Measles Case Investigation Guide

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Contents

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Introduction

This document provides general guidance for the investigation of measles cases and outbreaks, but we acknowledge that "all outbreaks are local." The highly contagious nature of measles invariably necessitates rapid response and working with many partners. Educating providers on measles presentation and reporting, establishing lab testing protocols for quick confirmation, and exercising measles case investigation and contact tracing are all activities that Navy medical departments can undertake in advance to prepare for a measles case response. The Command, the Installation, the MTF, DHA, other Services operating in the area, local and State public health authorities and Host Nation public health officials can all impact the investigation and response. Your cognizant NEPMU should be immediately consulted for guidance and assistance upon identification of a measles case: NEPMU Information

Investigation Process

1) Confirm measles diagnosis

- Confirm that the patient meets the clinical characteristics for measles: Fever, plus at least one of the 3 "Cs" (cough, coryza or conjunctivitis) and a descending rash that starts on the face. The rash typically follows the onset of illness within 4 days.
- Obtain specimens for lab testing if patient is experiencing clinical symptoms of measles, particularly rash and fever. Laboratory confirmation is essential for all sporadic measles cases and all outbreaks. Detection of measles-specific IgM antibody in serum and measles RNA by real-time polymerase chain reaction (RT-PCR) in a respiratory specimen are the most common methods for confirming measles infection. Healthcare providers should obtain both a serum sample and a throat swab (or nasopharyngeal swab) from patients suspected to have measles at first contact with them. Urine samples may also contain virus, and when feasible to do so, collecting both respiratory and urine samples for RT-PCR can increase the likelihood of detecting measles virus.
- Seek lab confirmation through the most expedited means possible. Within CONUS, the State public health lab should be contacted. OCONUS, seek assistance from nearest NMRTC or NEPMU to facilitate the most rapid testing options.

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2) Ensure patient has been isolated and that appropriate infection control procedures have been implemented

- Measles cases should be isolated away from unimmunized people during their infectious period, from 4 days before rash onset through 4 days after rash onset. Isolation at home is adequate, if practical. Aboard a ship or in a deployed environment, active duty are fully vaccinated, resulting in a much lower threat of spread than in the civilian sector. Measles patients should still be segregated from others and must be kept away from civilians who may not be immunized.
- Unimmunized infants in the home are particularly at risk and should be prioritized for Postexposure Prophylaxis (PEP)
- Details for medical facility control measures can be found here: CDC Interim Measles Infection Control Guidelines

3) Interview the case-patient

- Use the CDC Measles Investigation Worksheet to guide the interview and collect other relevant information (i.e. demographics, clinical details, vaccine history, etc.).
- Assess epidemiologic risk factors in the 21 days prior to rash onset:
    - Did the patient have contact with a known measles case or person with symptoms of measles (fever and rash)?
    - Did the patient travel outside of the U.S. or to an area with an active outbreak?
    - Was the patient exposed to someone who traveled outside of the US or to an area with an active outbreak?
- Other exposures/venues to ask about visiting in the previous 21 days include domestic air travel through international airports, school/university campuses, theme parks, events where crowds gather (e.g., weddings, conferences, concerts).
- Obtain an accurate and complete immunization history of the case (including manufacturer and lot number if possible).
- Interview the case-patient regarding contact with others and places visited during his/her infectious period (4 days before to 4 days after rash onset).
    - If air travel occurred during the infectious window, collect:
        - Departure and arrival cities
        - Flight number, date/time
        - Terminal/Gate #
        - Seat #
        - Traveling companion information

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4) Identify exposed and susceptible persons

- Initiate a contact investigation to identify persons who may have been exposed to measles through contact with the case-patient during the infectious period (4 days before to 4 days after onset of rash) and who may have been infected because they are not immune to measles.

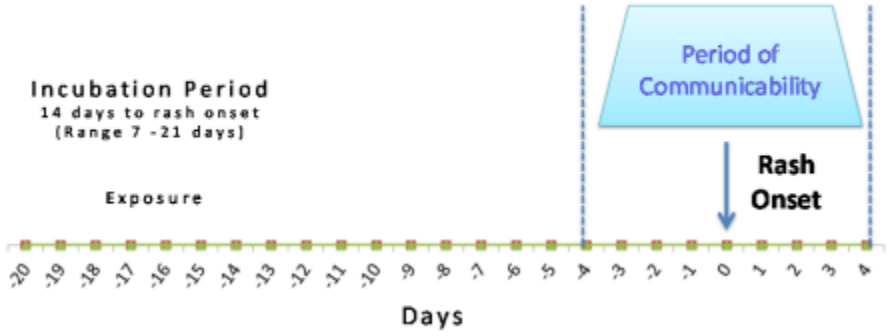

Image: "Local Health Dept Guidelines for the Epidemiological Investigation and Control of Measles," Maryland Dept Health and Mental Hygiene

