Measles (Rubeola): Infection Control and Prevention Guidance

This document outlines the latest Centers for Disease Control and Prevention (CDC) **recommendations** for infection prevention and control as it relates to the prevention of measles. These recommendations are focused on infection control and prevention practices and other guidance documents may need to be used in concert with this document. Information will be updated as new information becomes available. **Suspect or confirmed cases of measles should be immediately reported to your local or tribal public health department.**

Definitions:

- **Healthcare Settings:** Places where healthcare is delivered include but are not limited to, acute care facilities, long-term acute-care facilities, nursing homes, home healthcare, vehicles where healthcare is delivered (e.g., mobile clinics), and outpatient facilities, such as dialysis centers, physician offices, dental offices, and others.
- **Healthcare Personnel (HCP):** HCP refers to all paid and unpaid persons serving in healthcare settings who have the potential for direct or indirect exposure to patients or infectious materials, including body substances (e.g., blood, tissue, and specific body fluids); contaminated medical supplies, devices, and equipment; contaminated environmental surfaces; or contaminated air. These HCP include, but are not limited to, emergency medical service personnel, nurses, nursing assistants, physicians, technicians, therapists, phlebotomists, pharmacists, students and trainees, contractual staff not employed by the healthcare facility, and persons not directly involved in patient care, but who could be exposed to infectious agents that can be transmitted in the healthcare setting (e.g., clerical, dietary, environmental services, laundry, security, engineering and facilities management, administrative, billing, and volunteer personnel).
- **Unprotected Exposure for HCP:** HCP exposures to measles in a healthcare setting include spending any time while unprotected (i.e., not wearing recommended respiratory protection):
    - In a shared space with an infectious measles patient at the same time, **OR**
    - In a shared air space vacated by an infectious measles patient within the prior 2 hours
- **Shared Air Space**: Smaller spaces, such as the patient compartment of an ambulance, single patient room, or a clinic waiting area, are shared air spaces. Different areas in larger spaces or rooms that share a common air handling system, such as a large emergency department with patient waiting, triage, HCP work areas, or multiple individual patient rooms that share a common unfiltered air source, are also shared airspaces.
- **Source Control**: Use of respirators or well-fitting facemask or cloth masks to cover a person's mouth and nose to prevent spread of respiratory secretions when breathing, talking, sneezing or coughing.
- **High-Risk Group for Severe Illness and Complications:** Severely immunocompromised persons, infants too young to be vaccinated, and pregnant women who do not have presumptive evidence of measles immunity are persons considered to be in a high-risk group for severe illness and complications from measles.

Helpful Resources:

- CDC Interim Infection Prevention and Control Recommendations for Measles in Healthcare Settings
- CDC Infection Control Appendix A: Considerations when Evaluating a Person for Exposure to Measles in a Healthcare Setting
- CDC Measles Infection Control in Healthcare Personnel: Epidemiology and Control of Selected Infections Transmitted Among Healthcare Personnel and Patients (2024)
- CORHA Measles Information
- APIC Measles Information
- CDC Clinical Overview of Measles

1. **Symptoms:**
   - Measles is characterized by a prodrome of fever, malaise, cough, coryza (runny nose), conjunctivitis, and Koplik spots (clustered white lesions on the buccal mucosa), followed by onset of a maculopapular rash. Visit the CDC's Clinical Overview of Measles to see the full guidance.
2. **Fundamental Elements to Prevent Transmission:**
   - Measles is most commonly acquired from persons in the household or community, but spread of measles can also occur in healthcare settings.
   - While the most important measure to prevent measles transmission in all settings is ensuring community immunization, core measles prevention in healthcare settings requires a multi-faceted approach including:
     - Ensuring HCP have presumptive evidence of immunity to measles
     - Rapidly identifying and isolating patients with known or suspected measles
     - Adhering to Standard and Airborne Precautions for patients with known or suspected measles
     - Routinely promoting and facilitating respiratory hygiene and cough etiquette
     - Appropriately managing exposed and ill HCP
3. **Ensuring that all HCP Have Presumptive Evidence of Immunity to Measles**
   - Presumptive evidence of immunity to measles for HCP includes:
     - Written documentation of vaccination with 2 doses of measles virus-containing vaccine **OR**
     - Laboratory evidence of immunity (measles immunoglobulin G) in serum; equivocal results are considered negative **OR**
     - Laboratory confirmation of disease **OR**
     - Birth before 1957 (consider vaccinating HCP born before 1957 who do not have other evidence of immunity to measles)
     - During an outbreak of measles or mumps, healthcare facilities should recommend 2 doses of MMR vaccine at the appropriate interval for unvaccinated healthcare personnel regardless of birth year who lack laboratory evidence of measles or mumps immunity or laboratory confirmation of disease. Visit the MMWR Prevention of Measles, Rubella, Congenital Rubella Syndrome, and Mumps, 2013: Summary Recommendations of the ACIP to see the full guidance.

