

# Poliomyelitis

Math 5

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## Some Background

Polio is caused by one of three types of polio virus. Its effects range from no symptoms at all to permanent paralysis and possible death. Symptoms include fever, tiredness, headache, nausea and vomiting, severe muscle pain and spasms, and stiffness of the neck and back, with or without weakness of one or more arms or legs. The disease is usually caught following direct contact with an infected person (especially through contact with fecal material). Although polio has nearly been eradicated in the U.S., it was a source of great public concern until the mid-fifties.

In the U.S. polio struck primarily children ages 5 to 9. The disease appeared in epidemic waves, and as a result the rate of incidence of the disease in the U.S. varied dramatically from year to year. For example, in 1931 there were roughly 18,000 cases of poliomyelitis reported in the U.S., but in 1932 there were only about 6,000 reported cases. The largest number of cases occurred in 1952, with 60,000 reported cases. The rate of incidence varied considerably from city to city as well. In some years there would be virtually no cases of polio, and then suddenly there would be a large epidemic. Outbreaks or fears of outbreaks often led communities to close public pools and to discourage public gatherings. Polio's high visibility (Franklin Delano Roosevelt was left crippled by a childhood case of polio) and its seemingly random attacks on the most vulnerable segment population made it particularly feared.

## Key facts

- Polio is caused by 3 different viruses. A vaccine effective against only one or two strains would not provide complete protection from the disease, but it would still be of great value.
- Although polio caused great concern, the overall incidence rate of the disease in the population was relatively low. In the 1950s, the rate was between 0.5 to 1.0 cases per 1,000 6-year-olds per year.
- Many children contract a mild case of polio during early childhood while they are still protected by their mothers' antibodies. This initial case gives them immunity

against future, more severe recurrences of the disease. Children living in less sanitary conditions are more likely to contract an early, mild case of polio, and are hence less susceptible to the more debilitating versions of the disease.

- Nonparalytic cases of polio are difficult to diagnose and are easily confused with other diseases. In the 50's, about 10% of diagnosed cases of polio were actually determined to be other diseases after further testing. Paralytic and fatal cases of polio are much easier to diagnose, though less common.
- Early experimental polio vaccines involved the injection of dead or weakened viral particles. In some early vaccine trials in the thirties involving weakened viruses, there was evidence that in some cases the vaccinations actually caused the disease.

## Testing a Vaccine

Jonas Salk developed a very promising vaccine for polio based on killed viruses in the early fifties, and it was decided that it would be field tested in 1954.

### 1. How would you design a trial to test the vaccine's effectiveness?

- (a) Who would you test the vaccine on?
- (b) How big should your trial be?
- (c) What do you do about people who do not agree to be vaccinated?
- (d) How do you convince skeptics (such as your instructors) that the vaccine really works?

#### Sources

- *Statistics: A Guide to the Unknown* (Tanur et al, Wadsworth, 1985) and
- <http://vortex.netbistro.com/pg/People/polio.html>