Mumps in Vaccinated People

During mumps outbreaks in highly vaccinated communities, the proportion of all 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 not effective. The effectiveness of the vaccine is assessed by comparing the attack rate in vaccinated people with the attack rate in those who have not been vaccinated. During an outbreak in a highly vaccinated population, most of the people exposed to mumps have been vaccinated. This is why, even though the mumps attack rate is usually much greater among unvaccinated people than it is among those who have been fully vaccinated, there are usually more cases in vaccinated people than in unvaccinated people

Vaccination and Mumps Outbreak: an Example

Example: Let's say that an outbreak occurs among 1,000 people exposed to mumps. Among these 1,000 people, 950 have received two doses of vaccine while the remaining 50 are unvaccinated (i.e., vaccine coverage is 95%).

- If there is a 30% attack rate among people who haven't been vaccinated, 15 of the 50 unvaccinated people would get the disease.
- With only a 3% attack rate among those vaccinated, 29 of the 950 vaccinated people would get the disease.
- Therefore, of the 44 people who got sick during the outbreak, the majority of cases (29, or 66%) would have occurred in vaccinated people.

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 two 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 two 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.

From Mumps information for healthcare providers (CDC web pages)
http://www.cdc.gov/mumps/hcp.html