4. **Minimize Potential Measles Exposures**
    - Before arrival to a healthcare setting
        - When scheduling appointments by phone for persons with signs or symptoms of measles, provide instructions for arrival, including which entrance to use and the precautions to take (e.g., how to notify healthcare staff, don a facemask upon entry (if safe to do so), follow triage procedures)
        - If transported by Emergency Services, the receiving facility/accepting physician should be notified in advance
    - Upon arrival to a healthcare setting
        - Use existing triage stations for rapid identification and isolation of patients with measles.
            - Persons with signs or symptoms of measles should be identified, provided a facemask to wear (if safe to do so), and separated from other patients prior to or as soon as possible after entry into a facility.
        - Facilitate adherence to respiratory hygiene, cough etiquette, hand hygiene, and triage procedures.
            - Post visual alerts (signs, posters) in appropriate languages about respiratory hygiene, cough etiquette, and hand hygiene at the facility entrance and in common areas (e.g., waiting areas, elevators, cafeterias).
            - Provide persons with signs or symptoms of measles with instructions on all relevant infection control expectations.
            - Make supplies to perform hand hygiene available to all persons in the facility.
            - Provide supplies (e.g., facemask) near the visual alerts if possible.
    - Source Control and Exposures:
        - Effectiveness of source control measures for measles have not been formally studied in healthcare settings. However, known measles transmission has not been reported in scenarios in which exposure risk could be considered low, but is technically not zero, such as in a triage area and transport route within a facility when a suspect measles patient is appropriately identified at entry, masked, and quickly transported to an airborne infection isolation room (AIIR).
        - Examples of higher risk exposures to measles include, but are not limited to:
            - Susceptible HCP who are unprotected (i.e., not wearing recommended respiratory protection) and are providing face-to-face care to an unmasked patient
            - Persons in the waiting room with an unmasked measles patient for an extended period of time
        - While masking patients does not eliminate the possibility of exposing others, it reduces respiratory aerosol generation. Due to some level of potential residual risk, any time spent outside an AIIR may result in exposure to other individuals in the healthcare facility, depending on the air handling system.

5. **Testing:**
    - Laboratory testing is used to confirm measles infection, and both detection of measles-specific IgM antibody and measles RNA by real-time polymerase chain reaction tests are recommended to confirm measles infection.
    - Follow standard specimen collection procedures, wearing appropriate PPE and performing collection in an appropriate location (i.e., AIIR).
    - Prior to performing specimen collection for measles, please contact your local/tribal public health.
    - Follow the Montana Public Health Laboratory (MTPHL) testing recommendations and collect a respiratory specimen (either throat, nasopharyngeal, or nasal Dacron swabs in viral transport media) for reverse transcription polymerase chain reaction (RT-PCR) from all patients with clinical features compatible with measles. Also collect a blood specimen for serology testing (1 – 2 ml of serum). Specimens can be transported by courier (if available), UPS, or FedEx to MTPHL in Helena. Given potential shortages in IgM test kits, providers should be vigilant in contacting MTPHL at 1-800-821-7284 for guidance on testing. See below for more information.
6. **Monitoring and Managing Ill and Exposed Healthcare Personnel (HCP)**
    - HCP without acceptable presumptive evidence of measles immunity should NOT enter a known or suspected measles patient's room if HCP with presumptive evidence of immunity are available.
    - Management of **exposed** HCP:
        - For **asymptomatic** HCP **with presumptive evidence of immunity** to measles, who have an exposure:
            - Postexposure prophylaxis is not necessary
            - Work restrictions are not necessary
            - Implement daily monitoring for signs and symptoms of measles for the 5th day after their first exposure through the 21st day after their last exposure
        - For **asymptomatic** healthcare personnel **without presumptive evidence of immunity** to measles who have an exposure to measles:
            - Administer postexposure prophylaxis in accordance with CDC and ACIP recommendations. To see full ACIP recommendations, visit CDC's ACIP Recommendations: Measles, Mumps and Rubella (MMR) Vaccine page.
            - Exclude from work from the 5th day after their first exposure through the 21st day after their last exposure, regardless of receipt of postexposure prophylaxis.
            - Work restrictions are not necessary for HCP who received the first dose of MMR vaccine **prior** to exposure:
                - They should receive their second dose of MMR vaccine as soon as possible (at least 28 days after their first dose); implement daily monitoring for signs/symptoms of measles from the 5th day after their first exposure through the 21st day after their last exposure.

