CENTERS FOR DISEASE CONTROL

July 5, 1985 / Vol. 34 / No. 26

MMWR

MORBIDITY AND MORTALITY WEEKLY REPORT

Historical Perspectives

A Centennial Celebration: Pasteur and the Modern Era of Immunization

Louis Pasteur 1822-1895

On July 6, 1885, Louis Pasteur and his colleagues injected the first of 14 daily doses of rabbit spinal cord suspensions containing progressively inactivated rabies virus into 9-year-old Joseph Meister, who had been severely bitten by a rabid dog 2 days before. This was the beginning of the modern era of immunization, which had been presaged by Edward Jenner nearly 100 years earlier.

Pasteur's decision to treat the child followed 4 years of intensive research, culminating in the development of a vaccine capable of protecting experimentally challenged rabbits and dogs. His decision was difficult: "The child's death appeared inevitable. I decided not without acute and harrowing anxiety, as may be imagined, to apply to Joseph Meister the method which I had found consistently successful with dogs" (*1*). The immunization was successful; and the Pasteur rabies immunization procedure was rapidly adopted throughout the world. By 1890, there were rabies treatment centers in Budapest, Madras, Algiers, Bandung, Florence, São Paulo, Warsaw, Shanghai, Tunis, Chicago, New York, and many other places throughout the world.

The basic "Pasteur Treatment," based on brain tissue vaccine with the addition of formaldehyde, is still used in many countries of the world where rabies is prevalent. This treatment still involves immunizations given daily for 14-21 days, and it still carries the same risk of neurologic sequelae as in Pasteur's day. In the United States and other developed countries, more potent, safer, but very expensive, cell culture-based rabies vaccines are combined with hyperimmune globulin for postexposure treatment. The efficacy of such regimens has been well proven.

Another era in vaccine development is now beginning—an era based on the practical application of recombinant-deoxyribonucleic acid (DNA) technology and other novel genetic manipulations of rabies and other viruses and microorganisms. These new technologies promise even more potent and safer vaccines, as well as lower costs, improved stability, and easier delivery throughout the world to people at risk.

In celebrating the Pasteur centennial, the preeminent role of vaccines in the control of infectious diseases is recognized; as Rene Dubos stated: "Even granted that the antirabies treatment had saved the lives of a few human beings, this would have been only meager

Pasteur — Continued

return for so much effort . . . . It is on much broader issues that Pasteur's achievements must be judged. He had demonstrated the possibility of investigating by rigorous techniques the infectious diseases caused by invisible, noncultivable viruses; he had shown that their pathogenic potentialities could be modified by various laboratory artifices; he had established beyond doubt that a solid immunity could be brought about without endangering the life or health of the vaccinated person. Thanks to the rabies epic . . . immunization [has] become recognized as a general law of nature. Its importance for the welfare of man and animals is today commonplace, but only the future will reveal its full significance in the realm of human economy" (*2*).

Reported by Div of Viral Diseases, Center for Infectious Diseases, CDC.

References

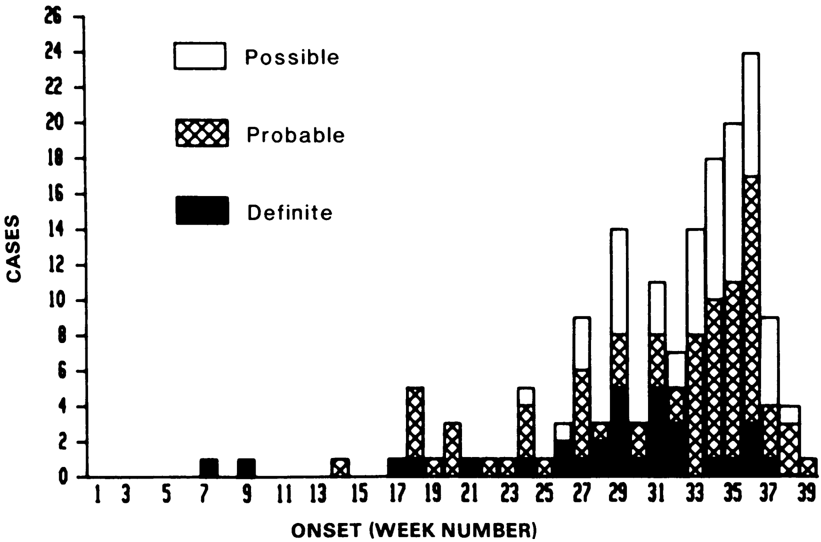
1. Cuny H. Louis Pasteur: the man and his theories. Greenwich, Connecticut: Fawcett Publications, Inc., 1963:173.
2. Dubos RJ. Louis Pasteur: free lance of science. Boston, Massachusetts: Little, Brown and Co., 1950:352-3.

Epidemiologic Notes and Reports

Pertussis — Washington, 1984

From January 1, to October 1, 1984, 162 cases of pertussis were reported from Seattle-King County, Washington (Figure 1). Before the outbreak, Seattle-King County's annual average number of reported cases (1979-1983) was 12; the state averaged 40 cases. The peak in reported cases in August and September coincided with the institution of aggressive active surveillance. The Seattle-King County cases were classified as: (1) confirmed—positive

FIGURE 1. Reported symptomatic pertussis cases, by week of onset of cough — Seattle-King County, Washington, January 1,-October 1, 1984*



*Excludes two definite and one probable case with onset of cough in 1983 but reported in 1984.

Pertussis — Continued

nasopharyngeal culture with any respiratory symptom (30 cases); (2) probable—positive fluorescent antibody (FA) test with any respiratory symptom but without positive culture (79 cases); or (3) possible—symptomatic without other known cause plus exposure to a definite or probable case but lacking laboratory confirmation (53 cases). Of the confirmed cases, 23 (77%) were also FA positive. Of an additional 63 asymptomatic individuals with positive FA tests, one also yielded a positive culture.

Twelve (7%) of the 162 patients were hospitalized; 10 of these were under 6 months of age. The hospitalization-to-case ratio among patients under 6 months of age was 45% (10/22). One 6-week-old patient had x-ray-documented pneumonia. No pertussis deaths were reported. The female-to-male ratio was 1.2:1.

Thirty-three cases (20%) were among children under 1 year of age (Table 1); of these, 22 children (67%) were under 6 months of age. Seventy-one (44%) cases occurred among patients 7 years of age or older; 78 (48%) cases occurred among children 3 months to 7 years of age, a group that should have received at least one dose of pertussis vaccine. Of the 69 patients 3 months through 83 months (6 years) of age with known immunization status, 34 (49%) were appropriately immunized for their ages with diphtheria and tetanus toxoids and pertussis vaccine (DTP)* (Table 2). There were no significant differences between age groups in the proportion of patients appropriately immunized. Among patients 7 months through 83

*Appropriately immunized for age if received: one dose by 3 months of age; two doses by 5 months of age; three doses by 7 months of age; four doses by 19 months of age; five doses by 5 years of age.

