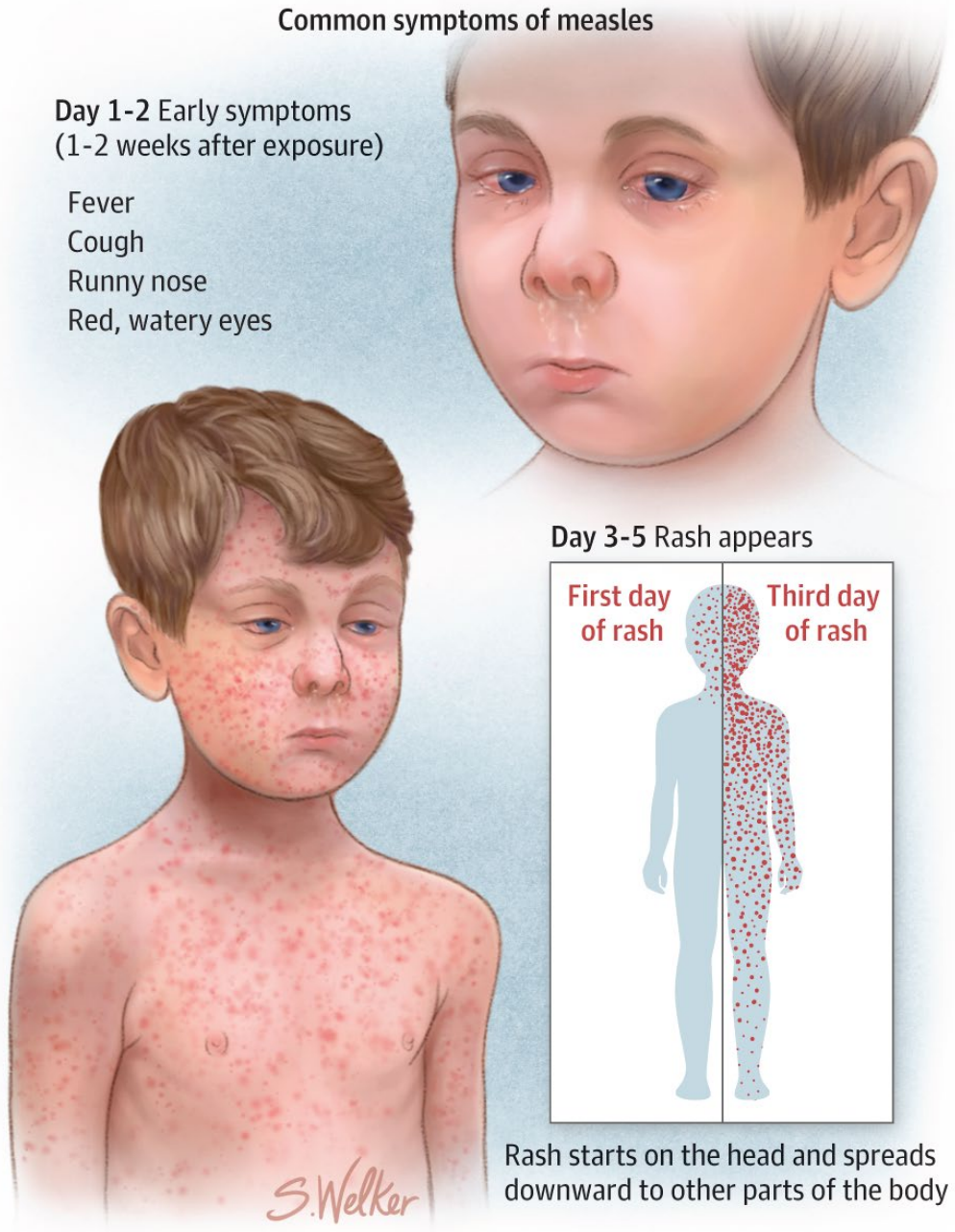


Think of Measles



Koplik spots:

- Diagnostic of Measles
- Almost inapparent
- Similar spots also seen in the conjunctivae
- Appear before the rash during fever & URI sx
- Spots fade as rash appears



Rule out Influenza and Covid
Check for Koplik spots
Call DOH - Measles PCR
Discuss Supportive Care
Arrange Telehealth follow up
Quarantine room for 2 hours.

Check for Koplik spots
CBC –Assess platelets and lymphocytes
DOH - Measles PCR
(Measles IgM)
Follow by telehealth or in Parking lot
Monitor for pneumonia, Neurologic signs
Admit to Airborne Isolation PRN
Offer post –exposure prophylaxis with MMR

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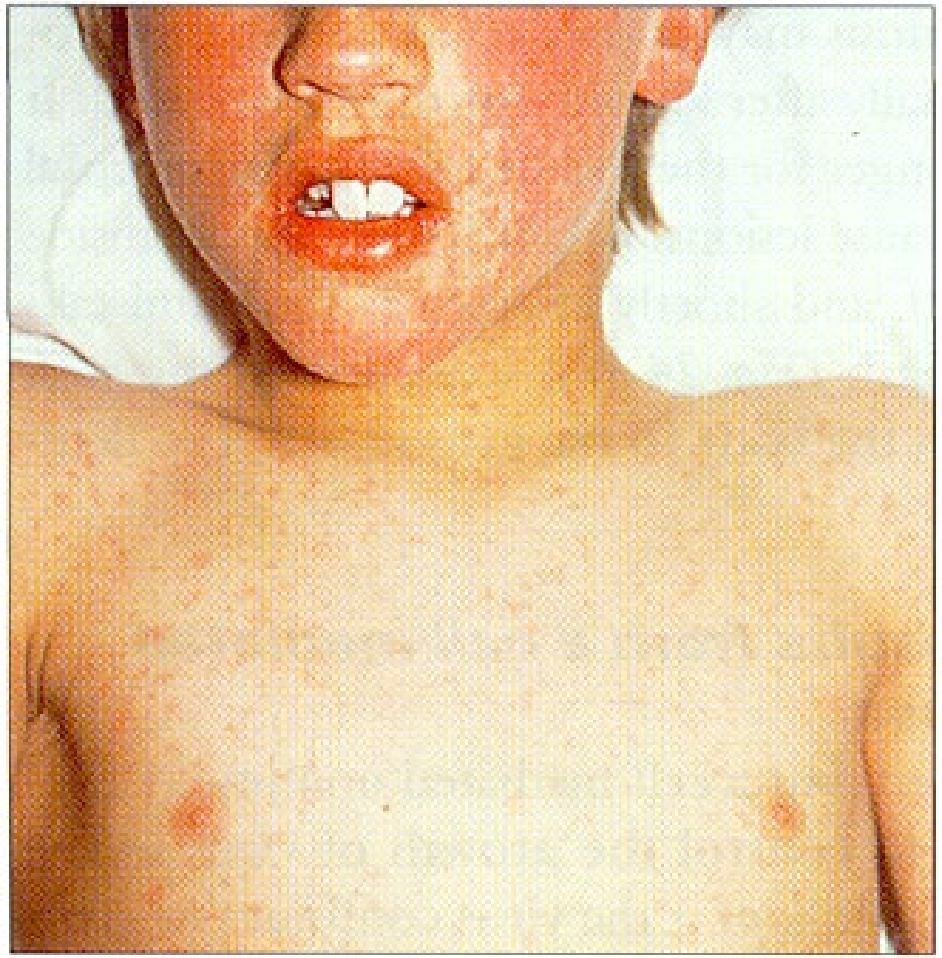
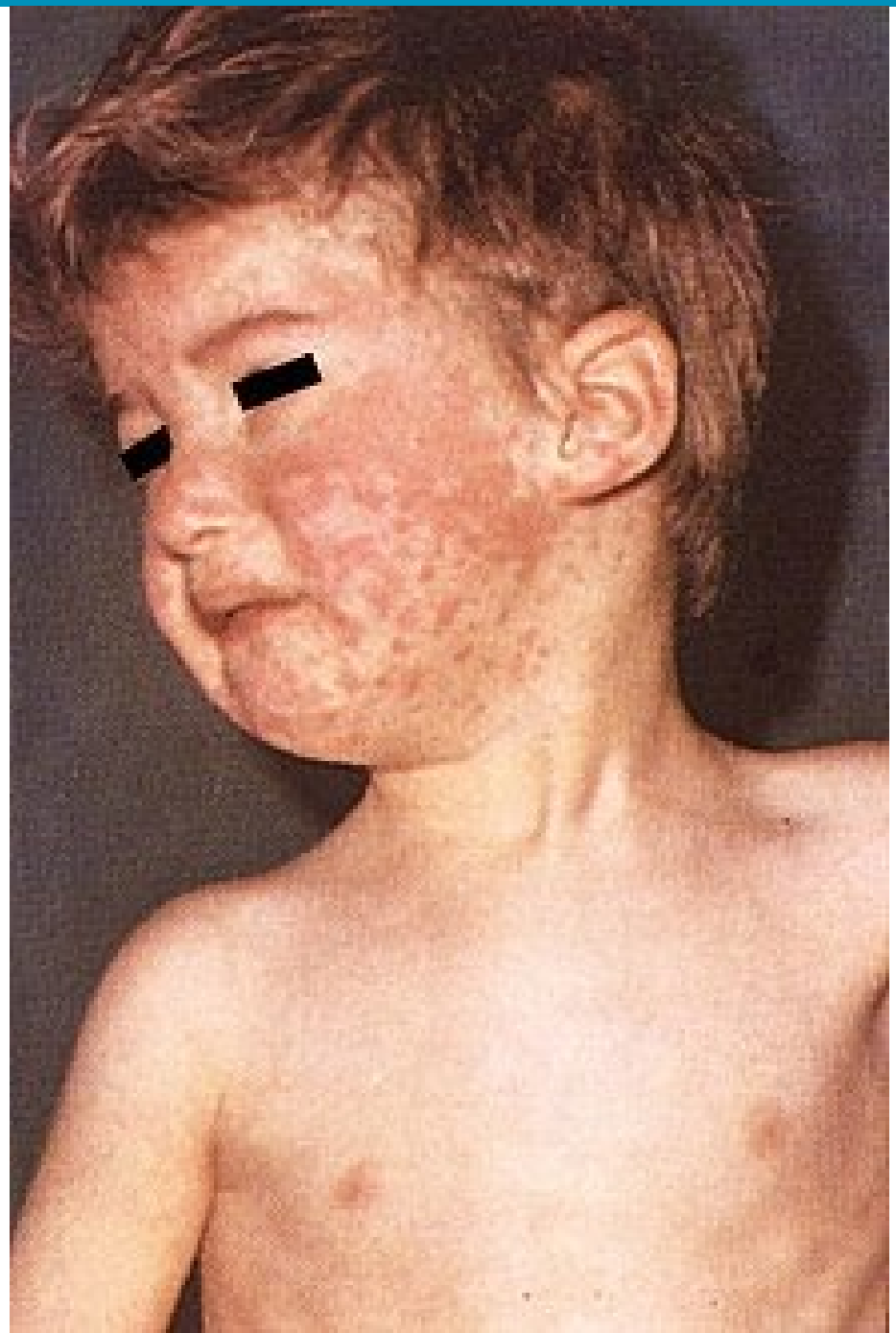
Coryza and Rash

