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Epidemiologic Notes and Reports

Chloroquine-Resistant *Plasmodium falciparum* Malaria in West Africa

On May 27, 1986, a 50-year-old American helicopter mechanic traveled to Enugu, a city in the eastern state of Anambra, Nigeria. While in Nigeria, he took chloroquine 300 mg base weekly for malaria chemoprophylaxis and continued this regimen after returning to the United States via Lagos on December 6. He traveled only in eastern Nigeria and did not travel to other malarious countries. On December 9, he developed fever, chills, and headache, and was hospitalized in California on December 18.

On December 20, a peripheral blood smear revealed that 0.5% of red blood cells were infected with asexual *Plasmodium falciparum* parasites, and treatment with chloroquine 1500 mg base was administered over a 3-day period. He became afebrile on December 22, and a peripheral blood smear on December 23 showed rare trophozoites. On December 27, he again became febrile, and a blood smear on December 31 revealed a parasitemia of 1.0%. A whole-blood specimen collected on December 31 was analyzed by high performance liquid chromatography (*1*) and contained 151 ng of chloroquine/ml, indicating that the treatment dosage of chloroquine had been adequately absorbed.

A parasite isolate collected on December 31 was assayed by the 48-hour in vitro test of Nguyen-Dinh and Trager (*2*) and found to be resistant to chloroquine: parasite multiplication was inhibited only at 0.3 μmol of chloroquine/liter of medium, a concentration higher than the accepted limit of in vitro chloroquine resistance (0.06 μmol/L). The patient responded promptly to treatment with quinine (650 mg three times daily for 3 days) and tetracycline (250 mg four times daily for 7 days) and has remained well.

Reported by DV Jackson, MD, P Marcarelli, MD, G Segal, MD, Dept of Infectious Diseases, Long Beach Veterans Administration/University of California, Irvine, SW Waterman, MD, County of Los Angeles Dept of Health Svcs, RR Roberto, MD, California Dept of Health Svcs; Control Technology Br, Malaria Br, Div of Parasitic Diseases, Center for Infectious Diseases, CDC.

Editorial Note: Chloroquine-resistant *P. falciparum* was first confirmed in Africa in 1979 when a *P. falciparum* infection in a traveler returning from Tanzania was not cured by a standard treatment regimen of chloroquine, and the infecting parasite was found to be resistant to chloroquine in vitro (*3*). Subsequently, chloroquine-resistant *P. falciparum* has spread throughout East and Central Africa and, in 1985, was reported from as far west as Cameroon (*4*). A

Chloroquine – Continued

recent report from Benin (*5*) and the case from Nigeria presented here indicate that chloroquine-resistant *P. falciparum* is now present in West Africa as well.

These reports of chloroquine-resistant *P. falciparum* malaria have serious public health implications since malaria transmission in much of West Africa is intense and perennial. In Nigeria, the most populous nation on the African continent, a change in the efficacy of chloroquine, the most widely used anti-malarial drug, could affect many of the country's estimated 80-100 million residents. Since chloroquine-resistance can extend rapidly after it is first observed in a geographic region, the efficacy of chloroquine will need to be systematically monitored by health care personnel throughout West Africa.

In accordance with Centers for Disease Control (CDC) recommendations for short-term travelers to chloroquine-resistant areas, travelers to Nigeria and Benin should take weekly chloroquine prophylaxis and should also carry pyrimethamine/sulfadoxine (Fansidar®) to be taken in the event of a fever or flu-like illness when medical attention is not readily available (*6*). Additionally, since *P. falciparum* infections that are chloroquine prophylaxis failures may respond poorly to full treatment dosages of chloroquine (*7*), they should be treated with anti-malarial medications that are effective against chloroquine-resistant infections.

The Malaria Branch/CDC is currently assisting in the investigation of additional cases of possible chloroquine-resistant *P. falciparum* malaria acquired elsewhere in West Africa. CDC will update malaria prophylaxis recommendations as further information regarding the geographic extent of chloroquine-resistant *P. falciparum* becomes available. Physicians treating patients with *P. falciparum* infections that were acquired in West Africa and that may represent chloroquine prophylaxis or treatment failures are encouraged to report these cases promptly to their local or state health departments and to the Malaria Branch/CDC (telephone: weekdays [404]452-4046, nights and weekends [404]329-2888).

References

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Epidemiologic Notes and Reports

Trichinosis — Hawaii

In January 1986, three cases of trichinosis were reported to the Hawaii Department of Health. The cases occurred among persons who had eaten wild boar meat given to them by a

Trichinosis — Continued

local Hawaiian who had killed the animal. Because the meat had been distributed among several family members and friends of the hunter, an investigation was conducted to determine the extent of the outbreak.

Among all of those who had received some of the wild boar, health officials identified 28 persons who had eaten the meat. Seven of them were not available for follow-up; the remaining 21 persons were interviewed on February 21 and 22, 1986. Seven (33%) of these had illnesses that met the standard case definition for trichinosis (*1*). All seven patients had at least four of the following symptoms: myalgia (7), malaise (7), fever (6), headache (6), diarrhea (4), nausea (4), periorbital edema (4), vomiting (2), and trunk and limb edema and cutaneous rash (1). The patients ranged from 13 to 55 years of age (mean = 32 years); five (71%) were male. All were of Hawaiian or Asian decent. Dates of ingestion ranged from January 9 to January 22; dates of onset of symptoms ranged from January 31 to March 1. The median incubation period was 26 days, and the median duration of illness was 14 days. One patient was hospitalized; three were treated with mebendazole, and two were treated with thiabendazole. All patients recovered.

