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Measles FAQs

Measles is a rare, extremely contagious, and serious disease.[1] Measles can lead to severe complications including pneumonia, encephalitis, and even death.[12] Vaccination with a measles-containing vaccine effectively prevents the measles (e.g., 93% effective [one dose]; 97% effective [two doses]) and provides lifelong immunity.[1,10] However, 90% of nonimmune people exposed will get the measles. Measles outbreaks have been on the rise over the last few years.[1] Outbreaks usually occur after exposure during travel to parts of the world where measles is more common (e.g., Africa, Asia, Europe) and then spread among nonimmune people.[1] See our chart, *Mumps FAQs*, for answers about mumps, including what to do during an outbreak. See our conversation starter, *Vaccine Adherence: Addressing Myths and Hesitancy*, for talking points to encourage vaccination. The chart below answers questions about measles vaccination, outbreaks, and management.

Abbreviations: HIV = human immunodeficiency virus; MMR = measles, mumps, and rubella; MMRV = measles, mumps, rubella, and varicella.

Topic/Clinical Question	Answer/Pertinent Information
When should children receive a measles-containing vaccine?	• Available measles, mumps, and rubella (MMR) live vaccines include ***M-M-R II*** and ***Priorix*** (Canada).[5,14,17] o Initial dose is recommended between the ages of 12 and 15 months old.[3,16] o A second dose is recommended before starting school, usually between the ages of four and six years old (at 18 months of age or after, but before school entry [Canada]).[3,16] o The second dose can be given as soon as four weeks after the first dose if necessary (e.g., catch-up vaccinations).[3,16] o Children may receive the first dose as young as six months old before international travel or travel to endemic or outbreak areas. If the first dose is given before 12 months old, three doses are recommended, due to limited efficacy data.[3,16] ▪ A second dose may be given as soon as four weeks after the first dose, but is recommended between the ages of 12 to 15 months old (given after 12 months of age [Canada]).[3,16] ▪ The third dose may be given as early as four weeks after the second dose.[3,16] • Available measles, mumps, rubella, and varicella (MMRV) live vaccines include ***ProQuad*** and ***Priorix-Tetra*** (Canada).[6,15,18] o Initial dose is recommended between the ages of 12 and 15 months old.[6,15,18,19] o A second dose is recommended before starting elementary school, usually between four and six years old (at 18 months of age or after, but before school entry [Canada]).[6,15,18,19] o Ensure ≥1 month has elapsed if a patient received a prior dose of a measles-containing vaccine (e.g., MMR).[6,15] o Ensure ≥3 months has elapsed if a patient received a prior dose of a varicella-containing vaccine (e.g., *Varivax* [U.S.]*; Varilrix, Varivax III* [Canada]).[6,19] o Doses given to children 12 to 23 months old not previously vaccinated against measles, mumps, rubella, or varicella, nor with a history of the wild-type infection, are associated with a higher rate of fever and febrile seizures five to 12 days after vaccination compared to MMR and a varicella vaccine given separately.[6,15,18]

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Topic/Clinical Question	Answer/Pertinent Information

Which adults need a measles-containing vaccine?	• ***M-M-R II*** or ***Priorix***[5,14,17]
	  o Adults (≥19 years old and born in 1957 or later [U.S.]; ≥18 years and born in 1970 or later [Canada]) without evidence of immunity and not previously vaccinated should receive one dose of MMR.[2,4,16] Two doses separated by at least 28 days are appropriate for:[2,4,16]
	  ▪ Healthcare professionals born in 1957 or later (regardless of year of birth [Canada])
	  ▪ Household contacts of immunocompromised persons
	  ▪ International travelers (born in 1970 or later [Canada])
	  ▪ Military personnel regardless of year of birth (Canada)
	  ▪ Patients who have HIV **without severe immunosuppression** (U.S. [e.g., CD4 ≥200 cells/mcL for ≥6 months])
	  ▪ Students attending college or university (born in or after 1970 [Canada])
	• MMRV vaccines (*Priorix-Tetra, ProQuad*) are not indicated for children older than 12 years old.[6,15,18]

