Measles Infection Control and Management of High-Risk Exposures during the 2018-2019 New York City Measles Outbreak

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Contents

The following are answers to questions received during a webinar conducted by the New York City Health Department on 4/18/2019. These answers represent current guidance as of 5/28/2019. Visit https://www1.nyc.gov/site/doh/providers/health-topics/measles.page for updated information on the measles outbreak in New York City.

Infection control

For more on infection control, please also review New York City Health Department guidance on **Preventing Measles in Health Care Settings during an Outbreak.**

Mode of transmission

Measles can be transmitted by airborne spread or direct contact with infectious droplets, and may remain infectious in the air for up to 2 hours after an infected person leaves the room. Persons with suspected or confirmed measles should be placed in airborne isolation promptly. Health care providers should use respiratory protection (an N95 respirator or respirator with similar effectiveness in preventing airborne transmission) when caring for persons with suspected or confirmed measles.

Transportation of patients

1. **What are best practices for safely transporting patients with known or suspected measles within the health care facility?**
    - Avoid transporting patients unless necessary for evaluation or care.
    - Notify all locations within the facility to which the patient is being transported (e.g., for additional clinical evaluation, laboratory testing) about the patient's suspected measles status. Do not transport suspected measles patients to other locations unless appropriate infection control measures can be implemented at those locations.
    - Have patients wear a surgical mask or other method of source control during transport.
    - If an infant or child cannot wear a mask: use a HEPA tent; place a blanket loosely over their head; or clear the transport route of other patients and visitors.
    - If transferring a patient with suspected or confirmed measles to another facility, ensure that the receiving facility/provider is informed of the diagnosis before the patient arrives so they can implement appropriate infection control measures.

2. **Should patients be fit tested and then given N95 respirators to wear during transport?**
    - No. Patients with suspected or confirmed measles should be given a surgical mask, although surgical masks do not entirely eliminate the risk of exposures.

Personal protective equipment (PPE) for patients and health care personnel

3. **Do all health care personnel (HCP) need to wear N95 respirators when seeing measles patients?**
    - Yes. Although uncommon, measles vaccine failure can occur. In one study, failure occurred in approximately 1% of HCP exposed to measles patients (Ammari LK, Bell LM, Hodinka RL. Secondary measles-vaccine failure in health-care workers exposed to infectious patients. Infect Control Hosp Epidemiolo 1993;14:81-6). Regardless of measles immunity, all HCP should wear a fit-tested N95 respirator (or a respirator with similar effectiveness in preventing airborne transmission) whenever they are with possibly infectious measles patients.

4. **Is it possible to reuse N95 respirators?**
    - No. N95 respirators should not be reused. They are single-use devices.

Other Infection Control Topics

5. **What are some other recommended ways to avoid measles exposures – other than offering patients surgical masks or covering a young patient's head?**
    - Avoid areas with other patients by bringing suspected measles patients in through alternative entrances.
    - Screen suspected measles patients in separate clinic spaces.
    - Schedule suspected measles patients after hours when other patients are not present.
    - See patients suspected of having measles outside (e.g., some providers have examined patients in a car or mobile clinic van).
    - Conduct home visits to evaluate suspect measles patients.

6. **If a negative pressure room is not available, what should hospitals do to limit transmission?**
    - Place the patient in a private exam room with a surgical mask and do not use that room for 2 hours after the patient has left.

7. **If a severely immunocompromised patient is exposed to measles virus and subsequently requires hospitalization, should we monitor them on airborne isolation?**
    - Yes. Since immunocompromised patients may be more susceptible to measles, they are at a higher risk for developing measles, even if they have received immunoglobulin as post-exposure prophylaxis. Severely immunocompromised patients may lose their specific antibody response to the measles, regardless of prior immunity, and thus should be treated as non-immune. It is not possible to wait for symptoms to place these patients on isolation since the presentation of measles may be atypical in these patients and because measles virus transmission can occur days before the onset of rash. Also, patients with compromised cell-mediated (or humoral) immunity are more likely to develop severe manifestations of measles and may present atypically. Additional

information may be found at https://www.cdc.gov/vaccines/hcp/acip-recs/general-recs/immunocompetence.html

