

Imported Measles Outbreak in a University

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Abstract. In 1981, a measles outbreak in an Arkansas university involved 16 students and four persons who were contacts of these students. The first two cases were in students who recently returned from Honduras. Of the 16 students with measles, 12 had significant gastrointestinal symptoms; five had elevated liver transaminase, and eight were hospitalized. Only two of the students were considered adequately immunized. A voluntary immunization clinic held on the university campus resulted in 67 per cent of 3,076 students being vaccinated. (*Am J Public Health* 1985; 75:397-398.)

Introduction

Since the initiation in 1978 of the campaign to eliminate indigenous measles transmission in the United States,¹ the number of measles cases has dramatically declined.^{2,3} Many cases still occur in persons who have acquired their infection abroad and developed symptoms upon returning to the United States and in susceptible contacts of these persons. Since as many as 20 per cent of young adults in some groups are susceptible⁴⁻⁶ and since they have considerable social contacts, measles transmission may be sustained once the virus has been introduced.^{7,8} In this report we describe an outbreak among university students following introduction of the measles virus by two students returning from a trip abroad.

Background

On September 18, 1981, the Arkansas Department of Health was notified by a physician that two male students belonging to a church-affiliated university had been hospitalized with possible measles. Follow-up identified four other university students who had also been recently hospitalized with a similar illness. In addition to the rash, these four students had nausea, vomiting, and diarrhea and were discharged with a diagnosis of "enteric fever," although laboratory studies including stool and blood cultures identified no bacterial pathogens.

Methods

A case of measles was defined as a person with fever $\geq 101^{\circ}\text{F}$, a generalized maculopapular rash ≥ 3 days duration, and cough, coryza, or conjunctivitis. Patients with measles were identified from physician reports and a review of university health records. Physicians in the community were notified and asked to report patients with rash illnesses. Patients were questioned about symptoms, contact with persons with rash illness, travel outside the local community, measles vaccination status, and past measles disease. Parents of students with measles were contacted to verify

past vaccination and measles disease history. Dates of vaccination were obtained from written records or the provider.

On September 23, five days after the initial case reports, an immunization clinic was held at the university to vaccinate all students who lacked documentation of measles vaccination. Students were exempted from the vaccination requirement if they furnished records of measles immunity, were pregnant, or had been born before September 1, 1957 (persons ≥ 25 years were considered immune).⁹ To determine the frequency of adverse reactions, questionnaires were distributed to students attending the chapel service on November 12, seven weeks after the clinic.

Results

Twenty cases of measles were identified with dates of onset between August 17, 1981 and October 16, 1981 (Figure 1). The first cases occurred in two male students who had had onset of rash on August 17 and 23 and had visited Honduras from August 1 through 16. Although measles is endemic in Honduras, these students had no known contact with persons having measles; however, they were involved in door-to-door visits. Fourteen additional cases were identified among university students. These included two male siblings of an index patient. Measles in another 10 students resulted from transmission within dormitories (seven cases) and in classrooms (three cases). No contact could be traced for two students. The remaining four cases were in non-university persons who had had face-to-face contact with persons with measles, including a 20-year-old pregnant woman who, following her illness, went into premature labor.

The overall attack rate for university students was 5.2 per 1,000 (16 of 3,076 students). The attack rate for males (7.4 per 1,000) was more than twice that for females (3.1 per 1,000). The attack rates per 1,000 students by college year were: freshmen 5.0, sophomores 6.5, juniors 9.4, and seniors/postgraduates 1.3. The attack rates for students living in campus dormitories and in on-campus housing were similar—6.7 and 6.1 per 1,000, respectively. No students living in off-campus housing developed measles.