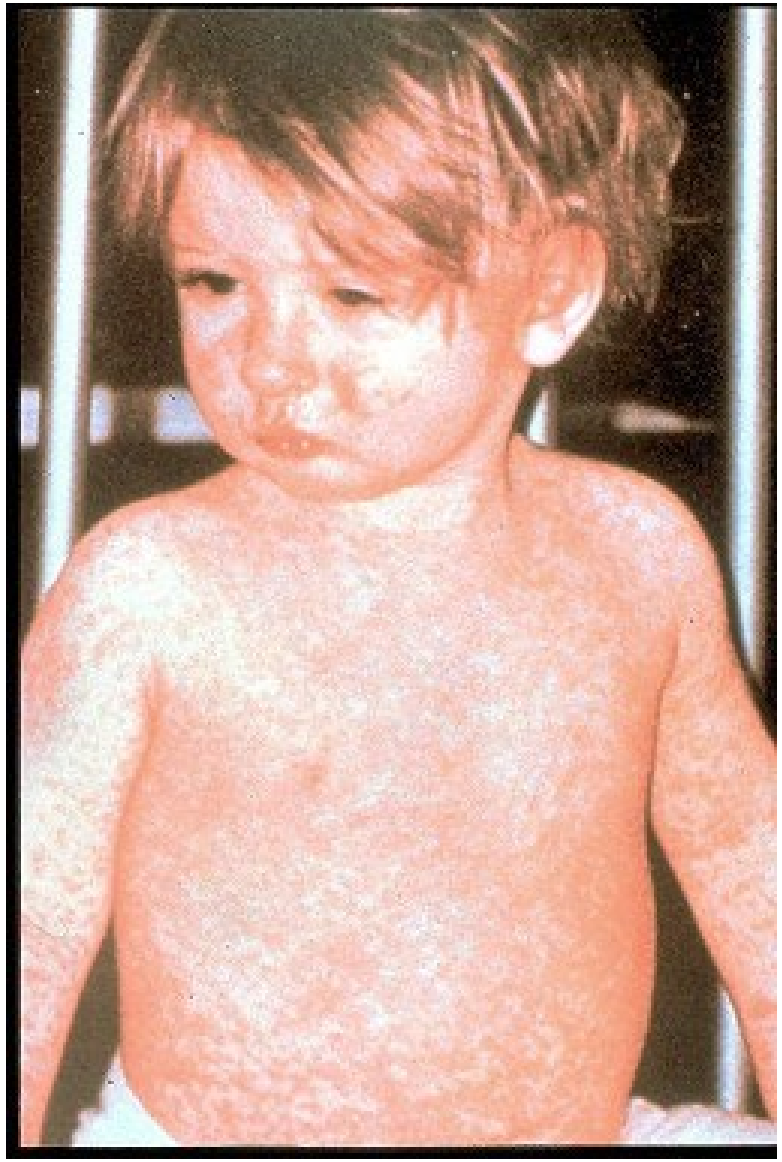
Appearance of Measles rash



- Measles rash begins on face, then spreads to trunk and extremities
- Rash has raised, intensely red macules measuring 3 to 6 mm and often coalesces into large red plaques. There are tiny 1mm papules overlying Macules and plaques

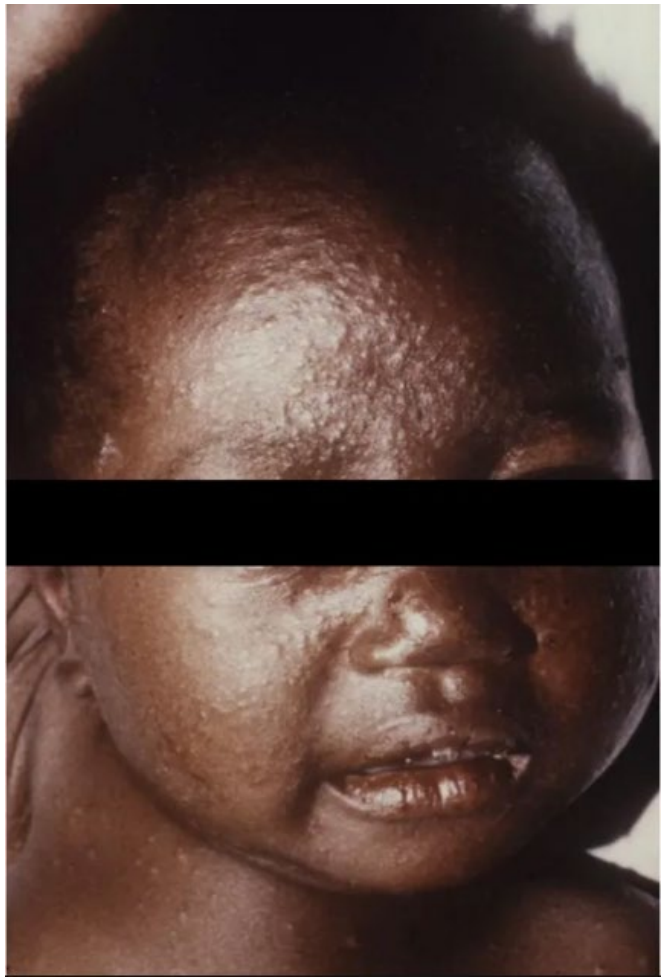


Measles on palms and soles: Discrete spots
Kawasaki Disease: Diffuse erythema



Fully developed "Morbilliform" rash. This type of rash is also seen in severe allergic reactions and rarely Kawasaki Disease. Enteroviral exanthems, rubella, roseola are usually less intense and less likely to become coalescent.

