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Current Trends

Pertussis Surveillance, 1979-1981

In 1979, in cooperation with state and territorial epidemiologists, CDC introduced a supplementary pertussis surveillance system to gather more detailed information on the epidemiology of pertussis in the United States. Before 1979, national pertussis surveillance by CDC was limited to data on the age and sex of each patient and the state reporting each case. These data were and continue to be reported in the *Morbidity and Mortality Weekly Report* (*MMWR*).

In the 3-year period, 1979-1981, the supplementary surveillance system received reports of 1,277 cases from 42 states. The largest numbers of cases were reported by Indiana (185), Washington (125), and New York (105).

Analysis of the data from this supplementary system indicates that 62% of the cases involved children <1 year of age, and that 79% of these cases were among children <6 months of age (Figure 1). The high percentage of cases found among <1-year olds by this supplementary system is similar to the 57% of pertussis cases in that age group reported in the *MMWR* for 1980 (*1*).

According to current recommendations of both the American Academy of Pediatrics (AAP) and the Immunization Practices Advisory Committee (ACIP), an infant should receive 3 doses of diphtheria-tetanus-pertussis (DTP) vaccine by 6 months of age and a fourth dose by 18 months of age in the absence of medical contraindications (*2,3*). Of 479 reported pertussis patients, ages 6 months-9 years,* with known vaccination status, 33% were not vaccinated with DTP before becoming ill, and 60% had received <3 doses.

Findings for the patients on whom clinical information was available showed that 72% had a whoop and 41% had apnea. Pneumonia was reported as a complication for 29% of patients (Table 1). The frequency of pneumonia was highest (34%) among infants <6 months of age. For patients <4 years of age, the likelihood of pneumonia was inversely related to the number of DTP doses (for children 0-5 months, $p = 0.009$; for children 6 months-4 years, $p = 0.025$.)†

Seizures were reported for 51 (4%) of 1,277 patients; 29 (56%) of these patients were <6 months of age. Among patients <4 years of age, the likelihood of developing seizures was also inversely related to the number of DTP doses received; however, the difference was not statistically significant. Encephalopathy was associated with 0.4% of cases. All patients reported to have encephalopathy were <1 year of age.

Fifty-eight percent of all reported patients were hospitalized, including 80% of infants <6

*Vaccination histories for persons >9 years old were thought to be less reliable and were therefore not included in this analysis.

†Chi square test for linear trend, used for all statistical analyses.

Pertussis — Continued

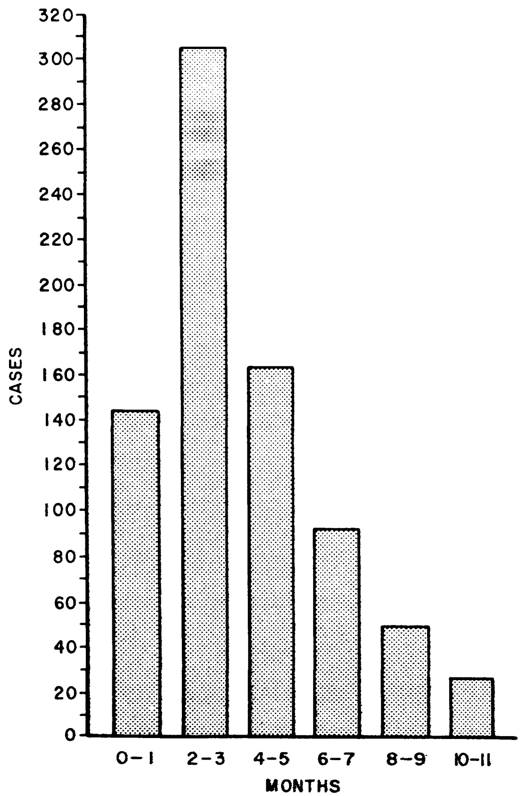
months of age, 60% of those 6-11 months of age, and 35% of those 1-4 years of age. Relatively few patients >4 years of age were hospitalized. The proportion of patients hospitalized was inversely related to the number of doses of DTP vaccine received; the highest proportion of patients hospitalized occurred among children who had received <3 doses of DTP vaccine ($p = 0.0046$ for 6- to 11-month olds and <0.0001 for 1- to 4-year olds).

Seven deaths (0.5%) associated with pertussis were reported. All deaths occurred among hospitalized patients who were <1 year of age, had not been vaccinated, and had pneumonia.

Laboratory confirmation of the diagnosis of pertussis was available for 72% of cases. The diagnosis was confirmed by direct fluorescent antibody (DFA) testing in 46% of cases, by DFA and culture in 18%, and by culture in 8%. The diagnosis was made on clinical grounds alone in 28% of cases.

Additional information about household contacts was available for 287 patients. To calculate vaccine efficacy, secondary attack rates were determined for unvaccinated household contacts (no DTP doses received) and for household contacts who were fully vaccinated (3 or more DTP doses). Vaccine efficacy for household contacts <5 years of age was 82.4%. Efficacy could not be calculated for children 5-9 years of age because very few household contacts in this age group were unvaccinated.

FIGURE 1. Age distribution of pertussis cases, United States, 1979-1981



Pertussis – Continued

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Editorial Note: During the recent controversy regarding pertussis vaccine, questions were raised as to whether the disease has caused sufficient morbidity and mortality, in recent years, to justify routine vaccine use. As with other vaccines, the decision to recommend use of DTP vaccine depends on the risk of developing disease, disease severity, vaccine efficacy, and adverse reactions associated with the vaccine.

Data from the CDC pertussis surveillance systems presented above provide information on the current morbidity and mortality due to pertussis in the United States and on the efficacy of currently used vaccines in both preventing and attenuating disease. They demonstrate that pertussis is a severe disease, particularly for children <1 year of age, and may be associated with seizures, encephalopathy, and death. The data also demonstrate that DTP vaccine is efficacious. More than 80% of children exposed to pertussis who have received at least 3 doses of DTP vaccine will be protected. Because, under the current ACIP vaccination schedule, children do not receive 3 doses of vaccine until 6 months of age, not all cases of pertussis in this age group are preventable. However, children who have received 1 or 2 doses of vaccine, if infected, tend to have milder illnesses than unvaccinated children of similar age. Furthermore, the risk of infection in the <6-month age group may also be reduced indirectly by high levels of vaccination in older children, and the resultant decreased transmission of disease.

As with most surveillance systems, underreporting is a problem. The supplementary system reported only 20% as many cases as were reported to the MMWR in 1979-1981. A disproportionate number of hospitalized, laboratory-confirmed, and classical cases may have been reported. Furthermore, a history of hospitalization may not indicate the same degree of disease severity for different age groups. Nevertheless, the data are useful for estimating the risks of disease and the benefits of vaccine usage.

