

UCSF Measles Control Plan

I. Purpose

The purpose of this control plan is to establish safety and infection prevention guidance for the management of suspected and/or confirmed measles.

II. Situation summary

Measles is a highly contagious viral illness. There has been an increase in global and U.S. measles cases, with many recent U.S. cases among people who have returned from international travel or have been in contact with recently returned travelers. These infections have occurred mainly in persons who have not received adequate MMR vaccination.

III. Notification and Quick Tips

- Report all suspected measles cases *immediately* to Hospital Epidemiology and Infection Prevention (HEIP) and San Francisco Department of Health (SFDPH)
 - i. [Contact HEIP](#) including after-hours through the nursing supervisors
 - ii. Contact SFDPH including after hours by calling 415-554-2830
- Please refer to the [UCSF measles tip sheet](#) for a summary of steps to follow for measles suspect, confirmed, or exposed patients.

IV. Case definition

Probable:

In the absence of a more likely diagnosis, an illness that meets the clinical presentation (see below) with:

- No epidemiologic linkage to a laboratory-confirmed measles case AND
- Noncontributory or no measles laboratory testing.

Confirmed:

An acute febrile rash illness meeting at least one of the following criteria:

- Detection of measles virus-specific nucleic acid from a clinical specimen using polymerase chain reaction (PCR) (preferred)
- Isolation of measles virus from a clinical specimen not explained by MMR vaccination during the previous 6–45 days.

- IgG seroconversion or a significant rise in measles immunoglobulin G antibody using any evaluated and validated method not explained by MMR vaccination during the previous 6–45 days.
- A positive serologic test for measles IgM antibody not otherwise ruled out by confirmatory testing.
- Direct epidemiologic linkage to a case confirmed by one of the methods above.

V. Transmission and clinical presentation

- Transmission
 - i. Measles is a highly infectious viral illness. Spread is through direct contact with infectious droplets or by airborne transmission when an infected person breaths, coughs, or sneezes. Measles virus can remain infectious in the air for up to an hour after an infected person leaves an area.
- Incubation period
 - i. The average interval between the appearance of rash in the index case and rash in secondary cases is 14 days (range 7–21 days). Time from exposure to onset of prodromal symptoms is generally 8–12 days.
- Infectious period
 - i. From four days before rash onset through four days after rash onset (day of rash onset is day 0) for most patients.
 - ii. Immunocompromised patients may have prolonged excretion of the virus in their respiratory tract secretions and can be contagious for the duration of the illness.
 - iii. Probable or confirmed measles cases should be isolated during their infectious period.
 - iv. Exposed, susceptible patients (i.e. those without evidence of immunity) and severely immunocompromised persons regardless of immune status are potentially infectious starting on day 5 after their first exposure (day of exposure = day 0) and through the incubation period.
- Clinical Presentation
 - Consider measles in patients of any age who have a fever ≥ 101 F, 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.
 - If the patient has fever + >1 “C” + consistent rash (if >4 days since onset of fever) + an epidemiological risk factor, measles should be considered *regardless of measles vaccination history*.
 - A tool to guide providers in evaluating a patient presenting with rash and fever is available [here](#).
 - Epidemiological risk factors in the past 21 days:

- o Known contact with a measles case or an ill person with fever and a rash.
- o Contact with an international visitor who arrived in the U.S.
- o Travel outside the U.S., Canada, or Mexico.
- o Domestic travel through an international airport.
- o Visited a U.S. venue popular with international visitors such as a large theme park.
- o Lives in or visited a U.S. community where there are measles cases.
- If the clinical presentation is highly suggestive of measles, but no epidemiologic risk factor can be elicited, still consider measles and immediately mask patient with or without risk factors and follow guidelines for infection control.
- If measles is being considered, [Hospital Epidemiology and Infection Prevention \(HEIP\)](#) and the local health department should be contacted immediately including to arrange expedited testing and for public health awareness.

VI. Isolation and Personal Protective Equipment (PPE)

- Please refer to the [UCSF measles tip sheet](#) for a summary of steps to follow for probable measles, confirmed or exposed patients.
- Required PPE:
 1. Fit-tested N95 respirator (or PAPR)
 - i. Donning PPE
 1. Healthcare personnel should don the fit-tested N95 respirator (or PAPR) before entering the patient's room and use it during all contact with the patient including during transport.
 - ii. Doffing PPE
 1. Healthcare personnel must perform hand hygiene prior to leaving the patient's room.
 2. Fit-tested N95 respirator (or PAPR) should be removed and discarded outside of the patient's room after every room exit (not in anteroom).
 3. Do not re-use or follow extended use of the N95s.
 4. Place a trashcan outside of the patient's room to discard the N95s. If a PAPR is worn, clean it with hospital-approved disinfectant after every room exit.
- Isolation
 - i. Inpatient and ED
 1. In the ED, place a mask on the patient. If the patient is unable to mask, if clinically safe, place a loose blanket over their heads.
 2. Expedite placing the patient into an Airborne Infection Isolation room (AIIR). If an AIIR is not immediately available, place the patient in a single room with the door closed.
 3. Initiate Airborne Isolation.
 - Place an Airborne Isolation order.