Rash in Darker Skin May Not Appear Red



Rubella Rash in 2 Children

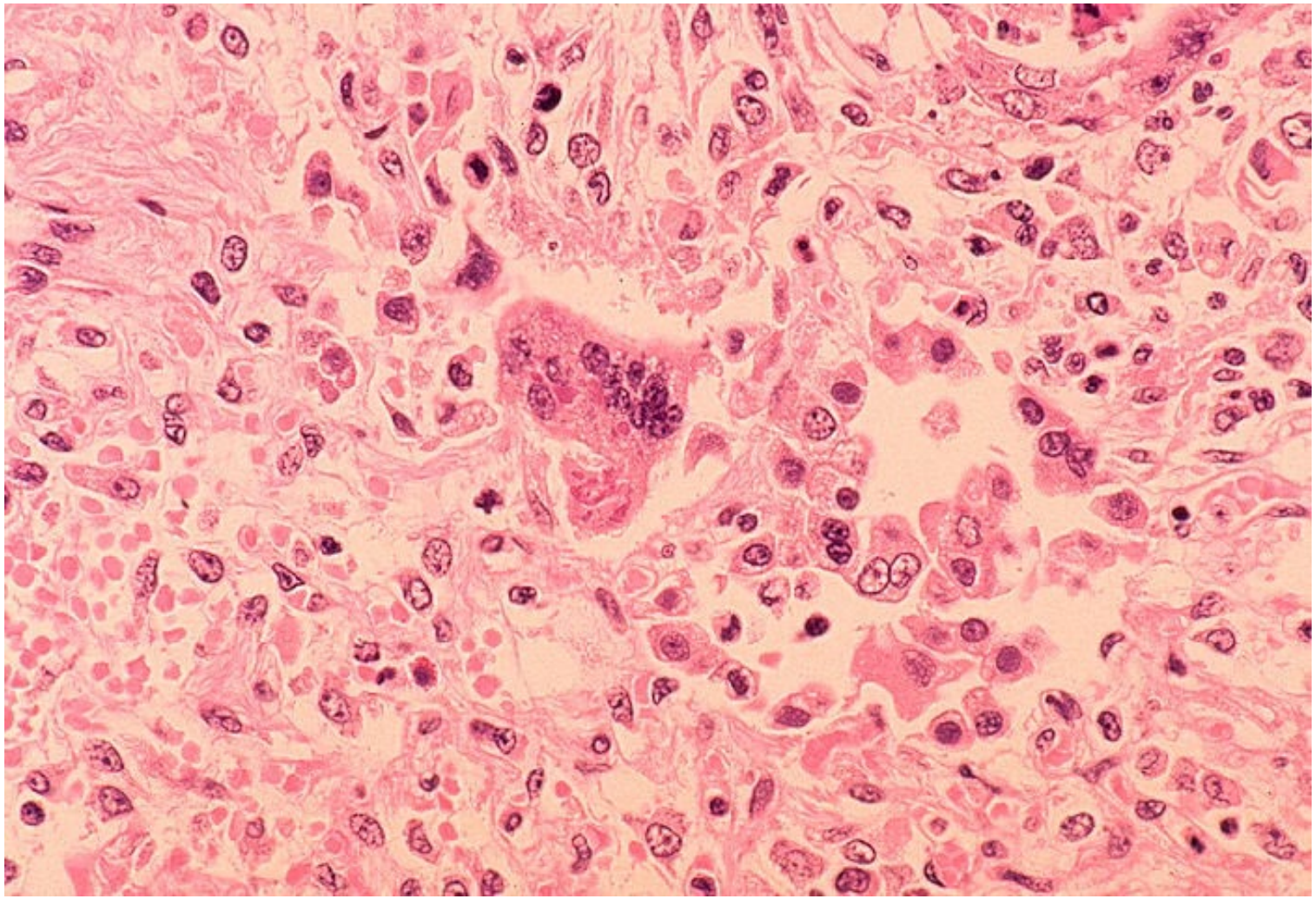
Compared with Measles: Rash is pinker, flatter, fades faster, leaves no trace.

Fever is mild or non-existent

Measles Complications

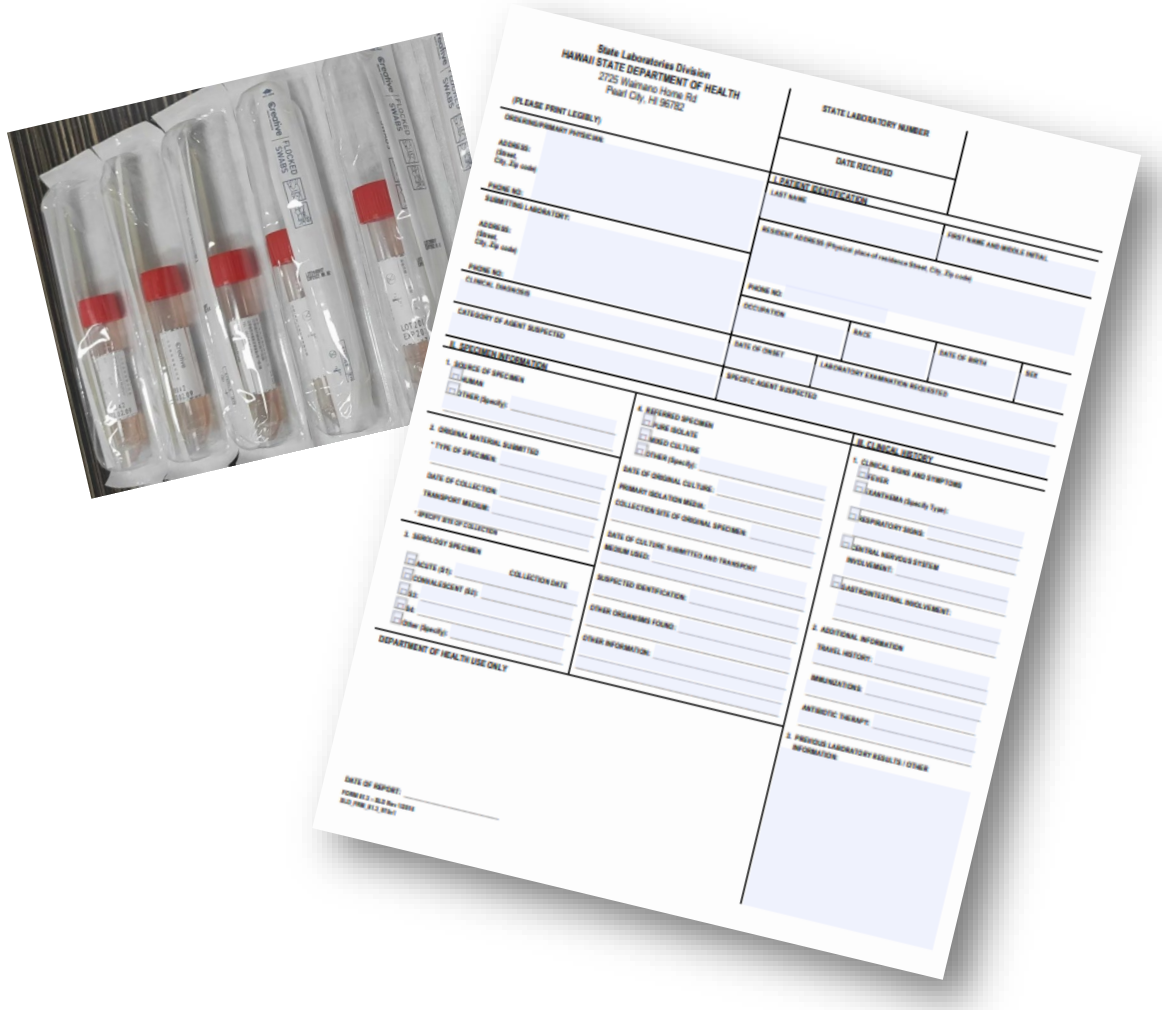
- Otitis Media – 20%
- Pneumonia –
  - Measles - Diffuse interstitial pattern +/- hypoxia
  - Secondary Bacterial – Staph aureus, pneumococcus, GAS
- Encephalitis 1-2/1000
- Mortality: 0.2% (1-2/1000) developed countries
- 1 - 10% mortality if malnourished, immune compromised or vitamin A deficient in developing countries
- SSPE – Rare fatal progressive degenerative brain disease with slow virus behavior occurring 6-12 years after measles

Measles – Giant Cell Pneumonia
Multinucleated Cell with Inclusions



Measles Testing Considerations

- For the latest guidance on measles testing – Refer to HDOH Medical Advisory issued on March 11, 2025
- Measles RT-PCR testing requires HDOH preauthorization and can only be performed by State Lab
- Preferred testing is NP/OP swabbing
- Don’t forget to complete and send the State Lab 81.3 form



