Chicago Department of Public Health

Health Alert

City of Chicago
Rahm Emanuel, Mayor

Immunization Program

Chicago Department of Public Health
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Measles Post-exposure Guidelines

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To: Infection Control Professionals, Infectious Disease Physicians, Emergency Departments, Laboratories, and Health Care Providers and Clinics

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Subject: **Measles Post-exposure Prophylaxis and Precautions**

Background

Measles infections have been detected in several states throughout the country since December 2014; nearly all are associated with an ongoing measles outbreak linked to an amusement park in California. Illinois has recently confirmed several cases of measles this year in suburban Cook County. Currently, there is no evidence to suggest linkage to the ongoing outbreak in California. Healthcare providers should be aware of the potential for measles cases at their facility and the proper measles testing and isolation procedures.

Measles

Measles is a highly contagious respiratory disease caused by a virus, transmitted by direct contact with infectious droplets or by airborne spread when an infected person breathes, coughs, or sneezes. Measles virus can remain infectious on surfaces and in the air for up to two hours after an infected person leaves an area.

Post-exposure Prophylaxis

People exposed to measles who cannot readily show that they have evidence of immunity** against measles should be offered post-exposure prophylaxis (PEP) or be excluded from the setting (school, hospital, childcare, etc.) MMR vaccine, if administered within 72 hours of initial measles exposure, or immunoglobulin (IG), if administered within six days of exposure, may provide some protection or modify the clinical course of disease.

MMR vaccine as post-exposure prophylaxis

If MMR vaccine is not administered within 72 hours of exposures as PEP, MMR should still be offered at any interval following exposure to the disease in order to offer protection from future exposures. People who receive MMR vaccine or IG as PEP should be monitored for signs and symptoms consistent with measles for at least one incubation period.

Except in healthcare settings, unvaccinated people who receive their first dose of MMR vaccine within 72 hours after exposure may return to childcare, school or work. Children vaccinated before their first birthday should be revaccinated when they are 12-15 months old and again when they are 4-6 years old.

Immune globulin (IG) as post-exposure prophylaxis

People who are at risk for severe illness and complications from measles, such as infants younger than 12 months of age, pregnant women without evidence of measles immunity, and people with severely compromised immune systems, should receive IG. Intramuscular IG (IGIM) should be given to all infants younger than 12 months of age who have been exposed to measles. For infants aged 6 through 11 months, MMR vaccine can be given in place of IG, if administered within 72 hours of exposure. Because pregnant women might be at higher risk for severe measles and complications, intravenous IG (IGIV) should be administered to pregnant

women without evidence of measles immunity who have been exposed to measles. People with severely compromised immune systems who are exposed to measles should receive IGIV regardless of immunologic or vaccination status because they might not be protected by MMR vaccine.

After receipt of IG, people cannot return to healthcare settings. In other settings, health care providers should work with the Chicago Department of Public Health to determine if the individual can return to childcare, school, work, etc.

Please see attached immune globulin guidelines from IDPH for details.

Post-exposure prophylaxis for healthcare personnel

If a healthcare provider without evidence of immunity is exposed to measles, MMR vaccine should be given within 72 hours, or IG should be given within 6 days when available. Exclude healthcare personnel without evidence of immunity from duty from day 5 after first exposure to day 21 after last exposure, regardless of post-exposure prophylaxis.

Healthcare Personnel Vaccination Recommendations

All persons who work in health-care facilities should have presumptive evidence of immunity to measles. This information should be documented and readily available at the work location. Presumptive evidence of immunity to measles for persons who work in health-care facilities includes any of the following:

- Written documentation of vaccination with 2 doses of live measles or MMR vaccine administered at least 28 days apart
- Laboratory evidence of immunity (titer),
- Laboratory confirmation of disease, or
- Birth before 1957*

*Although birth before 1957 is considered as presumptive evidence of immunity, for unvaccinated HCP born before 1957 that lack laboratory evidence of measles immunity or laboratory confirmation of disease, health care facilities should consider vaccinating personnel with two doses of MMR vaccine at the appropriate interval.

Measles Vaccination:

The best prevention for measles is vaccination; current CDC and ACIP guidelines for vaccination are as follows:

1. Administer a 2-dose series of MMR vaccine at ages 12-15 months and 4-6 years. The second dose may be administered before age 4 years, provided at least 28 days have elapsed after the first dose.
2. For those who travel abroad, CDC recommends that all U.S. residents older than 6 months be protected from measles and receive MMR vaccine, if needed, prior to departure.
    a. Infants 6 through 11 months old should receive 1 dose of MMR vaccine before departure.
    b. Children 12 months of age or older should have documentation of 2 doses of MMR vaccine (separated by at least 28 days).
    c. Teenagers and adults without evidence of measles immunity, should have documentation of appropriately spaced doses of MMR vaccine.
3. Infants who receive a dose of MMR vaccine before their first birthday should receive 2 more doses of MMR vaccine, the first of which should be administered when the child is 12 through 15 months of age and the second at least 28 days later.

