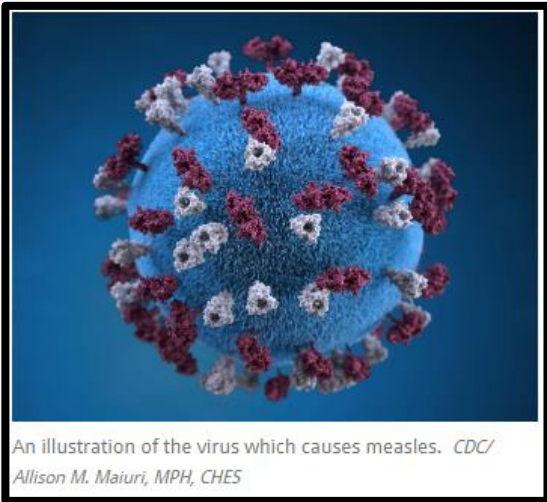
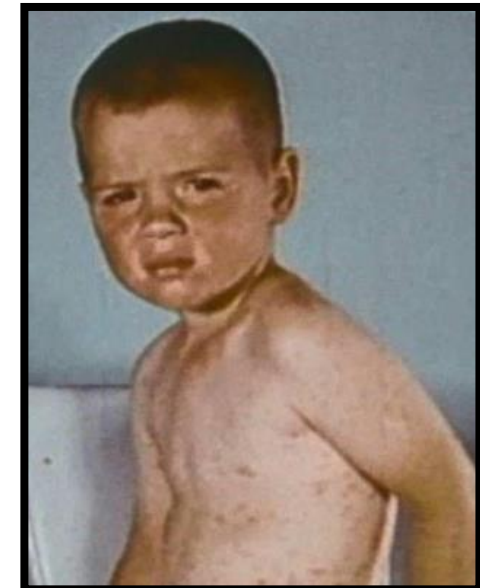


Introduction to Measles Case Investigation and Follow-Up for LBOHs



February 14, 2023

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Measles: A Brief History

- Measles is a respiratory disease caused by a virus.
- Measles is one of the most contagious diseases we know.
- Measles has been around for more than 1,000 years.
 - In the 9th century, a Persian doctor published one of the first written accounts of measles disease.
- Millions of people worldwide get measles each year, and thousands die from the disease.
- Measles has a Vaccine!
 - In 1963, measles vaccine was licensed in the United States.
 - In 1968, measles vaccine began to be distributed.
 - Measles was declared eliminated from the United States in 2000!
 - **Elimination** means there was no continuous disease transmission for more than 12 months. This was possible thanks to a highly effective vaccination program and better measles control in the Americas region.



We typically assume anyone born in US before 1957 probably had childhood measles.

Measles Across the Globe

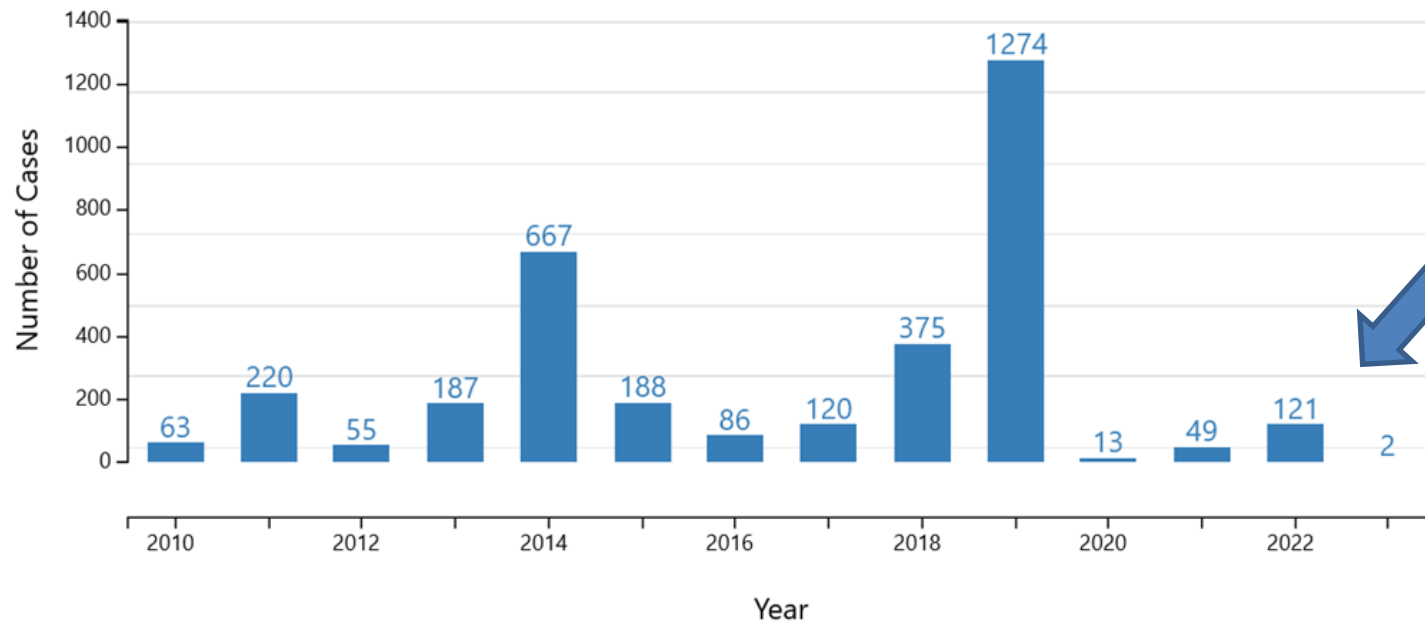
- In 1980, before widespread global use of measles vaccine, an estimated 2.6 million measles deaths occurred worldwide.
- While much progress has been made, including more than 56 million measles-related deaths prevented through vaccination from 2000 – 2021, measles still claimed the lives of almost 130,000 people (mostly children) in 2021.
- In 2021, the estimated number of measles cases was 9.5 million globally.



Measles Outbreaks in the U.S.

- In any given year, more measles cases can occur for any of the following reasons:
 - an **increase in the number of travelers who get measles abroad** and bring it into the U.S., and/or
 - further spread of measles in U.S. **communities with pockets of unvaccinated people**.

**Number of US Measles Cases Reported by Year
2010-2023* (as of January 27, 2023)**



**Majority from
Ohio Outbreak
(2022)**

Measles in the News Recently...

- In 2000, Measles was declared eliminated in the U.S.
- However, almost 1,300 cases of measles were reported in 31 states in the U.S. in 2019— the greatest number since 1992.
- The 2019 [U.S. measles outbreaks](#) were all linked to travel-related cases that reached at-risk populations (un or under vaccinated against measles) in the United States.
- Recently, Ohio reported the 4th largest measles outbreak since 2000.

 CBS News

[At least 82 children in Ohio infected with measles, more than half of whom are unvaccinated babies and toddlers](#)

Measles is spreading among children in Ohio two months after cases were first detected. As of Thursday morning, there are at least 82 cases...

1 month ago



 BBC

[Ohio reports more measles cases than previous two years combined](#)

An outbreak of measles in the US state of Ohio has infected 82 children so far - the biggest eruption of the disease in the county since...