Eight (50 per cent) of the 16 students were hospitalized for a mean duration of 5.4 days (range 2-9). Twelve patients

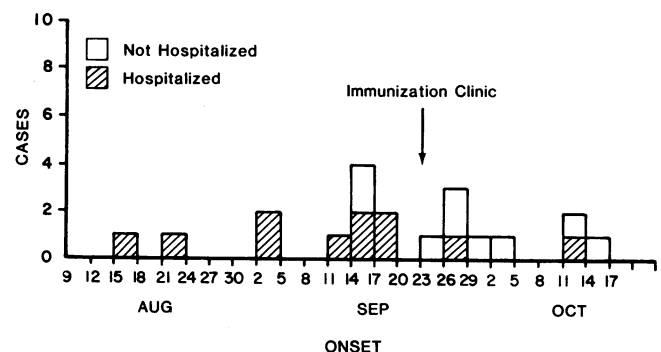


FIGURE 1—Cases of Measles, by Date of Rash Onset, a University in Arkansas, 1981

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reported gastrointestinal symptoms (nausea, vomiting, or diarrhea); in four, intravenous fluids were required for rehydration. Liver transaminases were elevated in five of the six patients tested and three patients had elevations greater than three times normal. Two patients developed mouth ulcers. All hospitalized patients had normal chest x-rays, except one who showed patchy infiltrates in both lungs. Acute- and convalescent-phase serum specimens were available for six students; all showed a four-fold rise in measles complement fixation antibodies. Of seven other serum specimens tested for measles-specific IgM antibodies, two were positive and one was negative; four were inconclusive.

Seven (44 per cent) of 16 students with measles had no history of measles vaccination. Of the remaining nine students with measles who had a history of vaccination, only two (12.5 per cent) students had received live measles vaccine on or after their first birthday.

A total of 2,057 students (43 per cent female) were vaccinated at the clinic; 2,023 with combined measles-rubella (MR) vaccine and 34 with the monovalent measles vaccine. Questionnaires distributed to 2,350 students were returned by 1,748 (74 per cent). Of these, 1,123 (64 per cent) students reported being vaccinated at the special clinic with MR vaccine and 13 students with monovalent measles vaccine. Vaccinated and unvaccinated students were similar in age, sex, and race. Joint pain was reported more frequently by vaccine recipients (8 per cent) than by unvaccinated students (3 per cent), otherwise there were no differences (Table 1).

Discussion

Transmission of measles following acquisition abroad is expected to be limited because of high immunization levels in the United States population.³ However, institutions housing young adults have experienced sustained measles transmission.¹⁰ Given the increased risk of exposure to measles virus outside of the United States, students who travel abroad should have documented evidence of measles immunity before departure.

In young adults, measles is often severe and persons previously vaccinated with a killed vaccine may develop atypical manifestations.^{11,12} Gastrointestinal manifestations causing dehydration following measles in adults is uncommon, although this is frequently observed in the tropics among malnourished children. It is possible that some of the patients had other concurrent illnesses, although none were identified.

Very high participation of the student body at the immunization clinic was responsible for stemming this outbreak. Symptoms among vaccinated students compared to unvaccinated students showed that only joint pain was more frequent in the vaccinees, most likely a minor, usually transitory reaction from the rubella component of the vaccine.¹³ The lack of joint pain in unvaccinated students

TABLE 1—Symptoms among Students Vaccinated with Measles-Rubella Vaccine in the Clinic and among Unvaccinated Students, Arkansas, 1982

Symptoms	% Vaccinated N = 1123	% Unvaccinated N = 612	Relative Risk	95% C.I.
Fever	8.4	9.0	0.9	(0.68–1.28)
Rash	2.8	3.4	0.8	(0.47–1.39)
Cough	9.5	11.4	0.8	(0.63–1.11)
Conjunctivitis	0.8	1.3	0.6	(0.24–1.57)
Sore throat	16.4	17.0	1.0	(0.77–1.20)
Joint pain	8.4	2.9	2.9	(1.79–4.54)
Tingling sensation in arms and legs	1.6	0.8	2.0	(0.75–5.16)
Missed classes	8.6	12.9	0.7	(0.51–0.89)
Consulted health authority for symptoms	8.3	10.9	0.8	(0.56–1.02)

suggested that a seasonal occurrence of illness unrelated to the immunization campaign was not likely.

This outbreak serves as a reminder that there is a need for counseling persons traveling abroad regarding measles vaccination. If vaccination or measles disease history is in doubt, vaccination is indicated. In addition, since immunity levels of students in universities are generally lower than those of younger children, it seems prudent for universities to consider requiring adequate documentation of measles immunity.

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