Additional Resources

For more information, including guidelines for patient evaluation, diagnosis and management, visit:
http://www.cdc.gov/measles/hcp/
For additional infection control information, please see the CDC “Guideline for Isolation Precautions” at:
http://www.cdc.gov/hicpac/2007IP/2007isolationPrecautions.html
For more information on healthcare personnel vaccination recommendations, visit:
http://www.cdc.gov/mmwr/pdf/rr/rr6007.pdf
For more information on measles post-exposure prophylaxis, visit:
http://www.cdc.gov/measles/hcp/

IMMUNE GLOBULIN (IG) FOR THE PROPHYLAXIS OF MEASLES
Updated February 2015

1.BACKGROUND

If administered within 6 days of exposure, IG can prevent or modify measles in persons who are nonimmune. IG is not indicated for persons who have received 1 dose of measles-containing vaccine at age ≥12 months, unless they are severely immunocompromised (see below). IG should not be used to control measles outbreaks, but rather to reduce the risk for infection and complications in the person receiving it. IG has not been shown to prevent rubella or mumps infection after exposure and is not recommended for that purpose.

Any nonimmune person exposed to measles who received IG should subsequently receive MMR vaccine, which should be administered no earlier than 6 months after IGIM administration or 8 months after IGIV administration, provided the person is then aged ≥12 months and the vaccine is not otherwise contraindicated.

Recommended Dose of Immune Globulin for Postexposure Prophylaxis

The recommended dose of IG administered intramuscularly (IGIM) is 0.5 mL/kg of body weight (maximum dose = 15 mL) and the recommended dose of IG given intravenously (IGIV) is 400 mg/kg.

Recommendations for Use of Immune Globulin for Postexposure Prophylaxis

The following patient groups are at risk for severe disease and complications from measles and should receive IG: infants aged <12 months, pregnant women without evidence of measles immunity, and severely immunocompromised persons. IGIM can be administered to other persons who do not have evidence of measles immunity, but priority should be given to persons exposed in settings with intense, prolonged, close contact (e.g., household, daycare, and classroom). For exposed persons without evidence of measles immunity, a rapid IgG antibody test can be used to inform immune status, provided that administration of IG is not delayed.

***Infants aged <12 months*. Because infants are at higher risk for severe measles and complications, and infants are susceptible to measles if mothers are nonimmune or their maternal antibodies to measles have waned (*337*), IGIM should be administered to all infants aged <12 months who have been exposed to measles. Note: for infants aged 6 through 11 months, MMR vaccine can be administered in place of IG if administered within 72 hours of exposure.**

***Pregnant women without evidence of measles immunity*.** Because pregnant women might be at higher risk for severe measles and complications (*20*), IGIV should be administered to pregnant women without evidence of measles immunity who have been exposed to measles. IGIV is recommended to administer doses high enough to achieve estimated protective levels of measles antibody titers.

Immunocompromised patients. Severely immunocompromised patients who are exposed to measles should receive IGIV prophylaxis regardless of immunologic or vaccination status because they might not be protected by the vaccine. Severely immunocompromised patients include: patients with severe primary immunodeficiency; patients who have received a bone marrow transplant until at least 12 months after finishing all immunosuppressive treatment, or longer in patients who have developed graft-versus-host disease; patients on treatment for ALL within and until at least 6 months after completion of immunosuppressive chemotherapy; and patients with a diagnosis of AIDS or HIV-infected persons with severe immunosuppression defined as CD4 percent <15% (all ages) or CD4 count <200 lymphocytes/mm3 (aged >5 years) and those who have not received MMR vaccine since receiving effective ART. Some experts include HIV-infected persons who lack recent confirmation of immunologic status or measles immunity.

For persons already receiving IGIV therapy, administration of at least 400 mg/kg body weight within 3 weeks before measles exposure should be sufficient to prevent measles infection. For patients receiving subcutaneous immune globulin (IGSC) therapy, administration of at least 200 mg/kg body weight for 2 consecutive weeks before measles exposure should be sufficient.