TABLE 1. Pertussis cases with hospitalizations and other complications, by selected age groups and vaccination status, 1979-81, United States

Age groups	Vaccination status by number of doses							
	0		1 or 2		≥3		Total*	
Pneumonia								
0-5 mo	104/272†	38§	33/127	26	0	-	137/399	34
6-11 mo	8/44	18	11/39	28	1/18	6	20/101	20
1-4 yrs	17/50	34	12/36	33	5/41	12	34/127	27
Seizures								
0-5 mo	21/304	7	8/173	5	0/1	0	29/478	6
6-11 mo	5/59	8	3/56	5	0/26	0	8/141	6
1-4 yrs	1/68	1	2/51	4	1/94	1	4/213	2
Hospitalized								
0-5 mo	297/352	84	141/193	73	1/1	100	439/546	80
6-11 mo	46/67	69	36/60	60	12/29	41	94/156	60
1-4 yrs	36/78	46	28/58	48	19/99	19	83/235	35

*Total cases with data available on vaccine status and specified complication.

†Number of cases with complication/total number of cases of specified vaccination status in each age group for which complication status was known.

§Percentage with specified complication.

Pertussis — Continued

Two recent studies provide estimates of risks associated with DTP vaccination. Of 15,752 recipients of DTP vaccine, 64% reported local reactions, and 50% reported minor systemic reactions within 48 hours (*4*). The more serious reactions, such as convulsions noted in 9 children and hypotonic hyporesponsive episodes noted in 9 children, each occurred at a frequency of 1/1,750 doses. Seventeen of the 18 children who had such reactions were examined by a physician shortly after the episode; all were found to be normal.

In Great Britain, 1,000 cases of neurologic illness were investigated by means of a case-control study to detect the occurrence of severe neurologic reactions following DTP vaccination (*5*). Neurologic illness attributable to DTP vaccination was estimated to occur at a frequency of 1/110,000 doses of DTP, and permanent neurologic residua to occur at a frequency of 1/310,000 doses.

In 1980, 95% of children in the United States had completed a primary series of vaccination by the time they entered school. Because of high levels of vaccine acceptance in the United States, the current risk of pertussis is low. However, the agent, *Bordetella pertussis*, continues to cause disease. Recent experience in Japan and Great Britain has demonstrated that a decline in vaccination level in a previously highly vaccinated population may result in resurgence of disease (*6,7*). In addition to the data presented, formal cost-benefit analysis of pertussis and DTP vaccine also indicates that the benefits of vaccine continue to outweigh the risks (*8*). Both the ACIP and the AAP continue to recommend routine use of DTP vaccine.

References

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Medical Examiner Summer Mortality Surveillance — United States, 1979-1981

Sustained increases in summer temperature and humidity (heat waves) have been associated with extensive morbidity and mortality in the United States (*1-4*). Identification of high-risk groups and effective prevention measures for certain heat-related illnesses have allowed development of prevention programs (*2,5-13*). A pilot study designed to explore the utility and feasibility of using summer mortality statistics from medical examiners as a basis for indirect surveillance of heat-related illness was initiated in June 1981. The medical examiners of 16 major metropolitan areas, the National Climatic Center, and the National Weather Service provided CDC with the number of deaths each day and meteorologic measurements for the period June 1 - August 31, 1979-1981.

Summer Mortality Surveillance – Continued

Average July temperatures were within 4F (2.2C) of normal at all surveillance sites in 1979 and 1981, but were as high as 8F (4.4C) above nôrmal in 1980 at several surveillance sites due to a severe and widespread heat wave in July 1980. Deaths reported by medical examiners rose in mid-July 1980 in areas in which other health effects related to heat were severe (Figure 2). The proportionate increase in deaths in July 1980 over those reported in July 1979 correlated poorly with the average maximum temperature for July 1980, even after adjustment for the effect of humidity, but correlated well with the upward departure from the normal July temperature for each surveillance site.

The striking increase in deaths recorded by medical examiners and noted in several cities in association with the onset of unusually high temperatures suggests that these mortality data are useful in the prompt detection of outbreaks of heat-related illness. Further work is required to quantify the specificity and sensitivity of this method. Data collection will continue during the summer of 1982.

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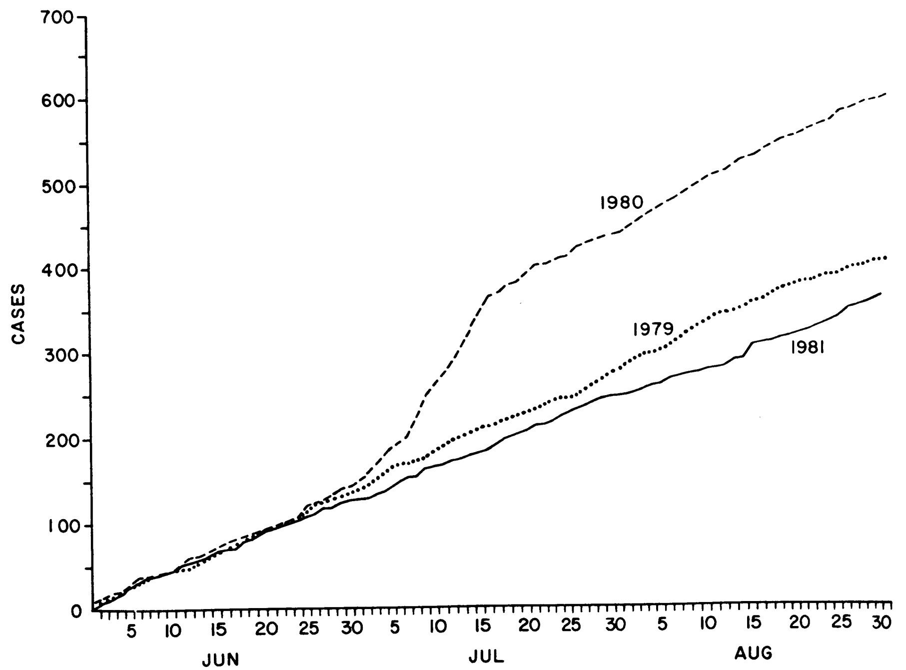
FIGURE 2. Cumulative deaths reported by medical examiners, Memphis, Tennessee, June-August 1979-1981



Summer Mortality Surveillance — Continued

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Editorial Note: Large increases in numbers of deaths from stroke and ischemic heart disease as well as deaths from more obviously heat-related illness (e.g., heatstroke) have been reported in association with heat waves (*14*). Deaths caused by these conditions are often sudden, unlikely to be witnessed by a physician, and therefore likely to be investigated by a medical examiner. A population-based study of heat-related morbidity and mortality in 2 midwestern