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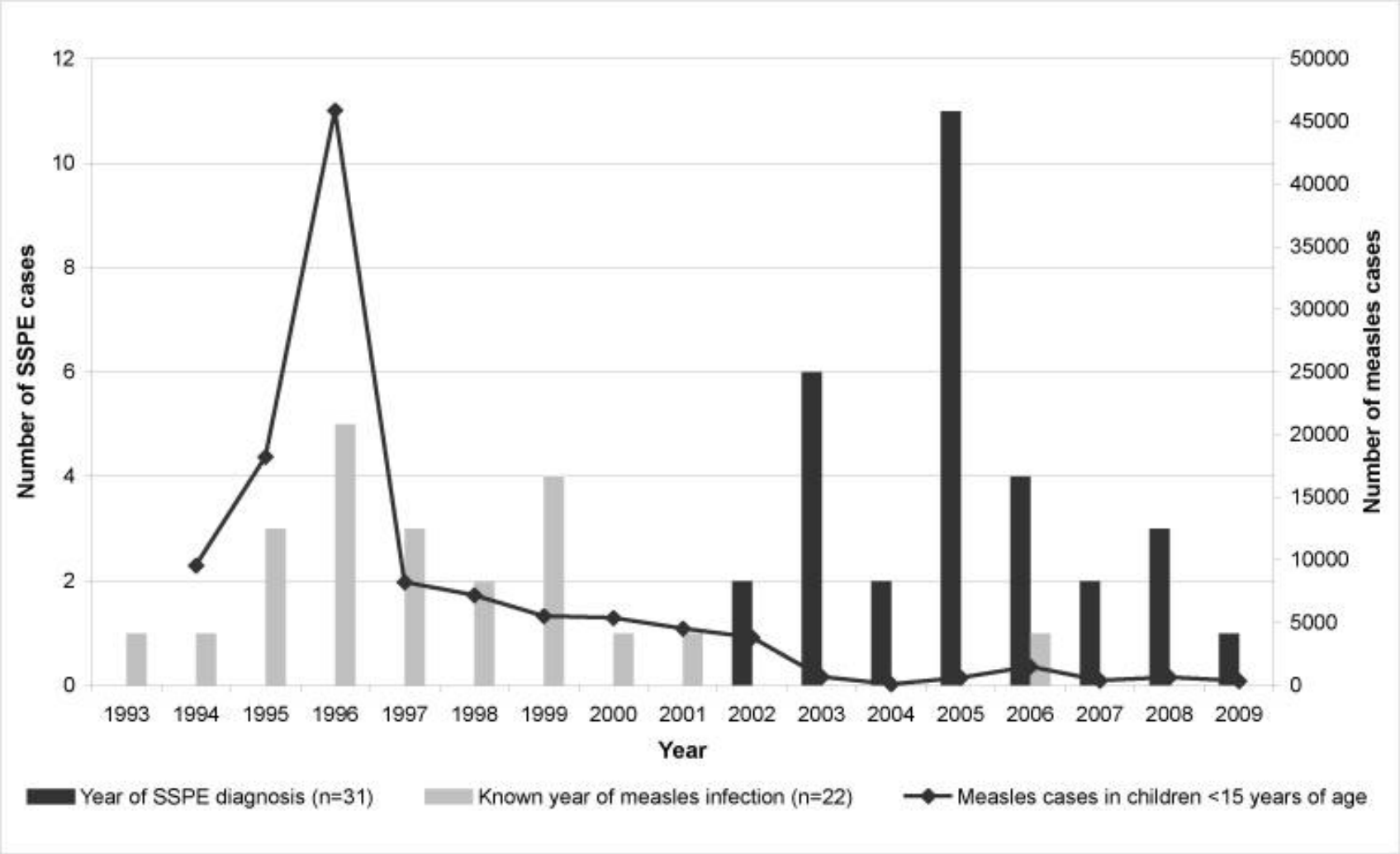
Contrasting Fates of Measles

CLINICAL IMPACT OF MEASLES		
site of virus growth	**well-nourished child good medical care**	**malnourished child poor medical care**
lung	temporary respiratory illness	life-threatening pneumonia
ear	otitis media quite common	otitis media more common more severe
oral mucosa	Koplik's spots	severe ulcerating lesions
conjunctiva	conjunctivitis	severe corneal lesions secondary bacterial infection blindness may result
skin	maculopapular rash	hemorrhagic rashes may occur ('black measles')
intestinal tract	no lesions	diarrhea – exacerbates malnutrition, halts growth, impairs recovery
urinary tract	virus detectable in urine	no known complications
overall impact	**serious disease in a small proportion of those infected**	**major cause of death in childhood (estimated one million deaths/year worldwide)**