1 month ago



 The Hill

[More than 80 Ohio children infected in measles outbreak, most unvaccinated](#)

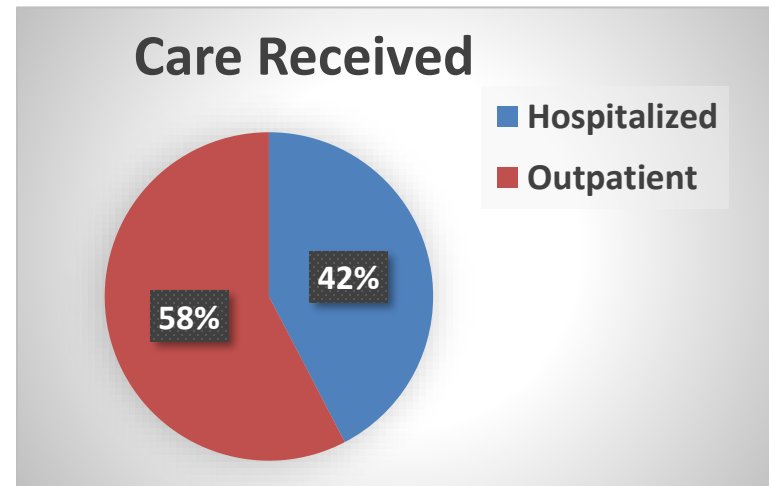
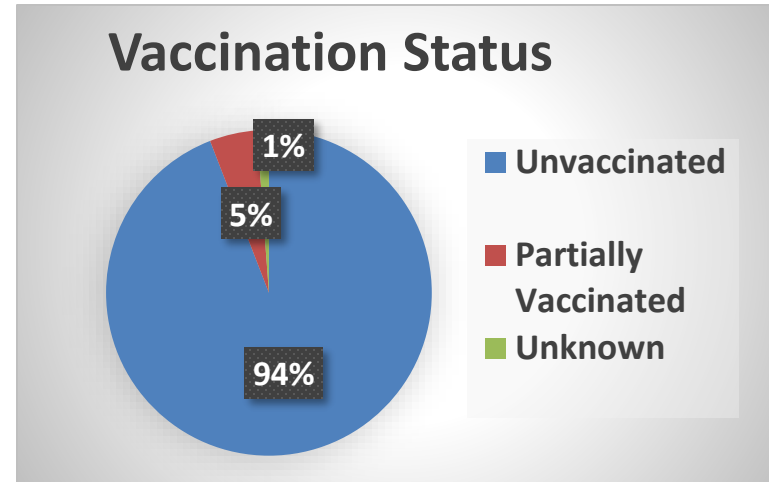
More than 80 children have been infected with measles in central Ohio as an outbreak in the state continues to spread rapidly among the...

1 month ago



Measles In Ohio...

- **Take Aways from the Ohio Measles Outbreak (2022-2023) N=85 Cases (as of Jan. 17, 2023)**
 - Began with international travel, spread among local community.
 - **94% of cases were unvaccinated**
 - Majority (71%) were age eligible
 - Parents reported vaccine hesitancy
 - **Notably higher hospitalization rate (42%)**
 - US hospitalization Rate typically ~25%
 - Young age of cases and case detection in the hospital setting
- Outbreak [declared over](#) following two incubation periods (42 days) with no new cases (2/5/23).

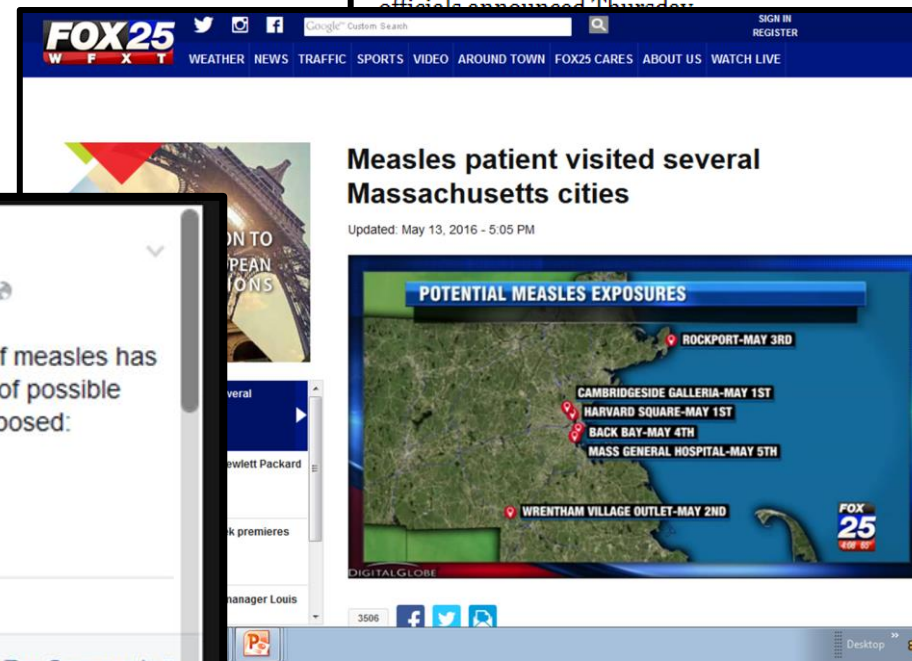
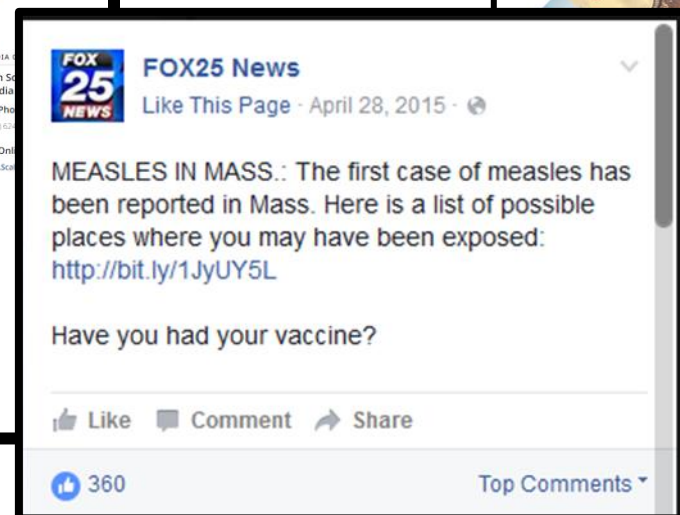
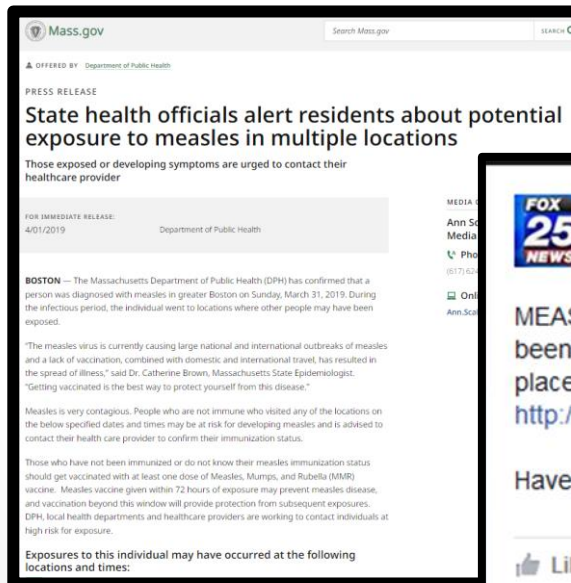


N=85 Cases as of 2/6/23



Measles in Massachusetts

- As of the recording of this webinar (February 2023), our last case of measles in MA was in early 2020 (just before our first case of COVID-19 in the start of a global pandemic)...
- And while vaccination rates are high in our state compared to many, we are still vulnerable as domestic and international travel picks up again and vaccine hesitancy grows.



infectious disease shopped, rode the
 May 1, then headed south to
 at at Unos Chicago Grill.