- Examples of severely immunocompromised persons include: patients with severe primary immunodeficiency; those who have received a bone marrow transplant (until at least 12 months after completing all immunosuppressive treatment, or longer in patients who have developed graft-versus-host disease); patients on treatment for acute lymphyoblastic leukemia until at least 6 months after completion of immunosuppressive chemotherapy; patients with acquired immunodeficiency syndrome (AIDS) or human immunodeficiency virus (HIV) with CD4 percent <15 (all ages) or CD4 count <200 (aged >5 years); and patients with HIV who have not received a measles-containing vaccine since receiving effective anti-retroviral therapy. (References: CDC. Prevention of Measles, Rubella, Congenital Rubella Syndrome, and Mumps, 2013. MMWR. 2013:62(4); Rubin et. al. 2013 IDSA Clinical Practice Guideline for Vaccination of the Immunocompromised Host. CID. 2014:58.) For patients who are on cancer chemotherapy, have had a solid organ transplant, or have had a hematopoietic stem cell transplant, consult the treating provider regarding the degree of immunosuppression.

8. **How long does measles virus live on surfaces, and can virus on a surface then be transmitted to someone who is not immune?**
    - Measles virus can live for up to two hours on a surface in a droplet where an infected person coughed or sneezed. Any type of standard disinfectant should inactivate measles on surfaces. HCP should use airborne and standard precautions and clean surfaces routinely.

9. **Is there recommended signage that institutions can use during an outbreak?**
    - Yes. The New York City Health Department's Measles Information for Providers web portal (https://www1.nyc.gov/site/doh/providers/health-topics/measles.page) contains a number of posters for patient and provider audiences, in a variety of languages. Health care facilities can download and print these posters or can order copies by calling 311.

10. **For patients with suspected measles who do not require hospitalization but are considered infectious, what are appropriate discharge instructions?**
    - Patients should avoid public transportation and take private transportation. Patients should wear a surgical mask if riding in a taxi.

Clinical evaluation and diagnostic testing

11. **How is "fever" defined?**
    - CDC considers fever to be a body temperature of ≥100.4 degrees F (38.0 degrees C).

12. **What steps can be taken to prevent hemolysis of serum specimens for measles diagnostic testing?**

- Collect blood in serum separator tubes (red, red-speckled, or gold-top tops). If possible, centrifuge and separate the serum. Refrigerate specimens after collection and transport on ice. Use a smaller gauge needle.

13. **Should clinicians conduct measles testing on all patients with fever and upper respiratory tract symptoms if they live in one of the outbreak affected ZIP codes, even if there is no rash?**
    - No. Measles testing should be reserved for patients who have a rash. CDC advises against testing prior to rash onset because of questions about sensitivity of diagnostic testing (if negative, you would need to retest again when the rash appears). Also, there is a risk of false-positive results with any test when the pre-test probability is lower.

Managing visitors

14. **Should health care facilities screen visitors for possible measles exposure and lack of immunity?**
    - During this measles outbreak, health care facilities may consider pre-screening visitors prior to entry per New York State guidance.
        - Screen visitors for:
            - Symptoms (e.g., fever, rash, other measles symptoms);
            - Known or suspected exposures to individuals with measles;
            - Residence in a measles outbreak area; and,
            - Evidence of immunity (ascertained by documented vaccination or evaluation of bloodwork for positive antibody titers).
    - New York State guidance encourages facilities to implement policies that exclude visitors with possible exposure to measles *or* who are from the outbreak areas *and* lack evidence of immunity. Anyone with symptoms should be masked immediately and asked to leave the unit.
    - You can use the Citywide Immunization Registry (CIR), an electronic immunization database, to look up a person's immunization history. Reporting of immunizations is required for persons 18 years of age and under; adult immunizations can be recorded with the person's consent. The CIR was started in 1996, and consequently has more complete records for people born and vaccinated in New York City since this time, compared to adults. The New York State Immunization Information System maintains records for children and adults (with consent) vaccinated outside of New York City.