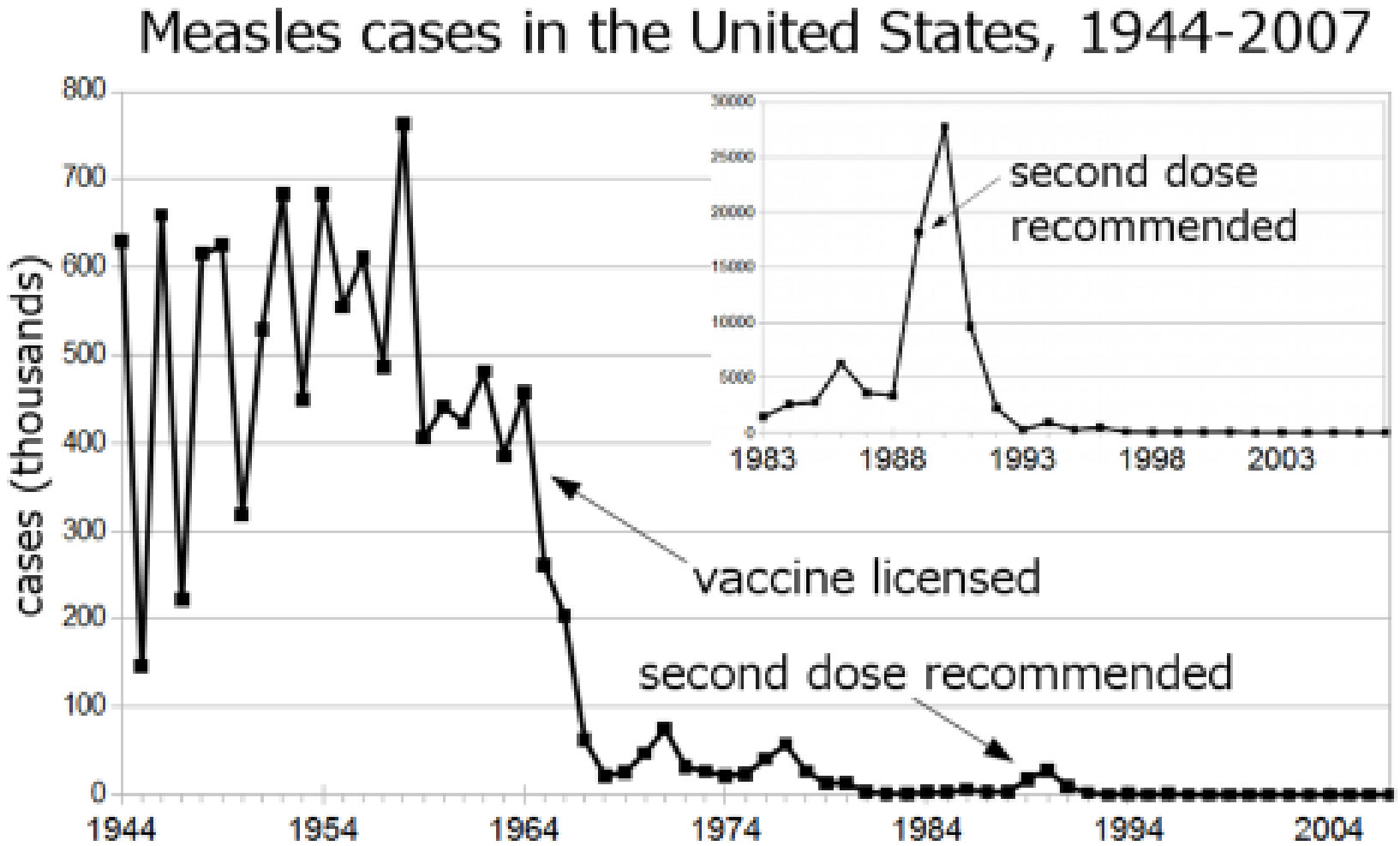
Measles – SSPE Germany



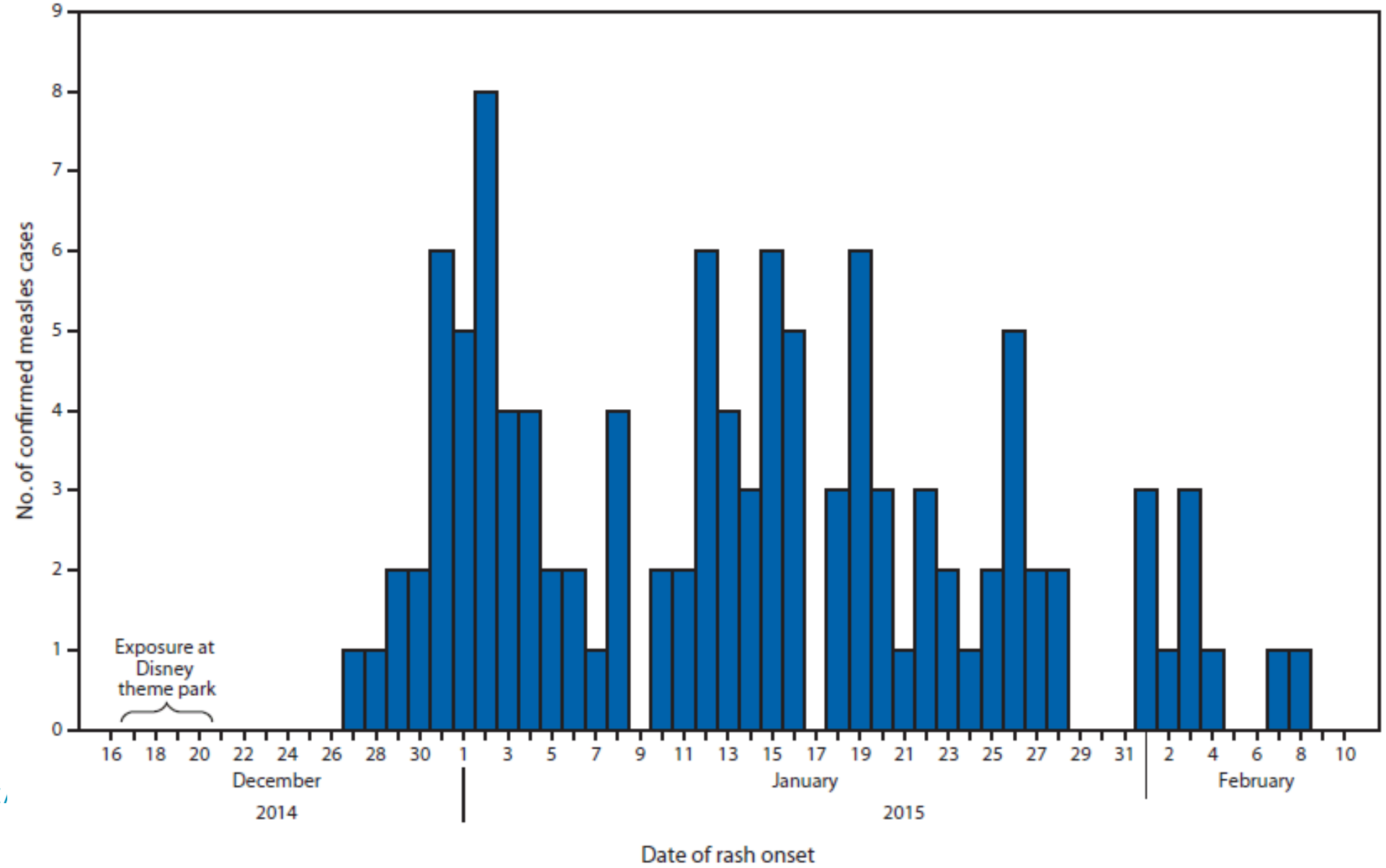
Measles Epidemiology Pre-Vaccine

- Highly contagious
- Virtually all infected by late childhood
- Adult disease rare unless *population* is unexposed
  - Hawaii 1848– Post European & American Contact*
    - Massive loss of life documented in 1850 census
  - Southern Greenland 1953

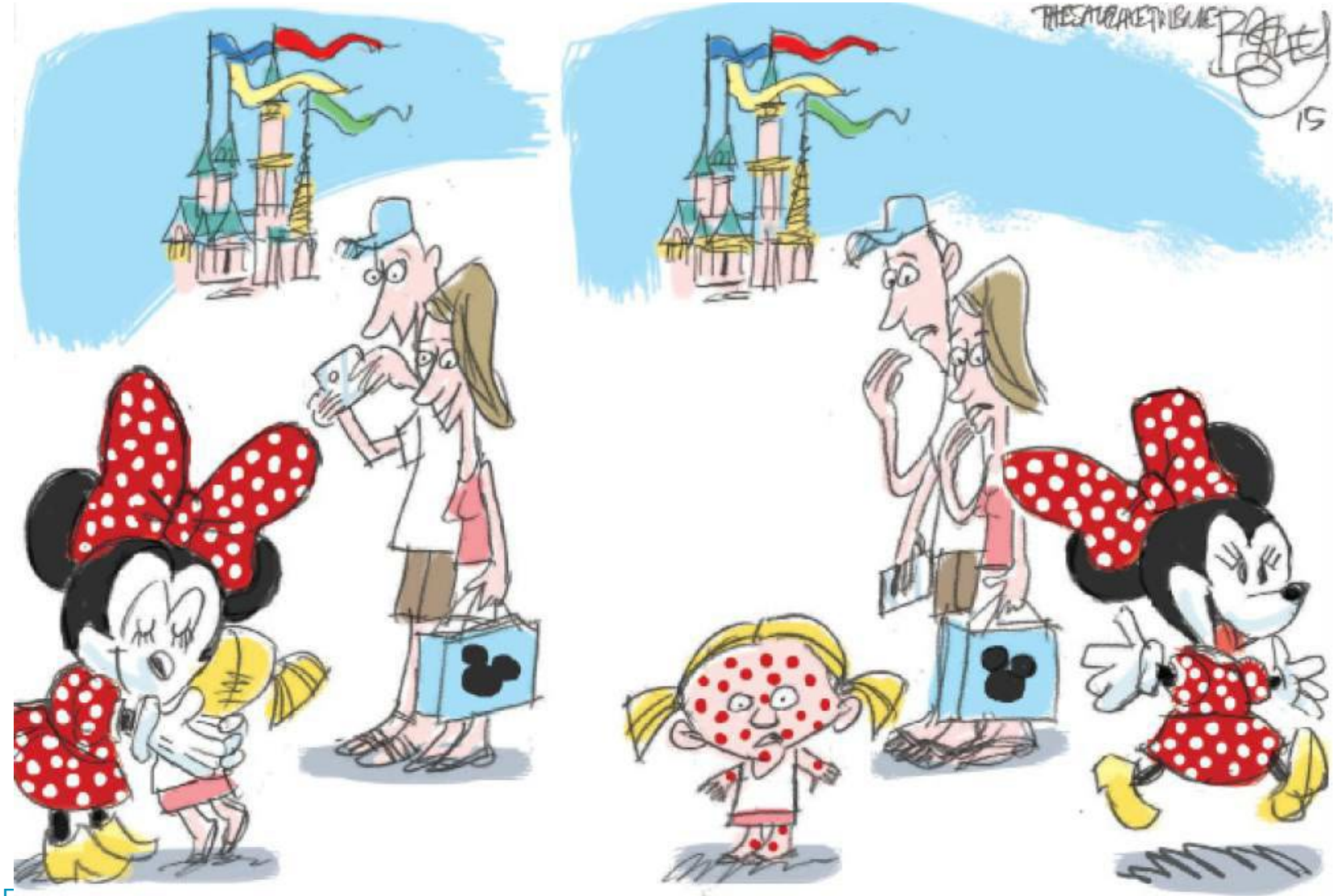
*Shulman ST, Shulman DL, Simms RH, History of Measles in Hawai‘i 2009. Pediatr Infect Dis J 28:728-733.