(Continued on page 343)

TABLE I. Summary — cases of specified notifiable diseases, United States

DISEASE	25th WEEK ENDING			CUMULATIVE, FIRST 25 WEEKS		
	June 26 1982	June 27 1981	MEDIAN 1977-1981	June 26 1982	June 27 1981	MEDIAN 1977-1981
Aseptic meningitis	146	139	116	2,026	1,904	1,413
Brucellosis	1	3	5	67	69	82
Encephalitis: Primary (arthropod-borne & unspec.)	26	19	19	375	358	308
Post-infectious	2	3	4	38	47	102
Gonorrhea: Civilian	17,798	19,358	20,192	430,049	468,185	452,235
Military	251	670	499	12,434	13,950	12,844
Hepatitis: Type A	354	431	578	10,394	12,293	13,734
Type B	464	418	319	9,814	9,572	7,888
Non A, Non B	43	N	N	1,027	N	N
Unspecified	172	179	179	4,327	5,265	4,797
Legionellosis	5	N	N	184	N	N
Leprosy	1	1	2	86	103	81
Malaria	12	43	26	408	640	288
Measles (rubeola)	49	75	464	880	2,218	11,252
Meningococcal infections: Total	36	48	48	1,671	2,078	1,564
Civilian	35	48	48	1,664	2,070	1,548
Military	1	-	1	7	8	11
Mumps	112	55	301	3,739	2,668	9,759
Pertussis	25	24	26	500	496	529
Rubella (German measles)	44	33	362	1,614	1,442	9,574
Syphilis (Primary & Secondary): Civilian	668	620	488	15,609	14,384	11,574
Military	8	5	5	194	181	146
Tuberculosis	488	506	655	12,247	12,646	13,162
Tularemia	13	10	6	75	89	70
Typhoid fever	6	7	8	178	226	210
Typhus fever, tick-borne (RMSF)	44	54	50	334	449	325
Rabies, animal	153	197	93	2,995	3,713	2,289

TABLE II. Notifiable diseases of low frequency, United States

	CUM. 1982		CUM. 1982
Anthrax	-	Poliomyelitis: Total	2
Botulism (Calif. 3)	37	Paralytic	2
Cholera	-	Psittacosis (Tenn. 1)	53
Congenital rubella syndrome	5	Rabies, human	-
Diphtheria	-	Tetanus (Calif. 1)	35
Leptospirosis	29	Trichinosis (Md. 1)	54
Plague	4	Typhus fever, flea-borne (endemic, murine) (Tex. 2)	14

N: Not notifiable

TABLE III. Cases of specified notifiable diseases, United States, weeks ending June 26, 1982 and June 27, 1981 (25th week)

REPORTING AREA	ASEPTIC MENINGITIS	BRUCELLOSIS	ENCEPHALITIS		GONORRHEA (Civilian)		HEPATITIS (Viral), by type				LEGIONELLOSIS	LEPROSY
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	1982	CUM. 1982	CUM. 1982	CUM. 1982	CUM. 1982	CUM. 1981	1982	1982	1982	1982	1982	CUM. 1982
UNITED STATES	146	67	375	38	430,049	468,185	354	464	43	172	5	86
NEW ENGLAND	6	3	15	4	10,454	11,501	12	27	3	22	-	1
Maine	3	-	-	-	490	568	2	3	-	-	-	-
N.H.	-	-	-	-	310	392	-	1	-	1	-	-
Vt.	-	-	-	-	212	200	-	-	-	-	-	-
Mass.	1	-	5	-	4,800	4,771	9	6	2	16	-	-
R.I.	2	-	-	-	722	602	-	3	1	-	-	-
Conn.	-	3	10	4	3,920	4,968	1	14	-	5	-	1
MID. ATLANTIC	11	-	50	9	54,555	53,758	21	75	1	10	1	4
Upstate N.Y.	3	-	19	3	8,806	9,076	2	13	1	1	-	1
N.Y. City	2	-	10	-	23,078	21,554	11	26	-	3	-	1
N.J.	5	-	10	-	9,794	10,562	8	36	-	6	1	1
Pa.	1	-	11	6	12,877	12,566	-	-	-	-	-	1
E.N. CENTRAL	13	-	76	7	58,034	73,309	54	56	-	20	3	3
Ohio	3	-	23	4	17,803	25,135	7	18	-	6	-	-
Ind.	6	-	15	2	7,477	6,513	13	6	-	3	-	-
Ill.	-	-	6	1	11,924	20,412	4	1	-	4	1	3
Mich.	3	-	30	-	15,011	14,996	28	29	-	7	2	-
Wis.	1	-	2	-	5,819	6,253	2	2	-	-	-	-
W.N. CENTRAL	6	7	23	3	21,158	22,189	28	14	2	4	-	1
Minn.	-	-	5	1	3,187	3,495	19	1	-	-	-	-
Iowa	3	1	10	1	2,268	2,405	-	5	-	2	-	-
Mo.	3	2	4	-	9,807	10,094	7	3	1	2	-	1
N. Dak.	-	-	-	-	285	314	-	-	-	-	-	-
S. Dak.	-	1	-	1	591	635	-	-	-	-	-	-
Nebr.	-	-	2	-	1,306	1,737	-	2	1	-	-	-
Kans.	-	3	2	-	3,714	3,509	2	3	-	-	-	-
S. ATLANTIC	23	15	56	6	103,890	115,015	48	96	14	23	-	5
Del.	-	-	-	-	1,756	1,705	1	5	-	-	-	-
Md.	2	-	13	-	14,588	12,406	4	19	4	2	-	2
D.C.	-	-	-	-	6,195	7,150	-	1	-	-	-	-
Va.	-	6	14	1	10,029	10,522	2	12	1	-	-	1
W. Va.	-	-	-	-	1,308	1,723	4	6	-	-	-	-
N.C.	4	-	4	1	18,444	17,796	2	4	-	6	-	-
S.C.	1	2	-	-	11,083	10,727	-	2	-	1	-	-
Ga.	-	1	-	-	9,483	23,779	4	18	-	1	-	-
Fla.	16	6	25	4	31,004	29,207	31	29	9	13	-	2
E.S. CENTRAL	9	7	20	2	37,528	38,508	21	21	1	4	-	-
Ky.	-	-	-	-	5,084	4,948	4	-	-	-	-	-
Tenn.	1	4	11	-	14,581	14,580	11	12	1	2	-	-
Ala.	8	2	6	2	11,136	11,763	2	8	-	2	-	-
Miss.	-	1	3	-	6,727	7,217	4	1	-	-	-	-
W.S. CENTRAL	36	19	44	1	62,247	61,623	62	45	-	43	-	10
Ark.	-	4	1	-	5,233	4,269	-	3	-	4	-	-
La.	1	2	6	-	11,524	9,756	7	6	-	2	-	-
Okla.	7	3	13	-	6,692	6,631	10	11	-	1	-	-
Tex.	28	10	24	1	38,798	40,967	45	25	-	36	-	10
MOUNTAIN	6	-	17	3	15,597	18,375	34	19	6	10	-	2
Mont.	-	-	-	-	636	639	1	1	-	-	-	-
Idaho	-	-	-	-	738	780	-	1	-	-	-	1
Wyo.	-	-	-	-	444	413	-	-	2	-	-	-
Colo.	2	-	7	1	4,092	4,909	5	7	1	3	-	-
N. Mex.	-	-	-	-	1,945	2,024	13	3	1	3	-	-
Ariz.	-	-	6	-	4,325	5,637	9	5	1	2	-	-
Utah	4	-	-	2	710	863	5	2	1	2	-	1
Nev.	-	-	4	-	2,707	3,110	1	-	-	-	-	-
PACIFIC	36	16	74	3	66,586	73,907	74	111	16	36	1	60
Wash.	-	-	7	-	5,445	6,124	7	8	2	3	1	6
Oreg.	1	-	1	-	3,702	4,647	6	8	-	1	-	-
Calif.	21	15	62	3	54,615	59,883	57	86	14	30	-	34
Alaska	-	1	3	-	1,656	1,839	-	5	-	-	-	1
Hawaii	14	-	1	-	1,168	1,414	4	4	-	2	-	19
Guam	U	-	-	-	42	64	U	U	U	U	U	-
P.R.	U	-	1	-	1,295	1,599	U	U	U	U	U	-
V.I.	-	-	-	-	93	82	-	-	-	-	-	-
Pac. Trust Terr.	U	-	-	-	36	211	U	U	U	U	U	1