- Management of HCP **infected with measles:**
    - For HCP with known or suspected measles, exclude from work for 4 days after the rash appears.
        - For immunocompromised HCP with known or suspected measles, exclude from work for the duration of their illness.

7. **Monitoring and Managing Ill and Exposed Individuals (non-HCP):**
    - Management of patients **infected with measles:**
        - Patients with measles should remain in Airborne Precautions for 4 days after the onset of rash (with onset of rash considered to be Day 0).
        - Immunocompromised patients with measles should remain in Airborne Precautions for the duration of illness due to prolonged virus shedding in these individuals.
    - Management of **patients exposed** to measles **who do not have presumptive evidence of measles immunity who are currently hospitalized or require hospitalization:**
        - Place the exposed patient without presumptive evidence of measles immunity on Airborne Precautions from the 5th day after the first exposure through the 21st day after the last exposure, or until discharge, if earlier.
            - This time period is based on the typical incubation period for measles and is consistent with work exclusion recommendations for asymptomatic healthcare personnel without presumptive evidence of immunity who have an exposure to measles. If the patient in a healthcare setting develops symptoms of measles earlier than the 5th day after their exposure, they should be immediately placed on Airborne Precautions pending further evaluation. For ease of implementation or if the timing of the first exposure is uncertain (e.g., in a community outbreak), healthcare facilities could choose to implement Airborne Precautions earlier in the suspected incubation period (e.g., at admission).
            - IG might prolong the incubation period for measles; for patients who have received IG for PEP, extend the monitoring period through the 28th day after the last exposure. Consider extending the isolation period through the 28th day after the last exposure, or until discharge, if earlier.
    - Management of individuals exposed to measles **who meet CDC's recommendations for Post-Exposure Prophylaxis (PEP) but do not require hospitalization:**
        - **For exposed individuals on day** 5 or 6 from an initial exposure (day of exposure=day 0), CDC recommends the use of an AIIR, when available, and that staff use a N95 or higher-level respirator.
            - After the patient leaves the room, it should remain vacant for the appropriate time (up to 2 hours) to allow for 99.9% of airborne-contaminant removal. Visit the full Appendix B. Air for further air guidance in healthcare settings.
            - Note for time management and patient flow considerations, the administration of IVIG could take several hours to complete.

- **For exposed individuals on day** 5 or 6 from an initial exposure (day of exposure=day 0) in facilities without an AIIR, CDC recommends the following:
    - Transfer the patient as soon as possible to a facility where an AIIR is available.
    - If transferring a patient is not possible, and the patient is presenting on day 5 or 6 from initial exposure, deliver PEP outside the facility (e.g., in a tent), with providers wearing respiratory protection.
    - If delivery of PEP outside is not possible, consider the following for administration indoors:
        - Mask individuals receiving PEP for the duration of their time in the facility. HCP in a shared airspace with the patient should wear respiratory protection.
        - If possible, schedule the patient at an off-peak time (e.g., end of the day) after regular clinic patients have left.
        - Place the patient in a designated room that is situated to limit transit of exposed individuals through the facility and through areas where large groups may gather (e.g., waiting areas, lobbies).
        - If the facility has (or can make) such a room negative pressure with air that exhausts the outside, this would be preferred over a standard room in the absence of an AIIR.
        - If it is not feasible to exhaust air outside the facility, a room where the exhaust is recirculated with high-efficiency particulate air (HEPA) filtration is preferred.
        - Facility engineers can help with implementation, including identifying shared air spaces and best placement of HEPA filters.
- **For exposed individuals on days 1 to 4 from a known initial exposure** (day of exposure=day 0), CDC does not recommend AIIR use. For ease of implementation or if the timing of the first exposure is uncertain (e.g., in a community outbreak), healthcare facilities could choose to implement Airborne Precautions earlier in the suspected incubation period (e.g., at admission).
    - Note for time management and patient flow considerations, the administration of IVIG could take several hours to complete.