Measles cases in the United States, 1944-2007
cases (thousands)
800
700
600
500
400
300
200
100
0
1944
1954
1964
1974
1984
1994
2004
vaccine licensed
second dose recommended
second dose
recommended
1983
1988
1993
1998
2003

Cases traced to Disneyland Outbreak

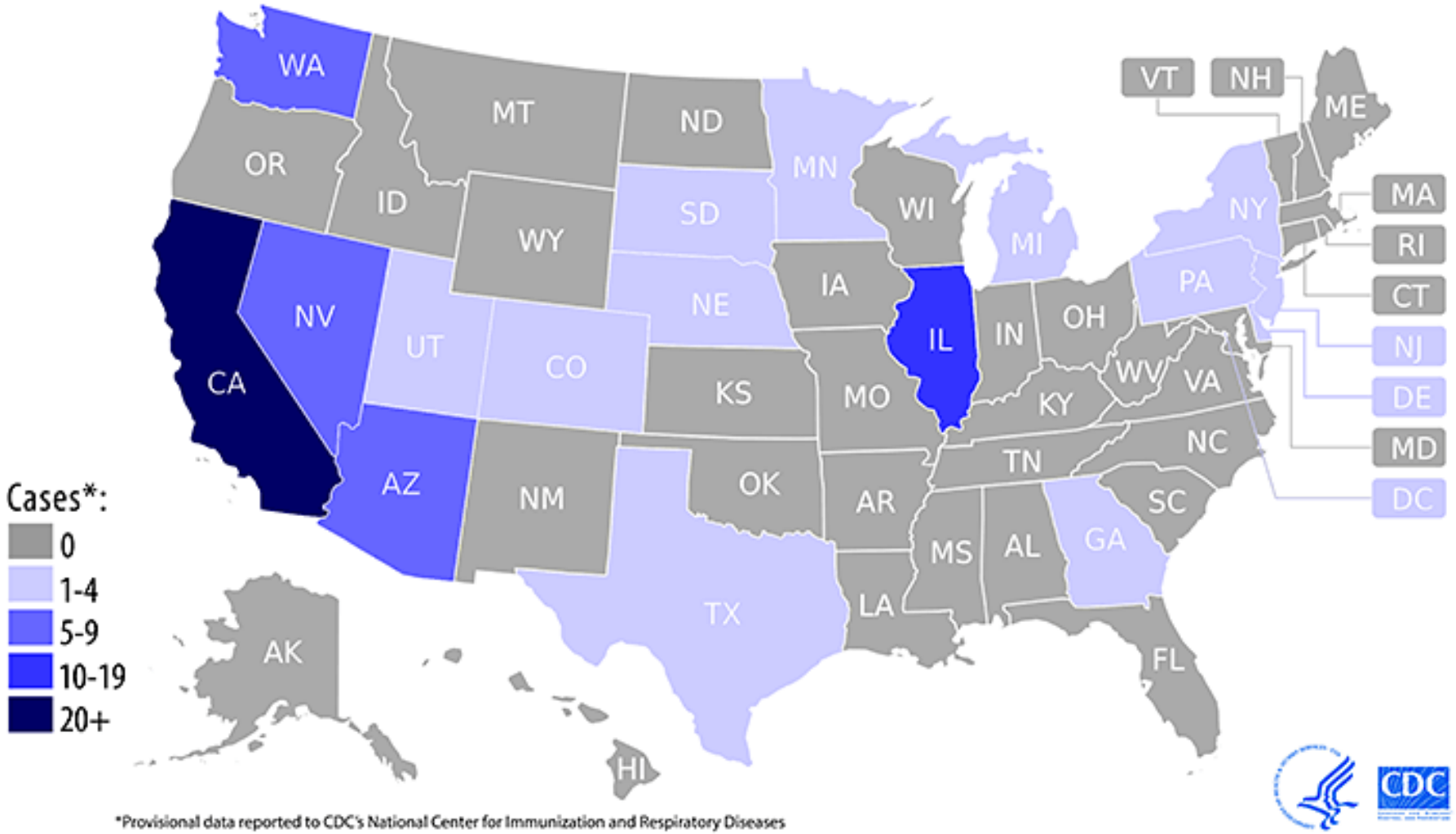


Measles Outbreak US 2014-2015



2015 Measles Cases in the U.S.

January 1 to February 20, 2015



*Provisional data reported to CDC's National Center for Immunization and Respiratory Diseases

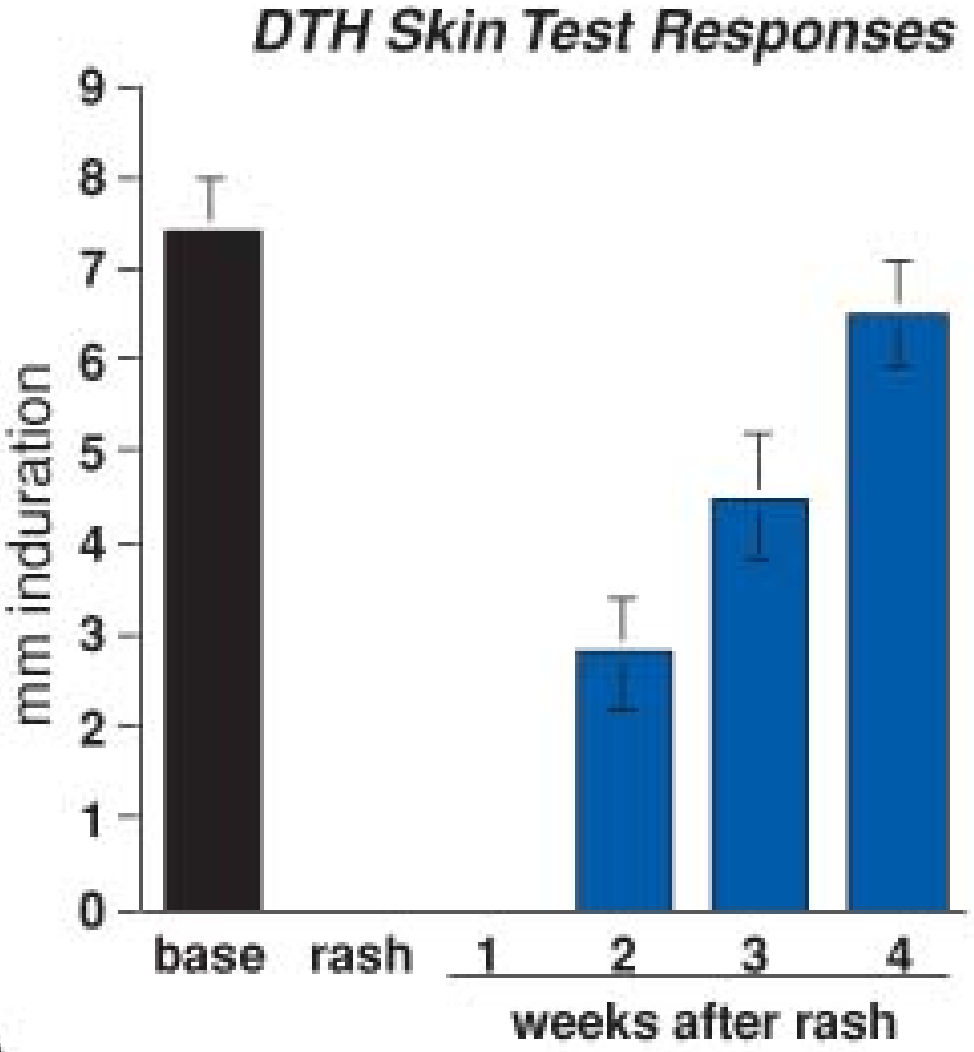
Samoa Outbreak October 2019 to January 2020

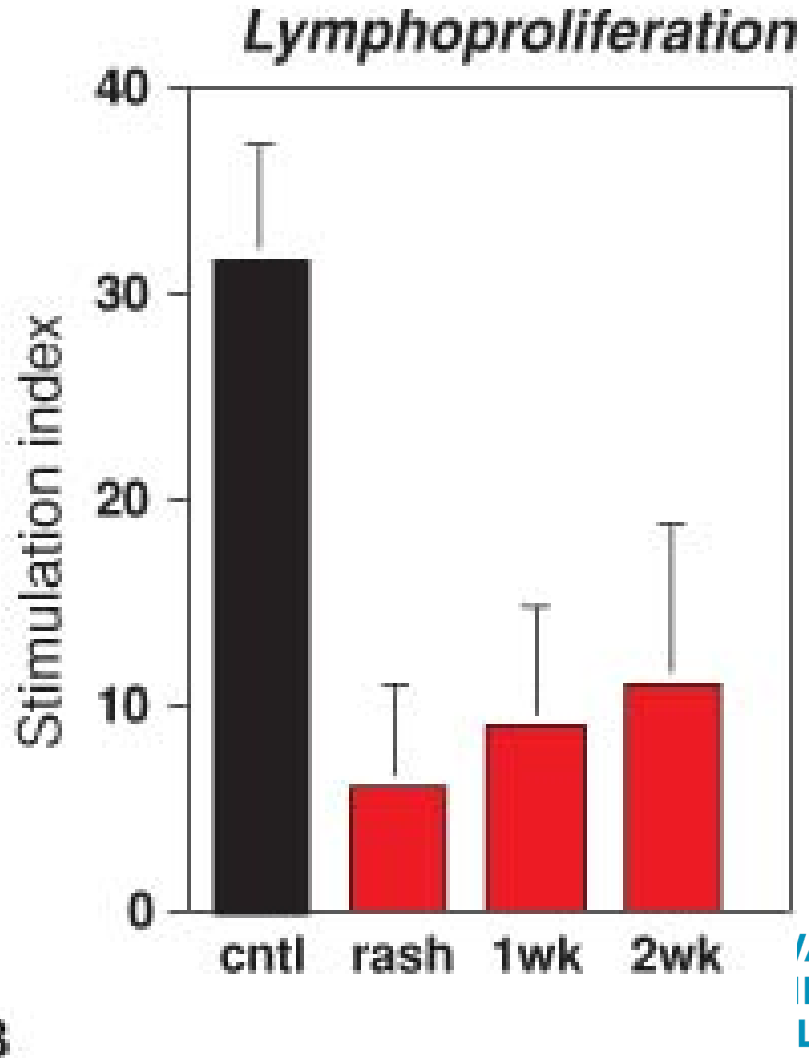
- 5700 Cases in Population of 200,000
- 83 deaths
- Low Immunization Rate
  - Effect of 2 Anti-Vaxers –Edwin Tamasese and Taylor Winterstein
  - Anti Vax Event in June 2019 in Samoa with Robert Kennedy Jr.
  - Vaccine Accident – 2 deaths following immunization due to vaccine contamination
- Government failure
- Traditional Healers
- October 9, First Suspected Case
- Mid-November 15 deaths Hospital Overwhelmed
- December –International Response
- Mass Immunization Campaign 35% to 90% Vaccinated