15. **Should hospitals restrict pediatric visitors? Is there a recommended age threshold?**
    - Decisions to restrict visitors are at the discretion of the health care facility, based on the patient population's risk for measles.
    - Because many NYC measles cases in the current outbreak have been in children under the age of 5 years, hospitals could consider restricting visits from young children, particularly those who are unvaccinated.
    - Facilities where visitors may be at risk for recent measles exposure may consider restricting visitors who live in, work in, or visit areas with measles transmission from high-risk units, such as: neonatal intensive care unit; pediatric intensive care unit; oncology; general transplant; bone marrow transplant

- Additional guidance from the New York State Department of Health on restrictions may be found in a Dear Administrator Letter from April 18, 2019: https://www.health.ny.gov/professionals/hospital_administrator/letters/2019/docs/dal_19-05_measles.pdf

Vaccination and verifying immunity

General information

16. **Are there New York City Health Department resources for where MMR vaccination and IgG testing can be obtained for exposed or at-risk people, particularly those who are uninsured?**
    - Adults: Adults who require vaccination or serological testing can visit a New York City public hospital (Health + Hospitals facilities) or federally qualified health center to receive free or low-cost vaccinations. Immunizations are available at the New York City Health Department immunization clinic in Fort Greene.
    - Children: Most children are eligible for free or low-cost vaccines or have private insurance that covers vaccines. If a child cannot obtain vaccination through a primary care provider, a family member can call 311 for information on where to obtain free or low-cost vaccinations. Eligible children (including children who are uninsured) can receive vaccinations free of charge at any facility participating in the Vaccines for Children Program.

17. **Can persons who are moderately or severely ill receive the MMR vaccine?**
    - According to CDC recommendations, vaccination of persons with concurrent *moderate or severe illness*, including untreated, active tuberculosis, should be deferred until they have recovered. This precaution avoids superimposing any adverse effects of the vaccine on the underlying illness or mistakenly attributing a manifestation of the underlying illness to the vaccine. The decision to vaccinate or postpone vaccination depends largely on the cause of the illness and the severity of symptoms.
    - MMR vaccine can be administered to children who have *mild illness, with or without low-grade fever*, including mild upper respiratory infections, diarrhea, and otitis media. Data indicate that seroconversion is not affected by concurrent or recent mild illness. Physicians should be alert to the vaccine-associated temperature elevations that might occur predominately in the second week after vaccination, especially with the first dose of MMRV (measles, mumps, rubella, and varicella) vaccine.

18. **What evidence is needed to confirm measles immunity?**
    - The following are considered sufficient evidence of measles immunity:
        - Written documentation of vaccination (i.e., 2 doses of live measles-containing or MMR vaccine administered at least 28 days apart); **or**
        - Laboratory evidence of immunity as indicated by a positive measles IgG titer; **or**
        - Laboratory confirmation of prior measles virus infection.
    - Physician diagnosed measles is NOT acceptable proof of immunity.

- Outside of an outbreak of measles, birth before 1957 is considered evidence of immunity to measles because the majority of such persons are likely to have been infected naturally and may be presumed immune. However, during an outbreak of measles, the New York City Health Department recommends that persons born before 1957 who are healthcare workers or persons who are likely to be exposed to measles virus (e.g. because they live or regularly spend time in outbreak-affected neighborhoods) check their measles immune status or get vaccinated.

19. **Is self-report of vaccination status sufficient to consider that individual immune?**
    - No. Self-report of vaccination is not considered valid and is not considered evidence of immunity.

20. **For high-risk exposures, what is the best way to quickly verify immunity?**
    - Providers should first check their medical records to verify immunity based on documentation of MMR vaccine or measles IgG titers. If records are not available, providers can check the New York City Citywide Immunization Registry to verify immunization status. If the patient's vaccination history is not available, conduct a STAT measles IgG test. Please see question 28 for additional information.

21. **Is there strong correlation between having immunologic evidence of immunity and protection from infection?**
    - Yes. According to recommendations from the Advisory Committee on Immunization Practices (ACIP), persons who meet the criteria for acceptable evidence of immunity have a very high likelihood of being immune to measles.

22. **Would you consider a person with 2 documented doses of MMR vaccine to be immune even if their serology for measles IgG comes back negative?**

    - Serologic testing after vaccination is not recommended. For more information, see ACIP's recommendations on the use of MMR at www.cdc.gov/mmwr/pdf/rr/rr6204.pdf, page 22. The Health Department's recommendations for ensuring measles immunity of healthcare personnel during the current outbreak in New York City may be found here.