2. ORDERING IMMUNOGLOBULIN:

1. Screen for contraindications.
2. Provide product information, answering questions.
3. Give immune globulin (IG) intramuscularly (IM) to children and adults with a 1 to 2 inch needle, depending on recipient's weight.
4. Select a large muscle mass that can support the administration of a large volume of IG.
    a. For children <3 years of age, administer IG into the vastus lateralis (outer thigh) muscle with a 7/8 to-1 inch needle. For certain very small infants a 5/8 inch needle may be adequate.
    b. For persons ≥3 years of age, administer IG into the ventrogluteal or dorsogluteal muscle with a 1-2 inch needle.
    c. For adults with sufficient deltoid muscle mass, the deltoid muscle may be used.
5. Use formulation and dosage according to recipient's weight. (Section 3.)
6. Do not administer more than 3 ml of IG per injection site in children or more than 5 ml of IG per injection site in adults.
7. IG and measles vaccine should not be given at the same time. See attached for

information about suggested intervals between IG and measles vaccine.

10. IG can be administered simultaneously with, or at any interval before or after, any inactivated vaccine.

Note: Measles vaccine is the biologic of choice if given within 72 hours of exposure. For persons in whom vaccine is contraindicated or more than 72 hours passed, and they are still within 6 days of exposure, immune globulin should be used.

3. IMMUNE GLOBULIN DOSE SCHEDULE FOR MEASLES EXPOSURE[1,2,3,4]

Indications	Dose
Standard immunocompetent Contact ≥ 12 months	0.5 ml/kg (max dose 15mL) IM
Infants <12months[5]	0.5 ml/kg IM (max dose = 15mL)
Pregnant women without evidence of immunity	400 mg/kg IV (intravenously)
Severely immunocompromised persons[6]	400 mg/kg IV (intravenously) IVIG

1 IG should be administered at room temperature and within 6 days of exposure.

2 IG should only be administered to susceptible children and adults. Note that most infants (>90%) in the United States still have some protection from circulating maternal antibodies through their 5th month of life. (An exception is infants <5 months whose mothers develop measles; indicating that she has little or no antibody against measles.) **Nevertheless, IGIM should be administered to all infants aged <12 months who have been exposed to measles.** For infants aged 6 through 11 months, MMR vaccine can be administered in place of IG if administered within 72 hours of exposure.

3 IGIM can be given to any person who lacks evidence of measles immunity, but priority should be given to persons exposed in settings with intense, prolonged, close contact (e.g., household, childcare, classroom, etc.).

4 The maximum dose is 15 ml intramuscularly for all persons.

5 Note that MMR vaccines can be given to infants' age 6–11 months for international travel.

6 Severely immunocompromised patients include patients with severe primary immunodeficiency; patients who have received a bone marrow or stem cell transplant until at least 12 months after finishing all immunosuppressive treatment, or longer where the patient has developed graft-versus-host disease; patients on treatment for Acute Lymphocytic Leukemia; until at least six months after completion of immunosuppressive chemotherapy; and patients with a diagnosis of AIDS or HIV-infected persons with CD4 percent <15% (all ages) or CD4 <200 lymphocytes /mm3 (age >5 years) and those who have not received MMR vaccine since receiving effective anti- retroviral therapy; some experts would include HIV infected persons who lack recent confirmation of immunologic status or measles immunity.

4. CONTRAINDICATIONS:

1. IG should not be given to people with immunoglobulin A (IgA) deficiency. Persons with IgA deficiencies have the potential for developing antibodies to IgA and therefore could experience an anaphylactic reaction when IG is administered
2. IG should not be administered to persons with severe thrombocytopenia or any coagulating disorder that would contraindicate intramuscular injections.
3. History of anaphylactic reaction to a previous dose of IG.

5. PRECAUTIONS:

1. Pregnancy: It is unknown whether IG can cause fetal harm when administered to a pregnant woman or if it could affect reproduction.(Pregnancy Category C)
2. Careful administration in persons reporting a history of systemic allergic reaction following the administration of IG.

6. SIDE EFFECTS AND ADVERSE REACTIONS:

Event	**Frequency**
Tenderness, pain, or soreness at injection site. Usually resolves within 24 hours.	Common

7. OTHER CONSIDERATIONS:

A. IG may interfere with the response to live, attenuated vaccines (e.g. MMR, varicella) when the vaccines are administered individually or as a combined vaccine. Delay administration of live attenuated vaccines for 5 months after the administration of IG. (See attached ACIP recommendations.)

B. Ideally, IG should not be administered within 2 weeks following the administration of MMR or for 3 weeks following varicella vaccine. Should this occur, the individual should be revaccinated, but no sooner than 5 months after IG administration.

C. For individuals currently on immune globulin intravenous therapy (IGIV), the dose of 100 to 400 mg/kg should be sufficient prophylaxis for exposures occurring in the three weeks following treatment.

D. In the event of a community outbreak, the age at which the first measles vaccine is recommended may be as low as 6 months. These infants, however, will still need a dose of MMR at or after 12 months of age and a third dose at school entry, 4 to 6 years of age.