- Place an [Airborne isolation sign](#) on the door.

ii. Ambulatory

1. Place a mask on the patient (unless <2 year of age or there are medical contraindications). If the patient is unable to mask, if clinically safe, place a loose blanket over their heads.
2. Initiate Airborne Isolation and place an [Airborne Isolation sign](#) on the door.
3. If available, place the patients into an AIIR. If an AIIR is not available, expedite placing the patients into a single room with the door closed, and place a mask on the patient assuming no age or clinical contraindications.
4. Determine patient disposition in conjunction with Hospital Epidemiology and Infection Prevention (HEIP) and San Francisco Department of Health (SFDPH). Patient facing resources are available [here](#).
5. The patient should always remain in the room with the doors closed unless diagnostic or therapeutic procedures (e.g., CT scan, surgery, etc.) are required and cannot be performed in the patient's room.
6. At discharge, leave the room empty with the Airborne Isolation sign in place, with the door closed for one hour prior to initiation of cleaning.

- Duration of Airborne Isolation

- i. Airborne Isolation should be maintained:
 - for probable cases, until measles has been ruled out.
 - if a confirmed case,
 - continue isolation until through at least four days after rash onset (day of rash onset is day 0) and isolation discontinuation is approved by both UCSF Hospital Epidemiology and Infection Prevention (HEIP) and SFDPH.
 - Immunocompromised patients may be infectious for the duration of illness and isolation discontinuation needs to be reviewed and approved by both UCSF Hospital Epidemiology and Infection Prevention (HEIP) and SFDPH.
 - For exposed, susceptible patients (i.e. those without evidence of immunity), isolation starts on day 5 after their first exposure (with day of first exposure being day = 0) through day at least 21 days after the date of their last exposure.
 - The isolation for patients that received immunoglobulin for postexposure prophylaxis should be extended to 28 days.
 - Patients who do not require hospitalization, but remain potentially infectious to others should be isolated at home. Quarantine and exclusion guidance will be directed by SFDPH.

VII. Patient transport

- Mask the patient (unless there are medical contraindications or patient is <2 years of age).
 - i. For pediatric patients who cannot tolerate being masked, if it is clinically safe, place a blanket loosely over their heads during transport.
- Healthcare personnel transporting the patient that will have direct contact with the patient must wear the PPE required for Airborne isolation (fit-tested N95, (or PAPR)). Refer to [this guidance](#) for additional information.
- Routes of Travel
 - **Inpatient:** Utilize the service elevator for patient transport, ensuring the patient and the transport and clinical team are the only ones present in the elevator. There is no need to close the elevator after it is used.
 - **Outpatient:** Escort the patient and their family directly from the exam room to their car. Utilize the service elevator for patient transport, ensuring the patient/family and healthcare personnel are the only ones present in the elevator. There is no need to close the elevator after it is used. Advise the patient not to use public transportation such as rideshare services, taxi, bus, metro, airplane, or train.
 - If there are questions about transportation, consult HEIP.

VIII. Bed placement

- For probable, confirmed, and exposed patients:
 - i. Emergency Department
 1. Ensure that the patient remains masked (unless medically contraindicated or the patient is <2 years of age).
 2. Isolate the patient in an Airborne Infection Isolation room (AIIR) as soon as possible. If not available, place the patient into single room with the door closed until the patient can be moved to an AIIR.
 - ii. Inpatient
 1. Admit the patient into an Airborne Infection Isolation room (AIIR). Do not place the patient in a protective environment room (for example on the BMT unit).
 - iii. Ambulatory/Urgent Care
 1. Isolate the patient in an Airborne Infection Isolation (AIIR), if available. If not available, place the patient into single exam room with the door closed until the patient can be moved to an AIIR.
 2. Ensure that the patient remains masked (unless medically contraindicated or patient is <2 years of age).

VIII. Hand hygiene

- Hand hygiene is essential.

- Hospital-approved hand hygiene products including alcohol-based hand rubs and soap and water are effective.

