

FAQs: THE MEASLES, MUMPS AND RUBELLA (MMR) VACCINE VS. MEASLES

Answers to questions about the risks of the MMR vaccine vs. the risks of measles in the United States

With data, statistics and analysis of disease risks vs. vaccine risks, the Physicians for Informed Consent (PIC) Measles Disease Information Statement (DIS) and Vaccine Risk Statement (VRS) provide important facts for making an informed risk/benefit calculation for vaccination. Read on for additional information about the risks of measles compared to the risks of the MMR vaccine, with answers to readers' questions about the DIS and VRS.

1. When assessing the risks of measles, why is disease risk sometimes measured using data from various time periods, like the pre-vaccine era (the late 1950s and early 1960s, before the vaccine was introduced), the 1980s, and 1990s?

Pre-vaccine data is necessary to account for the risk of getting measles, as the incidence has been significantly reduced by the mass vaccination program. However, there have been important advancements in health care, measles research, and surveillance of complications from measles since the 1960s. Therefore, information is also derived from more recent data concerning measles cases in U.S. populations.

2. Some sources estimate the measles case-fatality rate as 1 in 1,000, but PIC states that the actual case-fatality rate is 1 in 10,000. Why is that?

A pre-vaccination rate of about 1 in 1,000 reported cases has been publicized by public health departments. However, the key word is "reported." Only 10% of cases are reported to public health departments, such as the Centers for Disease Control and Prevention (CDC).

Since nearly 90% of measles cases are not reported to the CDC, the result is a case-fatality rate of 1 in 10,000 for all measles cases. It is important to measure disease risks based on total measles cases, not just the 10% of cases that are reported.

3. If not all cases are reported to the CDC, how is it known that only 10% are reported?

Blood tests in samples of the pre-vaccine population showed that nearly everyone contracted measles at some point in their youth. Consequently, on average, there were about as many measles cases annually as there were people being born into the population. Since the size of the pre-vaccine birth cohort was 4 million, there was an



Being educated about the risks of measles vs. the risks of the MMR vaccine helps to ensure an informed decision about vaccination.

average of 4 million measles cases per year. Of these 4 million, only 440,000 were reported.

4. What is the basis for saying all deaths are reported?

U.S. mortality records for measles are based on the cause of death documented in death certificates. Unlike reported measles cases, for which there is evidence of significant underreporting, there is no evidence that a significant number of death certificates are missing or failing to document measles deaths.

5. Has the MMR vaccine caused a change in the age distribution of reported measles cases?

Yes. There is evidence that since the measles vaccination program began, there is a disproportionate number of reported measles cases in very young and older individuals compared to the pre-vaccination era.

Before the 1980s, children between 5 and 19 years of age comprised more than 72% of all reported measles cases and less than 3% of reported cases were 20 or older. By 1990, only 35% of reported measles cases were between 5 and 19 years of age, and 17% of reported cases were 20 or older.

Before the mass vaccination program, nearly every child had a mild case of measles by age 15; therefore, older individuals were immune and not susceptible to measles. Also, when infants are born to mothers who have had naturally acquired measles, they are protected from measles via maternal immunity for a longer period of time than those born to vaccinated mothers. Therefore, maternal immunity protected babies for a longer period of time in the early months of life during the pre-vaccine era vs. today.

6. For measles, how is the mortality rate different from the case-fatality rate?

Mortality and case fatality are measurements with respect to different groups. Mortality rates are with respect to everyone in the population, regardless of whether they contracted the disease. In contrast, case-fatality rates are with respect to only that subset of the population that actually contracted the disease.

Right before the measles vaccine was introduced, the mortality rate was 0.2 per 100,000 in the population of the U.S., which means 1 person from 500,000 people living in the U.S. died from measles annually. Note that annually, only 2% of people in the U.S. contracted measles; there were only 4 million annual cases out of a population of 200 million.

During this same time period, the case-fatality rate was 1 in 10,000, which means for every 10,000 people who had measles, 1 person died annually.

7. What is the difference between the measles mortality rate of 0.2 per 100,000 in the U.S. population vs. the measles mortality rate of 0.9 per 100,000 children under age 10? Why are these figures (0.2 and 0.9) different?

These figures are looking at different groups. When looking at all ages of individuals in the U.S. population, in 1963 the mortality (or death) rate was 0.2 per 100,000 because there were about 400 measles deaths out of a population of 200 million. In contrast, when looking at children under age 10, the death rate was 0.9 per 100,000 because there were about 360 deaths in children under age 10 out of a population of 40 million children under age 10.

