
Measles Outbreak in Rhode Island

GERALD A. FAICH, MD
ROGER BERNIER, PhD
RONALD McCORD, MD

MAJOR EPIDEMICS OF MEASLES had been occurring in Rhode Island every 2 to 4 years until 1966. In that year, the State launched a large-scale measles immunization program and vaccinated more than 30,000 children aged 1 to 12 years (1). In 1970, the State adopted a law requiring immunization of students entering school for the first time, and this law has been enforced systematically since 1972. A 1978 survey of children in grades kindergarten through 9 revealed that measles immunization was docu-

mented in the school records of 94 percent of the elementary school students and 82 percent of the junior high school students. Only four sporadic cases of measles were reported in the State in 1978.

In late 1978 and early 1979, 99 cases of measles occurred in Rhode Island. Although cases occurred in 30 schools and 17 towns, most were clustered in a single town and particularly in a single junior high school. The outbreak illustrated the epidemiology of measles in a population with high immunity levels and highlighted some of the problems that arise in attempts to eliminate indigenous transmission of measles.

The Outbreak

On January 17, 1979, a physician reported a case of measles in a 13-year-old student of the Riverside Junior High School (RJHS) in

East Providence. A preliminary investigation by the health department uncovered an additional 14 previously unreported cases at RJHS, some with onsets in late November 1978. Of these 14 cases, 8 were confirmed as measles by serologic tests. The origin of the epidemic was traced to a 4-year-old who had traveled from Rhode Island to New Hampshire, was exposed to measles, and developed the disease in late October. In early and then late November, three relatives of this child (one attended RJHS) had measles.

Subsequently, 99 measles cases were reported statewide until February 1979 (see chart). During the epidemic, the definition of a case was based on the presence of a temperature equal to or greater than 101°F, a rash for 4 or more days, and cough, coryza, or conjunctivitis. Most of the affected students (71)

Dr. Faich is associate director, Rhode Island Department of Health. Dr. Bernier is an epidemiologist, Centers for Disease Control. Dr. McCord is a resident with the Chesterfield Family Practice Program, Medical College of Virginia. Tearsheet requests to Dr. Roger Bernier, Surveillance and Assessment Branch, Immunization Division, Center for Prevention Services, Centers for Disease Control, Atlanta, Ga. 30333.

lived in East Providence; 17 other towns reported at least 1 case. Although 30 schools in the State reported cases, only RJHS had a significant outbreak—42 cases. In the age group 10–19, 77 cases occurred; in the under-10 age group, only 13 cases occurred. The 99 cases included 7 that were imported to Rhode Island: 1 from New Hampshire, 3 from Florida, 1 from New York City, 1 from Pennsylvania, and 1 from the Azores.

At RJHS, studies revealed that the non-immunized students had the highest attack rate (22 percent). Students who had been vaccinated before the age of 12 months had an intermediate attack rate (9 percent), and those who had been vaccinated at 12 months or older had the lowest (3 percent). The overall attack rate at RJHS was 4.9 percent (41 of 829 students), and the measles vaccine efficacy was 88.7

percent (95 percent confidence limits, 75.6–94.1 percent).

Control Measure

As soon as the outbreak became apparent in mid-January, all children in East Providence without adequate proof of measles immunity (a history of measles diagnosed by a physician or of live vaccine given at 12 months or older) were excluded from school. At RJHS, 146 students were excluded initially, but three-fourths of them subsequently were able to provide adequate proof of immunity. No additional cases were reported after the exclusion action was taken.

In the following week, schools throughout the State were asked to identify and exclude susceptible students. More than 25,000 susceptible students were identified, but 78 percent of these were able to provide

evidence of previous or newly acquired immunization before the exclusion deadline. Only 3 percent of the school population was actually excluded from school; the exclusions were concentrated in the upper grade levels (see table).

In late January 1979, 39 public clinics were conducted at schools and various medical facilities, and vaccine was distributed to 130 private physicians. The public clinic staffs administered 25,240 doses of vaccine; 45 percent of the vaccine administered was the combined measles-rubella (M-R) type. The private physicians administered about 11,000 doses. At the public clinics, 87 percent of the vaccine recipients were 10 to 19 years old.