8. **Adherence to Infection Control Practices**

- Transmission-Based Precautions (TBPs):
    - Standard and Airborne: Adhere to Standard Precautions, which are the foundation for preventing transmission of infectious agents in all healthcare settings. Adhere to Airborne Precautions when caring for patients with known or suspected measles.
    - Personal Protective Equipment: N95 or higher-level respirator, plus consideration of gown, gloves, and eye protection based on the type of cares being provided, in accordance with Standard Precautions.
    - CDC Airborne Precautions TBP Sign.
- Respiratory Protection:

    - HCP should use respiratory protection (i.e., a respirator) that is at least as protective as a fit-tested, NIOSH-certified disposable N95 filtering facepiece respirator, regardless of presumptive evidence of immunity, upon entry to the room or care area of a patient with known or suspected measles.
    - Respirator use must be in the context of a complete respiratory protection program in accordance with Occupational Safety and Health Administration (OSHA) Respiratory Protection Standard 29 CFR 1910.134.
    - HCP should be medically cleared and fit-tested if using respirators with tight-fitting facepiece (e.g., a NIOSH-certified disposable N95) and trained in the proper use of respirators, safe removal and disposal, and medical contraindications to respirator use.
- Patient Placement:
    - Immediately place patients in an airborne infection isolation room (AIIR).
        - An AIIR should meet current standards including:
            - Providing at least six (existing facility) or 12 (new construction/renovation) air changes per hour
            - Directing exhaust of air to the outside
            - If an AIIR does not directly exhaust to the outside, the air may be returned to the air handling system or adjacent spaces if all air is directed through HEPA filters
        - When an AIIR is in use for a patient on Airborne Precautions, monitor air pressure daily with visual indicators (e.g., smoke tubes, flutter strips), regardless of the presence of differential pressure sensing devices (e.g., manometers).
        - Keep the AIIR door closed when not required for entry and exit.
        - Patients with measles should remain in Airborne Precautions for 4 days after the onset of rash (with onset of rash considered to be Day 0).
            - Immunocompromised patients with measles should remain in Airborne Precautions for the duration of illness due to prolonged virus shedding.
    - If an AIIR is not available, transfer the patient as soon as possible to a facility where an AIIR is available.
        - Pending transfer, place the masked patient in a private room with the door closed, if safe to do so. If feasible, the patient should continue to wear the mask for the duration of time spent in the non-AIIR room.
            - In advance of such a situation, work with facility engineers to identify a room that minimizes shared air space with other locations. Investigate options to make the room negative pressure and safely exhaust air outdoors or recirculate exhaust with in-duct high-efficiency particulate air (HEPA) filtration. See Ventilation Mitigation Strategies | Ventilation | CDC for more information.
    - After the patient leaves the room, it should remain vacant for the appropriate time (up to 2 hours) to allow for 99.9% of airborne-contaminant removal. Visit

the full Appendix B.Air for further air guidance in healthcare settings. Healthcare personnel who enter the room before the appropriate time for airborne-contaminant removal has passed should wear respiratory protection (i.e., a respirator) that is at least as protective as a fit-tested, NIOSH-certified disposable N95 filtering facepiece respirator.