Measles in Massachusetts

Total Confirmed Measles Cases and Measles Investigations*

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
CONFIRMED MEASLES	1	8	0	1	0	2	3	1	0	0
Total Investigations	63	111	119	62	55	74	196	24	16	17

*Data as of 2/1/2023

Note: Imported cases (AKA travelers who may visit MA while infectious) do not reside in MA and therefore are not included in the table above.

- As you can see, most suspect cases for measles are eventually ruled out, however even one case can lead to several hundred exposures and extensive follow-up.

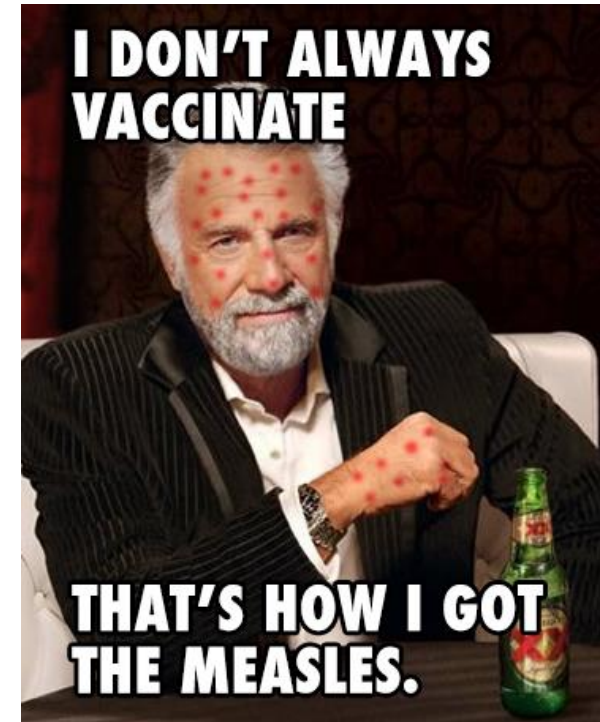
Learning Objectives Today




- **General Understanding of Measles Infection and Prevention (AKA VACCINES!!!)**
 - You should know what measles is, how we prevent it, and a few common facts about the MMR Vaccine (our greatest tool for prevention!)
- **Know what to do for a **LOW** Suspect Measles Event in MAVEN**
 - Most Common Scenario. There are a few follow-up tasks for this scenario as we await test results that will most likely rule out measles.
- **Know What to do for a **HIGH** Suspect Measles Event in MAVEN**
 - **Cliff's Notes:** You don't have to memorize everything today. In summary, there is a lot of follow-up for high-suspect situations, but MDPH Epis will partner with you and guide you through the process. If there is a confirmed case of measles, it will be ALL HANDS ON DECK.

Agenda

- **The Measles Virus**
 - Symptoms,
 - Transmission,
 - Vaccination,
 - Testing
- **Preventing Measles**
 - Control Measures
 - Measles MAVEN Events & Investigations
 - Low and High Suspect Case Studies
- **Discussion & Resources**



All About Measles




CONSIDER MEASLES

in patients presenting with febrile rash illness and clinically compatible measles symptoms (cough, coryza, and conjunctivitis)

Ask patients about recent travel internationally or to domestic venues frequented by international travelers, as well as a history of measles in the community.

www.cdc.gov/measles/hcp/index.html



Measles: Symptoms

- Viral disease characterized by **fever, cough, runny nose (coryza), conjunctivitis, erythematous maculopapular rash**, and characteristic **mouth lesions** (Koplik spots)
- **Fever** typically increases in stepwise fashion, peaking as high as 103° - 105° F
- **Rash** classically begins at the hairline, then involves the face and upper neck.
- Gradually proceeds downward over the next few days, reaching the hands and feet.
 - The rash fades in the same order that it appears, from head to the extremities (usually lasts 5–6 days).



Rash begins approx. 14 days after exposure.

- Maculopapular
- Head to toe progression



Measles: Clinical Complications

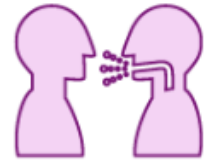
- **Common Complications** from measles include **otitis media (ear infection)**, **bronchopneumonia**, **laryngotracheobronchitis**, and **diarrhea**.
- Even in previously healthy children, measles can cause serious illness requiring **hospitalization**.
 - **One out of every 1,000** measles cases will develop **acute encephalitis**, which often results in **permanent brain damage**.
 - **One to three out of every 1,000** children who become infected with measles will **die from respiratory and neurologic complications**.
 - **Subacute sclerosing panencephalitis (SSPE)** is a rare, but fatal degenerative disease of the central nervous system characterized by behavioral and intellectual deterioration and seizures that generally develop 7 to 10 years after measles infection.

Complications	Rate
Hospitalized	1 in 4 cases
Death	1-3 per 1,000 Cases
Encephalitis	1 per 1,000 Cases
Subacute Sclerosing Panencephalitis (SSPE)	1 per 100,000 Cases



Measles: Transmission

- **A Respiratory Virus:** Measles is a highly contagious virus that lives in the nose and throat mucus of an infected person. It can spread to others through coughing and sneezing.
 - If other people **breathe the contaminated air or touch the infected surface**, then touch their eyes, noses, or mouths, they can become infected.
 - Animals do not get or spread measles.
- **Measles is one of the most contagious diseases!**
 - Measles is so contagious that if one person has it, up to 90% of the people close to that person who are not immune will also become infected.
 - Measles virus can **live for up to two hours in an airspace after an infected person leaves an area.**
- **Infectious Period:** Infected people can **spread measles to others from four days before through four days after the rash appears.**



It spreads when an infected person coughs or sneezes.



The virus can live for up to two hours in an airspace.



A True Measles Story!

**Measles
virus can
travel in
shared air
spaces!**

MDPH Investigated a measles case in a child <1 yr of age to determine the source of infection. Conclusion: while on vacation in the Caribbean, the MA family had stayed at a hotel on an island. In the next room, travelers from France were also staying as guests. One of the French travelers became sick with measles while staying at the hotel – and infected the child next door without ever interacting directly!

Measles: Vaccination





Measles, Mumps, and Rubella (MMR) Vaccination

- There are now **TWO MMR vaccines** available for use in US!
 - **KEY UPDATE:** Both vaccines are fully interchangeable for all indications for which MMR vaccination is recommended:
 - **M-M-R II** manufactured by Merck (Previous only US option available since 1978)
 - **PRIORIX** manufactured by GSK (Licensed June 2022)



[CDC MMWR: MMR Vaccine \(PRIORIX\) ACIP Recommendations Nov. 18, 2022.](#)

- **MMRV Combination Vaccine:** Children may also get MMRV (measles, mumps, rubella, & varicella) licensed for use 12 months through 12 years of age.

- **ProQuad** manufactured by Merck (MMRV licensed 2005)





Evidence of Immunity for Measles

1. **VACCINE RECORD:** Documentation of 2 appropriately timed doses of measles containing vaccine; or
2. **LAB TEST:** Serologic evidence of immunity or laboratory evidence of disease; or
3. **AGE:** Birth in the US before 1957 (unless a healthcare worker)
 - Past history of disease is NOT acceptable evidence of immunity without a lab test.
 - Foreign-born individuals (including those born before 1957) should have documentation of immunization or serologic evidence of immunity. Those who are born before 1957 can be assigned a lower priority for follow up.

