

Mumps Outbreak–Related Questions and Answers for Healthcare Providers

1) Some people who have had both doses of the recommended MMR vaccine (to protect against measles, mumps, and rubella disease) are still getting mumps. Why is this happening if the mumps vaccine is effective?

During mumps outbreaks in highly vaccinated communities, the proportion of cases that occur among people who have been vaccinated may be high (see example below). This should not be interpreted as meaning that the vaccine is ineffective. The way to assess the effectiveness of the vaccine is by comparing the attack rate in people who are vaccinated with the attack rate in those who have not been vaccinated. In outbreaks in highly vaccinated populations, the relatively few people who have not been vaccinated against mumps usually have a much greater mumps attack rate than those who have been fully vaccinated. During the outbreak in 2006, most of the mumps cases occurred in those who had received 2 doses of the MMR vaccine because most of the affected population had received 2 vaccine doses. However, the attack rate was much higher in the unvaccinated people, and 2 doses of the vaccine were estimated to be 88% (range: 66-95%) effective in preventing mumps.

Example: Let's say that an outbreak occurs among 1,000 people and that 950 of these 1,000 people have received 2 doses of the vaccine and 50 are unvaccinated (i.e., vaccine coverage = 95%). If there is a 30% attack rate among people who haven't been vaccinated, 15 unvaccinated people would get the disease. Among the 950 vaccinated people, the attack rate would be 3%, so 29 vaccinated people would get the disease. Therefore, of the 44 people who got sick during the outbreak, the majority (29, or 66%) would have been vaccinated. This doesn't imply that the vaccine didn't work—in fact, the people who hadn't been vaccinated were 10 times more likely to get sick as those who had been vaccinated, it's just that there were a lot fewer unvaccinated people at risk. Furthermore, if none of the 1,000 people had been vaccinated, the outbreak would have resulted in 300 cases rather than only 44. In this scenario, we would say that the vaccine is 90% effective in preventing the disease after 2 doses, which is the same as saying that the attack rate in the unvaccinated group is 10 times higher than the attack rate among people who have received 2 doses of vaccine. The formula to calculate vaccine effectiveness is (attack rate in unvaccinated group minus attack rate in vaccinated group) divided by attack rate in unvaccinated group, or $(ARU-ARV)/ARU$.

2) How effective is the MMR vaccine in general?

The MMR vaccine is very effective against measles, mumps, and rubella and has made these three once-common childhood diseases very rare in the United States.

Before there was a vaccine against mumps, mumps was a common disease in the United States and caused complications such as permanent deafness in children, and it occasionally caused encephalitis, which can result in death, although very rarely. Before vaccine was used, over 150,000 mumps cases were reported every year, although many more unreported cases occurred. Now, a few hundred cases of mumps are reported every year on average. However, outbreaks still occasionally occur. In 2006, there was an outbreak affecting more than 6,584 people in the United States, with many cases occurring on college campuses. In 2009, an outbreak started in close-knit religious communities and schools in the Northeast, resulting in more than 3,000 cases. These outbreaks have shown that when people who are sick with mumps have close contact with a lot of other people (such as among students living in dormitories and students and families in close-knit communities) mumps can spread even among vaccinated people. However, outbreaks are much larger in areas where vaccine coverage rates are lower.

The MMR vaccine is also effective against measles and rubella. Prior to a vaccine against measles, measles infected millions of people and caused approximately 500 deaths every year in the United States. Now, on average, fewer than 100 cases are reported every year and almost all can be linked to importation of measles from other countries and occur in individuals who have not been completely vaccinated.

And before a vaccine against rubella (German measles) was widely used, rubella and rubella-associated birth defects (congenital rubella syndrome or CRS) were common. In the global epidemic

from 1962 to 1965, an estimated 12.5 million rubella cases occurred in the United States and 20,000 infants were born with CRS. Now, approximately 10 cases of rubella are reported each year and CRS is very rare. These cases are usually the result of importation from other countries and almost always occur in individuals who have not been vaccinated against rubella.

3) Is mumps really a serious disease?

Almost all people with mumps fully recover after a few weeks. During the illness, many people feel tired and achy, have fever, and may have parotitis. Some may feel extremely ill and be unable to eat because of pain around the jaw, and some may develop serious complications. Men and adolescent boys can develop orchitis, which rarely results in sterility. Women and adolescents girls may develop oophoritis. Meningitis and loss of hearing can also occur, and in rare cases this hearing loss can be permanent. The most serious complication is encephalitis, which can lead to death or permanent disability, although rarely.

4) Staying home (or isolating oneself while at home) is not easy. Does this really matter?

Mumps is spread through respiratory droplets and direct contact with others who have the infection. The risk of spreading the virus increases the longer and the closer the contact is with someone who has the infection. When a person is ill with mumps, he or she should avoid contact with others from the time of diagnosis until at least 5 days after the onset of parotitis by staying home from work or school and staying in a separate room if possible. Others who are potentially exposed to those with mumps should make sure they are up to date with the vaccine against mumps.

5) Why did the 2009-10 U.S. mumps outbreak occur? Have similar outbreaks occurred in the past?

The vaccine against mumps is effective, with the 2-dose effectiveness estimated at 80% to 90%. The 10% to 20% of people who have received 2 doses of MMR but are still susceptible to mumps is sufficient to sustain occasional mumps outbreaks, especially in population settings where people have a high number of close contacts with others (e.g., school and college settings). In the 2009-10 mumps outbreak in the northeastern United States, a boy traveled to the United Kingdom, where mumps is more prevalent and cases were ongoing. From there, he returned to the United States and went to a summer camp without knowing he was infected with mumps. The virus spread within the camp, and after camp ended, the disease spread primarily in schools and then into households.

Similar outbreaks have occurred in the past. In 2006, a mumps outbreak occurred in the midwestern United States, with the highest incidence of disease among young adults, many of whom were college students. The spread of virus was likely facilitated by close contact in certain settings, such as dormitories. The strain of mumps virus that caused this outbreak was the same strain that was circulating at the time in the United Kingdom, where most cases were occurring in unvaccinated persons.

An outbreak also occurred in 1997-98 among a tradition-observant Jewish community in Brooklyn. Most cases occurred among school-aged children attending local yeshivas (traditional Jewish schools).

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For more information call **800-CDC-INFO**
(800-232-4636) or visit www.cdc.gov/mumps