TABLE 1. Age and cumulative percent distribution of confirmed cases and of all reported clinical cases — Seattle-King County, Washington, January 1,-October 1, 1984

Age group	Confirmed cases No.	(%)	All cases No.	(%)
< 6 mos.	9	(30)	22	(14)
6-11 mos.	3	(40)	11	(20)
1-4 yrs.	9	(70)	46	(49)
5-9 yrs.	2	(77)	19	(60)
10-14 yrs.	2	(83)	18	(72)
≥ 15 yrs.	5	(100)	46	(100)
Total	**30**		**162**	

TABLE 2. Age-appropriate immunization status* of reported clinical cases of pertussis with known immunization status, ages 3-83 months — Seattle-King County, Washington, January 1,-October 1, 1984

Age group† (mos.)	Cases	Appropriately immunized No.	(%)
3-6	9	5	(56)
7-18	20	10	(50)
19-83	40	19	(48)
Total	**69**	**34**	**(49)**

*Age appropriate if received: one dose by 3 months of age; two doses by 5 months of age; three doses by 7 months of age; four doses by 19 months of age; five doses by 5 years of age.

†Infants under 3 months of age are considered by default to be in compliance with recommendations of the Immunization Practices Advisory Committee.

Pertussis — Continued

months of age and, therefore, old enough to have received at least three doses of DTP, 42 (70%) of the 60 with known immunization status had received three or more DTP doses.

The following control measures were undertaken: (1) immunization of children was urged through the news media; (2) a physician's advisory was distributed advising immunization of previously inadequately immunized children under 7 years of age, encouraging consideration of pertussis in the differential diagnosis of illness with cough, and asking that cases be reported promptly; (3) in the outbreak setting, the primary DTP immunization schedule was accelerated, with the first three doses recommended at 1½, 2½, and 3½ months of age, compared to the usual practice of administration at 2, 4, and 6 months of age; (4) erythromycin treatment of suspected cases and prophylaxis of household contacts for 14 days was recommended regardless of contact age or immunization status (for those unable to tolerate erythromycin, trimethoprim/sulfamethoxazole was recommended); and (5) exclusion of patients from school or work until completion of 7 days or more of antibiotics was suggested.

Three studies were conducted during the outbreak:

Church group investigation. On August 29, questionnaires were completed for all 161 members of the 44 households belonging to a church from which five probable pertussis cases had been reported. Two additional asymptomatic FA-positive members, one of whom was also culture-positive, had also been reported. Excluding the seven index members, specimens for FA smears and cultures were obtained from 93 (60%) members; 41 (44%) specimens were FA positive. Five percent of both FA-positive and FA-negative members had at least one respiratory symptom (Table 3). Aside from the one culture-positive index member, no other cultures were positive.

One month later, follow-up questionnaires of the 88 asymptomatic members showed that 18% and 24% of the FA-positive and FA-negative members, respectively, had developed respiratory symptoms in the interim. Forty-three percent of 44 FA-positive members for whom prophylactic erythromycin were prescribed indicated compliance.[†] Information was available on both symptoms and antibiotic compliance for 30 initially asymptomatic FA-positive members for whom an antibiotic was prescribed. There was no significant difference in the development of symptoms between those who complied (4/17) and those who did not comply (0/13) with antibiotic therapy ($p = 0.09$).

[†]Compliance defined as a person who stated that the prescribed course of antibiotics was completed.

TABLE 3. Results of fluorescent antibody (FA) assay for *Bordetella pertussis* in persons with or without respiratory symptoms in a church group — Seattle-King County, Washington, 1984

Respiratory symptoms	FA(+) No.	FA(+) (%)	FA(-) No.	FA(-) (%)	Total No.	Total (%)
Survey 1 — August 29						
Present	2	(5)	3	(6)	**5**	**(5)**
Absent	39	(95)	49	(94)	**88**	**(95)**
Total	**41**	**(100)**	**52**	**(100)**	**93**	**(100)**
Survey 2 — September 29						
Present	7	(18)	12	(24)	**19**	**(22)**
Absent	32	(82)	37	(76)	**69**	**(78)**
Total	**39**	**(100)**	**49**	**(100)**	**88**	**(100)**

Pertussis — Continued

One or more members of 22 of the 44 households were FA positive. Specimens were available on all 69 household members of 19 of the 44 households. In these 19 households, FA-positive members were more likely to be grouped within a household than was expected by chance alone ($p < 0.01$). FA positivity was not related to age, sex, household size, presence of small children in the household, church study group, previous disease history, exposure history, or vaccination status.

Potential workplace occurrence of adult-to-adult transmission. Evidence for adult-to-adult transmission was sought in each of three consecutively reported indoor workplace situations with a laboratory-positive pertussis case (one confirmed and two probable) and in a fourth workplace situation with a possible case. These workplace situations met the following criteria: (1) a symptomatic pertussis patient 18 years old or older; (2) one or more adults sharing the workplace; and (3) a workplace area the same size or smaller than an average school classroom area. The situations were a vanpool and three offices with eight, three, five, and seven persons, respectively, exposed to a reported case. Questionnaires were completed and specimens collected on 91% of the 23 co-workers. Transmission occurred only in the vanpool, where four (50%) of eight exposed adults developed apparent pertussis (one confirmed, one probable, and two possible cases). Active surveillance of an additional 32 persons in adjoining offices in two of the workplace situations did not detect any additional cases.

The possibility of secondary transmission by co-workers to members of their households was also studied. Questionnaires and specimens were obtained from 95% of the 37 household members of co-workers; none developed clinical pertussis. However, no household had children with immunization histories of less than three doses of pertussis vaccine. Aside from the one culture-positive contact case in the vanpool, all culture and FA specimens from contacts were negative.

Effectiveness of immunization recall. A search of the records of 18,059 children under 2 years of age who had attended county public health clinics identified 2,301 (13%) children who were eligible for a DTP dose by the accelerated immunization schedule. Letters describing the epidemic and urging immediate immunization were sent September 26-27 to parents of 2,211 (96%) of these children. During the next 2 weeks, 427 (19%) children received a DTP dose at the clinics. Supplementary telephone calls were then made over 2 days to 263 (15%) of the remaining 1,784 nonrespondents selected by systematic interval sampling. During the following 2 weeks, 36 (14%) of those who received phone calls responded, compared to 163 (11%) of 1,521 of those who did not receive phone calls ($p > 0.5$). Including those who received phone calls, only 626 (28%) of the identified children returned to the clinics for immunization during the 4 weeks following the mailing.

Using systematic interval sampling, 59 responders and 57 nonresponders were selected, and telephone interviews were conducted with their parents. While 57 (97%) of 59 parents of responders knew of the epidemic, only 10 (18%) of 55 credited the letter, and one (2%) of 55, the media, as the stimulus for bringing the child in for immunization. Among parents of nonresponders, 53 (95%) of 56 knew of the epidemic. Households of nonresponders were more likely to have a primary wage-earner other than the father ($p = 0.03$), with a high school education or less ($p = 0.05$), a mother under 25 years old ($p = 0.01$), a longer travel time required to reach the clinic ($p < 0.01$), and a lower income ($p < 0.05$). Nonresponse was not associated with race, household size, years at current address, or employment status of the person responsible for taking the child for medical care.

