Measles Post-Exposure Prophylaxis (PEP)

Background

Evidence of Measles Immunity

Persons who have documentation of adequate vaccination for measles at age ≥12 months, laboratory evidence of measles immunity, laboratory confirmation of disease, or were born before 1957 have acceptable presumptive evidence of measles immunity. Adequate vaccination for measles for preschool-aged children (i.e., aged ≥12 months) and adults not at high risk for exposure or transmission is documentation of vaccination with at least one dose of live measles-containing vaccine. For school-aged children in kindergarten through grade 12, students at post-high school educational institutions, healthcare personnel, and international travelers, adequate vaccination for measles is documentation of vaccination with two doses of live measles-containing vaccine separated by at least 28 days. Adequate vaccination for measles for infants aged 6 through 11 months before international travel is one dose of live measles-containing vaccine.

Persons who have measles-specific IgG antibody detectable by any commonly used serologic assay are considered to have adequate laboratory evidence of measles immunity. Persons with an equivocal serologic test result do not have adequate presumptive evidence of immunity and should be considered susceptible, unless they have other evidence of measles immunity or subsequent testing indicates measles immunity.

Postexposure Prophylaxis

Postexposure Prophylaxis with MMR Vaccine

MMR vaccine, if administered within 72 hours of initial measles exposure, might provide some protection or modify the clinical course of measles. For vaccine eligible persons aged ≥6 months exposed to measles, administration of MMR vaccine is preferable to using immune globulin (IG), if administered within 72 hours of initial exposure. If exposure does not cause infection, postexposure vaccination should induce protection against subsequent exposures. If exposure results in infection, no evidence indicates that administration of MMR vaccine during the presymptomatic or prodromal stage of illness increases the risk for vaccine-associated adverse events. Except in healthcare settings, unvaccinated persons who receive their first dose of MMR vaccine within 72 hours post exposure may return to child care, school or work.

Postexposure Prophylaxis with Immune Globulin (IG)

If administered within six days of exposure, IG can prevent or modify measles in persons who are without presumptive evidence of immunity. IG is not indicated for persons who have received one dose of measles-containing vaccine at age ≥12 months, unless they are severely immunocompromised (as defined later in this report in the subsection titled Immunocompromised patients). IG should not be used to control measles outbreaks, but rather to reduce the risk of infection and complications in the person receiving it. (See: **Immune Globulin for Measles Post-Exposure Prophylaxis**)

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.

Infants aged <12 months.

Infants are at higher risk for severe measles and complications. Infants are susceptible to measles if mothers do not have presumptive evidence of immunity or their maternal antibodies to measles have waned. IGIM should be administered to all infants aged <12 months who have been exposed to measles.

Pregnant women without evidence of measles immunity.

Because pregnant women might be at higher risk for severe measles and complications, 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 Acute Lymphoblastic Leukemia (ALL) within and until at least six months after completion of immunosuppressive chemotherapy; and patients with a diagnosis of AIDS or persons living with HIV with severe immunosuppression defined as CD4 percent <15% (all ages) or CD4 count <200 lymphocytes/mm^3 (aged >5 years) and those who have not received MMR vaccine since receiving effective antiretroviral therapy (ART). Some experts include persons living with HIV 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 three 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 two consecutive weeks before measles exposure should be sufficient.

Immune Globulin Recommendations

Immune globulin (IG) may prevent or modify disease and provide temporary protection if given within 6 days of exposure. Any person without presumptive evidence of immunity exposed to measles who received IG PEP should subsequently receive MMR vaccine. MMR vaccine should be administered no earlier than six months after IGIM or eight months after IGIV, provided the person is then ≥12 months of age and the vaccine is not otherwise contraindicated.

Immune Globulin Recommendations, continued

- The recommended dose of IG given intramuscularly is 0.5 mL/kg of body weight (maximum dose = 15 mL). A weight of 30kg (66lbs) equates to the maximum dose of 15mL. Individuals who are at risk for severe disease and complications from measles (e.g., infants <12 months of age, pregnant women without evidence of measles immunity, and severely immunocompromised persons regardless of vaccination status because they might not be protected by the vaccine) should receive IG. IG administered intramuscularly (IGIM) is recommended for infants <12 months of age, and IG administered intravenously (IGIV) for severely immunocompromised persons and pregnant women who are exposed to measles. The dose of IGIV is 400mg/kg. GAMMAGARD is provided in 300 mL (30g) vials. (See **GAMMAGARD package insert**)
- For infants aged 6 through 11 months, MMR vaccine can be administered in place of IG if administered within 72 hours of exposure. IGIM can be given 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, classroom). However, postexposure use of IGIM might be limited because of volume limitations; persons who weigh >30 kg will receive less than the recommended dose and will have lower titers than recommended. IG should not be used to control measles outbreaks.