N: Not notifiable U: Unavailable

TABLE III (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending June 26, 1982 and June 27, 1981 (25th week)

REPORTING AREA	MALARIA		MEASLES (RUBEOLA)			MENINGOCOCCAL INFECTIONS (Total)		MUMPS		PERTUSSIS	RUBELLA		
	1982	CUM. 1982	1982	CUM. 1982	CUM. 1981	1982	CUM. 1982	1982	CUM. 1982	1982	1982	CUM. 1982	CUM. 1981
UNITED STATES	12	408	49	880	2,218	36	1,671	112	3,739	25	44	1,614	1,442
NEW ENGLAND	-	22	-	9	72	3	90	5	148	-	-	14	104
Maine	-	-	-	-	5	-	4	1	33	-	-	-	33
N.H.	-	-	-	2	6	1	13	-	12	-	-	8	42
Vt.	-	-	-	2	2	1	6	-	5	-	-	-	-
Mass.	-	17	-	2	51	-	22	2	72	-	-	3	18
R.I.	-	1	-	-	-	-	11	1	13	-	-	1	-
Conn.	-	4	-	3	8	1	34	1	13	-	-	2	11
MID. ATLANTIC	1	55	11	141	733	6	301	9	234	6	2	78	173
Upstate N.Y.	-	14	6	99	193	1	97	3	45	3	1	38	71
N.Y. City	1	18	5	34	52	3	53	3	38	2	-	26	46
N.J.	-	16	-	4	50	1	63	2	35	-	1	14	46
Pa.	-	7	-	4	438	1	88	1	116	1	-	-	10
E.N. CENTRAL	4	29	4	54	72	4	199	44	2,058	3	2	143	305
Ohio	-	7	-	1	15	-	77	27	1,520	2	-	-	-
Ind.	-	1	-	2	8	1	20	-	33	-	2	26	105
Ill.	-	3	-	16	21	2	51	9	154	1	-	55	71
Mich.	4	16	4	35	27	1	40	8	275	-	-	42	31
Wis.	-	2	-	-	1	-	11	-	76	-	-	20	98
W.N. CENTRAL	1	13	3	38	7	1	70	23	495	1	1	57	73
Minn.	1	2	-	-	3	-	14	16	373	-	1	7	7
Iowa	-	5	-	-	1	-	5	-	29	-	-	-	4
Mo.	-	3	-	2	1	-	21	1	14	-	-	38	2
N. Dak.	-	-	-	-	-	-	6	-	-	-	-	-	-
S. Dak.	-	-	-	-	-	-	3	-	1	-	-	1	-
Nebr.	-	2	-	-	1	-	9	-	-	-	-	-	1
Kans.	-	1	3	36	1	1	12	6	78	1	-	11	59
S. ATLANTIC	1	59	-	33	319	3	333	6	211	7	1	61	117
Del.	-	-	-	-	-	-	-	4	10	1	-	1	1
Md.	-	7	-	2	1	1	21	-	21	-	-	31	1
D.C.	-	3	-	1	1	-	2	-	-	-	-	-	-
Va.	-	22	-	14	6	-	36	-	30	-	1	11	3
W. Va.	-	3	-	2	8	-	7	-	80	-	-	1	22
N.C.	-	-	-	-	3	1	67	-	9	1	-	1	4
S.C.	-	3	-	-	-	-	39	1	12	2	-	1	8
Ga.	1	9	-	-	101	-	69	-	10	-	-	5	31
Fla.	-	12	-	14	199	1	92	1	39	3	-	10	47
E.S. CENTRAL	-	5	-	7	2	3	115	1	30	-	-	37	23
Ky.	-	4	-	1	-	-	19	-	9	-	-	21	14
Tenn.	-	-	-	5	-	2	46	-	11	-	-	-	8
Ala.	-	-	-	-	2	-	43	-	5	-	-	-	1
Miss.	-	1	-	1	-	1	7	1	5	-	-	16	-
W.S. CENTRAL	-	31	2	14	706	5	199	1	137	3	7	90	115
Ark.	-	3	-	-	1	-	12	-	6	-	1	1	2
La.	-	3	2	2	-	-	34	-	3	1	1	1	9
Okla.	-	3	-	-	5	1	17	-	-	-	-	3	-
Tex.	-	22	-	12	700	4	136	1	128	2	5	85	104
MOUNTAIN	1	10	-	5	31	1	83	3	55	5	-	50	68
Mont.	-	-	-	-	-	-	4	-	3	-	-	4	3
Idaho	-	-	-	-	1	-	6	-	3	1	-	-	3
Wyo.	-	-	-	-	-	-	5	-	2	-	-	5	1
Colo.	1	6	-	5	8	1	32	-	8	-	-	4	29
N. Mex.	-	2	-	-	8	-	12	-	-	-	-	5	5
Ariz.	-	1	-	-	4	-	14	1	24	4	-	7	17
Utah	-	1	-	-	-	-	7	-	11	-	-	16	3
Nev.	-	-	-	-	10	-	3	2	4	-	-	9	7
PACIFIC	4	184	29	579	276	10	281	20	371	-	31	1,084	464
Wash.	1	11	-	25	1	-	29	-	58	-	2	32	54
Oreg.	-	5	-	-	3	5	60	-	-	-	1	4	48
Calif.	3	166	29	550	270	5	180	19	300	-	28	1,040	357
Alaska	-	-	-	1	-	-	9	-	6	-	-	1	-
Hawaii	-	2	-	3	2	-	3	1	7	-	-	7	5
Guam	U	1	U	-	6	U	1	U	1	U	U	1	1
P.R.	U	4	U	63	195	U	5	U	39	U	U	4	3
V.I.	-	-	-	-	7	-	-	-	-	-	-	-	1
Pac. Trust Terr.	U	-	U	-	1	U	-	U	-	U	U	-	1