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Pertussis — Continued

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Editorial Note: The 2,463 reported cases of pertussis in the United States in 1983 and the 2,187 cases provisionally reported in 1984 are the largest annual numbers of reported cases since 1974 (1975-1984 annual average: 1,813 cases). Supplementary information on reported cases from 1979 to 1983 indicates that children under 6 months of age are at greatest risk of disease morbidity, severity, and mortality (*1,2*); 14% of patients in the Seattle-King County outbreak were under 6 months of age, of whom 45% were hospitalized. Because at least three doses of DTP are believed necessary for maximal protection, protecting this relatively immobile, high-risk age group that is too young to have received three doses of DTP depends primarily on preventing exposure to infection. Age-appropriate immunization of siblings and other contacts under 7 years of age lessens the risk of exposure for these infants. Presently, attempts to prevent transmission from older household members rely on early identification of cases and appropriate use of antibiotics to shorten the period of communicability.

(Continued on page 399)

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

Disease	26th Week Ending			Cumulative, 26th Week Ending		
	June 29, 1985	June 30, 1984	Median 1980-1984	June 29, 1985	June 30, 1984	Median 1980-1984
Acquired Immunodeficiency Syndrome (AIDS)	82	91	N	3,621	1,936	N
Aseptic meningitis	197	137	145	2,145	2,178	2,178
Encephalitis: Primary (arthropod-borne & unspec.)	17	19	19	442	410	410
Post-infectious	1	3	3	68	66	54
Gonorrhea: Civilian	18,123	17,970	17,970	402,133	399,704	466,944
Military	244	471	471	9,070	10,238	13,322
Hepatitis: Type A	416	367	496	10,552	10,305	11,105
Type B	484	460	409	12,504	12,375	10,465
Non A, Non B	88	69	N	2,034	1,892	N
Unspecified	111	98	158	2,767	2,411	4,224
Legionellosis	3	9	N	275	270	N
Leprosy	14	7	7	173	119	110
Malaria	15	29	29	373	395	472
Measles: Total*	82	99	59	1,802	1,788	1,788
Indigenous	79	90	N	1,467	1,589	N
Imported	3	9	N	335	199	N
Meningococcal infections: Total	33	47	51	1,408	1,670	1,690
Civilian	33	47	51	1,405	1,667	1,675
Military	-	-	-	3	3	9
Mumps	33	47	57	1,893	1,902	2,788
Pertussis	22	41	34	715	1,005	563
Rubella (German measles)	44	11	33	366	418	1,478
Syphilis (Primary & Secondary): Civilian	544	683	571	12,403	13,965	14,905
Military	3	5	5	85	172	183
Toxic Shock syndrome	6	11	N	188	247	N
Tuberculosis	486	448	495	10,302	10,435	12,521
Tularemia	1	7	6	53	103	101
Typhoid fever	19	5	6	151	157	191
Typhus fever, tick-borne (RMSF)	30	45	50	221	315	372
Rabies, animal	98	96	112	2,485	2,551	3,300

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1985		Cum. 1985
Anthrax	-	Leptospirosis (Iowa 1)	14
Botulism: Foodborne (Wash. 1, Alaska 2)	14	Plague	4
Infant (Ariz. 1)	23	Poliomyelitis: Total	3
Other	-	Paralytic (N.Y. City 1)	3
Brucellosis (Fla. 3, Miss. 1, Calif. 1)	57	Psittacosis (Ariz. 1, Calif. 1)	59
Cholera	-	Rabies, human	-
Congenital rubella syndrome	-	Tetanus	28
Congenital syphilis, ages < 1 year	74	Trichinosis (Conn. 1)	38
Diphtheria	1	Typhus fever, flea-borne (endemic, murine)	5

*Three of the 82 reported cases for this week were imported from a foreign country or can be directly traceable to a known internationally imported case within two generations.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending June 29, 1985 and June 30, 1984 (26th Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1985	1985	Cum. 1985	Cum. 1985	Cum. 1985	Cum. 1984	1985	1985	1985	1985	1985	Cum. 1985
UNITED STATES	3,621	197	442	68	402,133	399,704	416	484	88	111	3	173
NEW ENGLAND	128	7	12	-	11,841	11,228	6	40	1	5	1	4
Maine	5	-	-	-	491	456	-	2	-	-	-	-
N.H.	-	-	4	-	246	326	-	-	-	-	-	-
Vt.	-	2	-	-	144	188	1	-	-	-	-	-
Mass.	79	1	8	-	4,514	4,443	1	20	1	5	-	4
R.I.	4	-	-	-	910	730	-	9	-	-	1	-
Conn.	40	4	-	-	5,536	5,085	4	9	-	-	-	-
MID ATLANTIC	1,395	16	66	5	60,610	54,480	42	61	16	3	-	14
Upstate N.Y.	173	6	23	4	7,881	8,237	15	23	10	1	-	-
N.Y. City	914	-	5	-	30,521	23,123	-	-	-	-	-	14
N.J.	217	9	16	-	9,783	9,059	14	21	2	1	-	-
Pa.	91	1	22	1	12,425	14,061	13	17	4	1	-	-
E.N. CENTRAL	143	17	95	14	56,422	55,878	25	46	2	4	1	4
Ohio	24	3	39	4	14,341	14,137	10	27	-	-	-	2
Ind.	6	2	13	1	5,830	6,413	3	2	-	3	-	-
Ill.	74	1	12	6	15,446	13,653	3	2	-	1	-	-
Mich.	26	11	25	-	15,752	15,493	9	15	2	-	1	2
Wis.	13	-	6	3	5,053	6,182	-	-	-	-	-	-
W.N. CENTRAL	39	9	30	3	19,979	18,786	8	23	1	1	-	-
Minn.	7	1	14	1	2,956	2,766	1	6	1	-	-	-
Iowa	5	-	10	-	2,111	2,116	-	-	-	-	-	-
Mo.	20	3	-	-	9,481	8,987	4	7	-	1	-	-
N. Dak.	-	-	-	1	135	190	-	-	-	-	-	-
S. Dak.	-	-	-	-	362	492	2	1	-	-	-	-
Nebr.	2	-	1	-	1,779	1,270	1	3	-	-	-	-
Kans.	5	5	5	1	3,155	2,965	-	6	-	-	-	-
S. ATLANTIC	561	40	57	22	88,112	100,675	35	104	14	13	1	4
Del.	7	-	1	-	1,960	1,815	1	2	-	-	-	-
Md.	65	2	14	1	14,155	11,440	2	12	1	-	1	1
D.C.	68	1	-	-	7,168	7,330	-	5	-	-	-	-
Va.	32	6	14	4	9,056	9,615	7	21	3	2	-	-
W. Va.	4	1	6	-	1,243	1,205	-	2	-	-	-	-
N.C.	28	3	19	-	16,547	15,904	1	10	1	2	-	2
S.C.	7	-	3	-	10,940	9,691	2	7	2	-	-	-
Ga.	88	9	-	-	-	19,391	3	13	2	1	-	-
Fla.	262	18	-	17	27,043	24,284	19	32	5	8	-	1
E.S. CENTRAL	39	31	18	4	34,172	34,492	-	19	2	-	-	-
Ky.	11	-	5	-	3,879	4,205	-	3	-	-	-	-
Tenn.	12	6	4	-	13,717	14,157	-	10	1	-	-	-
Ala.	14	21	7	4	10,800	10,835	-	2	1	-	-	-
Miss.	2	4	2	-	5,776	5,295	-	4	-	-	-	-
W.S. CENTRAL	285	39	49	1	55,106	54,551	65	24	4	19	-	12
Ark.	4	-	1	1	5,131	4,877	3	-	-	-	-	1
La.	53	5	2	-	11,927	12,419	1	1	1	3	-	1
Okla.	5	6	12	-	5,695	5,863	2	2	1	1	-	-
Tex.	223	28	34	-	32,353	31,392	59	21	2	15	-	10
MOUNTAIN	56	5	19	3	12,970	12,795	66	38	20	10	-	5
Mont.	-	-	-	-	361	551	-	-	-	-	-	-
Idaho	-	-	-	-	418	635	5	-	-	-	-	-
Wyo.	-	-	1	-	312	374	-	1	-	-	-	-
Colo.	25	3	6	-	3,925	3,710	4	5	-	3	-	1
N. Mex.	6	-	1	-	1,485	1,434	9	13	2	-	-	-
Ariz.	18	2	2	-	3,860	3,480	33	13	16	7	-	1
Utah	4	-	7	3	540	624	6	2	2	-	-	2
Nev.	3	-	2	-	2,069	1,987	9	4	-	-	-	1
PACIFIC	975	33	96	16	62,921	56,819	169	129	28	56	-	130
Wash.	46	1	10	-	4,134	4,063	5	8	3	2	-	27
Oreg.	14	-	-	-	3,081	3,167	34	13	7	1	-	2
Calif.	896	27	83	16	53,321	47,239	130	104	17	53	-	90
Alaska	2	-	3	-	1,482	1,406	-	1	-	-	-	-
Hawaii	17	5	-	-	903	944	-	3	1	-	-	11
Guam	-	U	-	-	67	126	U	U	U	U	U	1
P.R.	36	U	4	1	1,695	1,709	U	U	U	U	U	2
V.I.	2	U	-	-	235	245	U	U	U	U	U	-
Pac. Trust Terr.	-	U	-	-	146	-	U	U	U	U	U	20