8. How many cases of death and encephalitis were there in the pre-vaccine era?

Between 1959 and 1962, annually there were about 400 measles deaths out of 4 million cases (or 1 in 10,000). Because there are about half as many cases of measles encephalitis as there are measles deaths, there were about 200 cases of measles encephalitis (or 1 in 20,000) in the pre-vaccine era.

9. Some sources state that there were 4,000 annual cases of measles encephalitis in the 1960s, yet measles encephalitis actually occurred in 1 in 20,000 cases—a total of 200 cases (4 million/20,000). What is going on?

Measles surveillance from 1985 to 1992 revealed that measles encephalitis occurred in 1 in 1,000 reported cases. Some sources make the mistake of multiplying this ratio by the number of *total* cases in the 1960s, when instead, the ratio should be multiplied by the number of

reported cases. In addition, some sources do not account for the fact that measles surveillance from 1985 to 1992 also revealed that measles encephalitis occurs half as often as death from measles. Therefore, since there were 400 annual measles deaths in the 1960s, there were about 200 cases of encephalitis out of 4 million total cases (1 in 20,000 cases).

10. What is the risk of dying from subacute sclerosing panencephalitis (SSPE) if you contract measles?

The risk of SSPE is between 6 and 22 out of a million measles cases, as cited in the MMR package insert.

11. Is the study by Bellini, which estimates the risk of SSPE to be 7–11 cases per 100,000 cases of measles, accurate?

No. Bellini found 12 cases of SSPE between 1989 and 1991 and derived a risk estimate under the assumption that 30% to 50% of all measles cases were reported. These percentages were based on studies of the reporting practices of hospitals and health care providers. However, most measles cases do not require medical attention; therefore, extrapolating the reporting completeness of measles cases that required medical attention to all measles cases is not appropriate.

In contrast, if the 12 cases of SSPE are compared to the 123 measles fatalities between 1989 and 1991, it can be reasonably estimated that there was 1 case of SSPE for every 10 measles deaths. Since the measles case fatality rate is 1 in 10,000, the SSPE risk Bellini found was about 1 in 100,000 (or 10 in a million).

12. What was the chance of getting pneumonia due to measles in the pre-vaccine era?

In the pre-vaccine era, prior to 1963, pneumonia due to measles was not tallied. On the other hand, measles surveillance from 1985 to 1992 showed that 6% of reported measles cases were diagnosed with pneumonia. However, the age distribution of reported cases changed during this time period as a result of the mass vaccination program (see question 5), resulting in a greater proportion of reported cases among very young and older individuals compared to the pre-vaccination era. Because those age groups are more vulnerable to complications from measles, the case-fatality rate (CFR) recorded based on reported cases after mass vaccination was higher (0.2%). To calculate the prevalence of pneumonia, 6% is divided by 0.2%, which indicates that pneumonia occurs 30 times more often than death. Thus, the chance of developing pneumonia in the pre-vaccination era was about 1 in 333 measles cases (30 times 1 in 10,000).

13. Why aren't VRS calculations based on all three viruses in the MMR (measles, mumps, and rubella)

vaccine when comparing to the risk of measles?

When assessing the disease risk of measles compared to the vaccine, there is no choice but to evaluate against MMR because the measles vaccine alone is no longer available in the U.S.

14. What are the risks of dying from measles today in the U.S.?

The risk of dying from measles has not changed since 1963. It is still 1 in 10,000 cases (or 1 in 1,000 reported cases) in the U.S.

15. What would happen today if everyone in the U.S. got measles?

For every 8,000 cases of measles, 7,999 cases or 99.99% would fully recover. This is known because in the 1960s, when everyone got measles, 1 in 10,000 cases would die from measles and 1 in 40,000 cases would suffer permanent injury or develop SSPE, a total of 1 in 8,000 cases (1 in 10,000 plus 1 in 40,000).

16. Back in the early 1960s, there were hundreds of deaths and permanent injuries from measles. Is PIC proposing that everyone in the U.S. get measles?

No. The goal is to reduce deaths and disabilities, from any cause, as much as possible. The public should be made aware that vaccination is not the only way to prevent death from measles. For example, it has been scientifically confirmed that low levels of vitamin A are associated with measles mortality. Indeed, populations with prevalent vitamin A deficiency are 30–60 times more likely to die from measles. Parents and physicians should consider all the facts that pertain to the children in their care when weighing their options.

17. Some possible side effects of the MMR vaccine are included in the Vaccine Risk Statement (VRS). Are there other possible side effects, and if so, where can they be found?

Yes. The MMR package insert contains a longer list of possible side effects.

18. How is it known that the MMR vaccine causes febrile seizures in 1 in 640 children?

This finding is derived from results of the most statistically powered safety study ever to measure the association between MMR vaccination and febrile seizures. More than half a million children were evaluated, both vaccinated and unvaccinated, from a Danish population that is relied upon globally to examine vaccine safety. Published in the *Journal of the American Medical Association*, the results showed that seizures from the MMR vaccine occur in about 1 in 640 children

up to two weeks following MMR vaccination.

