**2018 MMR Pink Book Webinar Questions and Answers**

**1. When we test patients for measles, mumps, and rubella titers who report receiving the MMR series but can't provide documentation, why does the mumps titer come back negative while measles and rubella show immunity?**

The median effectiveness of 2 doses of MMR vaccine in preventing mumps is 88%, with estimates ranging from 31% to 95% The studies reporting these findings were conducted during 2005–2016, and most included persons who received the second MMR dose <10 years before the study. Several studies found decreasing effectiveness with increasing time after receipt of the second dose or reported increased risk for mumps with increasing time after receipt of the second dose. Limited laboratory data on immune response to mumps virus indicate both lower antibody titers and poorer antibody quality (e.g., lower avidity antibodies, failure to generate strong memory B cell responses) after either natural mumps infection or mumps vaccination compared with the responses to infection with or vaccination against measles and rubella. Both neutralizing and non-neutralizing mean mumps antibody titers decline over time in persons who have received 2 doses of MMR vaccine.

<https://www.cdc.gov/mmwr/volumes/67/wr/mm6701a7.htm>

**2. What is the difference in measles vs. rubella regarding the rash?**

Measles is characterized by a prodrome of fever (as high as 105°F) and malaise, cough, coryza, and conjunctivitis—the three “Cs”, a pathognomonic enanthema (Koplik spots), followed by a maculopapular rash. The rash usually appears about 14 days after a person is exposed. It usually begins as flat red spots that appear on the face at the hairline and spread downward to the neck, trunk, arms, legs, and feet. Small raised bumps may also appear on top of the flat red spots. The spots may become joined together as they spread from the head to the rest of the body. Patients are considered to be contagious from 4 days before to 4 days after the rash appears. Of note, sometimes immunocompromised patients do not develop the rash.

Rubella is characterized by a mild, maculopapular rash, along with lymphadenopathy and a slight fever. The rash usually starts on the face, becomes generalized within 24 hours, and lasts a median of 3 days; it occurs in 50% to 80% of infected people. Lymphadenopathy, which may precede rash, often involves posterior auricular or suboccipital lymph nodes, can be generalized, and lasts between 5 and 8 days. About 25% to 50% of infections are asymptomatic. Clinical diagnosis of rubella virus is unreliable and should not be considered in assessing immune status. Up to half of all infections may be subclinical or unapparent. Many rubella infections are not recognized because the rash resembles many other rash illnesses.

When trying to discern whether measles or rubella may be the cause of a rash, health care providers should also consider other factors, including immunization history, additional signs and symptoms, and recent travel or other possible exposure. For more information, see:

<https://www.cdc.gov/measles/about/signs-symptoms.html>

<https://www.cdc.gov/rubella/about/symptoms.html>

<https://www.cdc.gov/rubella/hcp.html>

<https://www.cdc.gov/measles/hcp/>

**3. Will there be any adverse effects if a person has more than 3 doses of MMR?**

Five studies evaluated the safety of the third dose of MMR vaccine among children and young adults (age 9–28 years) using passive and active surveillance for adverse events. No serious adverse events were reported among 14,368 persons who received a third MMR vaccine dose. Nonserious adverse events were mild and reported at low rates. Among children, 6%–7% reported at least one nonserious adverse event within 2 weeks after receiving the third dose. Among young adults who received a third dose, the prevalences of four symptoms were significantly elevated during the 4-week postvaccination period compared with the prevaccination period. These symptoms and estimated proportions of subjects with episodes attributable to receipt of the third dose were lymphadenopathy (12%), diarrhea (9%), headache (7%), and joint pain (6%). The median duration of these episodes was short (1–3 days).

<https://www.cdc.gov/mmwr/volumes/67/wr/mm6701a7.htm>

**4. If you have a person working in a health care facility and they don't have dates of MMR vaccination and serologic titers do not show immunity, would you recommend 2 doses of MMR vaccine? Also is there a risk of arthritis if immunizing?**

For health care personnel, the following items are considered acceptable presumptive evidence of immunity to measles, mumps, and rubella:

1. Documentation of vaccination with 2 doses of live measles- and mumps-virus-containing vaccine and 1 dose of live rubella-virus-containing vaccine
2. Laboratory evidence of immunity (applies to all three diseases)
3. Laboratory confirmation of disease (applies to all three diseases)
4. Born before 1957 (applies to all three diseases except women of childbearing age born before 1957 who could become pregnant should still be vaccinated with a rubella-containing vaccine)

Temporary pain and stiffness in the joints, mostly in teenage or adult women who did not already have immunity to the rubella component of the vaccine, is a common side effect of MMR vaccine.