- Transporting Patients with Known or Suspected Measles Within and Between Healthcare Facilities:
  - Limit transport of patients with known or suspected measles to essential purposes, such as diagnostic and therapeutic procedures that cannot be performed in the patient's room or in the facility.
  - When transport within the facility is necessary:
    - The patient should wear a facemask, if tolerated.
    - The transporter should use respiratory protection that is at least as protective as a fit-tested, NIOSH certified disposable N95 filtering facepiece respirator.
    - Use a transportation route and process that includes minimal contact with persons not essential for the patient's care.
    - Notify HCP in the receiving area of the impending arrival of the patient and the precautions necessary to prevent transmission.
  - When transport outside the facility is necessary:
    - Inform the receiving facility and the transport vehicle HCP in advance about airborne precautions being used.
- Cleaning and Disinfection:
  - Standard cleaning and disinfection procedures (e.g., using cleaners and water to pre-clean surfaces prior to applying disinfectants to frequently touched surfaces or objects for indicated contact times) are adequate for measles virus environmental control in all healthcare settings.
  - Use EPA-registered disinfectant for healthcare settings, per manufacturer's instructions. Generally, EPA-registered disinfectants suitable for Hepatitis B viruses and HIV (i.e., those on List D) will be effective against the measles virus. Visit OSHA's Measles Control and Prevention General Guidance for Workers and Employers to see the full guidance.
  - Manage used, disposable PPE and other patient care items for measles patients as regulated medical waste according to federal and local regulations.
  - Detailed information on environmental cleaning in healthcare settings can be found in CDC's *Guidelines for Environmental Infection Control in Healthcare Facilities* and *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings*.
- Visitors:
  - If there are persons with measles in your community, consider screening visitors for signs and symptoms of measles before entering the facility.
  - Visitors without acceptable presumptive evidence of immunity should not enter the room of a patient with known of suspected measles.

    - Limit visitors to patients with known or suspected measles to those who are necessary for the patient's well-being and care.
- HCP Training and Education:
    - Provide all HCP with job- or task-specific education and training, including refresher training, on preventing transmission of measles.
    - Training, medically clear, and fit-test HCP for respiratory protection device use (e.g., N95 filtering facepiece respirators).
        - Alternatively, train and medically clear HCP in the use of an alternative respiratory protection device (e.g., Powered Air-Purifying Respirator (PAPR) whenever respirators are required.
    - Ensure that HCP are educated, trained, and can demonstrate competency in the use of appropriate PPE prior to caring for patients with known or suspected measles.

Montana Public Health Laboratory Guidance: Measles Testing

State communicable disease reporting rules require healthcare providers suspecting measles to report suspected cases to local public health authorities immediately. Public health authorities may implement immediate control measures to prevent transmission and/or arrange immediate transport of the specimen when warranted.

Specimen Criteria

Collect the following specimens to test for measles infection:

- Respiratory Specimen (Throat, NP, Nasal Swab)
- Serum

Specimen Collection for PCR Testing:

Collect specimens as soon as possible after appearance of rash, and ideally within 3 days of rash onset. Detection can be possible up to day 7 following onset of rash. *Respiratory Specimen*: Throat, Nasopharyngeal, or Nasal Dacron swabs in viral transport media.

Consult with Public Health authorities regarding PCR testing prior to rash development of individuals who may have had a recent exposure to measles.

Specimen Collection for IgM Testing:

For IgM testing, specimens must be collected >48 hours post rash onset.

- *Serum*: 1 – 2 ml of serum. Can be sent in a spun serum separator tube or can be poured off into a transport tube.

Transport Conditions:

- Keep *Respiratory specimens* cold, and transport with cold packs as soon as possible following specimen collection. Avoid repeat freeze-thaw cycles. If specimen transport is going to be delayed >24 hours, freeze the sample at -70°C and ship on dry ice.
- *Serum* specimens can be shipped cold (refrigerated) or frozen (preferable for IgM testing).

Submission Reminders:

- Please be sure to include the collection date and at least two patient identifiers (Name and DOB or medical record #) on the sample container.
- Use the online portal to order.
    - For respiratory specimens, order Measles PCR.
    - For serology specimens, order Rubeola IgM Serology (ND).
    - Be sure to select the appropriate specimen source when ordering.
    - For the Onset Date, enter the date of rash onset.
- Print the Requisition form, verify patient identifiers match the sample, and place the paperwork in the side pouch of the specimen bag.