- A person can be considered exposed to measles if they shared the same airspace as a measles case during the case's infectious period (4 days before to 4 days after rash onset) or entered a closed area up to 2 hours after a person infectious with measles was in the area (e.g. a patient who is seen in the same exam room as a person infectious with measles, 2 hours after the infectious person left the exam room). Exposures can occur in various settings including: the home, workplace, school, prison, dormitory, airplane, waiting room at doctor's office, etc. Contact with case-patients may vary widely in type and duration. Therefore, measles exposures should be evaluated on a case-by-case basis following an interview with the case and/or contact person to determine the nature of the exposure.
- Cases and Exposures (Contacts) may be organized using the CDC Measles Line List Template
- Obtain and document immunization histories for all contacts.
- A susceptible individual is defined as a person who has not received 2 doses of measles containing vaccine on or after his/her 1st birthday or does not have documented history of disease. In general, a person can be considered immune to measles if they:

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- Have written documentation of receiving 2 measles-containing vaccines
- Have serologic evidence of immunity (IgG antibody detected in a lab test)
- Have laboratory confirmation of disease
- Were born before 1957*
- Served in the U.S. Armed Forces (beyond initial accessions)

*During an outbreak, 2 doses of measles-virus containing vaccine are recommended for all healthcare workers (HCWs), regardless of date of birth.

- Infants <12 months who have received a single vaccine are considered immune. Children ≥12 months require their 2nd dose before they are considered immune in an outbreak setting.
- All symptomatic contacts should be tested for measles and managed as suspected measles cases, regardless of vaccination history.

5) Initiate measles control measures

- Identification and vaccination of susceptible household and congregate setting contacts can occur immediately and should not be delayed because of pending laboratory results. Waiting for laboratory confirmation of measles infection prior to vaccination and prophylaxis of non-household contacts (e.g. schoolmates) may be reasonable in some situations if exclusion from public locations can be initiated.
- Use Airborne precautions until 4 days after onset of rash.
- Measles vaccine should be provided to exposed susceptible persons who do not have a contraindication to MMR vaccine.* Infants ≥ 6 months should receive MMR vaccine in an outbreak setting. Measles immunization may be effective as prophylaxis if given within 72 hours of exposure to measles. However, immunization should be administered to susceptible individuals regardless of time since exposure in order to provide protection against subsequent measles exposures.
- Susceptible persons who receive vaccination within 72 hours of exposure:
  - Can be immediately readmitted to childcare, school or work.
  - Should be advised to monitor for signs and symptoms of measles.
- If vaccine cannot be given, immune globulin may be effective as a prophylaxis if administered to susceptible persons within 6 days from time of exposure.
- Susceptible persons who receive immune globulin:
  - Can NOT be immediately readmitted to childcare, school or work and should be excluded for 28 days from time of exposure.

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- Persons with a contraindication to measles vaccination, who decline to be vaccinated, or who receive vaccination greater than 72 hours after exposure should be monitored for the development of symptoms consistent with measles and excluded:
    - From schools, daycare centers or work until at least the 22nd day after the onset of rash in the last case identified.
    - From medical settings through the 21st day after last exposure.
- Exposed contacts may be monitored using the Susceptible Contacts Line List Template as a template.

*Contraindications to MMR vaccine include pregnancy, immunosuppression (due to disease or medication), HIV with CD4 <200 or 15%, active untreated TB or history of serious reaction to a previous dose of MMR vaccine or vaccine-component, including gelatin and neomycin). More detail can be found here: IHD Standing Order for MMR Vaccine

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Table 1. Post Exposure Prophylaxis and Quarantine/Exclusion