Measles - Immune Response

- IgM by EIA – Positive 6-31 days after rash 98%
- IgG responses persist for years and shows anamnestic response
- Hemagglutinin inhibition and neutralizing antibodies are most sensitive markers of immunity but some with undetectable antibodies will show anamnestic response
- Cell mediated immunity is most important in prevention and recovery
- Measles may cause decreased CMI to other agents
  - **Increased tuberculosis reactivation and negative PPD**
  - **Secondary bacterial infections are common and may be major cause of death**
  - **After measles both T cell and antibody responses are diminished**

Temporary Immune Suppression in Measles





Immune Amnesia Post Measles

- Depletion of memory CD150+ T and B cells causes a prolonged period of increased mortality and morbidity from infections including those to which they had been previously exposed
- Multiple studies in high and low resource countries show increased rate of infections in children following measles compared with children with no history of measles
- Sub-protective anti-tetanus antibody levels persist 2-3 years after measles in tetanus immunized children

Cherry, JD. Ongoing Measles in the Developed and Developing World - Review. J Ped Infect Dis Soc 2024 13:233-236.

Measles Action Plan

- Prepare Yourself: Recognition
- Prepare Your Office, Clinic or Hospital
- Identify your measles vulnerable patients:
  - Infants < 12 months, Unimmunized, Immunocompromised
- Focus on seeing these patients safely and effectively to prevent spread
- Examine in cars, masked, in separate rooms that can be closed off
- Confirm Diagnosis: PCR through Department of Health
- Assess need for hospitalization – Pneumonia, altered mental state
- Supportive care, use of telehealth to follow outpatients
- Pre-Exposure Prophylaxis > 6 month old infants: MMR vaccine travel & epidemic situations
- Post-exposure Prophylaxis < 72 hours after exposure: MMR vaccine
- (Immunoglobulin IVIG or IM for vulnerable patients > 72 hours after exposure)

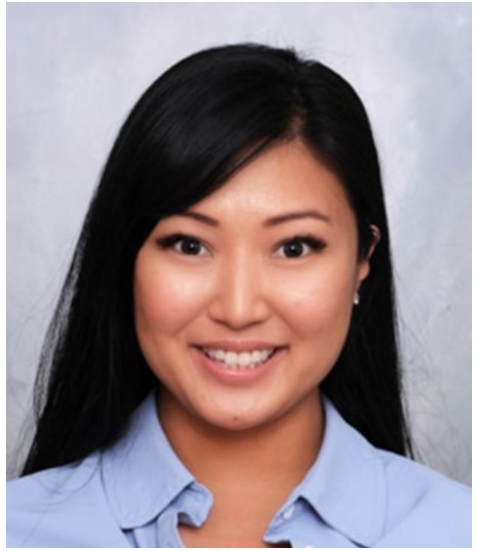
Measles – Summary

- Severe Illness in all infected
- Stereotyped course – No occult infections
- Incubation Period 7 – 18 days
- Cough, coryza, conjunctivitis, photophobia, fever Days 1-4
- Koplik Spots appear Day 3-4
- Rash appears Day 5-7 Fever persists 3-4 d
- Fever falls, rash fades Symptom Days 10-14
- Diagnose it by blood PCR, Report it to Health Department
- Hospitalize for pneumonia, Seizures, Altered mental state
- Often fatal in developing countries
- Even in US: expect 2-5/1000 fatal or severe handicap
- Measles stuns the immune system for months in survivors

Other Resurging Vaccine Preventable Diseases

- Influenza A & B
  - “I didn’t know the flu could be fatal”
- Pertussis – Whooping Cough – 100 day Cough
  - Multiple Kapiʻolani ICU admissions in 2025
- Mumps
  - Statewide Outbreak 2017-8: 925 cases
- Varicella – Chicken Pox
- Severe Sepsis, Meningitis, Pneumonia
  - Hemophilus Influenzae b
  - Pneumococcus

Infection Control Measures for Communicable Diseases in Healthcare Settings



Angela Kim, RN, BSN, MPH, CPHQ, CIC

Infection Prevention Manager

Hawai‘i Pacific Health

Objectives

- Apply core strategies in preventing communicable disease exposures while providing care to patients in the healthcare setting.
- Apply infection prevention core strategies to measles.

Why Experts are Concerned about Measles

- Being able to identify & isolate measles can be tricky:
  - The incubation period is long (~11-12 days)
  - First symptoms are general (fever, cough, coryza, conjunctivitis)
  - Rash appears 2 – 4 days after symptom onset
  - Measles is infectious 4 days before and 4 days after rash onset
  - Measles is highly contagious and can live up to 2 hours in airspace occupied by infected person

First and foremost: KNOW YOUR FUNDAMENTALS

1. Ensuring HCP have presumptive evidence of immunity to measles
2. Know your 3 I's
   - Identify
   - Isolate
   - Inform
3. Know the 2 tiers of precautions
   - Standard Precautions
     - For all patients
   - Transmission-based Precautions
     - For measles: airborne precautions

3 I's – General Principles

1.) Identify

- Know the symptoms
- Know the risk
- Remain vigilant

2.) Isolate

- Mask yourself
- Mask patient
- Room patient

3.) Inform

- Notify the proper contacts

3 I's – Measles

1.) Identify

- Know the symptoms
  - Fever, rash, cough, coryza, conjunctivitis
- Know the risk
  - Unvaccinated, recent travel
- Remain vigilant
  - Screen all patients checking in

2.) Isolate

- Mask yourself
  - Minimum N95
- Minimum N95
- Mask patient
  - Medical mask
- Room patient
  - Designated isolation room

3.) Inform

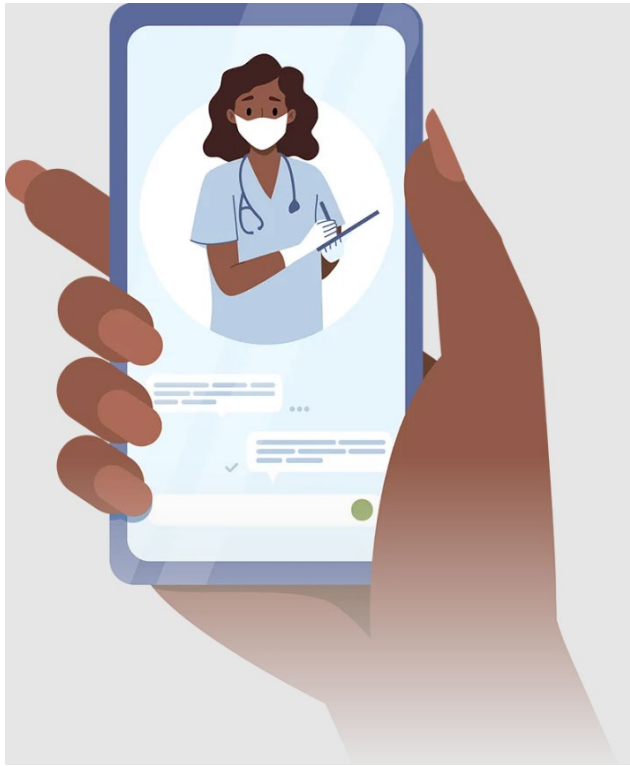
- Notify the proper contacts
  - Notify lead designee
  - Notify HDOH