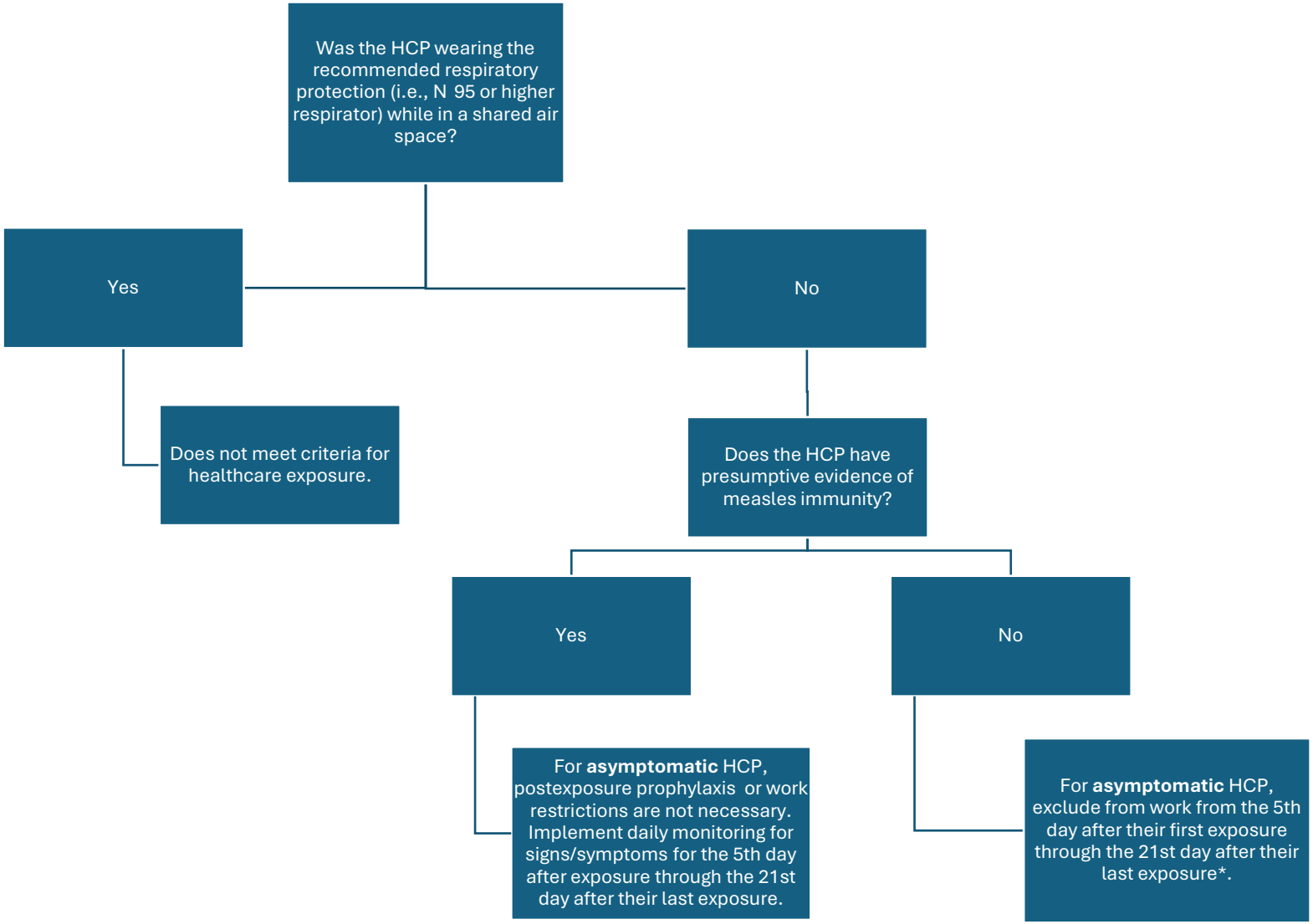
- Place the two specimens in separate specimen bags with the correct paperwork in each pouch.
- Finally, create a manifest for all samples being shipped and place the manifest separately in the shipping container.

Specimens can be transported by courier (if available), UPS or FedEx to:

Montana Public Health Laboratory
1400 Broadway, Room B126
Helena, MT 59601

Please contact the Montana Public Health Laboratory at 1-800-821-7284 for more information and remember to report any suspect measles to your local health department.