Quarantine for Susceptible Contacts: Day 5 through Day 21 Following Exposure.
(Exposure = Day 0)

Not sure if someone was previously vaccinated? There is no harm in giving MMR vaccine to a person who may already be immune to one or more of the vaccine viruses.



MMR Vaccine – Facts & FAQs

- MMR is part of the [Routine Childhood Immunization Schedule](#) and is a requirement for schools in MA. The two-dose series will typically be given at the 1 Year and 4 Year Well Child Visits.
 - If a child receives two valid MMR doses prior to their 4 year well child visit, they are considered up to date and would not need to obtain another dose when they turn 4.
- **The 4-day "grace period" applies to the minimum age for administration of the first dose of MMR.**
 - A dose of MMR vaccine administered up to 4 days before the first birthday may be counted as valid.
 - The 4-day "grace period" should NOT be applied to the 28-day minimum interval between two doses of a live parenteral vaccine.
- **The 2nd MMR dose helps more people develop immunity to measles**
 - Approximately 93% of people will develop immunity after the 1st MMR vaccine dose.
 - The second dose is to provide another chance to develop measles immunity for people who did not respond to the first dose. About 97% of people develop immunity to measles after two doses of measles-containing vaccine.

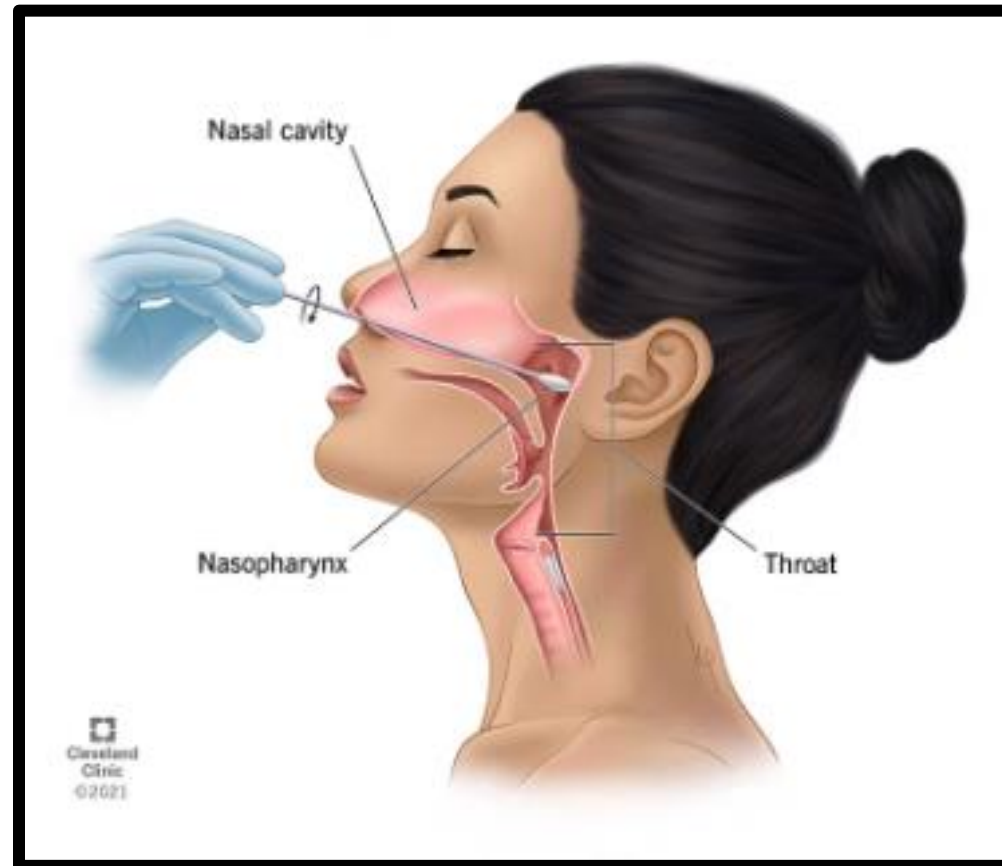


MMR Vaccine – Protection While You Travel!

- **Children ages 6–11 Months can receive one dose of MMR vaccine prior to travel for temporary increased protection from measles!**
- ACIP recommends that children who travel or live abroad should be vaccinated at an earlier age than that recommended for children who reside in the United States. The risk for measles exposure can be high in high-, middle- and low-income countries.
- A measles-containing vaccine administered more than 4 days before the first birthday should NOT be counted as part of the US Immunization Schedule series.
 - The MMR dose should be repeated when the child is age 12 through 15 months (12 months if the child remains in an area where disease risk is high). The second dose should be administered at least 28 days after the first dose



Testing for Measles





Specimens for Measles Testing

Nasopharyngeal (NP) Swab: Preferred Specimen

- Collected as soon as possible after rash onset
- Sent to State Public Health Lab for PCR Testing



Serum

- Acute serum should be collected at same time as swab
- Sent to State Public Health Lab for IgM testing.



**Specimen coordination is typically handled by MDPH Epis
(Goal is for PCR specimen to be sent to State Lab.)**



Measles Testing: Notes for LBOH

- **Measles is an Immediate Disease.** All suspected measles cases should be reported to MDPH by the provider wishing to test to ensure the proper specimens are collected and public health is ready to implement appropriate control measures and follow-up as soon as possible.
- Most **MAVEN Events for Measles** will be created by an MDPH Epi as Suspect Events while the test results are pending. Test results are typically available within 24-48 hours, but follow-up activities may be initiated sooner in highly suspect situations.
- **Partner with MDPH.** Be sure to be in communication with the assigned epi to receive the results and to ensure appropriate and timely local response as needed.

COMMUNICABLE AND OTHER INFECTIOUS DISEASES REPORTABLE IN MASSACHUSETTS BY HEALTHCARE PROVIDERS*

*Reportable infectious diseases and conditions are not limited to those designated below. This list includes only those which are primarily reportable by clinicians. A full list of reportable diseases in Massachusetts is detailed in 105 CMR 300.100.

REPORT IMMEDIATELY BY PHONE!
This includes both suspected and confirmed cases.
All cases should be reported to your local board of health;
if unavailable, call the Massachusetts Department of Public Health:
Telephone: (617) 983-6800 Confidential Fax: (617) 983-6813

• **REPORT PROMPTLY (WITHIN 24 HOURS)**
This includes suspected and confirmed cases.

Isolates should be submitted to the State Public Health Laboratory

<ul style="list-style-type: none"> ☒ Anthrax ☒ ☒ Any case of an unusual illness thought to have public health implications ☒ Any cluster/outbreak of illness, including but not limited to foodborne illness ☒ Botulism ☒ • Brucellosis ☒ ☒ Cholera • Chikungunya virus • Creutzfeldt-Jakob disease (CJD) and variant CJD ☒ Diphtheria • Encephalitis, any cause ☒ Foodborne illness due to toxins (including mushroom toxins, ciguatera toxins, scombrototoxin, tetrodotoxin, paralytic shellfish toxin and amnesic shellfish toxin, staphylococcus enterotoxin and others) • Hansen's disease (leprosy) ☒ Hemolytic uremic syndrome ☒ Hepatitis A (IgM+ only) • Hepatitis B in pregnant women • Hepatitis syndrome, acute possibly infectious ☒ Influenza, pediatric deaths (<18 years old) ☒ ☒ Infection due to novel influenza A viruses ☒ • Jamestown Canyon virus • Lymphocytic choriomeningitis • Malaria ☒ Measles ☒ • Meningitis, bacterial, community acquired • Meningitis, viral (aseptic), and other infectious (non-bacterial) 	<ul style="list-style-type: none"> ☒ Meningococcal disease, invasive (<i>Neisseria meningitidis</i>) ☒ • Mumps ☒ • Pertussis ☒ Plague ☒ ☒ Polio • Powassan ☒ Pox virus infections in humans, including variola (smallpox), monkeypox, vaccinia, and other orthopox or parapox viruses ☒ Rabies in humans ☒ Respiratory infection thought to be due to any novel coronavirus including SARS and MERS • Reye syndrome • Rickettsialpox • Rocky Mountain spotted fever ☒ Rubella ☒ Tetanus • Toxic shock syndrome • Trichinosis ☒ Tuberculosis ☒ • Evidence of tuberculosis infection • Tularemia ☒ ☒ Typhoid fever ☒ • Typhus • Varicella (chickenpox) ☒ Viral hemorrhagic fevers
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Animal bites should be reported immediately to the designated local authority.