VII. REFERENCES:

1. CDC. ACIP Recommendations for prevention of measles, rubella, congenital rubella syndrome (CRS), and mumps, 2013. Available at http://www.cdc.gov/mmwr/pdf/rr/rr6204.pdf
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3. CDC. Manual for Prevention of Vaccine-Preventable Diseases, 2008. Available at: http://www.cdc.gov/vaccines/pubs/surv-manual/chpt07-measles.html
4. American Academy of Pediatrics. Measles. In: Pickering LK, Baker CJ, Long SS, McMillan JA, eds. Red Book: 2012 Report of the Committee on Infectious Diseases. 28th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2012. Available at: http://aapredbook.aappublications.org/
5. Greenway K. Using the ventrogluteal site for intramuscular injection. Nurse Stand 2004; 18:39–42.
6. Nicholl LH & Hesby A. Intramuscular injection: an integrative research review and guideline for evidence-based practice. Appl Nurs Res 2002;15:149-62.
7. GamaSTAN® Immune Globulin package insert. Available at: www.talecris-pi.info/inserts/gamastans-d.pdf

Recommended intervals between administration of **immune globulin preparations** and **measles-** or **varicella-containing vaccine**

Product / Indication	Dose, including mg immunoglobulin G (IgG)/kg body weight	Recommended interval before measles or varicella-containing[1] vaccine administration
Botulinum Immune Globulin Intravenous (Human)	1.5 mL/kg (75 mg IgG/kg) IV	6 months
Tetanus IG (TIG)	250 units (10 mg IgG/kg) IM	3 months
Hepatitis A IG		
- Contact prophylaxis	0.02 mL/kg (3.3 mg IgG/kg) IM	3 months
- International travel	0.06 mL/kg (10 mg IgG/kg) IM	3 months
Hepatitis B IG (HBIG)	0.06 mL/kg (10 mg IgG/kg) IM	3 months
Rabies IG (RIG)	20 IU/kg (22 mg IgG/kg) IM	4 months
Varicella IG	125 units/10 kg (60-200 mg IgG/kg) IM, maximum 625 units	5 months
Measles prophylaxis IG		
- Standard (i.e., nonimmunocompromised) contact	0.25 mL/kg (40 mg IgG/kg) IM	5 months
- Immunocompromised contact	0.5 mL/kg (80 mg IgG/kg) IM	6 months
Blood transfusion		
- Red blood cells (RBCs), washed	10 mL/kg (negligible IgG/kg) IV	None
- RBCs, adenine-saline added	10 mL/kg (10 mg IgG/kg) IV	3 months
- Packed RBCs (hematocrit 65%)[2]	10 mL/kg (60 mg IgG/kg) IV	6 months
- Whole blood (hematocrit 35%-50%)[2]	10 mL/kg (80-100 mg IgG/kg) IV	6 months
- Plasma/platelet products	10 mL/kg (160 mg IgG/kg) IV	7 months
Cytomegalovirus IGIV	150 mg/kg maximum	6 months
IGIV		
- Replacement therapy for immune deficiencies[3]	300-400 mg/kg IV	8 months
- Immune thrombocytopenic purpura treatment	400 mg/kg IV	8 months
- Immune thrombocytopenic purpura treatment	1,000 mg/kg IV	10 months
- Kawasaki disease	2 g/kg IV	11 months
- Postexposure varicella prophylaxis[4]	400 mg/kg IV	8 months
Monoclonal antibody to respiratory syncytial virus F protein (Synagis™)[5]	15 mg/kg (IM)	None

This table is not intended for determining the correct indications and dosages for using antibody-containing products. Unvaccinated persons might not be fully protected against measles during the entire recommended interval, and additional doses of IG or measles vaccine might be indicated after measles exposure. Concentrations of measles antibody in an IG preparation can vary by manufacturer's lot. Rates of antibody clearance after receipt of an IG preparation also might vary. Recommended intervals are extrapolated from an estimated half-life of 30 days for passively acquired antibody and an observed interference with the immune response to measles vaccine for 5 months after a dose of 80 mg IgG/kg.

1 Does not include zoster vaccine. Zoster vaccine may be given with antibody-containing blood products.

2 Assumes a serum IgG concentration of 16 mg/mL.

3 Measles and varicella vaccinations are recommended for children with asymptomatic or mildly symptomatic human immunodeficiency virus (HIV) infection, but are contraindicated for persons with severe immunosuppression from HIV or any other immunosuppressive disorder.

4 The investigational product VariZIG, similar to licensed VZIG, is a purified human IG preparation made from plasma containing high levels of anti-varicella antibodies (IgG). The interval between VariZIG and varicella vaccine (Var or MMRV) is 5 months.

5 Contains antibody only to respiratory syncytial virus

Adapted from Table 5, ACIP General Recommendations on Immunization

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