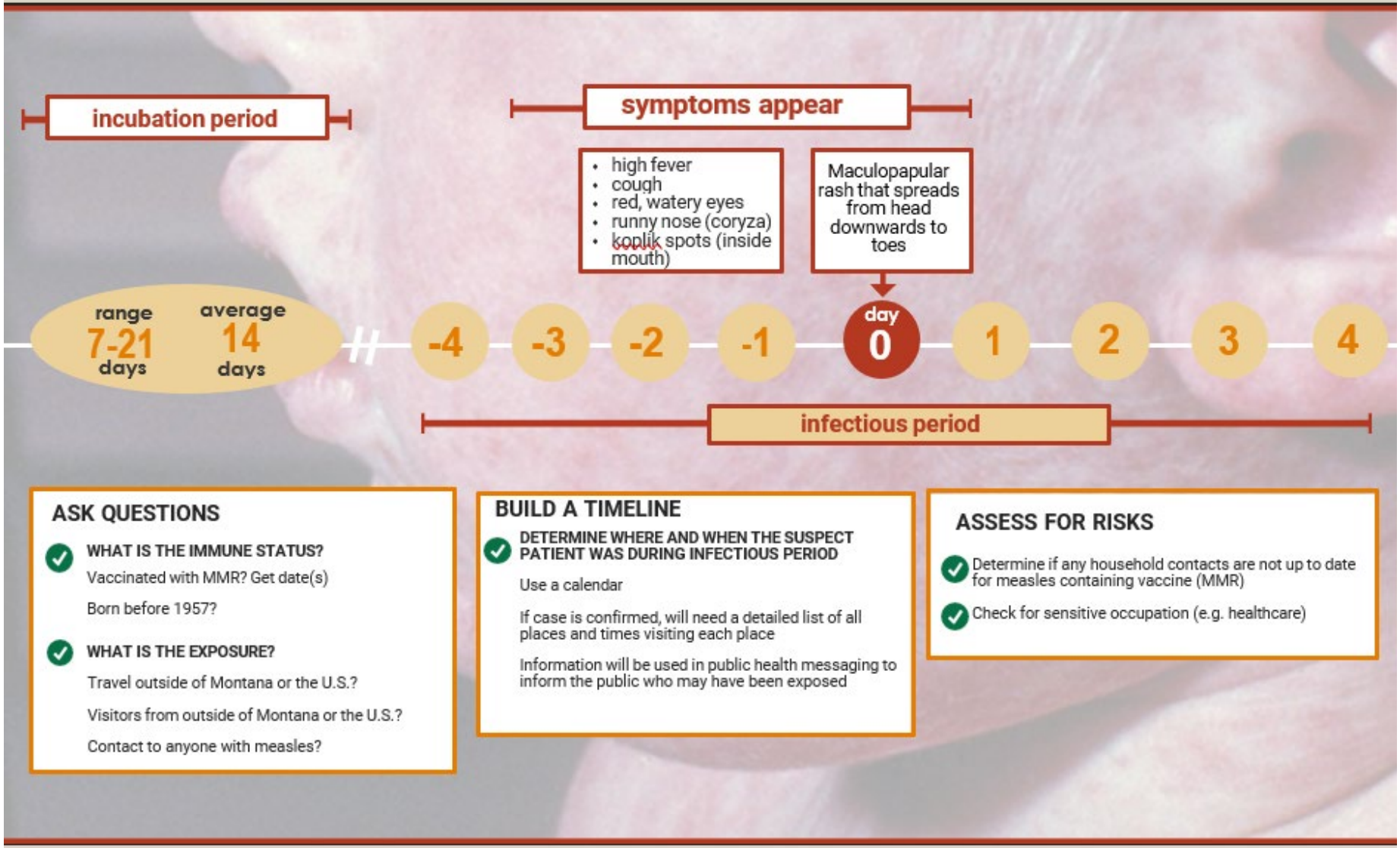
Healthcare Personnel (HCP) Exposure Recommendations: CDC Guidance



*Work restrictions are not necessary for HCP who received the first dose of MMR vaccine prior to their exposure. They should receive their second dose of MMR vaccine as soon as possible (at least 28 days after their first dose).

MEASLES TIMELINE

Guidance for local public health investigation



ASK QUESTIONS

WHAT IS THE IMMUNE STATUS?

Vaccinated with MMR? Get date(s)

Born before 1957?

WHAT IS THE EXPOSURE?

Travel outside of Montana or the U.S.?

Visitors from outside of Montana or the U.S.?

Contact to anyone with measles?

BUILD A TIMELINE

DETERMINE WHERE AND WHEN THE SUSPECT PATIENT WAS DURING INFECTIOUS PERIOD

Use a calendar

If case is confirmed, will need a detailed list of all places and times visiting each place

Information will be used in public health messaging to inform the public who may have been exposed

ASSESS FOR RISKS

Determine if any household contacts are not up to date for measles containing vaccine (MMR)

Check for sensitive occupation (e.g. healthcare)

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Public Health in the 406 — Montana Communicable Disease Epidemiology