N: Not notifiable U: Unavailable

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending June 29, 1985 and June 30, 1984 (26th Week)

Reporting Area	Malaria	Measles (Rubeola)					Meningococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported *		Total									
	Cum. 1985	1985	Cum. 1985	1985	Cum. 1985	Cum. 1984	Cum. 1985	1985	Cum. 1985	1985	Cum. 1985	Cum. 1984	1985	Cum. 1985	Cum. 1984
UNITED STATES	373	79	1,467	3	335	1,788	1,408	33	1,893	22	715	1,005	44	366	418
NEW ENGLAND	20	-	33	-	86	101	65	-	37	1	36	21	-	9	17
Maine	3	-	-	-	-	-	2	-	6	-	2	-	-	-	1
N.H.	2	-	-	-	-	36	5	-	6	-	18	4	-	2	-
Vt.	-	-	-	-	-	5	12	-	2	-	2	11	-	-	-
Mass.	10	-	29	-	83	47	11	-	13	-	5	5	-	6	16
R.I.	2	-	-	-	-	-	11	-	6	-	4	1	-	-	-
Conn.	3	-	4	-	3	13	24	-	4	1	5	-	-	1	-
MID ATLANTIC	56	6	140	1	27	106	234	4	209	1	61	73	37	154	139
Upstate N.Y.	21	1	67	1†	11	23	99	3	119	1	28	50	2	14	94
N.Y. City	15	4	39	-	7	73	25	-	14	-	9	3	35	119	32
N.J.	6	1	11	-	9	6	37	1	26	-	2	5	-	9	12
Pa.	14	-	23	-	-	4	73	-	50	-	22	15	-	12	1
E.N. CENTRAL	17	1	282	-	125	617	250	6	726	3	85	268	-	20	68
Ohio	3	-	-	-	43	7	80	2	208	-	19	49	-	-	2
Ind.	1	-	-	-	1	3	36	-	30	-	11	176	-	-	2
Ill.	1	1	193	-	66	162	55	-	147	-	13	18	-	5	39
Mich.	11	-	36	-	15	422	54	4	275	3	18	12	-	14	18
Wis.	1	-	53	-	-	23	25	-	66	-	24	13	-	1	7
W.N. CENTRAL	13	-	1	-	6	9	78	-	62	3	65	79	1	19	28
Minn.	6	-	-	-	4	3	17	-	1	1	15	8	-	2	2
Iowa	1	-	-	-	-	-	7	-	8	-	3	3	1	1	-
Mo.	2	-	-	-	2	2	33	-	11	-	12	14	-	7	-
N. Dak.	1	-	-	-	-	-	3	-	2	1	8	-	-	2	3
S. Dak.	1	-	-	-	-	-	1	-	-	-	1	4	-	-	-
Nebr.	1	-	-	-	-	-	7	-	2	1	4	2	-	-	-
Kans.	1	-	1	-	-	4	10	-	38	-	22	48	-	7	23
S. ATLANTIC	53	13	194	-	6	28	274	9	163	2	128	93	1	35	20
Del.	-	-	-	-	-	-	6	-	1	-	-	2	-	1	-
Md.	13	9	40	-	4	9	34	6	25	2	33	17	-	1	1
D.C.	4	-	-	-	1	5	6	-	-	-	-	-	-	-	-
Va.	11	-	18	-	1	2	36	-	28	-	5	11	-	1	-
W. Va.	1	-	31	-	-	-	5	-	51	-	1	7	-	9	-
N.C.	5	-	9	-	-	-	37	-	9	-	9	17	-	-	-
S.C.	-	-	-	-	-	1	28	-	7	-	-	2	-	3	-
Ga.	3	-	8	-	-	-	48	-	13	-	48	8	-	4	2
Fla.	16	4	88	-	-	11	74	3	29	-	32	29	1	16	17
E.S. CENTRAL	7	-	-	-	1	3	62	-	17	-	9	6	-	2	7
Ky.	2	-	-	-	-	1	5	-	4	-	3	1	-	2	3
Tenn.	-	-	-	-	-	2	20	-	11	-	2	2	-	-	-
Ala.	4	-	-	-	-	-	22	-	-	-	2	-	-	-	1
Miss.	1	-	-	-	1	-	15	-	2	-	2	3	-	-	3
W.S. CENTRAL	31	45	260	1	8	374	121	4	202	2	118	226	-	22	6
Ark.	-	-	-	-	-	1	12	-	4	-	10	11	-	1	3
La.	-	5	32	-	-	-	19	-	2	-	5	3	-	-	-
Okla.	1	-	-	-	-	7	25	N	N	2	66	203	-	1	-
Tex.	30	40	228	1†	8	366	65	4	196	-	37	9	-	20	3
MOUNTAIN	22	7	425	-	43	138	64	3	191	3	39	71	-	4	12
Mont.	-	-	122	-	17	-	4	-	7	-	3	17	-	-	-
Idaho	1	7	108	-	18	23	2	-	6	-	-	3	-	1	1
Wyo.	-	-	-	-	-	-	5	-	2	-	-	3	-	-	2
Colo.	7	-	-	-	6	-	17	-	16	-	10	25	-	-	2
N. Mex.	8	-	1	-	2	88	8	N	N	-	5	5	-	2	-
Ariz.	3	-	194	-	-	-	19	3	93	3	13	11	-	1	-
Utah	2	-	-	-	-	27	7	-	5	-	8	5	-	-	7
Nev.	1	-	-	-	-	-	2	-	62	-	-	2	-	-	-
PACIFIC	154	7	132	1	33	412	260	7	286	7	174	168	5	101	121
Wash.	11	-	1	-	-	108	44	-	23	-	24	32	-	2	1
Oreg.	8	-	3	-	-	-	25	N	N	2	21	11	-	2	-
Calif.	118	5	115	1†	28	266	181	6	250	3	115	57	5	63	116
Alaska	2	-	-	-	-	-	6	-	3	2	11	-	-	1	1
Hawaii	15	2	13	-	5	38	4	1	10	-	3	68	-	33	3
Guam	1	U	10	U	-	90	-	U	4	U	-	-	U	1	4
P.R.	-	U	46	U	-	1	9	U	107	U	5	-	U	20	5
V.I.	-	U	4	U	6	-	-	U	3	U	-	-	U	-	-
Pac. Trust Terr.	-	U	-	U	-	-	-	U	3	U	-	-	U	-	-