Age or Health Status	Measles Immune	Time From First Exposure		
Category	**Status**	**≤ 72 Hours**	**>72 Hours-6 Days**	**>6 Days**
All Ages, not severely immunocompromised	Immune	•PEP not indicated when exposed person has presumptive evidence of immunity •No quarantine or exclusion from congregate setting/work needed •Monitor for symptoms for 21 days after exposure		
<6 Months, not severely immunocompromised	Non-immune	•Give IMIG •Quarantine and monitor for symptoms for 28 days after last exposure		•PEP not indicated (too late) •Quarantine and monitor for symptoms for 21 days after last exposure
6-11 months, not severely immunocompromised	Non-immune	•Give MMR Vaccine (preferred) or IMIG •If vaccinated: no quarantine or exclusion from congregate settings needed. Monitor for symptoms for 21 days after last exposure •If IMIG: quarantine and monitor for symptoms for 28 days after last exposure	•Give IMIG •Quarantine and monitor for symptoms for 28 days after last exposure	•PEP not indicated (too late) •Quarantine and monitor for symptoms for 21 days after last exposure
>12 months, not pregnant, not severely immunocompromised	Non-immune (0 doses MMR vaccine or IgG negative)	•Give 1st MMR vaccine dose •No quarantine or exclusion from congregate settings needed if vaccinated in time •Healthcare work restriction: Exclude from work for 21 days after last exposure •Monitor for symptoms for 21 days after last exposure	•Give IMIG if <66 lb and quarantine and monitor for symptoms for 28 days after last exposure •Otherwise, PEP not indicated. •Quarantine and monitor for symptoms for 21 days after last exposure	•PEP not indicated (too late) •Quarantine and monitor for symptoms for 21 days after last exposure
	1 dose of MMR Vaccine	•Give 2nd MMR vaccine dose if at least 28 days since first dose •No quarantine or exclusion from congregate setting/work needed if vaccinated in time •Monitor for symptoms for 21 days after last exposure	•PEP not indicated •No quarantine or exclusion from congregate setting/work needed •Monitor for symptoms for 21 days after last exposure	
	Unknown immune Status	•Give MMR Vaccine •No quarantine or exclusion from congregate setting needed if vaccinated in time •Healthcare work restriction: exclude from work for 21 days after last exposure •Monitor for symptoms for 21 days after last exposure	•Give IMIG if <66 lb and quarantine for 28 days after last exposure •Otherwise, PEP not indicated. •Quarantine and monitor for symptoms for 21 days after last exposure	•PEP not indicated (too late) •Quarantine for 21 days after last exposure
Pregnant	Immune	•PEP not indicated •No quarantine or exclusion from congregate setting/work needed •Monitor for symptoms for 21 days after exposure		
	Non-immune (IgG negative)	•Give IVIG •Quarantine and monitor for symptoms for 28 days after last exposure		•PEP not indicated (too late) •Quarantine and monitor for symptoms for 21 days after last exposure
	Unknown	•Draw IgG titers to determine immunity •If IgG negative: give IVIG3 and quarantine and monitor for symptoms for 28 days after last exposure •If IgG positive: PEP not indicated. No quarantine or exclusion from congregate setting/work needed. Monitor for symptoms for 21 days after exposure.		•PEP not indicated (too late) •Quarantine and monitor for symptoms for 21 days after last exposure
Severely Immunocompromised	Any	•Give IVIG (preferred); IMIG is an option if <12 months •Quarantine and monitor for symptoms for 28 days after last exposure		•PEP not indicated (too late) •Quarantine and monitor for symptoms for 21 days after last exposure

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6) Conduct active surveillance

Active surveillance for additional cases should be maintained for at least 2 incubation periods (42 days) after the last reported confirmed case to ensure that all cases are identified. Enhanced surveillance may be facilitated through PAO communication for exposures at public venues such as restaurants, airports and malls, communicating with the general public through radio, social media, etc. Persons can be guided to call their physicians or the health department for assessment of immunity status and the need for vaccination.

Special Settings

In addition to following the recommended steps for case investigation described above, the following measles control measures should be conducted for cases and outbreaks occurring in settings where measles can be transmitted easily due to crowding and/or close contact of individuals.

1) Schools and Childcare Centers

- Assess immunization status of staff and students. Consider gathering immunization status for siblings of students in an outbreak.
- Request that the school notify parents/guardians that a measles case has been identified in the school. A letter and measles fact sheet should be sent to each parent/guardian.
- Vaccinate staff and students without contraindications who are exposed and susceptible to measles. In outbreak situations, vaccination of siblings of students should be considered.
- Susceptible persons who receive measles vaccination (whether it is their 1st or 2nd dose) within 72 hours can return to the school or childcare immediately.
    - If the first dose of MMR is after 72 hours, child should be excluded from school/childcare for 21 days after exposure.
    - If child already has one dose of MMR, school exclusion is not necessary after the second vaccine is administered, even if >72 hours have elapsed from exposure.
- Susceptible persons who refuse vaccination must be excluded from school or childcare until at least the 22nd day has passed from the onset of rash in the last case of measles identified in the school.
- Post-exposure prophylaxis with IMIG or IVIG, when indicated, increases the duration of school/childcare exclusion to 28 days.