Discussion

The epidemic apparently was due to the introduction of measles virus

Rhode Island school population, by grade, measles vaccine status, and percentage excluded from school because of inadequate proof of immunity, January-February 1979

Grade	Number students enrolled	Vaccine documented		Percent excluded
		Before outbreak (percent)	Before deadline (percent)	
Kindergarten-6	99,316	94	5	1
7-9	48,729	82	15	3
10	14,297	75	16	9
11	15,047	69	22	9
12	12,287	69	20	11
Total	189,676	86	11	3

into an unusually large pocket of susceptible students at the junior high school. During the investigation of the epidemic, we found that such introductions from outside the State are not uncommon. The increased number of susceptible stu-

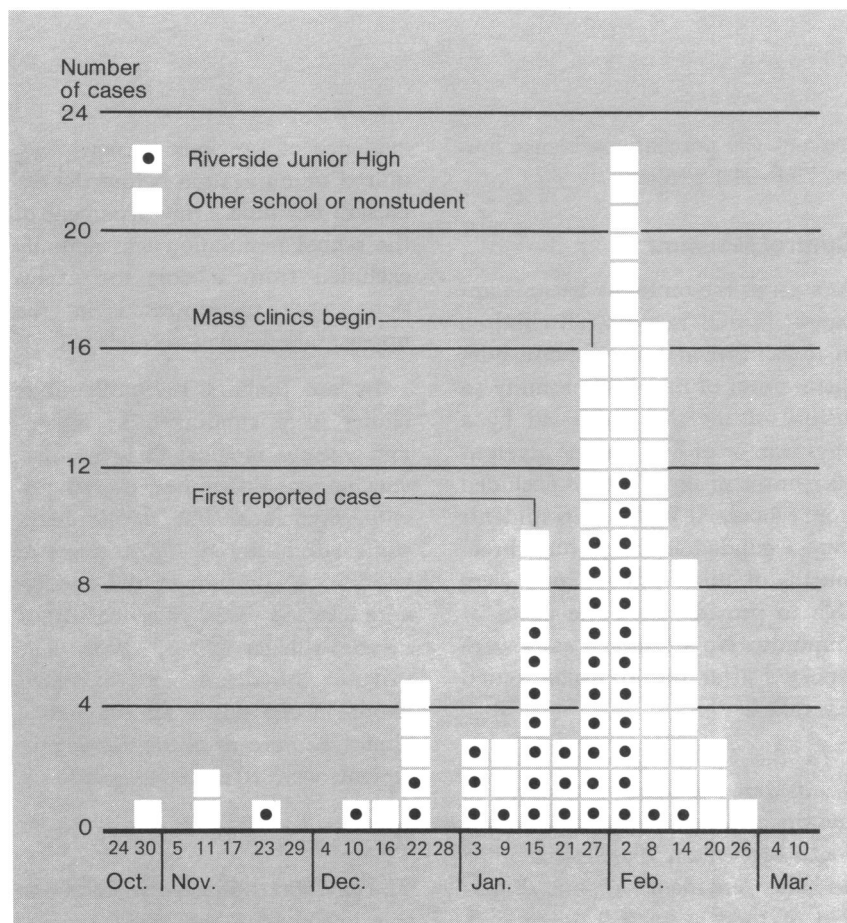
dents at the school may be attributed to the fact that this school's nurse did not complete the immunization record review that had been conducted statewide in 1978 for grades kindergarten through 9.

Overall, 86 percent of Rhode

Island's school children had documented measles immunization before the epidemic, but documentation levels were particularly low for those in grades 7 through 12, as shown in the table. To some extent these low documentation levels could be attributed to inadequate updating of records; however, immunity often could not be proved, and immunization was required. Since few cases of measles occurred in the State before the outbreak or in the towns outside of East Providence during the outbreak, it seems that the school population of Rhode Island had a higher level of immunity than could be documented by school records.

Most measles cases reported nationally are among people 10 years and older (2). Before the epidemic, Rhode Island's school immunization law required proof of immunization solely for initial entry to school. Because this law had been in place for only 7 years, documented immunity levels were high only for children in grades kindergarten through 7. If measles outbreaks and large-scale, crash immunization programs are to be avoided, proof of measles immunity for students must be required at all grade levels. For this reason, the Rhode Island State law and those in several States have been modified to include all grade levels. Other areas that do not have such a law or do not enforce it systematically will be compelled to conduct large "fire fighting" immunization programs such as the one conducted in Rhode Island.

Distribution of 99 cases of measles reported in Rhode Island, October 1978-February 1979



References

1. Byrne, E. B., Rosenstein, B. J., Jawarski, A. A., and Jawarski, R. O.: Statewide mass measles immunization. *JAMA* 199: 613-623 (1967).
2. PHS Advisory Committee on Immunization Practices: Measles prevention. *Morbidity Mortality Weekly Rep* 27: 427-437 (1978).