Immune globulin (Human) (GamaSTAN) is a sterile solution of immune globulin for intramuscular administration. It is supplied in 10 mL single dose vials that are preservative-free and latex-free. GamaSTAN should be stored at 2-8° C (36-46° F) before use. (See **GamaSTAN package insert**)

Immune Globulin Administration

Immune Globulin IM (IGIM) Administration

- IG is administered intramuscularly, preferably in the vastus lateralis and the deltoid muscles. The gluteal region should not be used routinely as an injection site because of the risk of injury to the sciatic nerve.
- Doses over 10mL should be divided and injected into several muscle sites to reduce local pain and discomfort. An individual decision as to which muscle is injected must be made for each patient based on the volume of material to be administered. If the gluteal region is used when very large volumes are to be injected or multiple doses are necessary, the central region MUST be avoided; only the upper, outer quadrant should be used.
- Suggested volumes:

Deltoid:	Average 0.5 mL	Range 0.5 - 2 mL
Vastus Lateralis:	Average 1 - 4 mL	Range 1 - 5 mL

- Pediatric populations: limit to <3mL per injection site.

Immune Globulin IV (IGIV) Administration

- IGIV is recommended for severely immunocompromised persons and pregnant women who are exposed to measles.
- Immune globulin (Human) (GAMMAGARD) is a sterile solution of immune **globulin for intravenous infusion. It can be stored refrigerated** 2-8º C (36-46º F) for up to 36 months before use or at room temperature up to 25°C [77°F] for up to 24 months. Expiration dates are printed on the outer carton and vial label. Do not use beyond expiration dates.
- The dose of IGIV is 400mg/kg. Reference the **GAMMAGARD package insert** for infusion rates and detailed IV administration guidance.

Sources

- **Prevention of Measles, Rubella, Congenital Rubella Syndrome and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP). June 14, 2013.**
- **General Recommendations on Immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP). January 28, 2011.**
- **Epidemiology and Prevention of Vaccine-Preventable Diseases- PinkBook - Measles Chapter**
- **Chapter 7: Measles | Manual for the Surveillance of Vaccine-Preventable Diseases | CDC**

Post Exposure Prophylaxis (PEP) for Asymptomatic Persons Exposed to Measles:
Recommendations by Age, Health Status and Levels of Measles Immunity

Age or Health Status Category	Measles Immune Status	Time from First Exposure[1]		
		≤72 hours	>72 hours–6 days	>6 days
All ages	Immune[2]	▪ 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[5]	Non-immune	▪ Give IGIM[3] ▪ Quarantine for 21 days after last exposure and monitor for symptoms for 28 days		▪ PEP not indicated (too late) ▪ Quarantine and monitor for symptoms for 21 days after last exposure
6–11 months, not severely immunocompromised[5]	Non-immune	▪ Give MMR[4] vaccine ▪ If vaccinated: no quarantine or exclusion from congregate settings needed. Monitor for symptoms for 21 days after last exposure	▪ Give IGIM[3] ▪ Quarantine for 21 days 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[5]	Non-immune (0 doses MMR vaccine or IgG negative)	▪ Give 1st MMR[4] vaccine dose ▪ Persons who receive their first dose of MMR vaccine within 72 hours post exposure may return to child care, school or work. **Healthcare worker restriction:** ▪ Give 1st MMR[4] vaccine dose ▪ 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	▪ Consider giving IGIM[3] if <66 lbs or IGIV[3] and quarantine for 21 days and monitor for symptoms for 28 days after last exposure. ▪ Otherwise, PEP is 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

