

**BRIEF REPORT**

# Are Boosters Necessary If Adult Patients Do Not Achieve Seroconversion After 2 Doses of the MMR Vaccine?

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**The Centers for Disease Control (CDC) recommend 2 documented doses of the MMR (measles-mumps-rubella) vaccine for adequate measles, mumps, and rubella immunity for all children and most adults. Sometimes, individuals are asked to provide serologic proof of immunity to measles, mumps, and/or rubella for educational or employment purposes. In other instances, serologic testing may be used to help clarify whether an individual has immunity to measles, mumps, and/or rubella. These serologic tests may sometimes show negative or equivocal antibody titers to measles, mumps and/or rubella, raising the question of adequate immunity. This report provides practical guidance for clinicians on when to use serologic testing to determine measles, mumps, and rubella immunity. (J Am Board Fam Med 2022;00:000–000.)**

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Per the current Centers for Disease Control (CDC) guidelines, all children and unvaccinated adults are recommended to get 2 doses of the MMR (measles-mumps-rubella) vaccine.<sup>1</sup> Individuals are often asked to provide proof of immunity to measles, mumps, and rubella for educational or employment purposes. Commonly accepted proof of immunity comes in the form of a documented 2-dose MMR vaccine series or positive serologic testing. In patients who do not have documentation of the CDC-recommended 2 MMR vaccine series or who have negative/equivocal IgG serologic testing, a question arises as to whether they should receive additional doses of the vaccine to achieve immunity.

The CDC recommendation for assessment of measles, mumps, and rubella immunity is disease-dependent. For measles, the CDC considers the receipt of 2 doses of a measles-containing vaccine as sufficient evidence of immunity.<sup>2</sup> Adequate documentation of these 2 doses supersedes any negative serologic testing as evidence of measles immunity. In patients without documentation of a measles vaccination series, serologic testing (presence of IgG) may be used as evidence of immunity.<sup>2</sup> As an alternative, a 2-dose series vaccination can be completed (Table 1). Notably, there have been reports of recent measles outbreaks, often in areas of lower overall vaccination rates.<sup>2,3</sup> These outbreaks include both primary measles cases as well as breakthrough cases. Despite these recent outbreaks, the CDC has yet to release a recommendation for a measles booster dose in fully vaccinated individuals.<sup>2</sup>

For mumps, the CDC also recommends 2 doses of a mumps-containing vaccine as proof of immunity.<sup>2</sup> A positive mumps titer is also an acceptable

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**Table 1. Summary of Recommendations for Individuals Without Detectable Measles, Mumps, and Rubella (MMR) Antibody (IgG) After the Original CDC Recommended MMR Vaccination<sup>2,4,7-10</sup>**

Virus	Recommendation for Vaccination	Recommendation When Seroconversion Occurs	Recommendation When Seroconversion Does Not Occur
Measles	2 documented doses of MMR*, at least 4 weeks apart	N/A	No need for more dosage
Mumps	2 documented doses of MMR*, at least 4 weeks apart	N/A	3 <sup>rd</sup> dose only for high risk individuals during outbreaks
Rubella	1 documented dose of MMR*	N/A	2 <sup>nd</sup> or 3 <sup>rd</sup> dose of MMR in pregnant women

\*MMR is the only available vaccine containing measles, mumps, and rubella in the USA. Data sharing is not applicable as no new data were generated or analyzed during this study.

form of immunity. However, there have been a number of mumps outbreaks in recent years among vaccinated populations.<sup>4</sup> Studies in the United States have shown varied efficacy (75 to 90%) of a 2-dose series of the MMR vaccine during mumps outbreaks.<sup>4-6</sup> The current recommendation by the Advisory Committee on Immunization Practices, recommends a third dose of MMR for certain individuals at increased risk of mumps during an outbreak.<sup>4</sup> The recommendation for an additional dose of a mumps-containing vaccine during an outbreak is independent of any serologic testing or previous vaccination history a patient may have.<sup>4</sup>

For rubella, the CDC recommends 1 dose of a rubella-containing vaccine as proof of immunity in all patients except for women of childbearing age.<sup>2</sup> In the case of women of childbearing age, serologic testing is used as a surrogate for immunity. This change is due to an uptick in congenital rubella syndrome (CRS) during the 1990s.<sup>2</sup> To prevent future outbreaks, the CDC now recommends all women of childbearing age be vaccinated with at least 1 dose of a rubella-containing vaccine or have positive serologic testing for rubella.<sup>2</sup> In addition, all pregnant women are routinely screened for rubella immunity prenatally. If rubella IgG titers are negative, they are recommended to receive a dose of the MMR vaccine postpartum to prevent CRS in future pregnancies.<sup>2</sup>

In summary, the CDC and immunization experts endorse that 2 documented doses of the MMR vaccine are considered proof of immunity for measles, mumps and rubella, with the exception of the discussed cases for mumps (certain high-risk individuals during an outbreak) and rubella (postpartum women with negative titers). Positive serologic testing has also been an acceptable form of

documented immunity. It is worth noting that serologic testing relies on a humoral-mediated immune response with the production of antibodies to these viruses. There is currently no commercially available way of monitoring cell-mediated immune responses, which likely play a large role in long-term immunity from vaccines. Therefore, we still consider patients with proof of adequate vaccination and negative serologic titers to have disease immunity. It is also worth noting that there are no systematic reviews, randomized controlled trials, or international health organization recommendations that specifically provide guidance as to whether adult patients without measles, mumps, and rubella immunity on serologic testing should be given additional MMR boosters. There are also no longitudinal studies that investigate whether adult patients with undetectable measles, mumps, and rubella antibody titers have higher rates of measles, mumps, and rubella than those with detectable titers. The challenge emerges when a patient does not have good documentation of their vaccinations, as commonly seen in refugee and/or immigrant populations. In instances where there is uncertain or incomplete information about a patient's vaccination record, it may be prudent to forego serologic testing and opt to complete their vaccination series per the CDC guidelines.<sup>2</sup>

To see this article online, please go to: <http://jabfm.org/content/00/00/000.full>.

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