U: Unavailable

TABLE III (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending June 26, 1982 and June 27, 1981 (25th week)

REPORTING AREA	SYPHILIS (Civilian) (Primary & Secondary)		TUBERCULOSIS		TULA-REMIA	TYPHOID FEVER		TYPHUS FEVER (Tick-borne) (RMSF)		RABIES, Animal
	CUM. 1982	CUM. 1981	1982	CUM. 1982	CUM. 1982	1982	CUM. 1982	1982	CUM. 1982	CUM. 1982
UNITED STATES	15,609	14,384	488	12,247	75	6	178	44	334	2,995
NEW ENGLAND	262	311	17	328	-	-	11	-	3	21
Maine	1	2	1	25	-	-	-	-	-	19
N.H.	1	12	-	10	-	-	-	-	-	-
Vt.	1	13	-	7	-	-	2	-	-	-
Mass.	184	207	11	219	-	-	8	-	1	-
R.I.	12	18	3	14	-	-	-	-	1	-
Conn.	63	59	2	53	-	-	1	-	1	2
MID. ATLANTIC	2,142	2,164	73	1,999	6	1	30	2	8	71
Upstate N.Y.	229	206	9	338	6	-	3	-	-	38
N.Y. City	1,280	1,307	33	748	-	-	19	-	-	-
N.J.	279	283	7	402	-	1	5	1	6	1
Pa.	354	368	24	511	-	-	3	1	2	32
E.N. CENTRAL	775	1,017	55	1,843	-	-	14	3	31	344
Ohio	145	128	5	300	-	-	6	3	30	53
Ind.	102	103	9	241	-	-	-	-	-	52
Ill.	343	571	22	727	-	-	3	-	1	167
Mich.	132	168	18	470	-	-	5	-	-	2
Wis.	53	47	1	105	-	-	-	-	-	70
W.N. CENTRAL	302	286	22	378	10	1	7	8	12	655
Minn.	56	101	3	66	-	1	4	-	-	105
Iowa	17	13	2	47	1	-	1	2	2	208
Mo.	183	147	6	170	6	-	1	3	5	65
N. Dak.	4	6	-	7	-	-	-	-	-	59
S. Dak.	-	2	2	16	-	-	-	-	-	47
Nebr.	8	3	-	15	1	-	-	-	-	78
Kans.	34	14	9	57	2	-	1	3	5	93
S. ATLANTIC	4,307	3,750	116	2,538	7	-	27	23	190	492
Del.	8	7	-	22	-	-	-	-	-	-
Md.	241	293	9	302	1	-	6	5	25	27
D.C.	257	311	6	103	-	-	-	-	-	-
Va.	314	347	24	305	1	-	2	2	20	249
W. Va.	16	9	-	69	-	-	3	1	4	24
N.C.	291	298	20	408	-	-	-	5	77	30
S.C.	227	252	-	233	4	-	3	7	47	25
Ga.	882	967	22	366	-	-	-	3	16	103
Fla.	2,071	1,266	35	730	1	-	13	-	1	34
E.S. CENTRAL	1,115	926	54	1,141	6	1	14	5	19	374
Ky.	61	48	11	292	-	-	-	-	-	77
Tenn.	299	363	8	376	4	-	2	3	11	241
Ala.	402	251	21	325	-	-	9	-	4	56
Miss.	353	264	14	148	2	1	3	2	4	-
W.S. CENTRAL	4,025	3,472	56	1,452	34	3	16	2	64	609
Ark.	106	67	10	146	20	-	1	-	11	82
La.	884	796	-	240	3	1	1	-	-	16
Okla.	83	85	3	209	11	-	2	1	31	115
Tex.	2,952	2,524	43	857	-	2	12	1	22	396
MOUNTAIN	401	360	10	350	8	-	6	1	6	106
Mont.	3	9	-	25	1	-	-	1	1	40
Idaho	19	14	-	14	1	-	-	-	1	1
Wyo.	10	7	-	2	1	-	-	-	1	10
Colo.	109	106	1	46	1	-	2	-	-	14
N. Mex.	89	71	5	66	-	-	-	-	1	10
Ariz.	92	80	4	144	-	-	3	-	-	26
Utah	12	14	-	17	4	-	1	-	-	3
Nev.	67	59	-	36	-	-	-	-	2	2
PACIFIC	2,280	2,098	85	2,218	4	-	53	-	1	323
Wash.	69	68	3	134	1	-	3	-	-	-
Oreg.	60	43	6	88	-	-	1	-	-	-
Calif.	2,079	1,943	72	1,800	3	-	48	-	1	254
Alaska	8	6	-	32	-	-	-	-	-	69
Hawaii	64	38	4	164	-	-	1	-	-	-
Guam	1	-	U	3	-	U	-	U	-	-
P.R.	273	327	U	157	-	U	1	U	-	24
V.I.	7	9	-	1	-	-	-	-	-	-
Pac. Trust Terr.	-	-	U	19	-	U	-	U	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending June 26, 1982 (25th week)