23. **If a person with a solid organ transplant is exposed to measles and they had positive measles IgG titers prior to the transplant, does post-transplant immunity need be confirmed in the event of an exposure?**

    For a patient who received solid organ transplant previously but had pre-transplant measles immunity, the question of management of exposure depends on the severity of the immunosuppression at the time of the exposure. If the exposure occurs during the use of anti-rejection therapies or within 2 months of their discontinuation (including 2 months post-transplant), IV immunoglobulin (IG) should be administered. If the patient is more than 2 months after discontinuation of anti-rejection therapies, the management can depend on the degree of immune suppression at that time. Decisions

should be made in consultation with an infectious disease expert or another provider who is familiar with the specific details of the patient's medical status.

Vaccination among children

24. **Should infants aged 6-11 months *citywide* be getting vaccinated early?**
    - No. However, infants aged 6-11 months who live or regularly spend time in areas affected by the current measles outbreak should receive an early dose of MMR vaccine. Visit New York City Health Department's Measles Information for Providers for updated information on areas where early vaccination at the age of 6-11 months recommended or required. An early dose of MMR is also recommended for infants before traveling internationally. Note that these early doses do not count toward the routine, two-dose vaccine series.

25. **Should children aged 1-4 years receive their 2nd MMR dose early in the setting of this outbreak?**
    - The second dose of MMR can be given earlier than age 4 years, provided it has been at least 28 days since a previous dose of MMR or other live virus vaccine (varicella, MMRV, live intranasal influenza vaccine, or yellow fever vaccine). Administer an early second dose of MMR to children who reside in or regularly spend time in areas experiencing measles activity. This second dose will meet the school immunization requirement and does not need to be repeated. An early second dose is not part of the vaccine order for Williamsburg and is at the discretion of the parent and healthcare provider.

Vaccination among pregnant persons

26. **Should pregnant persons receive MMR (measles, mumps, rubella) vaccine?**
    - No. MMR vaccines should not be administered to persons known to be pregnant. Because of the theoretical risk to the fetus when the pregnant person receives a live virus vaccine, persons should be counseled to avoid becoming pregnant for 28 days after receipt of MMR vaccine. If the vaccine is inadvertently administered to a pregnant person or a pregnancy occurs within 28 days of vaccination, the person should be counseled about the theoretical risk to the fetus. However, there is no documented risk to the fetus after MMR vaccine. MMR vaccination during pregnancy should not be considered an indication for termination of pregnancy.

27. C**an household contacts of pregnant persons receive MMR?**
    - Yes. According to ACIP recommendations, MMR vaccine can be administered safely to children or other persons without evidence of immunity to measles, mumps, or rubella who have pregnant or immunocompromised household contacts. There is no evidence that the vaccine virus is transmissible.

Vaccination among HCP

28. **Should HCP who received previous MMR vaccination (2 doses) but are known IgG negative receive an additional (third) MMR?**
    - New York City Health Department guidance on this question may be found at: https://www1.nyc.gov/assets/doh/downloads/pdf/imm/measles-letter-immunity-health-workers.pdf
    - Serologic testing is not required or recommended to routinely confirm immunity for HCP who have documentation of having received two doses of live virus measles containing vaccine. However, if titers are checked and the provider is found to be IgG negative, an additional dose of MMR should be administered. No further IgG titers should be checked. If a provider with 2 documented MMR is found to have a negative IgG in the setting of a known measles virus exposure, the New York City Health Department recommends that the HCP be considered non-immune and furloughed for 21 days.
    - HCP with a known exposure to a patient with measles and unknown immunity or negative serology should be evaluated immediately. If the HCP has unknown measles immunity, obtain a stat IgG. HCP with one dose of a measles-containing vaccine or with negative IgG should receive a second MMR vaccine. Post-exposure prophylaxis (PEP) with immune globulin should be administered if indicated according to this guidance. All non-immune HCP exposed to measles should be furloughed, regardless of whether they receive appropriate post-exposure MMR prophylaxis, through 21 days post-exposure, in accordance with ACIP recommendations. Following the 21-day home quarantine period, non-immune HCP should receive MMR vaccine (if not provided earlier as post-exposure prophylaxis). No further IgG titers should be checked.

29. **If HCP with previously documented immunity (described above) have a negative IgG and is exposed to the measles, do they need PEP?**
    - Yes. *In the setting of an outbreak*, HCP with negative IgG should be considered non-immune regardless of previous vaccine history or immunity status. However, checking measles IgG is not required or recommended after 2 documented doses of MMR. Detailed guidance on HCP immunity is available here.
    - These HCP should be offered MMR PEP (if within 72 hours of exposure) and furloughed through the 21-day incubation period.