Can patients with an egg allergy safely receive a measles-containing vaccine?	• The measles component of the vaccine is developed in chick embryo cell cultures.[8,16]
	• An egg allergy is NOT a contraindication to receiving MMR.[7,8,16]
	  o The risk of developing a severe allergic reaction due to egg allergy is extremely low.[7,8]
	  o Most serious allergic reactions are thought to be due to vaccine components other than egg antigens.[7,8]
	• Skin testing is not required prior to giving a measles-containing vaccine to patients with an egg allergy.[8,16]

Who should NOT receive a measles-containing vaccine?	The following patients should NOT receive a measles-containing vaccine:
	• Patients with a documented history of anaphylaxis to neomycin.[8]
	  o Contact dermatitis from neomycin is not a contraindication to receiving a measles-containing vaccine.[8]
	• Patients with a history of a severe allergic reaction to any component of the vaccine.[8,16]
	• Immunosuppressed patients[8,20]
	• Pregnant women
	  o CDC and some product labeling recommend that women should avoid pregnancy for at least 28 days (MMR) or one month (MMRV, *Priorix*, *Priorix-Tetra*) after receiving the vaccine, due to theoretical risk for fetal abnormalities.[8,9,17,18] Product labeling for *M-M-R II* and *ProQuad* recommend delaying pregnancy for at least three months after vaccination.[5,6,14,15]
	  o Either vaccine (MMR or MMRV) can be safely given to women who are breastfeeding or household contacts of pregnant women.[8,9,16,19]

More. . .

Topic/Clinical Question	Answer/Pertinent Information

What are signs and symptoms of measles?	• Symptoms of measles usually start about one to two weeks after exposure.[1,21]
	• Common signs and symptoms usually begin with high fever (≥101° F [38.3° C]), rash, and the **three C's**:[1,11,21]
	  o Cough
	  o Coryza (runny nose)
	  o Conjunctivitis or "pink eye" (red, watery eyes)
	• **Rash** develops (about four days after the three C's), usually starting on the face.[1,21]
	  o Rash begins as flat red spots (sometimes with small raised bumps).[1]
	  o Over time, the red spots join together and the rash spreads over the whole body.[1]
	• **Koplik spots** (tiny white spots) may appear inside the mouth, beginning a couple of days before or after the development of the rash.[1,11,21]

How should patients with measles be managed?	• Report all confirmed and suspected cases of measles to local public health officials (e.g., health department) as soon as possible (e.g., within 24 hours).[1,21]
	• Patients with the measles are considered contagious for about **four days before and four days after** the rash appears.[11,21]
	  o Patients should stay home and avoid contact with others (especially those who have not been vaccinated) for four days after appearance of the rash.[1]
	• Healthcare professionals should follow airborne respiratory precautions when interacting with patients who have measles.[1]
	  o If possible, hospitalized patients who have measles should be put in **respiratory isolation** rooms.[1]
	• There is no specific treatment for measles. Management of measles focuses on symptoms and managing complications.[1,21]
	  o Patients can use acetaminophen or nonsteroidal anti-inflammatory drugs to reduce fever.[13]
	  o Antibiotics may be appropriate for some complications (e.g., bacterial pneumonia).[13]
	  o **Vitamin A (oral)** can be given to hospitalized children with measles, especially if younger than 2 years old, malnourished, immunocompromised, or vitamin A deficient, to lessen disease severity and reduce the risk of pneumonia.[1,13,22,28] There are case reports with vitamin A use in adults (dose of 200,000 international units).[26] To make oral administration easier in young kids, squeeze vitamin A liquid from gelatinous capsules (soft gel capsules) to administer directly into the patient's mouth; or mix with formula, breast milk, or soft foods. If mixed, be sure patients take the entire dose.[25]
	  ▪ **Two doses are given** (one upon diagnosis and then repeated the next day). Doses vary based on age:[1]
	  • Infants younger than six months old: 50,000 internation units/dose
	  • Infants between six and 11 months old: 100,000 international units/dose
	  • Children 12 months and older: 200,000 international units/dose
	• Limited data suggest early use (e.g., within five days of measles symptoms) of ribavirin may reduce mortality in hospitalized patients with severe cases of measles (e.g., pneumonitis with respiratory failure, immunosuppressed). However, more data are needed to confirm benefit and clarify dose and duration of therapy.[22,25,26]