ALL CAUSES, BY AGE (YEARS) LL ES	>65	45-64	25-44	1-24	<1	P&I** TOTAL
93	473	155	31	14	20	62
12	128	57	10	9	8	22
42	32	7	1	1	1	8
24	18	6	–	–	–	1
31	24	7	–	–	–	3
71	51	15	4	1	–	6
27	21	5	1	–	–	2
16	11	3	2	–	–	–
30	23	6	1	–	–	2
44	24	14	3	–	3	–
67	49	11	3	–	4	6
8	4	4	–	–	–	–
40	29	8	1	–	2	6
25	19	1	2	2	1	3
56	40	11	3	1	1	3
20	1,599	556	170	58	37	91
41	27	8	3	–	3	–
19	16	3	–	–	–	1
05	66	27	5	5	2	8
33	22	7	4	–	–	3
30	20	10	–	–	–	–
36	25	8	3	–	–	3
49	36	11	1	–	1	3
99	834	310	107	32	16	42
72	28	28	9	2	5	5
25	15	4	3	3	–	–
92	195	65	19	9	4	12
76	55	15	2	2	2	4
26	18	7	1	–	–	2
08	84	18	2	3	1	3
18	13	4	1	–	–	–
21	17	3	1	–	–	–
81	57	15	5	2	2	–
34	28	5	1	–	–	1
28	21	7	–	–	–	2
27	22	1	3	–	1	2
40	1,408	537	156	57	82	61
59	45	9	–	2	3	–
31	15	10	5	1	–	1
28	304	132	50	18	24	14
62	102	45	7	4	4	6
89	116	51	15	4	3	–
37	86	31	13	2	5	8
99	53	33	7	3	3	2
30	135	59	20	5	11	3
66	45	9	7	3	2	2
53	38	10	2	1	2	3
29	16	6	4	1	2	1
46	33	10	1	–	2	6
63	106	39	10	7	1	1
39	28	4	1	–	6	2
31	92	29	4	2	4	1
43	29	7	2	–	5	2
43	29	7	2	1	4	1
46	29	14	2	1	–	3
92	66	22	2	2	–	3
54	41	10	2	–	1	2
12	475	147	29	27	33	26
54	52	–	–	1	–	–
36	27	8	–	–	1	1
33	19	10	1	3	–	–
26	84	24	5	7	6	9
21	15	1	3	1	1	1
84	48	25	4	3	4	–
85	55	24	3	2	1	–
32	85	21	7	2	17	8
72	49	17	2	3	1	2
69	41	17	4	5	2	5

REPORTING AREA	ALL CAUSES, BY AGE (YEARS) ALL AGES	>65	45-64	25-44	1-24	<1	P&I** TOTAL
S. ATLANTIC	1,100	657	273	84	36	50	42
Atlanta, Ga.	143	79	39	12	4	9	5
Baltimore, Md.	201	118	49	20	11	3	4
Charlotte, N.C.	53	25	16	6	1	5	1
Jacksonville, Fla.	118	80	25	9	3	1	5
Miami, Fla.	89	47	26	8	3	5	4
Norfolk, Va.	44	28	8	3	1	4	1
Richmond, Va.	55	33	15	–	3	4	3
Savannah, Ga.	22	16	5	–	1	–	5
St. Petersburg, Fla.	80	72	7	1	–	–	1
Tampa, Fla.	75	48	17	5	1	4	5
Washington, D.C.	177	84	58	13	8	14	6
Wilmington, Del.	43	27	8	7	–	1	2
E.S. CENTRAL	639	393	161	47	14	24	24
Birmingham, Ala.	114	65	28	9	3	9	1
Chattanooga, Tenn.	51	32	6	7	2	4	3
Knoxville, Tenn.	39	27	9	2	1	–	–
Louisville, Ky.	111	65	30	5	4	7	6
Memphis, Tenn.	112	77	23	10	–	2	10
Mobile, Ala.	49	28	15	4	1	1	1
Montgomery, Ala.	57	39	14	2	1	1	2
Nashville, Tenn.	106	60	36	8	2	–	1
W.S. CENTRAL	1,226	704	315	91	69	46	32
Austin, Tex.	40	24	9	5	–	2	1
Baton Rouge, La.	54	41	8	2	2	1	–
Corpus Christi, Tex.	23	17	4	2	–	–	–
Dallas, Tex.	179	94	50	13	14	8	–
El Paso, Tex.	61	38	12	4	4	2	3
Fort Worth, Tex.	84	43	27	6	5	3	6
Houston, Tex.	288	142	83	32	18	13	4
Little Rock, Ark.	58	30	16	5	2	5	2
New Orleans, La.	150	99	33	10	5	3	–
San Antonio, Tex.	139	74	41	8	10	6	7
Shreveport, La.	53	34	12	1	5	1	1
Tulsa, Okla.	97	68	20	3	4	2	8
MOUNTAIN	636	407	140	42	22	25	21
Albuquerque, N.Mex.	45	32	12	–	1	–	2
Colo. Springs, Colo.	38	20	12	2	2	2	3
Denver, Colo.	133	85	26	13	1	8	9
Las Vegas, Nev.	92	49	20	11	9	3	1
Ogden, Utah	21	16	4	1	–	–	–
Phoenix, Ariz.	149	94	36	8	3	8	3
Pueblo, Colo.	26	19	4	1	2	–	1
Salt Lake City, Utah	44	26	9	3	4	2	–
Tucson, Ariz.	88	66	17	3	–	2	2
PACIFIC	1,791	1,205	357	123	63	43	94
Berkeley, Calif.	31	22	5	2	2	–	1
Fresno, Calif.	52	35	12	4	1	–	5
Glendale, Calif.	20	18	–	2	–	–	1
Honolulu, Hawaii	64	38	15	9	2	–	8
Long Beach, Calif.	96	68	26	1	1	–	5
Los Angeles, Calif.	483	325	96	38	14	10	14
Oakland, Calif.	77	54	15	4	–	4	3
Pasadena, Calif.	28	19	5	2	–	2	–
Portland, Oreg.	127	100	16	4	2	5	6
Sacramento, Calif.	94	54	20	12	5	3	10
San Diego, Calif.	147	93	36	6	9	3	15
San Francisco, Calif.	166	112	30	13	7	4	3
San Jose, Calif.	174	115	39	9	7	4	16
Seattle, Wash.	138	89	24	12	8	5	4
Spokane, Wash.	56	37	11	4	2	2	2
Tacoma, Wash.	38	26	7	1	3	1	1
TOTAL	11,457††	7,321	2,641	773	360	360	453

able are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

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reporting methods in these 4 Pennsylvania cities, these numbers are partial counts for the current week. C

Summer Mortality Surveillance — Continued

cities in 1980 showed that numbers of cases reported to medical examiners increased to a proportionately greater extent than did other indirect measures of impact on community health, e.g., total mortality, emergency room visits, and hospital admissions (*2*).

Surveillance of mortality data from medical examiners is simple, timely, and relatively inexpensive. Information that reflects the health of an entire city is rapidly available from a single source. Even the time required for post-mortem diagnosis does not delay collection of data.