IX. Testing and the Clinical Microbiology Laboratory

- Contact the HEIP department immediately if you are concerned for measles.
- Please refer to this measles testing [tip sheet](#) for recommendations for measles diagnostics.
- Prior to sending measles testing, please obtain approval from SFDPH,
- Notably, measles IgM is subject to false positive results. Clinical correlation is needed.
- Please contact the adult and pediatric infectious disease consult service for additional input.

X. Treatment

- No specific antiviral therapy is available for measles. The measles virus is susceptible in vitro to ribavirin, which has been given by the intravenous and aerosol routes to treat severely affected and immunocompromised children with measles. However, no controlled trials have been conducted.
- Vitamin A treatment of children with measles in developing countries has been associated with decreased morbidity and mortality rates. The WHO currently recommends vitamin A for all children with measles, regardless of their country of residence, and many US experts concur for all children regardless of hospitalization status with measles in the United States.
- Please contact the adult and pediatric infectious disease consult service for additional input.

XI. Visitation

- For the safety of the visitor, in general, patients should be encouraged to limit in-person visitation to those who are essential for the patient's care and well being while they are infectious.
 - i. Limit visitors to patients with known or suspected measles to those who are necessary for the patient's well-being and care.
 - Encourage use of alternative mechanisms for patient and visitor interactions such as video-call applications on cell phones or tablets, when appropriate.
 - ii. Visitors without acceptable presumptive evidence of immunity should not enter the room of a patient with known or suspected measles.
- Visits to patients in isolation should be controlled to allow for:
 - i. Screening visitors for symptoms of concern for measles including a rash and fever before entering the facility.
 - ii. The patient's care team should provide instruction before visitors enter the patient's room on hand hygiene and use of personal protective equipment (PPE).
 - iii. The patient's care team should maintain a list of all visitors who enter the patient's room.
 - iv. Visitors should not be present during aerosol-generating procedures.

- v. Visitors should be instructed to limit their movement within the facility.
- vi. Exposed visitors should be advised to report any signs and symptoms of acute illness to their health care provider for a period of at least 21 days after the last known exposure to the sick patient.

XII. Environmental and Equipment Cleaning and Linen handling

- **Environmental cleaning**
 - i. Hospitality staff should wear a fit-tested N95 (or PAPR) when entering the room for the daily or discharge clean.
 - ii. At discharge, leave the room empty with the Airborne Isolation sign in place, with the door closed for one hour prior to initiation of cleaning as noted in this [guidance](#).
- i. Standard cleaning and disinfection procedures with hospital-approved disinfectants are effective. Follow appropriate contact times.
- **Equipment Cleaning**
 - i. All equipment entering the patient room will be appropriately cleaned and disinfected using an approved hospital-approved disinfectant and appropriate contact time.
- **Linen**
 - i. Soiled linen (e.g., bedding, towels, personal clothing) can be routinely handled.
 - ii. Soiled laundry should be gently and promptly contained in an appropriate laundry bag and should never be shaken or handled in a manner that may disperse infectious material.

XIII. Food service

- Management of food service items should be performed in accordance with routine procedures.

XIV. Waste handling

- Standard waste handling is appropriate.

XV. Discharge planning

- Discharge planning must be coordinated with UCSF Hospital Epidemiology and Infection Prevention (HEIP) and SFDPH.
- Transfers to another healthcare facility must be coordinated with SFDPH, other relevant public health authorities, and the healthcare facility.

XVI. Exposure follow-up and contact tracing

- **Contact Occupational Health Services (OHS) with questions and/or concerns for exposure (415) 885-7580 or after hours by calling 415-353-STIC (7842)**

- **Exposures**
 - See [Appendix A](#) that describes the exposure workflow.
 - **Exposure definition**
 - i. Sharing the same airspace with an infectious person or being in these areas up to 1 hour after the infectious person has left the area is considered to be a measles exposure.
 - ii. Examples of shared air space include:
 - A single patient room, or a clinic waiting area
 - Different areas in a larger space 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.
 - iii. Exposure criteria apply even if the infectious person was masked.
- **Definition of Immunity**
 - Evidence of immunity to measles includes any of the following:
 1. Documentation of age-appropriate vaccination with a live measles virus-containing vaccine:
 - Preschool-aged children: 1 dose administered after the first birthday;
 - School-aged children (grades K-12): 2 doses; the first dose administered after the first birthday and the second dose administered at least 28 days after the first dose;
 2. Laboratory evidence of immunity (i.e., a documented positive measles IgG result);
 3. Laboratory confirmation of disease; or
 4. Born before 1957 (a measles IgG may be requested to confirm immunity). **Note- birth before 1957 by itself is not accepted as evidence of immunity for healthcare personnel or patients with immunocompromising conditions.**
 5. Additional evidence of immunity is required for high risk contacts and settings such as healthcare settings and may also be required during an outbreak. Acceptable documentation of immunity includes:
 - Documentation of two doses of measles vaccine given in 1968 or later, separated by at least 28 days with the first dose on or after the first birthday.
 - If no documentation of two measles vaccine, a documented IgG positive test for measles
 - Laboratory confirmation of prior disease.
- **Postexposure prophylaxis (PEP)**
 - The administration of MMR vs. immune globulin (IG) as PEP to exposed

people depends primarily upon time since exposure, age of the contact, and risk status of the contact (e.g., pregnant or immunocompromised).