*For measles only, imported cases includes both out-of-state and international importations.

N: Not notifiable U: Unavailable †International §Out-of-state

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending June 29, 1985 and June 30, 1984 (26th Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1985	Cum. 1984	1985	Cum. 1985	Cum. 1984	Cum. 1985	Cum. 1985	Cum. 1985	Cum. 1985
UNITED STATES	12,403	13,965	6	10,302	10,435	53	151	221 +31	2,485
NEW ENGLAND	270	279	-	330	290	-	6	3 +1	9
Maine	8	2	-	24	14	-	-	-	-
N.H.	6	6	-	8	18	-	-	-	1
Vt.	3	1	-	4	3	-	-	-	-
Mass.	143	167	-	197	156	-	5	3 1	5
R.I.	7	9	-	32	25	-	-	-	-
Conn.	103	94	-	65	74	-	1	-	3
MID ATLANTIC	1,726	1,909	1	1,848	1,881	1	18	2	195
Upstate N.Y.	117	152	-	312	291	-	7	2	48
N.Y. City	1,066	1,179	-	940	776	1	5	-	-
N.J.	357	349	-	229	403	-	5	-	10
Pa.	186	229	1	367	411	-	1	-	137
E.N. CENTRAL	584	655	1	1,230	1,371	-	16	18 +1	79
Ohio	74	122	1	213	272	-	3	16 1	17
Ind.	61	69	-	155	152	-	3	-	10
Ill.	303	216	-	539	570	-	4	-	14
Mich.	116	208	-	263	290	-	4	2	9
Wis.	30	40	-	60	87	-	2	-	29
W.N. CENTRAL	120	218	3	283	320	19	7	19 +2	430
Minn.	28	65	3	58	58	1	5	1 1	70
Iowa	14	10	-	38	34	-	-	-	87
Mo.	55	114	-	131	153	15	1	1	22
N. Dak.	1	4	-	2	8	-	-	1	61
S. Dak.	4	-	-	15	11	2	-	-	136
Nebr.	5	9	-	10	17	1	1	1	22
Kans.	13	16	-	29	39	-	-	15 1	32
S. ATLANTIC	3,061	4,126	-	2,151	2,183	5	16	92 +14	688
Del.	17	10	-	18	26	1	-	-	-
Md.	188	262	-	198	241	-	4	7	344
D.C.	184	161	-	94	83	-	-	-	-
Va.	155	218	-	187	220	-	3	10 2	87
W. Va.	8	11	-	50	74	-	-	2 1	16
N.C.	336	420	-	259	323	4	1	37 5	3
S.C.	399	375	-	294	244	-	-	24 2	40
Ga.	-	692	-	330	305	-	-	9 4	104
Fla.	1,774	1,977	-	721	667	-	8	3	94
E.S. CENTRAL	1,061	929	-	957	983	3	3	25 +7	121
Ky.	34	55	-	207	226	-	1	1 1	19
Tenn.	297	255	-	296	309	3	-	15 5	25
Ala.	316	290	-	298	296	-	2	5 1	75
Miss.	414	329	-	156	152	-	-	4	2
W.S. CENTRAL	3,087	3,345	-	1,201	1,181	15	11	53 +4	488
Ark.	160	106	-	122	132	5	-	7	80
La.	551	615	-	179	157	-	-	-	10
Okla.	90	116	-	133	122	7	-	39 3	60
Tex.	2,286	2,508	-	767	770	3	11	7 1	338
MOUNTAIN	390	322	-	255	271	8	6	7 +1	207
Mont.	2	2	-	29	13	2	-	4 1	106
Idaho	3	14	-	11	14	-	-	1	2
Wyo.	5	5	-	5	-	-	-	2	12
Colo.	91	72	-	30	28	1	4	-	9
N. Mex.	63	42	-	49	54	2	1	-	2
Ariz.	203	128	-	112	128	1	1	-	75
Utah	5	10	-	6	19	2	-	-	-
Nev.	18	49	-	13	15	-	-	-	1
PACIFIC	2,104	2,182	1	2,047	1,955	2	68	2	268
Wash.	57	72	-	108	101	-	-	-	3
Oreg.	44	69	-	71	75	1	-	-	1
Calif.	1,960	2,001	1	1,715	1,637	1	65	2	264
Alaska	2	3	-	57	33	-	-	-	-
Hawaii	41	37	-	96	109	-	3	-	-
Guam	2	-	U	14	27	-	-	-	-
P.R.	390	419	U	164	217	-	1	-	18
V.I.	1	7	U	1	3	-	52	-	-
Pac. Trust Terr.	13	-	U	16	-	-	-	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending June 29, 1985 (26th Week)