Important Note: MDPH, its authorized agents, and local boards of health have the authority to collect pertinent information on all reportable diseases, including those not listed on this page, as part of epidemiological investigations (M.G.L. c. 111, s. 7).

Measles Control Measures

A blue rectangular graphic with a white circle in the upper right. The circle contains text about measles contagion. The bottom left of the graphic has the text "MEASLES AWARENESS".

National Foundation for Infectious Diseases

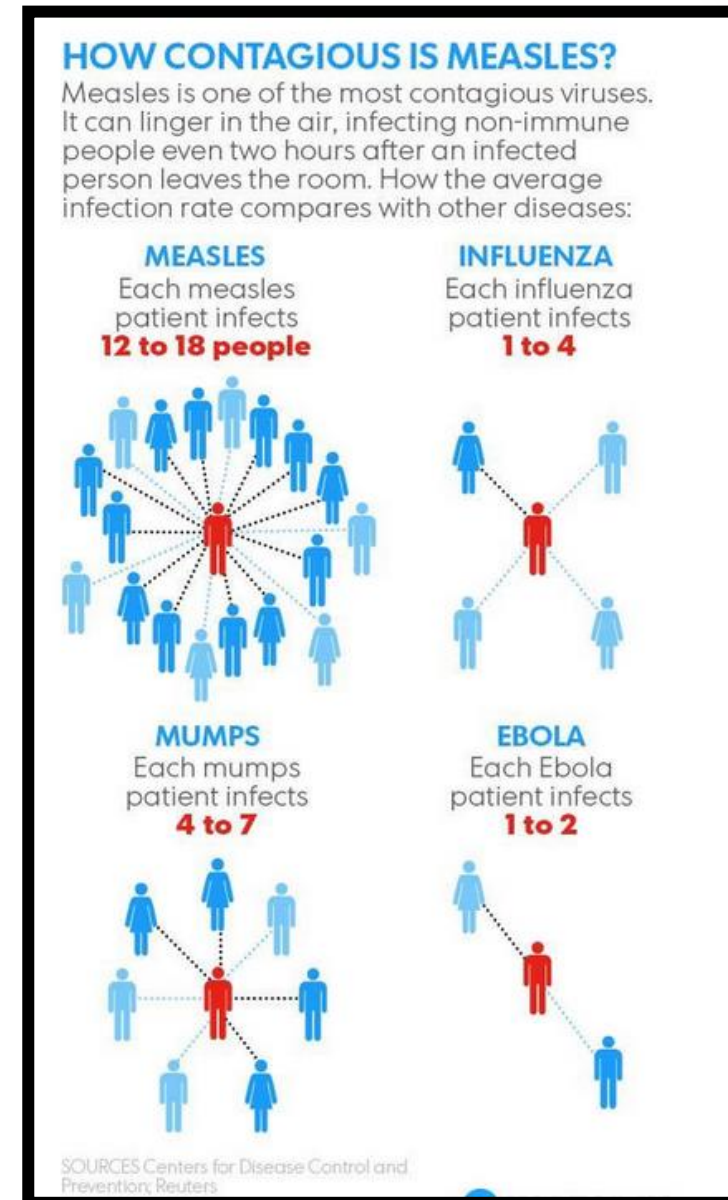
MEASLES IS SO
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UP TO 9 IN 10
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INFECTED

MEASLES AWARENESS



Measles Control Measures

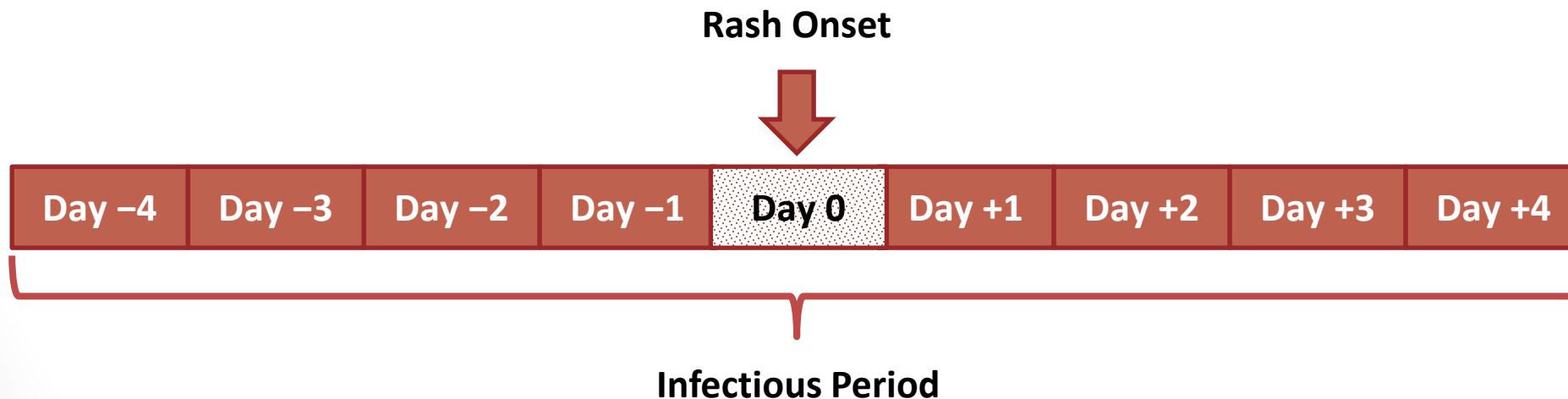
- Isolate & Interview Cases
- Identify Contacts
- Are Contacts Immune or Susceptible?
- Is Post-Exposure Prophylaxis Recommended?
- Quarantine Contacts





Isolate All Suspect Cases

- **Infectious Period:** 4 days before rash through 4 days after rash onset.
- Isolate case through 4 days after rash onset.
 - Onset of Rash= Day 0
 - If in a health care facility, the patient should be kept on airborne precautions.
 - Remember, shared air space up to 2 hours after a case was present can lead to exposure.





Thoroughly Interview Case (or Family of Child)

Key Questions to ask the Patient

- **Symptom History** (Review the symptoms experienced, rash onset date is critical) (QP #3)
- **MMR Vaccination History** (if not already known from ordering provider)? (QP #4)
- **Occupation/school** (if so, where and did they work/attend school while infectious)? (QP #2)
- **Race/Hispanic Status** (if not known by provider)?
- **Risk History**
 - **Contact with another case of measles, or someone with similar symptoms?** (QP #5)
 - **Travel History** (including where and dates), **or recent out of town visitors** (from where and dates)? (QP #5)
 - Flights while infectious? Obtain Flight Info.
 - **Transmission setting** (childcare, school, healthcare setting)? (QP #5)

Risk History Time Period is generally 3 weeks (up to 21 days) prior to onset so we can hopefully determine where they may have been exposed to measles (risk history).