19. Some sources say febrile seizures occur less frequently than 1 in 640. Why is that?

There are various studies that look at the association between seizures and the MMR vaccine, however they are weak in their statistical power. The seizure risk of 1 in 640 children is derived from a comprehensive study that examined over half a million children, and included 98,000 unvaccinated kids in the control group. Thus, it is the study with the greatest statistical power available regarding seizures and the MMR vaccine.

20. Can epidemiological studies show the MMR vaccine “causes” seizures in some children or only that the MMR vaccine is “associated” with an increased risk of seizures?

MMR vaccination can cause seizures because measles infection can cause seizures. Injecting a live measles virus (that’s in the MMR vaccine) into a person introduces the potential for that virus, in combination with various substances in the vaccine, to cause a seizure. In this context, epidemiological studies are not needed to prove causation; rather, they are needed to measure the extent to which MMR causes seizures.

21. How many febrile seizures does the MMR vaccine cause in the U.S. annually?

The MMR vaccine causes about 5,700 seizures annually in the U.S. (applying the risk of seizures [1 in 640] to the 3.64 million U.S. children vaccinated with a first dose of MMR every year), as reported in a PIC 2017 Letter to the Editor in the *BMJ*.

22. How is it known that 3.64 million U.S. children are vaccinated with a first dose of the MMR vaccine per year?

A birth cohort consists of about 4 million children, and the CDC Pink Book states that vaccine coverage for the MMR vaccine is 91%. Thus, 91% of 4 million is 3.64 million children annually that receive the first dose of MMR.

23. Is a febrile seizure from MMR vaccination a medical emergency?

Febrile seizures from measles vaccination often require a medical visit to the emergency department.

24. Some sources say febrile seizures are transient. Can seizures from the MMR vaccine lead to permanent harm?

Yes. Five percent of febrile seizures result in epilepsy,

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a brain disorder that leads to recurring seizures and permanent harm.

25. How many cases of epilepsy does the MMR vaccine cause each year?

About 300 MMR-vaccine seizures (5% of 5,700) will lead to epilepsy annually in the U.S., as explained in the PIC 2017 Letter to the Editor in the *BMJ*.

26. Does the Vaccine Adverse Event Reporting System (VAERS) monitor MMR-vaccine seizure rates?

Yes, but not sufficiently. VAERS is a passive reporting system that is significantly limited by underreporting. VAERS receives only 90 annual reports of MMR-vaccine seizures following the first dose—that's only 1.6% of the 5,700 MMR-vaccine seizures that actually occur. Thus, other serious vaccine adverse events from MMR, including permanent neurological harm and death, may similarly be underreported.

27. Does measles cause more or less harm than the MMR vaccine?

The answer to this question is not known. In the pre-vaccine era, measles caused 400 annual cases of death and 100 annual cases of permanent harm; however, most serious measles cases are preventable with adequate levels of vitamin A. In contrast, the MMR vaccine causes 5,700 annual seizures, of which 300 (5%) result in epilepsy; and seizures are only 12% of the serious reactions from the MMR vaccine that are reported to VAERS. Furthermore, the Measles Vaccine Risk Statement (VRS) also shows that studies have not ruled out the possibility of MMR causing permanent harm four times more often than measles causes death.

28. What is the importance of examining certain MMR vaccine safety studies from the early 2000s?

Certain studies in the early 2000s were the largest ever conducted that included control groups not vaccinated with MMR. These studies were a response to safety concerns about the MMR vaccine that threatened the mass vaccination program in the late 1990s.

29. Why didn't PIC use Hviid et al.'s 2019 measles, mumps, and rubella (MMR) vaccination and autism study in the VRS?

Hviid et al.'s 2019 study is weaker than the Madsen et al. study analyzed in the Measles VRS for the reasons described in PIC's statistical analysis entitled, "A Review of Hviid et al.'s 2019 MMR-Autism Study." Click here to read the review.

30. The measles mass vaccination program has eliminated endemic measles in the U.S. Isn't this proof that the benefits outweigh the risks?

The available research and data have not proven that the risks of the MMR vaccine are less than the risks of measles, as described in the Measles DIS and VRS.

31. Does PIC encourage parents not to vaccinate children with the MMR vaccine?

Physicians for Informed Consent does not provide any personal medical advice. However, PIC does encourage parents to make informed decisions. After reviewing PIC's educational materials, a parent may decide to accept or decline the MMR vaccine, or any vaccine.

For more information about measles and the MMR vaccine, visit physiciansforinformedconsent.org/measles.