Reporting Area	All Causes, By Age (Years)						P&I** Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	580	383	120	38	15	24	28
Boston, Mass.	156	89	42	12	2	11	8
Bridgeport, Conn.	46	31	11	2	2	-	2
Cambridge, Mass.	28	19	5	2	1	1	3
Fall River, Mass.	26	15	7	4	-	-	-
Hartford, Conn.	55	37	9	4	2	3	-
Lowell, Mass.	17	9	8	-	-	-	-
Lynn, Mass.	5	4	1	-	-	-	-
New Bedford, Mass.	17	11	4	1	-	1	1
New Haven, Conn.	49	34	6	3	2	4	3
Providence, R.I.	53	37	9	1	3	3	4
Somerville, Mass.	8	5	3	-	-	-	-
Springfield, Mass.	50	36	7	4	2	1	3
Waterbury, Conn.	17	13	1	2	1	-	-
Worcester, Mass.	53	43	7	3	-	-	4
MID ATLANTIC	2,529	1,623	552	210	78	66	100
Albany, N.Y.	52	31	13	5	2	1	2
Allentown, Pa.	23	21	2	-	-	-	-
Buffalo, N.Y.	116	75	30	9	1	1	11
Camden, N.J.	26	13	11	1	-	1	1
Elizabeth, N.J.	27	21	4	-	1	1	2
Erie, Pa.†	41	23	14	4	-	-	2
Jersey City, N.J.	37	22	8	4	2	1	-
N.Y. City, N.Y.	1,372	844	295	142	46	45	40
Newark, N.J.	60	31	15	9	3	2	5
Paterson, N.J.	22	17	3	1	1	-	2
Philadelphia, Pa.	325	211	77	16	13	8	19
Pittsburgh, Pa.†	63	37	20	4	-	2	1
Reading, Pa.	22	18	3	1	-	-	-
Rochester, N.Y.	131	103	20	5	2	1	6
Schenectady, N.Y.	30	20	7	2	1	-	2
Scranton, Pa.†	28	24	3	-	1	-	1
Syracuse, N.Y.	74	54	13	1	4	2	1
Trenton, N.J.	28	16	8	2	1	1	2
Utica, N.Y.	17	14	2	1	-	-	1
Yonkers, N.Y.	35	28	4	3	-	-	2
E.N. CENTRAL	2,236	1,552	370	137	76	100	96
Akron, Ohio	52	33	11	2	2	4	2
Canton, Ohio	40	26	13	1	-	-	1
Chicago, Ill.§	553	462	11	26	16	37	16
Cincinnati, Ohio	113	71	29	8	4	1	8
Cleveland, Ohio	150	98	35	5	4	8	5
Columbus, Ohio	132	80	26	11	8	7	3
Dayton, Ohio	76	51	19	5	1	-	1
Detroit, Mich.	277	156	66	28	12	15	6
Evansville, Ind.	58	45	7	5	1	-	5
Fort Wayne, Ind.	51	36	6	2	3	4	3
Gary, Ind.	19	8	8	3	-	-	1
Grand Rapids, Mich.	66	50	5	7	3	1	5
Indianapolis, Ind.	157	82	49	10	8	8	4
Madison, Wis.	46	28	7	8	3	-	4
Milwaukee, Wis.	138	104	22	4	2	6	5
Peoria, Ill.	46	31	8	2	3	2	7
Rockford, Ill.	38	23	10	2	2	1	3
South Bend, Ind.	45	35	7	1	1	1	4
Toledo, Ohio	106	77	20	4	1	4	12
Youngstown, Ohio	73	56	11	3	2	1	1
W.N. CENTRAL	715	476	153	43	23	20	25
Des Moines, Iowa	71	46	20	3	-	2	7
Duluth, Minn.	23	17	6	-	-	-	-
Kansas City, Kans.	39	26	10	1	1	1	3
Kansas City, Mo.	117	77	28	5	4	3	2
Lincoln, Nebr.	32	23	3	5	1	-	3
Minneapolis, Minn.	92	60	10	11	6	5	1
Omaha, Nebr.	74	48	16	4	3	3	4
St. Louis, Mo.	128	86	28	7	3	4	1
St. Paul, Minn.	68	47	14	4	3	-	1
Wichita, Kans.	71	46	18	3	2	2	3
S. ATLANTIC	1,124	689	272	80	37	46	55
Atlanta, Ga.	142	95	22	14	2	9	3
Baltimore, Md.	209	121	58	15	8	7	7
Charlotte, N.C.	86	49	27	7	3	-	2
Jacksonville, Fla.	112	67	29	3	7	6	8
Miami, Fla.	23	11	9	3	-	-	-
Norfolk, Va.	61	38	14	2	5	2	4
Richmond, Va.	75	43	22	5	1	4	9
Savannah, Ga.	24	17	5	1	-	1	1
St. Petersburg, Fla.	118	88	21	7	-	2	7
Tampa, Fla.	69	41	16	4	5	3	3
Washington, D.C.	191	110	45	18	6	12	11
Wilmington, Del.	14	9	4	1	-	-	-
E.S. CENTRAL	650	423	153	38	17	19	37
Birmingham, Ala.	117	86	22	3	-	6	2
Chattanooga, Tenn.	43	23	11	4	3	2	5
Knoxville, Tenn.	70	46	13	7	3	1	7
Louisville, Ky.	123	80	29	7	3	4	3
Memphis, Tenn.	114	74	26	7	5	2	8
Mobile, Ala.	40	23	13	2	2	-	3
Montgomery, Ala.	53	34	17	-	-	2	4
Nashville, Tenn.	90	57	22	8	1	2	5
W.S. CENTRAL	1,283	853	221	93	67	49	66
Austin, Tex.	62	39	10	4	7	2	7
Baton Rouge, La.	44	28	13	3	-	-	2
Corpus Christi, Tex.	45	29	8	2	6	-	2
Dallas, Tex.	222	116	53	31	13	9	12
El Paso, Tex.	61	34	15	4	4	4	2
Fort Worth, Tex	104	73	19	4	5	3	8
Houston, Tex. §	281	247	3	8	12	11	7
Little Rock, Ark.	59	29	20	3	4	3	4
New Orleans, La.	122	77	28	9	5	3	1
San Antonio, Tex.	158	100	26	19	6	7	15
Shreveport, La.	41	23	9	4	3	2	3
Tulsa, Okla.	84	58	17	2	2	5	3
MOUNTAIN	607	399	123	43	21	21	43
Albuquerque, N.Mex.	71	48	12	3	5	3	3
Colo. Springs, Colo.	41	25	8	3	2	3	3
Denver, Colo.	107	78	14	11	2	2	6
Las Vegas, Nev.	92	58	25	7	1	1	11
Ogden, Utah	23	15	3	-	1	4	3
Phoenix, Ariz.	127	74	28	12	7	6	3
Pueblo, Colo.	21	13	6	1	1	-	1
Salt Lake City, Utah	28	20	7	-	-	1	-
Tucson, Ariz.	97	68	20	6	2	1	13
PACIFIC	1,645	1,071	323	133	75	40	102
Berkeley, Calif.	9	5	1	1	-	2	-
Fresno, Calif.	91	58	14	8	7	4	11
Glendale, Calif.	9	7	2	-	-	-	1
Honolulu, Hawaii	74	34	28	4	6	2	5
Long Beach, Calif.	80	57	13	5	4	1	11
Los Angeles, Calif.	393	250	85	34	15	7	9
Oakland, Calif.	61	36	15	7	-	3	6
Pasadena, Calif.	28	25	1	1	-	1	1
Portland, Oreg.	100	72	14	8	4	2	8
Sacramento, Calif.	126	70	30	15	8	3	7
San Diego, Calif.	123	83	26	6	5	3	9
San Francisco, Calif.	157	100	31	20	2	4	3
San Jose, Calif.	126	84	15	12	11	3	11
Seattle, Wash.	148	97	30	9	8	4	7
Spokane, Wash.	53	41	7	2	2	1	7
Tacoma, Wash.	67	52	11	1	3	-	6
TOTAL	11,369††	7,469	2,287	815	409	385	552

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.
** Pneumonia and influenza.
† Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.
††Total includes unknown ages.
§ Data not available. Figures are estimates based on average of past 4 weeks.