Identify Close Contacts

Those individuals present at the same time as the case in a shared airspace, as well as in the determined airspace for 2 hours after the case left:

- Household
- Close friends
- School or daycare (students and staff)
- Medical facility (patients and staff)
- Workplace
- Religious/social groups
- Sports teams or other extracurricular activity groups
- Buses/Carpools/Taxis/Ubers, etc.
- Travel (companions and drivers)
- Persons exposed at social events or retail establishments

The most common locations of exposure include **household** and **medical facility settings** (from when the patient sought care prior to diagnosis).

Don't forget to ask how the patient got to and from various locations while infectious.



Contact Notification

- Identify and notify all exposed contacts of the case while the case was infectious.
 - Phone calls
 - Letters
 - Public advisories
- Prioritize high-risk contacts and refer them to their healthcare providers immediately for possible use of IG.
 - Pregnant women
 - Immunosuppressed individuals
 - Infants <12 months of age
- Ensure that companions of known exposed contacts, who have also been exposed, are identified.
 - Examples: a medical office might have a list of patients that were in the waiting room, but family/companions that accompanied the patients would not be on their list.



Identifying Close Contacts - Challenges

- **Some exposures may occur in locations where individual contact identification is not possible:**
 - **Examples:** Retail Establishments, Public Transportation, Public Spaces.
 - Sometimes there are clear groups that can be targeted (like staff that worked during a particular timeframe or a list of patients that were in a waiting room).
 - Other times we may have to rely on broader outreach so that potentially exposed individuals can self-identify.
- You may need to work with an establishment to post a **General Notice** or **Advisory** with recommendations for next steps if someone believes they may have been at a particular location during a designated time period.
 - **Remember to add 2 hours** on to the timeframe in question to ensure comprehensive outreach.
 - For example, if a case reported shopping in **Target from 2:00-2:15 pm**, you would want to provide a general advisory for anyone who may have been in the facility from **approximately 2:00-4:15 pm**.
 - MDPH Epi will help with these advisories and verifying timeframes/dates.

Are Contacts Immune or Susceptible?

Exposed individuals should immediately be assessed for immunity.

- **VACCINE RECORDS:** Finding historical vaccination records may be challenging for some contacts, particularly those who may have been vaccinated prior to electronic medical records and/or electronic immunization registries.
- **Tips** for finding records include:
 - Calling PCPs, parents, school/college health offices, old baby books/records, recently visited travel clinics (where MMR status might have been assessed?), etc. Check MIRS or other state registry.

Measles Control:
Assessing Immunity



Official Evidence of Immunity

1. **VACCINE RECORD:** Documentation of 2 appropriately timed doses of measles containing vaccine; or
2. **LAB TEST:** Serologic evidence of immunity or laboratory evidence of disease; or
3. **AGE:** Birth in the US before 1957 (unless a healthcare worker)



Are Contacts Immune or Susceptible?

Exposed individuals should immediately be assessed for immunity.

- **LAB TESTS:** Obtaining a titer to assess immunity may be an option for individuals who lack vaccination records but are fairly confident they are immune.
 - Things to consider include:
 - Not all serologic titers may be covered by insurance.
 - Timing following exposure (ensuring the titer is reflective of previous status and not acute illness). Sooner is better!
 - Is the contact currently symptomatic?
 - Titers following exposure may not eliminate the need to quarantine.
 - **Getting a dose of MMR at the same visit is often advised.**



Official Evidence of Immunity

1. **VACCINE RECORD:** Documentation of 2 appropriately timed doses of measles containing vaccine; or
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Post-Exposure Vaccine & Immune Globulin

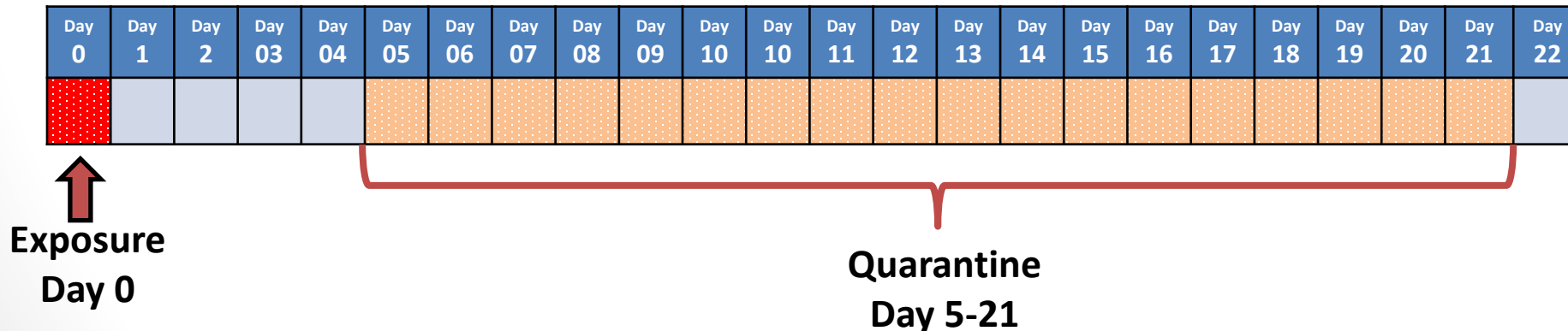
- **Identify close contacts who do not have evidence of immunity and recommend MMR or immune globulin (IG).**
 - **Vaccination:** Measles vaccine given within 72 hours of exposure may prevent disease.
 - Beyond 72 hours, vaccine is still recommended to provide protection against exposure to future cases of measles.
 - MDPH can help coordinate MMR vaccine supply for certain outbreak situations.
 - **Immune Globulin:** IG may prevent or modify measles in persons who are nonimmune, if given within 6 days of exposure.
 - This is typically recommended for individuals who are at risk for severe disease and complications from measles (e.g., infants <12 months of age, pregnant women without evidence of measles immunity, and severely immunocompromised persons regardless of vaccination status because they might not be protected by the vaccine)



Quarantine Contacts

- Exclude susceptible close contacts unable to be vaccinated, or not vaccinated quickly enough, from **day 5 through day 21 after exposure**
 - In most low-risk settings, susceptible close contacts may be readmitted immediately after they receive a dose of MMR, even when given >5 days post exposure. (local discretion)
 - Susceptible close contacts who receive IG (instead of vaccine) should be quarantined.

Measles Quarantine





Notes on Exposure Follow-up: If Symptoms Develop

- **No Asymptomatic Testing.** Contacts without symptoms should NOT be tested for measles. Only symptomatic contacts need to seek testing.
- **Testing for Measles?** Avoid additional exposures at the medical office by calling ahead to arrange testing.
 - Symptomatic contacts should be masked when seen.
 - Attending providers should all have evidence of immunity and wear appropriate PPE.
 - Pre-arrange a time when exposing other staff/patients can be minimized (before opening/after closing).
 - Meet the patient at the door and immediately mask them to prevent the generation of droplets.
 - Escort the patient through a separate entrance to a private waiting area or exam room, preferably a negative pressure room.
 - Be creative. Consider collecting a specimen outside/through car window.

True Story: Healthcare Exposures!



Health care workers, regardless of year of birth, who are not appropriately immunized or do not have laboratory evidence of immunity, will be excluded from work from the 5th day after their first exposure through the 21st day after their last exposure. These restrictions for health care workers and inpatients remain even if the contact received IG or was vaccinated post-exposure.