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- Persons who develop symptoms of measles should be excluded from school or childcare for 4 days after rash onset.
- Template- School Exposure Letter to Parents
- CDC Template- School Exposure Letter to Principals

2) Healthcare Settings

- Assess immunization status of all staff, including persons involved in direct patient care as well as persons who work in the patient care setting (e.g. clerical staff, front office staff, technicians).
- Patients who have been exposed in a healthcare setting should be informed of their exposure, assessed for immunity, educated on the signs and symptoms of measles (including prodromal presentation), and asked to contact a healthcare professional if symptoms of measles develop prior to seeking treatment.
- Vaccinate persons who are exposed and susceptible to measles.
    - Note: Persons born before 1957 are considered immune to measles. However, if they do not have documented evidence of immunity and have direct contact with patients, measles vaccination should be considered.
- Immune globulin may be administered instead of vaccination. However, vaccination is the preferred method.
- Workplace exclusions:
    - Susceptible HCWs who are exposed and have no immunity to measles should be excluded from direct patient contact for 21 days after last exposure regardless of whether they receive vaccine within 72 hrs or not.
    - If the exposed HCW is vaccinated within 72 hrs, they must still be excluded from direct patient contact for 21 days and excluded from the workplace from the 5th day after exposure through the 21st day after exposure.
    - If they receive immune globulin within 6 days after exposure, they must be excluded from patient contact for 28 days.
    - Resumption of patient care in all situations is contingent on not experiencing symptoms of measles infection.
- HCWs with documentation of 1 vaccine dose may remain at work and should receive the second dose of MMR.
- Susceptible persons who develop symptoms of measles should be excluded from the facility for 4 days after rash onset.
- CDC Interim Measles Infection Control Guidelines

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3) Shipboard and Expeditionary Settings

- Although Navy and Marine Corps units are fully vaccinated, a rare mild case is possible. If a Sailor or Marine is suspected to have measles, isolate the patient as much as practicable. Exposed servicemembers do not require quarantine due to previous vaccination. Evaluate exposed civilians or contractors for immunity. Susceptible contacts should be managed per Section 5. Preventive medicine consultation from the nearest NMRTC or NEPMU is strongly recommended to guide response and facilitate laboratory testing.
- An outbreak of measles among AD causing disruption to mission operations is highly unlikely outside of accessions.

4) USN and USMC Accessions

- Approximately 20% of Navy and Marine Corps accessions arrive either unimmunized or with inadequate measles antibody titers, making the arrival of a measles infected trainee a distinct possibility.
- **Delayed vaccination is the single most important risk factor for a measles outbreak to occur at an accession site**. Prioritize rapid verification of vaccination status and vaccination of susceptible individuals as early as possible during intake. Ensure vaccination status of all accession site staff is also documented.
- Maintain alertness for a measles case among arrivals at accession sites, particularly in the first 2-3 weeks of arrival. Recruit training staff should be trained in the signs and symptoms of measles. If a Sailor or Marine is suspected to have measles, seek Infectious Disease or Preventive Medicine consultation from the nearest NMRTC or NEPMU.
- If a measles case is suspected, immediately isolate the patient and coordinate testing as described in the first two steps of this Guide.
- Assess immunization status of all exposed recruits and staff as per Section 4.
- Administer MMR vaccine within 72 hours of initial exposure to susceptible contacts as per Section 5. In a post-exposure situation, do not wait for titers if they will delay vaccination beyond the 72-hour window. If outside of the 72-hour exposure window, immunization should still be administered to susceptible individuals as soon as possible to provide protection against subsequent measles exposures.
- Fully vaccinated individuals as well as and susceptible individuals who receive vaccination within 72 hours of initial exposure may continue with training and do not require quarantine.
- If vaccination is delayed, quarantine should be considered if trainee movement cannot be limited to the accession environment. Because all trainees/staff should be immune by the time a secondary case becomes infectious and trainee movement is already limited to the training environment, quarantine is not

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absolutely required. Consultation with Preventive Medicine authorities for specific risk evaluation is recommended.

- To limit risk of spread to the local community, staff, visitors, and vendors who cannot demonstrate immunity against measles should be excluded from the facility for 42 days after the last case of measles. Susceptible pregnant women and others who are at increased risk of severe disease (like those with immunocompromising conditions) should also be removed from the training environment during an outbreak.

References

1) Maryland Department of Health and Mental Hygiene Prevention and Health Promotion Administration Infectious Disease Epidemiology and Outbreak Response Bureau (IDEORB) Center for Immunization, May 2017
2) CDC Measles for Public Health Professionals
3) Prevention of Measles, Rubella, Congenital Rubella Syndrome, and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). Morbidity and Mortality Weekly Report (MMWR), 14Jun2013/62(RR04);1-34. MMWR-rr6204
4) CDC Interim Measles Infection Control Guidelines
5) Virginia Department of Health VDH Measles Post Exposure Prophylaxis

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