Pertussis — Continued

Individuals 7 years of age or older comprised 44% of the cases reported in this outbreak. Transmission of pertussis from older children and adults has previously been described (*3-5*). The true incidence rate of pertussis in these age groups and their relative importance in transmission is unknown. Pertussis in older children and adults may not be recognized, because the clinical presentation can be modified by previous immunizations and/or age (*6*). While adult-to-adult transmission may have played some role in perpetuating this outbreak, documented transmission occurred in only one of four workplace settings, and no spread to household contacts was shown, suggesting that adult-to-adult transmission was not common.

Current laboratory methods to diagnose pertussis appear to be inadequate and may have impeded studies of pertussis transmission. While a positive culture of nasopharyngeal secretions in a symptomatic patient is diagnostically specific for pertussis disease, the sensitivity of culture results may be less because of inadequate specimen collection, prior antibiotic therapy, or delay in specimen collection beyond the first 3 weeks of illness (*7*). The alternative, FA testing of secretions, may provide a rapid presumptive diagnosis of pertussis in outbreaks in which *Bordetella pertussis* has been documented by culture, but it also may not be very sensitive. In addition, specificity of the FA test may suffer, because of the difficulties in interpretation and interreader variability (*8*). Thus, reliance on either culture or FA alone for the diagnosis of pertussis can potentially result in underdiagnosis and misdiagnosis of cases.

The significance of asymptomatic FA-positive persons and their role in transmission in this outbreak is unknown. Although the absence of symptoms and lack of confirmation by culture suggest false-positive FA results, the clustering of FA-positive persons within households suggests the results may have truly identified persons harboring the organism. Earlier studies using culture and FA techniques reported few or no asymptomatic infections (*9,10*). New laboratory diagnostic tests, such as the enzyme-linked immunosorbent assay (ELISA), to evaluate serum antibody responses (*11*) may have higher sensitivity and specificity for pertussis infection and may help to better define the epidemiology of pertussis and new methods of outbreak control. Using such an ELISA, one study reported asymptomatic *B. pertussis* infections among 29 (46%) of 63 family members of symptomatic patients (*12*).

The poor response to a communitywide immunization recall by mail and telephone in this outbreak, despite the availability of computerized immunization records, confirms the difficulty of using immunization recall as a method to control pertussis outbreaks (*13*). Since pertussis outbreaks are easier to prevent than control, efforts should be directed toward ensuring that the maximal number of children are up to date for DTP in accordance with the recommendations of the Immunization Practices Advisory Committee (*14*).

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Pertussis — Continued

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Dental Caries in American Indian and Alaskan Native Children

A study conducted by the Indian Health Service (IHS) of the U.S. Public Health Service in 1983-1984 showed that American Indian and Alaskan Native (AI/AN) children develop more tooth decay than the general population of U.S. schoolchildren (*1*). This study involved patients seen in IHS dental clinics in the 11 geographic areas of the IHS, including Alaska. Among AI/AN children, an average of 6.8 decayed, missing due to caries, and/or filled permanent teeth (DMFT) was identified for approximately 5,800 children 5-19 years old. The National Caries Prevalence Survey (NCPS), conducted by the National Institute of Dental Research in 1979-1980, reported that 5- to 17-year-olds in the overall U.S. population had an average of 4.8 DMFT (*2*).

Results from the IHS study indicate that 19% of 5- to 19-year-old dental patients were caries-free. By contrast, 37% of 5- to 17-year-olds from the NCPS were reported to be caries-free. Approximately 33% of AI/AN children treated in dental offices had seven or more DMFT; 15% of other U.S. children had the same rate. On average, 12-year-old AI/AN children had 6.5 DMFT, and by age 17 years, 11.9 DMFT. U.S. schoolchildren surveyed from a national random sample had 2.6 DMFT at 12 years and 6.3 DMFT at 17 years of age (Figure 2). Although the 1990 U.S. Public Health Service objective stating that 40% of 9-year-old children should be caries-free (*3*) has been achieved (51% reported from NCPS), 2.3% of AI/AN children of the same age group were reported as caries-free from the IHS study.

Severe, rampant tooth decay caused by prolonged bottle feeding (milk, formula, juices, or sweetened beverages) of infants and young children is called nursing-bottle caries. Based on the characteristic dental caries pattern of nursing-bottle caries (affecting the upper front primary teeth and, frequently, the back teeth), up to 50% of AI/AN preschool-aged children who seek dental services suffer from this disease. Eighteen percent of preschool-aged AI/AN children (under 5 years old) had caries-free primary teeth, while over 40% had seven or more decayed and/or filled primary teeth (DFT). Children with nursing-bottle caries had almost four times the amount of tooth decay as those children who had not had nursing-bottle caries.

Reported by Indian Health Svc; Dental Disease Prevention Activity, Center for Prevention Svcs, CDC.

Editorial Note: Although major differences in the sampling methods make direct comparisons of the IHS data with the NCPS data difficult, the higher incidence of tooth decay in AI/AN children cannot be explained by these differences alone. Also, since infrequent users of

Dental Caries — Continued

the IHS-care system who were studied had as much dental decay as more frequent users, the sampling methodology in itself may not account for the major differences in caries prevalence between the AI/AN population and the general U.S. population. The differences in data collection indicate the need for standardization of surveillance methods and reporting of data.

Because the IHS data were collected from a sample of dental patients, they do not necessarily represent the actual dental caries prevalence among all AI/AN children. The magnitude of dental caries in these children remains a serious problem. IHS and Native American communities are placing increased emphasis on both the extent and quality of dental caries prevention activities, which include: community water fluoridation, supplemental fluorides, and pit and fissure sealants. The IHS anticipates that future surveys will reflect the impact of these activities by a decrease in caries prevalence. The IHS is also increasing its emphasis on the prevention of nursing-bottle caries by educating health professionals and parents.

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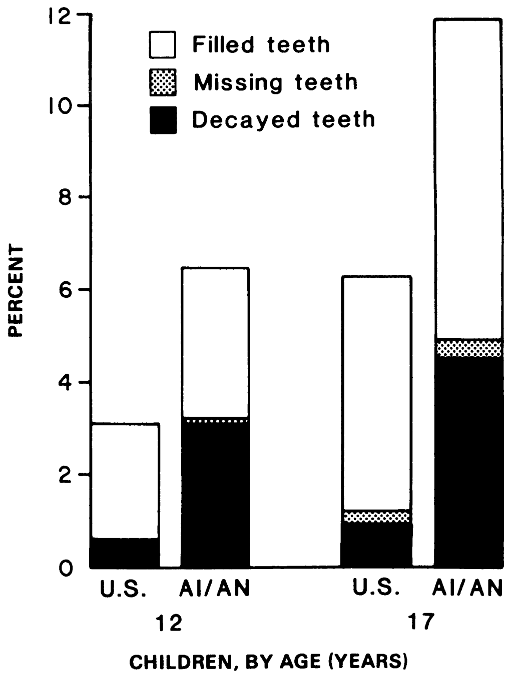
FIGURE 2. DMFT* status for U.S. and American Indian/Alaskan Native children†



*Decayed, missing (due to caries), and/or filled permanent teeth.