More. . .

Topic/Clinical Question	**Answer/Pertinent Information**

When and how should measles post-exposure prophylaxis be given?	• Vaccination with a measles-containing vaccine effectively prevents the measles (e.g., 93% effective [one dose]; 97% effective [two doses]) and provides lifelong immunity.[1,10]
	  o Booster doses are not necessary for patients who previously received recommended measles vaccine dose(s).[21]
	• People exposed to measles, **without evidence of immunity**, should be offered post-exposure prophylaxis (PEP).[1]
	• Post-exposure prophylaxis given to patients without evidence of immunity might provide some protection. Options:[1,21,24]
	  o Give one dose of MMR to most patients at least 6 months of age **within 72 hours of exposure**, unless contraindicated. The second dose may be given as soon as four weeks later (a third dose is needed if the first dose is given to a child less than 12 months old).
	OR
	  o Immunoglobulin (IG) can be given **within six days of exposure** (intramuscularly [IM] to infants younger than 12 months old; intravenously [IV] to adults and children 12 months or older) if MMR is not available or appropriate.
	  ▪ Reserve IG for people at risk of severe illness (e.g., infants <12 months old [for infants between six and 11 months of age the MMR vaccine can be used instead], pregnant women, severely immunocompromised).
	  ▪ Recommended doses of IG are:[1,21,24]
	  • IM administration (infants younger than 12 months old): 0.5 mL/kg (max dose of 15 mL).
	  o IM administration can also be used for older patients (non-infants) who weigh less than 30 kg (patients weighing ≥30 kg won't achieve high enough titers with max dose).
	  o Divide and use two or more injection sites for doses greater than 2 mL (children) or 3 to 5 mL (adults).[21,24]
	  • IV administration: 400 mg/kg (preferred method for immunocompromised patients)
	  o Do NOT coadminister the MMR vaccine and IG at the same time. IG interferes with vaccine effectiveness.[1]
	  o IG only provides short-term protection (e.g., five to six months).[21]
	  ▪ Patients who receive IG should receive the MMR vaccine to ensure long-term protection, but administration needs to be delayed to avoid IG interfering with vaccine efficacy.[1,21] Delay vaccination for at least:[21,23]
	  • Eight months (after IV administration of IG) or six months (after IM administration of IG).
	  • Five to six months, regardless of route of IG administration (Canada).

When can patients return to work or school after receiving post-exposure prophylaxis?	• **After MMR post-exposure prophylaxis** (NOT healthcare workers), patients may return to childcare, school, or work if they receive their first dose of MMR within 72 hours of measles exposure.[1] • **After IG post-exposure prophylaxis** (NOT healthcare workers), individualize the timing to return to childcare, school, or work. Consider factors such as the patient's immune status, at-risk populations, and intensity or duration of contact. These factors may reduce the effectiveness of IG or increase the risk of measles or measles complications.[1] • Regardless of the method of post-exposure prophylaxis (MMR, IG), **healthcare workers** (without evidence of immunity) should not return to work until 22 days after exposure.[1]

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Users of this resource are cautioned to use their own professional judgment and consult any other necessary or appropriate sources prior to making clinical judgments based on the content of this document. Our editors have researched the information with input from experts, government agencies, and national organizations. Information and internet links in this article were current as of the date of publication.

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