Age or Health Status Category	Measles Immune Status	Time from First Exposure[1]		
		≤72 hours	**>72 hours–6 days**	**>6 days**
≥12 months, not pregnant, not severely immunocompromised[5]	1 dose of MMR vaccine	▪ Give 2nd MMR[4] vaccine dose if at least 28 days since first dose ▪ No quarantine or exclusion from work/ congregate setting needed if vaccinated in time ▪ Monitor for symptoms for 21 days after last exposure	▪ PEP not indicated ▪ No quarantine or exclusion from work/congregate setting needed ▪ Monitor for symptoms for 21 days after last exposure	▪ 1 dose of MMR vaccine
≥12 months, not pregnant, not severely immunocompromised[5]	Unknown immune status	▪ Give MMR[4] 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	▪ Consider giving IGIM[3] if <66 lbs or IGIV[3] and quarantine for 21 days and monitor for symptoms for 28 days after last exposure ▪ PEP otherwise 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[2]	▪ 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 IGIV[3] ▪ Quarantine for 21 days 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 IGIV[3] and quarantine for 21 days and monitor for symptoms for 28 days after last exposure ▪ If IgG positive: PEP not indicated. No quarantine or exclusion from work/ congregate setting 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[5]	Any	▪ Give IGIV[3] (preferred); IGIM[3] is an option if <12 months ▪ Quarantine for 21 days 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

Footnotes

[1]**Exposed** - Household or other close contact, persons in the same congregate setting (e.g., school classroom), or anyone who shared air space with a confirmed case within 2 hours of the person known or suspected to have measles leaving a room.

- All exposed persons should self-monitor for **signs and symptoms of measles.**
- Quarantine or self-quarantine means to stay home and away from others. It includes not going to school, work, or public spaces and not using public transportation.
- After receipt of IG, individuals should self-quarantine at home for 21 days after the last exposure to measles and self-monitor for symptoms of measles for an additional seven days (total of 28 days after exposure). This is because IG potentially prolongs the incubation period. Persons who continue to be exempted from or who refuse measles vaccination should be excluded from the school, child care, or other institutions until 21 days after last contact with any case of measles.

[2]**Immune** - Meets presumptive evidence of immunity criteria for exposed persons, as defined below.

Presumptive Evidence of Immunity for Exposed Persons who Do Not Work in a Healthcare Setting

Acceptable presumptive evidence of measles immunity includes at least one of the following:

- Written documentation of adequate vaccination- receipt of one or more doses of a measles-containing vaccine administered on or after the first birthday for children 12 months through preschool-age and adults not at high risk, and two doses of measles-containing vaccine for school-age children and adults at high risk for exposure transmission (i.e., health care personnel, international travelers, and students at post-high school educational institutions); or
- Laboratory evidence of immunity; or
- Birth before 1957; or
- Laboratory confirmation of disease.

Persons who do not meet the above criteria are considered susceptible and should be vaccinated unless contraindicated.

Presumptive Evidence of Immunity for Exposed Persons who Work in a Healthcare Setting (including volunteers, trainees, nurses, physicians, technicians, receptionists, and other clerical and support staff)

Presumptive evidence of immunity to measles for health care personnel includes any of the following.

- Written documentation of vaccination with 2 doses of live measles or MMR vaccine administered at least 28 days apart, or
- Laboratory evidence of immunity, or
- Laboratory confirmation of disease.

Source: **CDC Vaccine Preventable Diseases Surveillance Manual (Chapter 7: Measles)**

[3]**Immunoglobulin** (IG) - Use of IG is prioritized for infants, susceptible pregnant women, and severely immunocompromised persons. It is not indicated for persons who have received one or more doses of measles-containing vaccine at age 12 months or older, unless they are severely immunocompromised.

- Doses – intramuscular (IGIM) = 0.5 mL/kg. Maximum dose 15 mL. Give measles vaccine 6 months after IGIM as long as at least 12 months of age and not contraindicated. For dosing information, refer to the GamaSTAN package insert.
- Doses – intravenous (IGIV) = 400 mg/kg. Give measles vaccine 8 months after IGIV as long as at least 12 months of age and not contraindicated. For dosing information, refer to the GamaGUARD package insert.

[4]**MMR** - measles, mumps, rubella vaccine. For dosing information, refer to the MMR II package insert, Priorix package insert and MMRV package insert.

[5]**Severely immunocompromised** persons includes:

- Patients with severe primary immunodeficiency;
- Patients who have received a hematopoietic stem cell transplant, until at least 12 months after finishing all immunosuppressive treatment or longer in patients who have developed graft- versus-host disease;
- Patients undergoing treatment for acute lymphoblastic leukemia, within and until at least 6 months after completion of immunosuppressive chemotherapy;
- People who have received a solid organ transplant;
- People with human immunodeficiency virus (HIV) infection who have severe immunosuppression; and
- Patients younger than 12 months whose mothers received biologic response modifiers during pregnancy.

Source: Red Book: 2021 Report of the Committee on Infectious Diseases, 32nd Edition, American Academy of Pediatrics. https://ebooks.aappublications.org/content/red-book-2021