- Refer to this CDPH document for more [guidance](#) on postexposure prophylaxis.
- For the purposes of postexposure prophylaxis
 - MMR vaccine for eligible patients should be administered ≤ 3 days from the *first* exposure.
 - MMR vaccine is a live virus vaccine and should not be given to persons who are immunocompromised or pregnant.
 - Immunoglobulin (IG) for eligible exposed susceptible persons (and severely immunocompromised persons regardless of immune status) can be given until ≤ 6 days from their *last* exposure
 - Do not administer MMR vaccine and IG simultaneously

XVII. Additional Response Guidance

- Any response guidance not outlined in this document will be developed as needed based on risk assessment. Guidance modifications will be reviewed and approved by the UCSF HEIP leadership prior to implementation.

XVIII. References

- UCSF HEIP measles [resource page](#)
- [CDPH Measles Quicksheet](#)
- [CDPH Measles Healthcare Exposure Investigation](#)
- CDC Interim Infection Prevention and Control Recommendations for Measles in Healthcare Settings
- AAP Red Book

Appendix A: Measles Exposure Workflow

- 1) Patient presents with suspected or confirmed measles infection
- 2) Place a mask on the patient (unless there are medical contraindications or patient is <2 years of age).
- 3) Put the patient into an Airborne Infection Isolation Room (AIIR). If an AIIR is not available, place the patient in a private room with the door closed.
- 4) Initiate Airborne Isolation (place a sign on the door and if inpatient or in the ED also write an order)
- 5) Notify HEIP and SFDPH immediately
- 6) Notify Administrator On Call and Occupational Health Services (OHS)

- 7) Schedule an urgent technical advisory group/stakeholders meeting (HEIP, OHS, unit/area leadership, Facilities, Senior Leadership, pharmacy)
 - a. HEIP will schedule the urgent technical advisory group/stakeholders meeting
 - b. Depending on the magnitude of the exposure, the HICS structure may need to be activated
 - c. The [CDPH Exposure Investigation Tipsheet](#) is a helpful reference.
- 8) Contact tracing and exposure follow-up for exposed patients
 - a. Area/unit leadership will identify and create a line list of all patients meeting exposure criteria (i.e., shared airspace for any amount of time with an infectious person or being in these areas up to 1 hour after the infectious person has left the area) with guidance from HEIP.
 - i. Facilities may need to help identify all the areas that share the same air handling system
 - b. Area/unit leadership and HEIP will assess each patient on the exposure line list for high-risk criteria including age <12 months, immunocompromising medical conditions and medications, pregnancy.
 - c. Area/unit leadership and HEIP will assess whether patients have evidence of measles immunity as defined by CDPH.
 - d. Area/unit leadership and HEIP will work with SFDPH to determine the need for and appropriate recommendations regarding post-exposure prophylaxis in collaboration with pharmacy.
 - e. Area/unit leadership, HEIP, and SFDPH will work together to notify patients of their exposure and coordinate recommended next steps, including arranging for administration of post-exposure prophylaxis (MMR vaccine or immunoglobulin), as appropriate.
 - i. Notification needs to be done as soon as possible
 - ii. Notification should be done over the phone as well as in writing
 1. A sample CDPH measles exposure letter can be found [here](#).
- 9) Contact tracing and exposure follow-up for exposed healthcare personnel (HCP)
 - a. Area/unit leadership will identify and create a line list of all HCP meeting exposure criteria.
 - b. OHS will assess exposed HCP for high-risk criteria including immunocompromising conditions and pregnancy and evidence of measles immunity.
 - c. OHS will work with SFDPH and HEIP to determine the need for quarantine/exclusion from work and appropriate recommendations regarding post-exposure prophylaxis.
 - d. OHS and area/unit leadership will work together to notify HCP of their exposure and coordinate recommended next steps, including arranging for administration of post-exposure prophylaxis (MMR vaccine or immunoglobulin), as appropriate.
 - e. OHS will provide exposed employees with guidance regarding self-monitoring for signs and symptoms of measles infection.