Groups at high risk of having heatstroke are the elderly, infants <1 year of age, military recruits, persons exposed to high temperatures in the work place, the chronically ill or bedfast, the mentally ill, those taking antipsychotic or anticholinergic drugs, and alcoholics (*2,5-7,9-12*). Low socioeconomic status and residence in an urban area have also been associated with high risk of heatstroke (*2,9*). Studies of race and sex as predisposing factors for heatstroke have yielded inconsistent results (*4,8,9*). Deaths from heatstroke reflect 10%-50% of the increase in mortality associated with unusually high temperatures (*2,14*). Less is known about the risk factors for deaths not associated with heatstroke during a heat wave.

During a heat wave, prevention programs are best targeted toward persons at high risk of having heatstroke. Having home air conditioning and spending increased time in air-conditoned places have been associated with decreased risk, suggesting that air-conditioned heat wave shelters are of benefit. Reducing physical activity during hot weather has also been associated with decreased risk (*5*).

Adequate fluid intake is important in reducing the risk of having heatstroke (*5,13*). Although adequate salt intake with meals is important, salt tablets are of doubtful benefit and should not be taken unless prescribed by a physician (*13*). Alcohol consumption should be reduced or eliminated during very hot weather.

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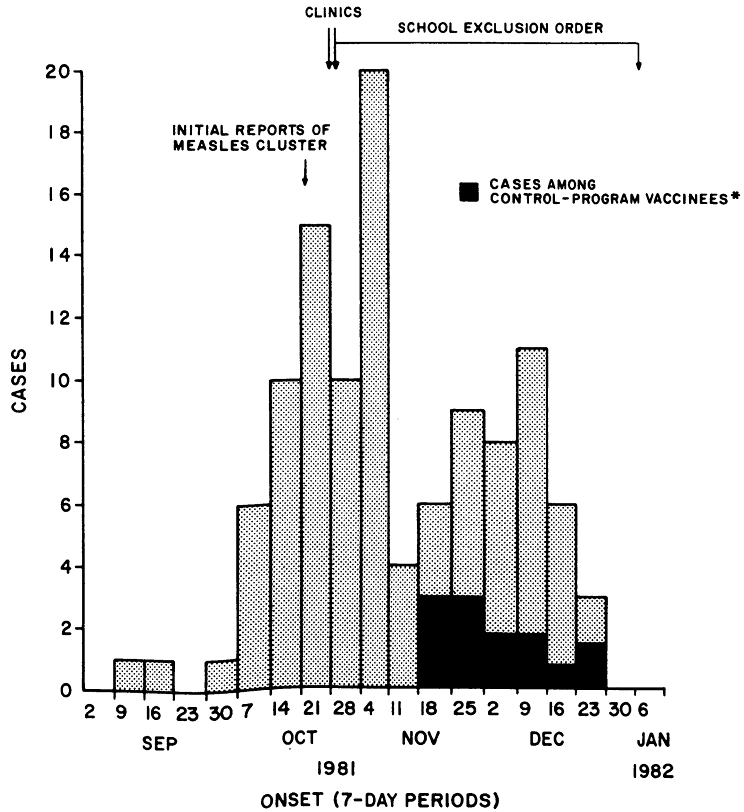
Epidemiologic Notes and Reports

A Continuing Measles Outbreak among School-Age Children Despite an Outbreak-Control Program with School Exclusion — Pennsylvania

In the 4-month period, September 9-December 27, 1981, 111 cases of measles were reported among school children in Warren County, Pennsylvania (Figure 3). Nine of these cases were confirmed by serologic tests. An additional 45 related cases were reported in the rest of the community. Health authorities were first notified 6 weeks after the first patient had rash onset; they promptly initiated school-record reviews in preparation for mass vaccination clinics and exclusion from school of noncompliant susceptible students. Of the county's 8,315 students, 39% (3,210) were identified as lacking adequate proof of immunity.* At the

*Pennsylvania State Health Department criteria for adequate proof of immunity to measles consist of either a documented history of live-measles vaccine received on or after the first birthday or of detectable measles-specific antibody on serologic testing.

FIGURE 3. Measles cases in school children, by onset of symptoms, Warren County, Pennsylvania, September 9-December 27, 1981



*Those with onset > 2 weeks after vaccination.

Measles — Continued

time of the school exclusion order, 22% (728) of the students identified as being potentially susceptible furnished an updated record of vaccination, 73% (2,336) were vaccinated (most of them in control-program school clinics on October 28 and 29) and the other 5% (146) were excluded from school as of October 29.

Of the 111 cases among school children, 46 occurred more than 2 weeks after the control program was implemented, even though school records for these students indicated that all 46 had been vaccinated >2 weeks before becoming ill. Thirteen of these children from 3 schools had been vaccinated at control-program clinics; 10 of the 13 were from the same school. At these 3 schools, the measles attack rate was significantly higher for students vaccinated in control-program clinics (13 of 267, 5%) than for students who already had records of adequate vaccination before the outbreak-control program began (19 of 990, 2%)($p<0.01$). The 13 children who had been vaccinated during the control program but had measles disease during the outbreak were among 362 students of a high school and 4 elementary schools who had been vaccinated by a single jet-injector team (team A) at control-program clinics on October 28. No cases were reported among the 1,771 students vaccinated on that date by 4 other jet-injector teams or by several needle-and-syringe teams.

A seroprevalence survey was done in order to investigate the extent of apparent vaccination failures. Blood samples were collected from 115 of the 128 clinic vaccinees who were attended by team A at the 4 elementary schools but did not become ill and from 85 of the 101 vaccinees at selected elementary schools each attended by 1 of 3 other jet-injector teams. Students vaccinated by team A had a significantly higher rate of vaccination failure† than did children vaccinated by the other jet-injector teams (37% vs 6%, $p<0.001$).

Control-program vaccination teams had all used vials from the same vaccine lot except team A, which had used some vials of vaccine of another lot as well; these particular vials from the other lot had been handled differently from other control-program vaccine. Records were not available on vaccine vial usage by team A in each school.

To evaluate possible differences in vaccination technique among jet-injector teams, students participating in the serosurvey from 2 schools at which vaccinations were given by team A and from 3 comparison schools were questioned about their experiences with vaccination in the control program. Students vaccinated by team A stated that they had experienced significantly less pain (36% vs 75%, $p<0.001$) and bleeding at the site of vaccination (6% vs 62%, $p<0.001$) than did students vaccinated by other teams.