Identification – Infection Screening Procedure

- Standardized and apply infection screening for all patients
  - Include hallmark symptoms such as fever, chills, cough, rash, sore throat, congestion.
  - Clear patient communication is imperative (e.g., visuals)

Scheduling Appointments

- Upstream your identification and isolation process
  - Apply infection screening tool during scheduling over phone.
  - Option to apply measles-related screening if warranted
    - E.g., screening is + fever AND rash → ask about MMR vaccination and recent travel
  - Allows exercising other safer options:
    - Schedule telehealth
    - Schedule patient at end of day
    - Provide clinic arrival instructions (instruct to mask and enter through special route that limits exposure)

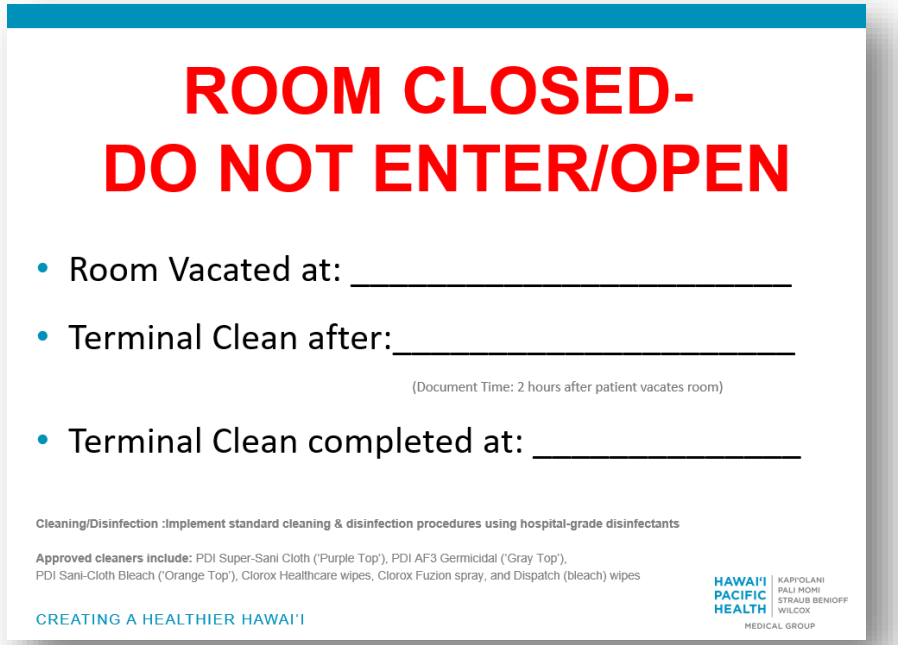


Optimize your environment – Signage/Supplies

- Facilitate adherence to respiratory hygiene, cough etiquette, hand hygiene.
  - Post visual alerts
  - Provide patients with symptoms instructions on all relevant infection control expectations
  - Make supplies to perform hand hygiene available
  - Provide supplies (e.g., facemasks) near visual alerts if possible

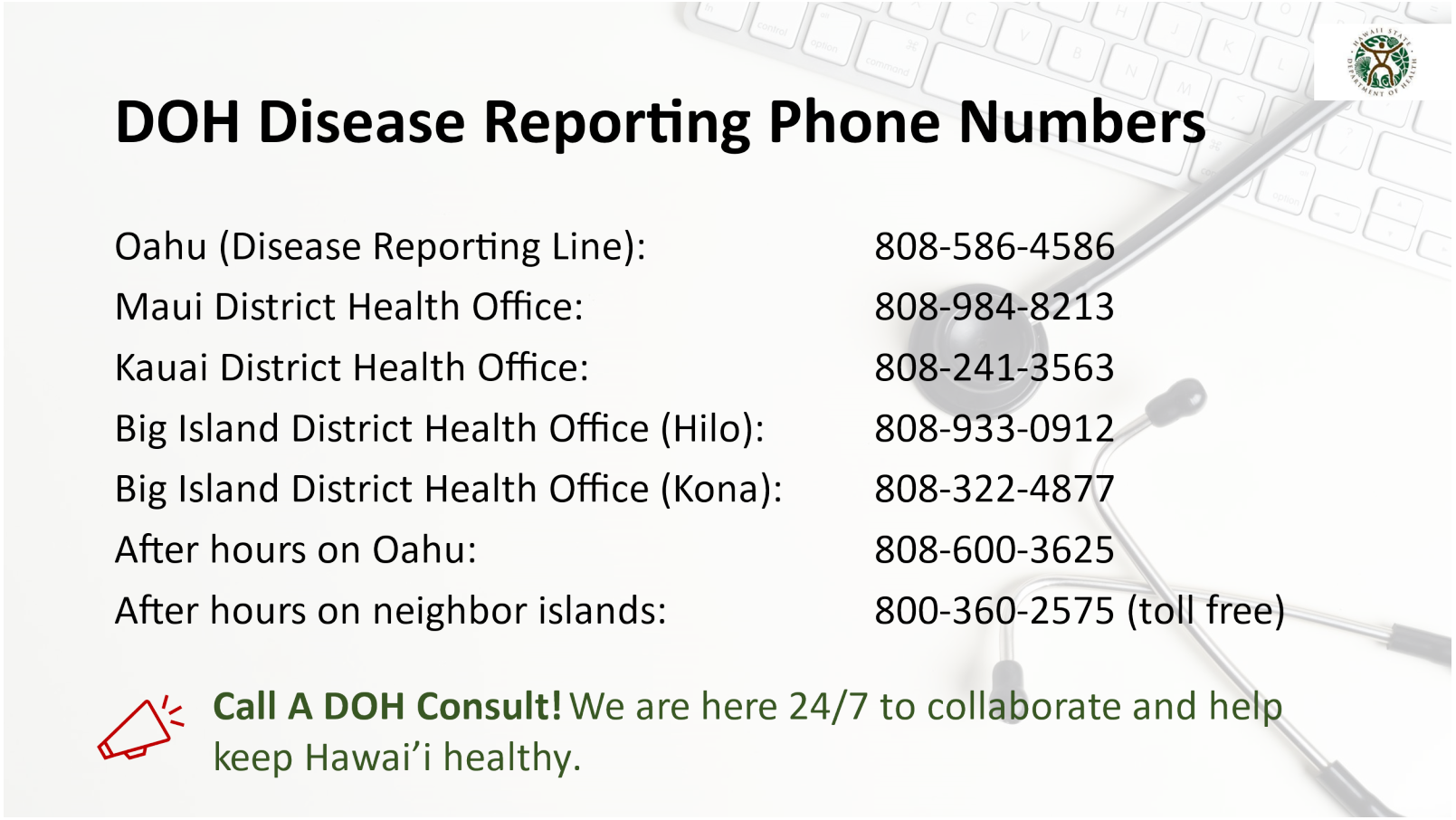
Optimize your environment – Room preparation

- Designate a private isolation room
- Once patient discharged, keep room(s) vacant (with door closed) for 2 hours
- Cleaning/Disinfection supplies
  - Standard cleaning and disinfection procedures are adequate for measles
  - Use EPA-registered disinfectants for health care settings
  - Used PPE and other patient care items should be managed as regulated medical waste.



Questions?

- Dr. Sarah Kemble, State Epidemiologist, Department of Health



Next HHP Webinar: (for HQIP credit)

Date: May 22, 2025, 5:30-6:30pm
Aortic Stenosis
Dr. Andrew Baldwin & Dr. Jared Oyama

To view upcoming HHP webinars and future events, please visit our Hawai‘i Health Partners website for the “**Events Calendar**” from the “For Providers” dropdown.

For Specialists Only – For HQIP Credit:

The **Annual Assessment of Chronic Conditions** Presentation will be sent on May 30th from Info@HawaiiHealthPartners.org.

This measure is separate from HHP Network Engagement – Webinars measure

CREATING A HEALTHIER HAWAIʻI

For All Providers - Provider Review Period: June 2 - 30

Final performance for 2024 HHP QPP/SSP (now HQIP) will be available on **Monday, June 2nd**.

Please review your 2024 dashboard and send discrepancies/inquiries to Info@HawaiiHealthPartners.org during this period.

An email from Info@HawaiiHealthPartners.org with instructions to access your dashboard will be sent on May 30th.

CREATING A HEALTHIER HAWAIʻI

Thank you for joining us!

- A recording of the meeting will be available afterwards
- Unanswered question?
  - Contact us at Info@HawaiiHealthPartners.org