30. **Should HCP with young children receive an additional dose of MMR vaccine (i.e., beyond the routine, 2-dose vaccine series) pre-emptively?**
    - No. It is not necessary to receive an additional dose of MMR vaccine if the HCP have documented evidence of immunity. See question #25 for the evidence needed to confirm measles immunity.

31. **Do HCP with documentation of vaccination still require serologic evidence of immunity?**
    - No. Serologic testing is not required or recommended to routinely confirm immunity for HCP who have documentation of having received two doses of live virus measles containing vaccine.

32. **What to do with HCP who are vaccinated or immune but exposed to patients with measles?**

- Although PEP is not indicated in these individuals, exposed HCP should be educated about the symptoms of measles and immediately notify their employer if they develop symptoms suggestive of measles.

33. **Are previously vaccinated but now immunocompromised HCP considered at risk for measles?**
    - HCP who are now severely immunocompromised and who are likely to be exposed to measles virus (e.g. they work in an outbreak-affected area) should be transferred to patient care duties that do not involve possible exposure to measles.

Managing high-risk exposures

34. **What options are there for measles post-exposure prophylaxis?**
    - Post-exposure prophylaxis include the MMR vaccine (within 72 hours of initial exposure to someone with measles) or immune globulin (within 6 days of initial exposure).
    - Additional information on post-exposure prophylaxis may be found in this table.

35. **How should we manage pregnant patients with suspected measles near the end of pregnancy?**
    - A pregnant woman with suspected or confirmed measles who requires hospitalization should be promptly placed in an airborne infection isolation room.
    - Report the suspected case to the NYC DOHMH; DOHMH will provide guidance regarding diagnostic testing for mother and baby.
    - The infant should also be placed in airborne isolation pending guidance from NYC DOHMH. The infant may be placed in the same airborne isolation room as the mother.

36. **How should exposed patients without immunity who did not receive MMR within 72 hours be managed? Is home quarantine during the incubation period indicated?**
    - As per the guidance contained in this table, exposed patients who lack immunity but fail to receive post-exposure prophylaxis within the recommended time frame should be placed on home quarantine for 21 days after last exposure

37. H**ow can health care organizations or individual physicians order intramuscular immunoglobulin (IG)?**
    a. Providers can order their own supply directly from manufacturer. Once they set up an account, they could potentially receive IG as soon as 24 hours. Facilities can contact either:
        i. ASD: 1-800 -746- 6273, *or*
        ii. BDIPharma: 1-800-948-9834

38. **There are intramuscular (IM) and intravenous (IV) formulations of immunoglobulin (IG). Are they interchangeable since there is a shortage of IVIG?**
    - IG formulations are for *either* IM or IV administration. They are *not* interchangeable. See the subsequent questions regarding which exposed individuals should receive each formulation.

39. **When should the different formulations (IM vs. IV) of immunoglobulin (IG) be used?**
    - As per the guidance contained in this table, persons aged <12 months should receive the IM formulation of immunoglobulin (IG). All other persons requiring IG (immunocompromised individuals aged ≥12 months and pregnant persons) should receive the IVIG formulation.

40. **Is it possible to mix different brands of immunoglobulin?**
    - No. It is not recommended to mix different brands of IG in one single administration as it might increase the likelihood of hypersensitivity reactions.

41. **What is the guidance we should give to patients who received immunoglobulin after exposure to measles and now need non-emergent medical follow-up (e.g., cancer patients, transplant patients, pregnant women) while still on home quarantine?**
    - Patients observing home quarantine are asked to avoid unnecessary visits to health care settings. If patients must attend a follow-up appointment, the patient should call ahead to let the office know about their recent exposure and be seen in a negative pressure room or be seen at the end of the day after all other patients have left (see question #7).

42. **I am managing PEP for a person exposed to a suspected measles patient whose specimen for IgM testing is hemolyzed but the PCR Is negative. How should this exposed person be managed with respect to post-exposure prophylaxis?**
    - If PCR is negative, the patient is unlikely to have measles. You can give the exposed person MMR, if there are no contraindications to vaccination.
    - PEP with immune globulin is not generally recommended until the diagnosis of measles in the index patient is confirmed.