†From the 1979-1980 National Caries Prevalence Survey and 1983-1984 Indian Health Service Survey.

Neurologic Findings among Workers Exposed to Fenthion in a Veterinary Hospital — Georgia

In July 1983, a neurologist in Georgia saw a patient who complained of shooting pains, muscle weakness, and numbness. The patient worked at a veterinary hospital (hospital A). The National Institute for Occupational Safety and Health (NIOSH) was asked to determine whether these symptoms were caused by occupational exposures (*1*). Investigators interviewed all eight workers in hospital A, performed medical examinations, including neurologic examinations, on seven, and collected blood samples for cholinesterase levels. They visited hospital A, reviewed work practices and working conditions, and inventoried all chemicals used there. In addition, they conducted a telephone survey of three other veterinary hospitals in the area to assess whether their workers had similar complaints and to compare work practices among the hospitals.

Medical examinations revealed that two additional workers at hospital A experienced multiple shooting pains, muscle weakness, back pain, and numbness; another had experienced occasional "shooting pain" in the back, and a fourth complained of rare numbness and tingling of the hands and feet at night. Neurologic examinations revealed that the most severely ill employee had ocular muscle weakness and was unable to maintain upward gaze. This veterinary assistant also had decreased sensation to light touch below the left knee. Otherwise, the neurologic findings were unremarkable. Results of tests of plasma and red blood cell cholinesterase activity were within the normal range for all workers tested, including the most severely ill worker.

Investigators noted 22 different preparations of insecticide dips, shampoos, pills, powders, and sprays used in or dispensed by hospital A. These products contained 12 types of pesticides. Employees took no special precautions to avoid skin contact with these materials, except one animal groomer who wore gloves and a dust mask when working with certain dips.

The telephone survey of three other veterinary hospitals in the area revealed no reports of similar illnesses among 20 employees. However, a difference in work practices was identified; in hospital A, an organophosphate insecticide, fenthion, was frequently used. In contrast, fenthion was used infrequently or not at all at the other hospitals surveyed. No other notable differences in work practices were identified. In hospital A, a 20% solution of fenthion was routinely applied topically to dogs in the hospital to control infestation with fleas. Investigators determined that affected workers frequently came in heavy contact with fenthion.

The investigators recommended that use of fenthion be discontinued and alternative insecticides be selected. They also recommended limiting skin contact with all pesticides as much as possible. Since discontinuing exposure to fenthion, both individuals who were most severely affected have gradually improved.

Reported by RL Metcalf, MD, Dept of Entomology, University of Illinois, Urbana; CE Branch, MD, Northeast Georgia Medical Center, Gainesville, TR Swift, MD, Medical College of Georgia, Augusta, RK Sikes, DVM, State Epidemiologist, Georgia Dept of Human Resources; Hazard Evaluations and Technical Assistance Br, Div of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Safety and Health, CDC.

Editorial Note: The pesticide, fenthion (0,0-dimethy1-0-[4-(methylthio)-m-tolyl] phosphorothiolate), is readily absorbed through the skin; it is highly fat soluble and has prolonged biologic effects (*2,3*). In very limited studies, neurotoxicity has been demonstrated in hens (*4,5*).

In humans and in experimental animals, chronic exposure to organophosphates has been shown to cause various forms of nerve damage. Organophosphate-induced delayed neuropathy usually occurs 8-14 days after exposure to organophosphate compounds (*6,7*). The mixed sensory-motor neuropathy usually begins in the legs, first causing burning or tingling

Neurologic Findings — Continued

sensations, then weakness of the lower legs and feet. The thighs and arms also become involved. Severe cases proceed to complete paralysis, impaired respiration, and death. Confusion, headache, disorientation, and altered mental and emotional states have also been reported. The nerve damage of organophosphate-induced delayed neuropathy is usually permanent. Although organophosphate-induced delayed neuropathy has been reported after exposure to many compounds containing phosphorus-esters, none of the compounds to which workers were exposed in hospital A are commonly recognized as causing it. Therefore, because of the above investigation, it would appear prudent to add fenthion to the list of agents thought capable of producing this syndrome.

An estimated 30,000 veterinarians are in private practice in the United States, and they employ an additional 45,000 support personnel. It is not known how many use fenthion or other organophosphate insecticides in the manner described here. However, because of the apparent association of symptoms specifically with fenthion, and because of scientific information currently available on the neurotoxicity of other organophosphates, NIOSH reiterates its previous recommendation that skin contact with all pesticides, including fenthion, be limited as much as possible (*8*).

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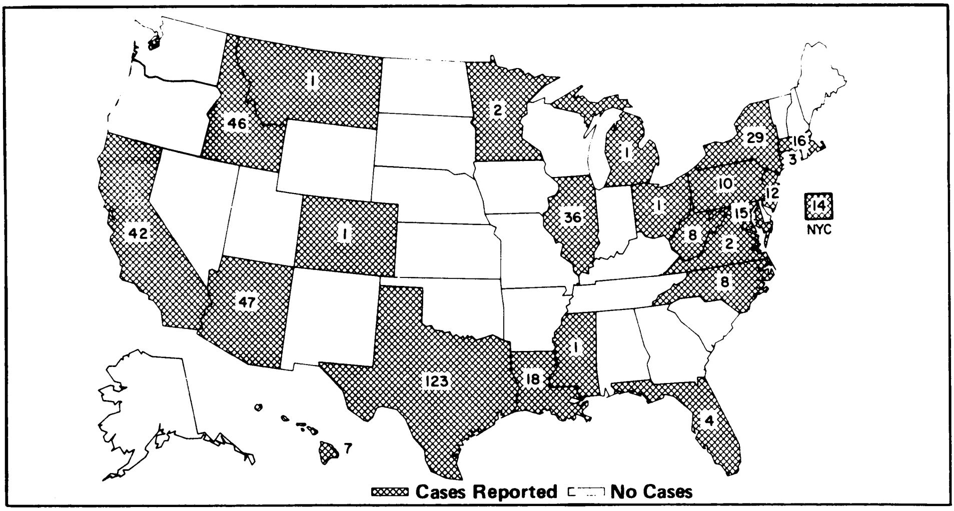
FIGURE I. Reported measles cases — United States, weeks 22-25, 1985



The *Morbidity and Mortality Weekly Report* is prepared by the Centers for Disease Control, Atlanta, Georgia, and available on a paid subscription basis from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, (202) 783-3238.

The data in this report are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday.

The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: ATTN: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333.

☆U.S. Government Printing Office: 1985-746-149/21003 Region IV

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HEALTH & HUMAN SERVICES
Public Health Service
Centers for Disease Control
Atlanta GA 30333