MA Medical Practice saw a patient with a rash, suspected measles and sent a lab specimen to a commercial lab (no notification to MDPH) and the results returned positive for measles.

Multiple providers were exposed, and the office had **NO IDEA if their staff had evidence of immunity**, requiring titers on all staff and closing the office for a day while awaiting results.
(1 Day Revenue Loss)

Fortunately, all came back immune but remember to have **vaccination documentation or laboratory evidence readily available!**

Measles Investigations for LBOH





Measles Events (Low or High Suspect?)

- Due to high vaccination rates in MA and the US at large, measles is still relatively rare.
- **SUSPECT** measles cases reported to MDPH will be assessed as Low or High Suspect based upon:
 - clinical presentation, vaccination status of the patient, and additional known risk factors (typically travel or known exposures).

High Suspect Measles	Low Suspect Measles
<ul style="list-style-type: none">• International traveler• Recent travel to an area with known confirmed cases• Sick contacts• Unvaccinated or vaccinated abroad• Classic symptom presentation	<ul style="list-style-type: none">• US born• No known risk (no travel, no sick contacts)• Fully vaccinated in the US• Alternative diagnosis in differential• Doesn't meet clinical case definition

- **Public Health Actions** while awaiting test results will be based upon how high the likelihood is the test results will be positive.



“Low” Suspect Measles Events

- Always review the MAVEN event for specific notes or guidance from MDPH Epis on next steps.
- **Typically, for LOW Suspect Situations:**
 - If a low suspect case is NOT yet lab confirmed, there are **no** formal control measures for contacts from public health, **however:**
 - **Patient:** LBOH can touch base with the patient/family and collect any missing case information (Often symptom onset hx, risk hx, and vaccination status of case can be reviewed for potentially missed information reported by provider.)
 - **Household:** LBOH can inquire about vaccination status of household and immediate contacts.
 - It is always a good time to get Up-to-Date with MMR Vaccine if needed!
 - Patients should remain in isolation until measles is ruled out.

LBOH: You may want to discuss the potential infectious period timeline and get an idea on possible exposures for follow-up should results come back positive.



“High” Suspect Measles Events

- Always review the MAVEN event for specific notes or guidance from MDPH Epis on next steps.
- **Typically, for High Suspect Situations:**
 - **If the likelihood of positive lab results is high, identifying a timeline of activities during the infectious period is the place to start.**
 - This will help outline the work ahead (and help determine how many staff will be needed for follow-up).
 - MDPH Epis will provide detailed guidance and assistance in these situations, as confirmed measles is an ALL HANDS ON DECK Situation.
 - Follow-up for different exposure settings will be split across local and state public health.

Case Study: Low Suspect MAVEN Event



- **On Feb 13, pediatrician at Community Health Center calls MDPH to report a suspect case of Measles:**
 - Case is a 12-year-old male from Town Z
 - Case was initially seen on 2/8 with a 3-day history of low-grade fever and right sided otitis media (onset 2/5)
 - Diagnosed with an ear infection and prescribed amoxicillin
 - The patient returned on 2/13 with a maculopapular rash that developed earlier in the day (onset 2/13)
 - The rash began on the torso and has spread to the extremities
 - No recent travel or ill contacts
 - The patient has two documented MMRs
- MDPH advises the facility to collect a NP swab and serum to be sent to MA State Public Health Laboratory (SPHL).

Case Study: Low Suspect MAVEN Event Cont.



- **MDPH:**

- Creates suspect “Measles” event in MAVEN and enters data.
- Notifies LBOH in Town Z.
- Coordinates specimens being sent to State Lab.

Classic Low Suspect
situation based upon
minimal risk hx and likely
alternative diagnosis.

- **LBOH interviews the patient’s mother:**

- Confirms symptoms and onsets (Infectious Period: 2/9-2/17).
- The patient attends School and has only been out sick on 2/13.
- The patient has a younger sibling who has recently had upper respiratory symptoms.
- LBOH checks MMR status of household, recommends catchup if not up to date.
- Documents notes in MAVEN event and maintains communication with assigned MDPH EPI.

- **Next Day:**

- Lab reports that the patient is PCR negative and IgM negative for measles.
- MDPH notifies the Community Health Center & LBOH of results.
 - MD had a low suspicion for measles, believes that the rash was caused by a drug reaction.
- Case does not meet the clinical case definition for a confirmed or probable case, MDPH Epi changes case classification to “Revoked”
- LBOH and MDPH Epi update MAVEN Notes and finalize Admin QP Variables to sign off.

- **Follow-up Complete**



Case Study: High Suspect MAVEN Event

- **On Feb 13, provider at Community Health Center calls MDPH to report a suspect case of Measles:**
 - Case is a 34-year-old male from Town Z.
 - The patient presented on 2/13 with a maculopapular rash that developed earlier in the day (onset 2/13)
 - The rash began on the face and has spread to the torso & extremities
 - Significant respiratory issues (cough, runny nose, high fever $\sim 103^{\circ}$ and rising.)
 - Returned from 2-week trip and family wedding in France 2/10
 - No vaccine on record, has lived in US for 10 years (not US born)
- MDPH advises the facility to collect an NP swab and serum to be sent to MA State Public Health Laboratory (SPHL).

Classic High Suspect
situation based upon
recent travel, classic
symptoms, no vaccine hx.



Case Study: High Suspect MAVEN Event

- **MDPH:**

- Coordinates specimens being sent to State Lab.
- Advises provider office to immediately assess potential staff and patient exposures. Can make lists while awaiting test results.
 - Are staff records immediately accessible? (They should be!)
- Creates suspect "Measles" event in MAVEN and enters data.
- Notifies LBOH in Town Z.

- **LBOH Interviews the Patient (or Patient Designee):**

- Obtains Patient Information
 - May need to coordinate through infection control if patient is admitted.
 - May need to interview a spouse or emergency contact.
 - Confirms symptoms and onsets (Infectious Period: 2/9-2/17).
 - Goes over timeline and starts to make a detailed list of places visited/potential exposures.
 - Traveled While Infectious: Collects flight information for potential notification to quarantine station pending results.
- Follows Up With Household
 - LBOH checks MMR status of household and provides recommendations.
- Documents notes in MAVEN event and maintains communication with assigned MDPH EPI. Discusses plan of action and alerts public health staff as needed.



High Risk Scenarios/Case Study

- **Next Day:**
 - Lab reports that the patient is PCR positive for measles. MDPH Epi changes case classification to "Confirmed"
 - MDPH notifies the Community Health Center & LBOH of results.
- **MDPH and LBOH:**
 - Go over timeline and locations of exposures and discuss coordination of healthcare and other exposures.
 - Additional LBOH jurisdictions are notified as applicable.
 - Plans for each exposure location and list of contacts is determined.
 - Line lists of contacts from various locations should be collected and follow-up outlined.
 - MDPH creates Measles MAVEN Cluster Event to track exposures and upload contact roster lists.
- **Follow-up Continues as New Information is Obtained (as always):**
 - New suspect cases should be isolated and tested as needed.
 - Vaccination Recommendations and Guidance for contacts.
 - LBOH and MDPH update MAVEN Notes and finalize Admin QP Variables to sign off on individual cases and contacts as applicable.