<https://www.cdc.gov/mmwr/pdf/rr/rr6007.pdf>

<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm#Tab3>

**5. Why is the amount of varicella in MMRV so much higher than in the monovalent varicella vaccine?**

MMRV vaccine was licensed on the basis of equivalence of immunogenicity of the antigenic components rather than the clinical efficacy. Clinical studies involving healthy children 12–23 months of age indicated that those who received a single dose of MMRV vaccine developed similar levels of antibody to measles, mumps, rubella, and varicella as children who received MMR and varicella vaccines concomitantly at separate injection sites.

<https://www.cdc.gov/vaccines/pubs/pinkbook/varicella.html>

**6. Does the first MMR dose count for the 12–15-month dose if given 4 days prior 12 months of age**?

Per ACIP, vaccine doses administered up to 4 days before the minimum interval or age can be counted as valid; this dose would count for the 12–15-month MMR dose. However, you should check state and/or school requirements to ensure that they also allow a dose given 4 days prior to the first birthday to count. If they do not, you may need to repeat the dose.

<https://www.cdc.gov/vaccines/pubs/pinkbook/genrec.html>

**7. For whom do you recommend an adult MMR booster? Is this age-related? Does the vaccine efficacy wane after a certain age?**

Generally, an adult MMR booster is not recommended; however, there are certain adults for whom 2 doses of MMR vaccine are recommended. This group includes students at post-high school educational institutions, international travelers, and health care personnel. People who are born during or after 1957 who do not have evidence of immunity and don’t fit into one of the categories listed should get at least 1 dose of MMR vaccine.

In January 2018, ACIP published recommendations for use of a third dose of mumps-virus-containing vaccine in persons at increased risk for mumps during an outbreak.

For additional information, please see: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm#Tab3> <https://www.cdc.gov/mmwr/volumes/67/wr/mm6701a7.htm>

**8. For health care personnel (HCP) born before 1957 who provide a self-reported history of measles, mumps, or rubella, do we still need to do a titer to check for immunity or consider self-reported and birth before 1957 adequate?**

Although birth before 1957 is considered acceptable evidence of measles, rubella, and mumps immunity, health care facilities should consider vaccinating unvaccinated personnel born before 1957 who do not have laboratory evidence of measles, rubella, and mumps immunity; laboratory confirmation of disease; or vaccination with 2 appropriately spaced doses of MMR vaccine for measles and mumps and 1 dose of MMR vaccine for rubella. Vaccination recommendations during outbreaks differ from routine recommendations for this group.

For more information, please see: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm#Tab3>

**9. Can you administer the MMR vaccine to a nursing mother?**

Yes. Breastfeeding is not a contraindication to MMR vaccination.

**10. Why are people born before 1957 generally considered immune to measles, mumps and rubella?**

Adults born before 1957 can be considered to have immunity to measles, rubella (except for women who could become pregnant), and mumps. Adults born before 1957 were most likely infected with these diseases prior to widespread availability of MMR vaccine and, therefore, have already developed immunity. However, there are certain circumstances in which MMR vaccination may still be considered in an adult born before 1957. For more information, please see:

<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm>

**11. In consideration of measles, the ease of international travel, do you think offering (on return to the US) voluntary revaccination of travelers would assist the occasional small measles outbreaks that have been experienced at universities?**

Measles, rubella, and mumps are endemic in many countries and protection against measles, rubella, and mumps is important before international travel. All persons age ≥6 months who plan to travel or live abroad should ensure that they have acceptable evidence of immunity to measles, rubella, and mumps **before** travel. Travelers age ≥6 months who do not have acceptable evidence of measles, rubella, and mumps immunity should be vaccinated with MMR vaccine. Before departure from the United States, children age 6 through 11 months should receive 1 dose of MMR vaccine and children age ≥12 months and adults should receive 2 doses of MMR vaccine separated by at least 28 days, with the first dose administered at age ≥12 months. Children who received MMR vaccine before age 12 months should be considered potentially susceptible to all three diseases and should be revaccinated with 2 doses of MMR vaccine, with the first dose administered when the child is age 12 through 15 months (12 months if the child remains in an area where disease risk is high) and the second dose at least 28 days later.

All students entering colleges, universities, technical and vocational schools, and other institutions for post-high school education should receive 2 doses of MMR vaccine (with the first dose administered at age ≥12 months) or have other evidence of measles, rubella, and mumps immunity before enrollment. Students who have already received 2 appropriately spaced doses of MMR vaccine do not need an additional dose when they enter school.

