Vaccines and the Lottery: Winners and Losers at Disneyland

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Why is receiving a vaccination a bit like entering a lottery? Our author uses the 2014 measles outbreak in California to illustrate.

The recent billion-plus dollar Power Ball Lottery payout had two sets of winners and millions of losers. The obvious set of winners were the individuals who had the winning numbers. The other winners, of course, were the state governments who win with every ticket sold.

When someone receives a vaccine, they are in a sense participating in a lottery. They are paying for something in hopes of receiving a benefit in the future. Most vaccine recipients are “winners.” They develop an immunity to a disease they wanted to avoid. Unfortunately, some vaccine recipients are “losers.” They pay for and get a vaccine but for whatever reason do not develop an immunity and may still contract the disease if exposed.

For example, in 2014 a measles outbreak began in individuals visiting Disneyland in California. The cases spread to 6 states before public health departments were able to stop the outbreak. Out of the 125 reported cases, some were in unvaccinated individuals, some in children under a year of age and too young to have received the vaccine, and, sadly, some cases were in individuals who had received the recommended 2 shots of MMR.

A few questions for you on details of the outbreak:

1. Out of the 125 cases, how many were in persons fully immunized?
   A. 2
   B. 5
   C. 8
   D. 15
   Please leave answer below; click here for answer, discussion and next question.

   Answer: C. 8

   Forty-nine of the cases (45%) were in unvaccinated children and adults (one individual was on an “alternative” vaccine schedule, so this is something you might share with a parent when they make a request to have you “spread the vaccines out”); 12 cases (10%) were in children too young to receive the vaccine; 8 cases (6%) were in persons who had received at least 2 doses of MMR. The rest of the cases had unknown or undetermined vaccination status. One MMR shot protects about 95% of vaccine recipients. The second MMR shot is not a booster; it is given to try to protect the 5% who did not respond to the first dose. Obviously, a lot of fully vaccinated persons were exposed at Disneyland. They were the winners of their “MMR lottery.”

   Let’s look at what happens to the “losers” in this measles outbreak

2. The hospitalization status was reported for 84 of the 125 infected individuals. How many persons ended up in the hospital out of that 84-person cohort?
   A. 5
   B. 10
C. 15
D. 20

Please leave answer below; click here for answer and discussion.

Answer: D. 20

Twenty persons, or about 24% were hospitalized. Even if you assume that all the others beyond that group of 84 were not hospitalized, you still end up with 16% of the measles cases needing inpatient care.

Hollywood is not far from Disneyland. I wonder if the unimmunized individuals would have answered Clint Eastwood’s “Dirty Harry” character's question when they refused a measles vaccine, ... “You’ve got to ask yourself one question: 'Do I feel lucky?' Well, do ya, ...?”

Sources


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