Questions to Think About for LBOH

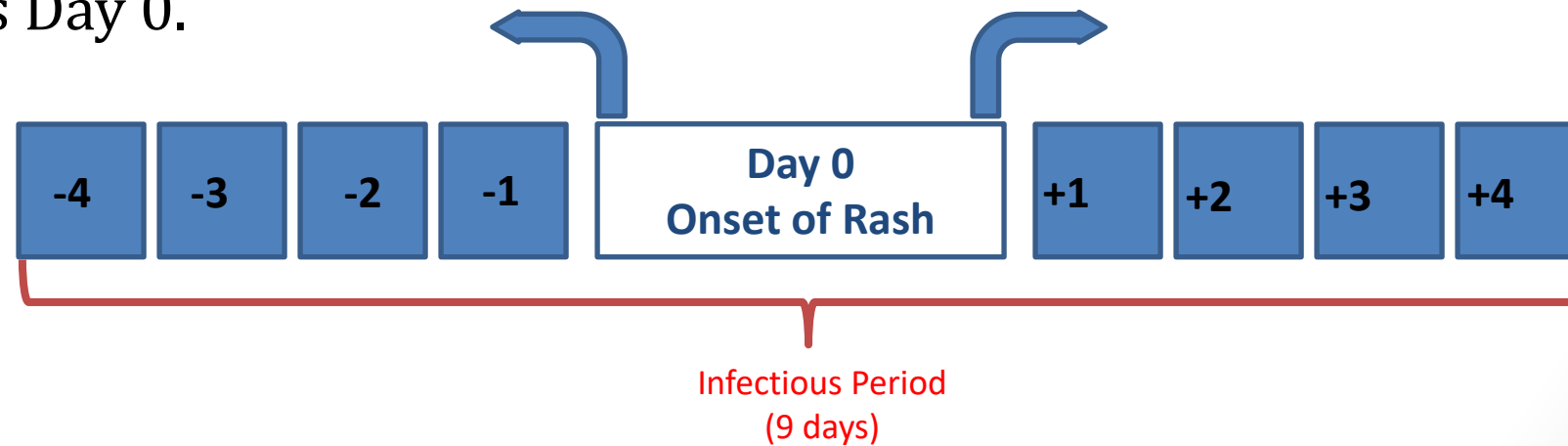
- **Do YOU have evidence of your immunity to measles?**
 - Your Staff?
 - Could you quickly stand up an MMR vaccine clinic for exposed residents?
- **Is it clear who would provide emergency weekend response if you did have a large exposure requiring immediate follow-up?**





Measles In Review – The Case

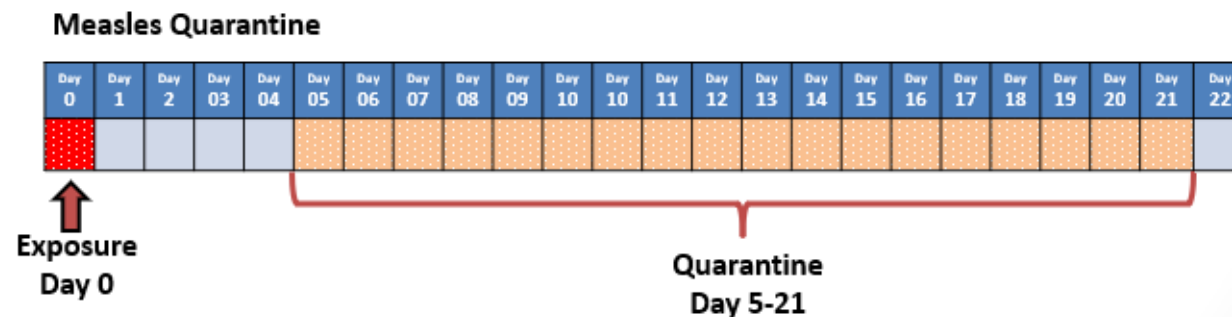
- **Cause:** Measles Virus
- **Transmission:** respiratory/airborne transmission
- **Symptoms: Primary Symptom is a rash**
 - **Prodromal Symptoms:** high fever, cough, coryza, and conjunctivitis (the Three “C”s)
- **Incubation period:** Incubation period is usually 10–12 days (average 14 days to onset of rash)
- **Infectious Period:** 4 days before rash through 4 days after rash onset.
Onset of Rash is Day 0.





Measles In Review – Exposed Contacts

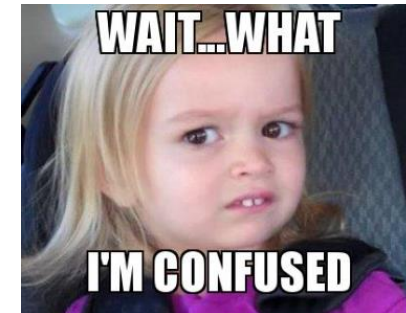
- **Contacts with Evidence of Immunity do not need to quarantine:**
 - 2 doses of MMR Vaccine
 - Lab test showing immunity or Lab evidence of previous disease.
 - Birth before 1957 (non-HCWs)
- **Quarantine for Susceptible Contacts:** Day 5 through 21 following exposure. Exposure = Day 0.
 - **Vaccine:** Post Exposure MMR within 72 hours may prevent disease (and quarantine requirements).
 - **Immune Globulin:** IG may prevent or modify measles in persons who are nonimmune, if given within 6 days of exposure



Measles/Rubella/Rubeola/Roseola – Keeping It All Straight!

- The **MMR Vaccine** prevents both **measles** and **rubella**, which both present with rashes but are importantly not the same.
 - **Measles** is caused by a virus that specifically infects the respiratory system.
 - More severe and can be life threatening
 - **Rubella** is caused by a virus that invades the lymph nodes, eyes and skin.
 - Generally milder infections than measles, but can **cause severe birth defects** if infection occurs during pregnancy.

MEASLES	RUBELLA
It is highly contagious	It is not as contagious as measles
It is also known as Rubeola	It is also known as German measles



- **Another common viral infection:**
 - **Roseola:** A common viral infection in young children that may cause high fever and a rash. Generally, a self-resolving mild illness that can be caused by two strains of the herpes virus.



Learning Objectives Today – A Review

- **General Understanding of Measles Infection and Prevention (AKA VACCINES!!!)**
 - You should know what measles is, how we prevent it, and a few common facts about the MMR Vaccine (our greatest tool for prevention!)
- **Know what to do for a **LOW** Suspect Measles Event in MAVEN**
 - Most Common Scenario. There are a few follow-up tasks for this scenario as we await test results that will most likely rule out measles.
- **Know What to do for a **HIGH** Suspect Measles Event in MAVEN**
 - **Cliff's Notes:** You don't have to memorize everything today. In summary, there is a lot of follow-up for high-suspect situations, but MDPH Epis will partner with you and guide you through the process. If there is a confirmed case of measles, it will be ALL HANDS ON DECK.



Resources

- **Measles-Specific Resources**
 - The Epidemiology and Prevention of Vaccine-Preventable Diseases, a.k.a. the "[Pink Book, Chapter on Measles](#)"
 - [CDC Measles Chapter](#)
 - [Measles for Healthcare Providers](#)
 - [WHO Information on Measles](#)
- **MDPH Division of Epidemiology and Immunization: 617-983-6800**
 - Questions/Guidance for follow-up
 - Sample Letters/Alerts
 - Reporting
- **MAVEN Help Desk: 617-983-6801**
- **MDPH Reference Materials**
 - [MDPH Guide to Surveillance, Reporting, and Control: Disease-Specific Chapters](#)
 - [The Massachusetts Immunization Information System \(MIIS\) Onboarding and Resources:](#)
 - [105 CMR 300.00: Reportable diseases, surveillance, and isolation and quarantine requirements](#)