<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm>

**12. If the MMR titer shows that a patient is not immune, then why wouldn't revaccination be recommended?**

Documented, age-appropriate vaccination supersedes the results of subsequent serologic testing. If a person who has 2 documented doses of measles- or mumps-containing vaccines is tested serologically and is determined to have negative or equivocal measles or mumps titer results, it is not recommended that the person receive an additional dose of MMR vaccine. Such persons should be considered to have presumptive evidence of immunity. In the event that a person who has 1 dose of rubella-containing vaccine is tested serologically and is determined to have negative or equivocal rubella titer results, it is not recommended that the person receive an additional dose of MMR vaccine, except for women of childbearing age. Women of childbearing age who have 1 or 2 documented doses of rubella-containing vaccine and have rubella-specific IgG levels that are not clearly positive should be administered 1 additional dose of MMR vaccine (maximum of 3 doses) and do not need to be retested for serologic evidence of rubella immunity.

<https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm>

**13. Due to the interaction of PPD skin test testing results and MMR vaccine, how much time should elapse between receiving the MMR vaccine and obtaining a PPD test?**

MMR or MMRV may suppress the positive response to TB testing in a person who has tuberculosis (TB). This suppression might result in a false negative test in a person who is infected with TB. If a person needs TB testing and MMR or MMRV vaccine, you can correctly administer both in one of three ways:

* Give the TB test and the MMR or MMRV vaccine at the same visit (preferred option).
* Give the TB test first. When the person returns to have the test results interpreted, give the MMR or MMRV vaccine (least favored option).
* If MMR or MMRV vaccine has been administered recently, TB testing should be delayed for at least 4 weeks after vaccination.

**14. Is there any risk of exposure to a pregnant woman or immunocompromised family member?**

Generally, no. Vaccines that contain measles or rubella may cause a mild transient rash. Rashes usually appearing 7 to 10 days after MMR or measles vaccination have been reported in approximately 5% of vaccine recipients, usually after the first dose. After MMR vaccination, presence of a rash requires no special precautions because transmission of vaccine viruses does not occur from vaccinated persons, including those who develop a rash. However, if a child develops a rash following MMRV vaccination, it might be related to the varicella component of the vaccine. A child who has a varicella rash after MMRV vaccination might be able to spread the varicella virus to an unprotected person. Even though this happens very rarely, children who develop a rash after MMRV vaccination should stay away from people with weakened immune systems and unvaccinated infants until the rash disappears.

**15. If MMRV is given to a patient older than 12 years of age, would it still count as a valid dose?**

Yes, the dose counts, but the minimum interval, if given subsequent to another dose of MMR or MMRV, must still be met. Additionally, this would still be considered a vaccine administration error and your organization should take steps to ensure this error does not occur again.

**16. If they get a rash after receiving the vaccine are they considered contagious?**

No, unless the vaccine used was MMRV, vaccine recipients are not considered contagious. If a child develops a rash following MMRV vaccination, it might be related to the varicella component of the vaccine. A child who has a varicella rash after MMRV vaccination might be able to spread the varicella virus to an unprotected person. Even though this happens very rarely, children who develop a rash after MMRV vaccination should stay away from people with weakened immune systems and unvaccinated infants until the rash disappears.

**17. Have there been studies done in a Somali community to see if autism rates have declined since uptake of MMR has declined?**

In a community with previously high vaccination coverage, concerns about autism, the perceived increased rates of autism in the Somali-American community, and the misunderstanding that autism was related to the MMR vaccine resulted in a decline in MMR vaccination coverage to a level low enough to sustain widespread measles transmission in the Somali-American community following introduction of the virus. For more information about this outbreak, please see: <https://www.cdc.gov/mmwr/volumes/66/wr/mm6627a1.htm?s_cid=mm6627a1_w> .

Extensive studies have been conducted and have shown that there is no link between receiving vaccines and developing autism spectrum disorder. For more information, please see <https://www.cdc.gov/vaccinesafety/concerns/autism.html>.

It is important for health care providers to combat misinformation about vaccines and form good relationships with members of the community to ensure high vaccination coverage and prevent future vaccine-preventable disease outbreaks.

**18**. **Shouldn't repeat MMR doses be 28 days apart?**

Yes, the minimum interval between doses of MMR vaccine is 28 days.