To assess other factors (among the remaining 33 of the 46 patients) that might have been associated with students' susceptibility to measles after the control-program was implemented, a case-control study was done to examine such variables as age at vaccination and whether school records could be documented by the purported sources of vaccination. Cases were defined as measles illness occurring >2 weeks after the control program among the 33 students who had not been vaccinated at control-program clinics; controls were randomly chosen from classmates of ill students who also had not been vaccinated during the control program and who had not become ill. Three times as many children who contracted measles had school records of measles vaccination that could not be documented by physicians or clinics than did their well classmates. Of the students with physician-documented vaccination records, relatively more of those who contracted measles disease than well classmates had been vaccinated before 12 months of age (with school records in error) or at 12 months of age, rather than at ≥15 months of age.

†Vaccination failures were defined as measles cases among clinic vaccinees or the absence of detectable hemagglutination-inhibition antibody in blood specimens collected from clinic vaccinees.

Measles — Continued

Thus, of the 46 students who became ill >2 weeks after the control-program was implemented, 13 (28%) had been vaccinated by team A, 13 (28%) did not have physician-documented records of vaccination, 2 (5%) had been vaccinated before 12 months of age, and 11 (24%) had been vaccinated at 12 months of age; no specific reason for remaining susceptible to measles could be identified for the other 7 (15%).

The Pennsylvania Department of Health has taken the necessary steps to provide live-measles vaccine to those students found to be seronegative in the seroprevalence survey.

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Editorial Note: In school settings, the recommended measures for controlling measles outbreaks include the rapid identification and vaccination of susceptible individuals at risk and exclusion from school of students who lack adequate evidence of immunity.‡

Generally, reports of new cases of measles decline markedly within 2 weeks of implementing a school exclusion order and transmission among students ends shortly thereafter (*1,2*). The outbreak in Pennsylvania was unusual in that transmission persisted for more than 8 weeks after control-program clinics were held and exclusion of noncompliant students was implemented.

There appeared to be at least 3 reasons for the continued transmission. First, vaccination by team A was significantly less effective than vaccination by the other teams. This lower efficacy may have been caused by administration of impotent vaccine, poor vaccine administration technique (e.g., unrecognized jet-injector malfunction), or some combination of the two. Proper handling of vaccine should not be taken for granted, and persons using vaccine should follow the manufacturer's instructions carefully. It appears unlikely that measles transmission would have continued in the county's schools for such an extended period if these operational problems had not occurred.

Second, some school records were found to be inaccurate. Ideally, vaccination records should be verified by health-care providers when students first enter school. Third, these data indicate that persons vaccinated at 12 months of age are at higher risk of contracting measles than those who are older when vaccinated. These results are consistent with those of previous studies (*3*). Persons vaccinated at 12 months are not routinely revaccinated because their estimated level of protection (80%-95%) has been considered adequate.

References

1 CDC. School exclusion in two measles outbreaks—Wisconsin. MMWR 1979;28:488,493-4.
2 CDC. Multiple measles importations—New York. MMWR 1981;30:288-90.
3 CDC. Measles—Florida. MMWR 1981;29:625-8.

‡Generally considered a documented history of live-measles vaccine on or after the first birthday or of physician-diagnosed measles disease.

Poliomyelitis Update — Jamaica

As of June 23, 1982, a total of 54 suspected cases of paralytic poliomyelitis, including 1 death, had been reported from Jamaica. Onset of the first case occurred in late March 1982. Type I poliovirus has been isolated in 8 cases. Forty-eight persons were from Cornwall County; of these, 44 were from St. James Parish. Eighty-three percent (42) occurred in the <15-year age group. Of 37 suspect cases from whom previous vaccination status could be

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elicited, 29 had never received any polio vaccine; three had had 1 dose; two, 2 doses, and three, 3 doses. Cases have occurred predominantly among children living in crowded households with limited access to water and with substandard or absent sanitation facilities. Immunization status data suggest that 45% of Jamaican children who reached age 1 during 1981 had received a primary series of 3 doses of trivalent oral poliovirus vaccine (OPV) compared with 25% in 1980 and 20% in 1979.

Onset of illness for 35 patients was before June 1, 1982, the date when an island-wide immunization program began. In 13 parishes the program delivered 1 dose of OPV each to an estimated 70%-80% of children 6 weeks through 4 years of age and to 80%-90% of the 5-14 year age group by June 21, 1982. In addition, an estimated 40%-55% of the population 15 years and older each received a dose of OPV. The second round of OPV immunization, targeted to the most susceptible age group, 6 weeks through 14 years of age, is planned to begin during the first week of July. Between June 1 and June 23 an average of 6 cases occurred each week; no cases of poliomyelitis in travelers to Jamaica have been reported.

Reported by Ministry of Health, Jamaica; Viral Diseases Div, Center for Infectious Diseases, Immunization Div, Quarantine Div, Center for Prevention Svcs, CDC.

Editorial Note: The last outbreak of poliomyelitis in Jamaica occurred in 1964 and was associated with type I poliovirus. Since then no cases had been reported to the Ministry of Health.

In the present outbreak, the occurrence of cases following the immunization campaign is not unexpected because the incubation period for poliomyelitis may range up to 21 days and because of the time period required for the campaign. Prompt recognition of poliomyelitis outbreaks and intense immunization programs with OPV that have achieved high coverage in a short period of time (as in Jamaica) have been successful in markedly decreasing transmission of the wild poliovirus and in controlling poliomyelitis outbreaks (*1,2*).

Proof of diphtheria, measles, rubella, and poliomyelitis immunization is not required for international travel to or from any country. However, travelers to any country in which these diseases are endemic or epidemic should be protected. For travel to any country with poliomyelitis, adequate protection in unvaccinated or partially vaccinated travelers can be achieved by completion of a primary series with poliomyelitis vaccine as detailed in the ACIP recommendations published in MMWR Vol. 31, January 29, 1982. Travelers who have previously completed a primary series may wish to receive another dose of OPV or inactivated poliovirus vaccine (IPV).

References

1. Sabin AB. Poliomyelitis in the tropics. Increasing incidence and prospects for control. Trop Geogr Med 1963;15:38-44.
2. Witte JJ, Page MI, Gelfand HM. Control of type 1 poliomyelitis epidemic in British Guiana, 1962-1963, with trivalent oral poliovirus vaccine. 1. Epidemiological aspects. Bull WHO 1965;33:1-11.

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The editor welcomes accounts on interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Send reports to: Attn: Editor, Morbidity and Mortality Weekly Report, Centers for Disease Control, Atlanta, Georgia 30333.

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Erratum, Vol. 31, No. 22

p301. In the article "Plague Vaccine," there is only one table. Because of its position in the issue, it is designated as Table 2. All text references in that article should be to Table 2. Thus, on page 303 in the section *Primary Vaccination*, under *Children* $\leqslant$ *10 years old*, the reference should be to Table 2—not Table 1 as printed.

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