**19. If someone has been vaccinated with only 1 dose of mumps vaccine in 1971–72, should they be revaccinated due to only 1 documented dose?**

Adults born in 1957 or later should receive at least 1 dose of MMR vaccine unless they have other acceptable evidence of immunity to these three diseases. However, persons who received measles vaccine of unknown type, inactivated measles vaccine, or further attenuated measles vaccine accompanied by IG or high-titer measles immune globulin (no longer available in the United States) should be considered unvaccinated and should be revaccinated with 1 or 2 doses of MMR vaccine. Persons vaccinated before 1979 with either killed mumps vaccine or mumps vaccine of unknown type who are at high risk for mumps infection (e.g., persons who are working in a health care facility) should be considered for revaccination with 2 doses of MMR vaccine.

Adults born before 1957 can be considered to have immunity to measles, rubella (except for women who could become pregnant), and mumps. However, MMR vaccine (1 dose or 2 doses administered at least 28 days apart) can be administered to any person born before 1957 who does not have a contraindication to MMR vaccination. Adults who might be at increased risk for exposure or transmission of measles, rubella, or mumps and who do not have evidence of immunity should receive special consideration for vaccination. Students attending colleges or other post-high school educational institutions, health care personnel, and international travelers should receive 2 doses of MMR vaccine.

For more information, see

<https://www.cdc.gov/vaccines/hcp/acip-recs/vacc-specific/mmr.html>

**20. Can you move MMR from the refrigerator to the freezer and back to the refrigerator?**

Yes, MMR needs to be stored between -58°F and +46°F (-50°C to +8°C). So, either type of vaccine storage unit (refrigerator or freezer), if set appropriately, would maintain an adequate storage temperature for the lyophilized component of MMR. The diluent for MMR can be stored in the refrigerator or at room temperature.

<https://www.merck.com/product/usa/pi_circulars/m/mmr_ii/mmr_ii_pi.pdf>

**21. If 2 varicella injections are required at a facility, would 2 MMRV doses be acceptable?**

For persons 12 months through 12 years of age, if varicella vaccine is indicated and only MMRV is available, they can receive MMRV, as long as none of the other components are contraindicated.

If you are retrospectively reviewing the record of an adult who had 2 doses of MMRV (either as a part of their childhood immunizations or if MMRV was given in error after 12 years of age), the doses would be considered valid.

**22. Are there any plans to extend MMRV to adults?**

There are currently no new data on use of MMRV in adults being discussed. ACIP would evaluate any new studies or data if/when they become available.

**23. CDC data show passive measles immunity for newborns is too low to confer protection if the mother was vaccinated rather than having had wild measles infection. And measles protection from vaccine does not last a lifetime, but wanes, and so we are moving into an era of vulnerable newborns and a vulnerable older adult population. A third dose only temporarily boosts titers before falling back to baseline. What is CDC doing to plan for this new era of measles we are heading toward?**

Although data are limited, a recent systematic review noted that in settings with sustained elimination, in which maternal immunity is primarily derived from vaccination, some infants are susceptible to measles before the age of routine measles vaccination. Antibodies are also known to wane after vaccination, potentially placing some adult individuals at risk. A few important aspects related to these issues should be kept in mind.

* Earlier vaccination of infants (before 12 months) leads to decreased rates of seroconversion. This is thought to be related to maternal antibody interference, but also to immaturity of the immune system.
* Although the routine recommendation is to give the vaccine at 12 months, we recommend vaccination of infants as young as 6 months who are at increased risk of measles (e.g., during an outbreak or travel).
* The decline in antibodies after vaccination is slow, and sufficient antibodies appear to persist for many years in most persons.
* Low titers might not equate to being completely unprotected (some antibodies are present; cell-mediated immunity might be preserved) so, if susceptible, these persons might have milder presentations and decreased transmission.
* Only about 12% of cases occur in persons that are vaccinated in the U.S., and rates of disease decrease with age.
* A third dose of measles vaccine seems to only temporarily increase antibody levels before declining to baseline.

Overall, the key to protecting infants too young to be vaccinated and to maintain measles elimination in the United States is improving vaccination coverage in pockets of underimmunization and maintaining high 2-dose coverage nationally. CDC continues to gather data reported by states on confirmed measles cases and monitor these data from a national perspective; this includes evaluating the risk for measles among infants, adults, and among vaccinated persons, and overall MMR vaccination coverage. CDC provides technical advice and rapid assistance on the ground (if requested) to states during outbreaks to limit measles spread after measles introductions.

**24. Can we get a copy of the PowerPoint presentation, please?**

The presentation is posted on the Pink Book webinar web page along with the recording and other materials.