Serum was drawn from all seven patients during a time period that ranged from 50 and 81 days after ingestion of the implicated meat. There was serological evidence of infection in five of these patients (titers $\geq$40 by the bentonite flocculation test). Laboratory studies of four patients seen by a physician during acute illness revealed eosinophilia ranging from 8% to 55%.

Samples of the implicated wild boar meat were sent to the Centers for Disease Control for study. An artificial digestion procedure performed on the meat revealed from two to nine *Trichinella* larvae per gram of the frozen meat.

Four of the 21 persons interviewed ate the meat after it had been microwaved at high heat for 2 minutes; the remaining 17 persons ate the meat fried. All four of those eating microwaved meat became ill, and three (18%) of those who had eaten fried meat became ill ($p = < 0.01$, RR = 5.7). Inadequate recall and incomplete responses prevented investigators from looking at dose response for illness. However, the two people with the most severe illness had eaten the largest amounts of wild boar meat.

All remaining portions of the wild boar meat were confiscated. In addition, all persons who had eaten the meat were instructed in the proper handling and preparation of pork products.

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Editorial Note: *Trichinella spiralis* continues to be a persistent public health problem in the United States. During the period 1975-1985, pork (including wild boar) was implicated in 78.7% of the reported cases in which the implicated meat item was identified. Other wild animal meat was implicated in 13.8% of the reported cases, and ground beef, in 6.7%. During the same time period, only 19 (1.6%) of the reported cases of trichinosis were associated with wild boar meat. Hawaii reported nine cases, eight of which were associated with consumption of wild boar meat (*1,2*).

In the present outbreak, three cases were associated with fried wild pork sausage that was undercooked. Four cases were associated with wild pork sausage prepared in a microwave oven; however, the procedures used were not compatible with those generally recommended by microwave oven manufacturers or pork interest groups for safe microwave cooking of pork (*3*). The U.S. Department of Agriculture has recommended cooking pork in a microwave oven until it attains a temperature of 76.7 C (170 F) throughout. Improper cooking of meat in a microwave can result in variability of internal temperatures in the meat, with the result that

Trichinosis — Continued

there will not be proper inactivation of bacteria and other potentially disease-producing organisms (*4,5*).

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Epidemiologic Notes and Reports

Update: Influenza Activity — United States

Outbreaks of type A(H1N1) influenza affecting primarily children and young adults are continuing. For the week ending January 17, seven states* and Puerto Rico reported widespread outbreaks of influenza-like activity, and 21 states† and the District of Columbia reported regional outbreaks of influenza-like illness. This is the fourth week with more than 20 states reporting outbreak activity. The level of current activity is below the peak of the previous winter when 37 states indicated outbreaks for one week in February.

For the report week ending December 31, the Centers for Disease Control's sentinel physicians§ saw an average of 11.9 patients with cases of influenza-like illness per week per physician; the average was 9.1 for the report week ending January 7 (Figure 1). The maximum averages reported during influenza epidemics of the past three winters were between 11 and 12. The percentage of deaths associated with pneumonia and influenza reported from 121 cities has remained below the epidemic threshold (Figure 1).

Influenza A/Taiwan/86(H1N1)-like virus continues to be the predominant strain of influenza this season and represents 99% of isolates reported from collaborating diagnostic laboratories (Figure 1). Forty-four states and the District of Columbia have now reported isolates of influenza A(H1N1) virus¶. Influenza type A(H3N2) has recently been reported from sporadically occurring cases in Colorado and in Texas; only one isolate (from Arizona) had been reported previously this season. There have been no recent reports of type B virus isolates.

Reported by G Meiklejohn, MD, School of Medicine, Univ of Health Sciences Center, Denver, Colorado; Influenza Research Center, Baylor College of Medicine, Houston, Texas; State and Territorial Epidemiologists; State Laboratory Directors; WHO Collaborating Center for Influenza, Influenza Br, Div of Viral Diseases, Center for Infectious Diseases, CDC.

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*Colorado, Connecticut, Minnesota, Oregon, Texas, Washington, and Wyoming.

†Alabama, Alaska, Arizona, California, Idaho, Iowa, Kansas, Kentucky, Maryland, Massachusetts, Montana, Mississippi, Nebraska, New Mexico, North Carolina, North Dakota, Pennsylvania, South Dakota, Virginia, West Virginia, and Wisconsin.

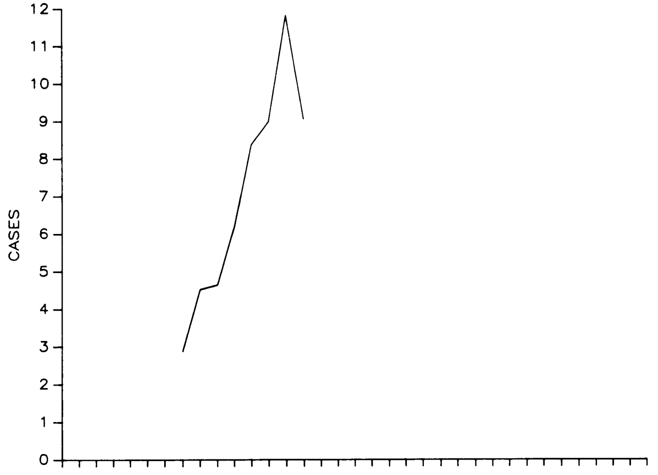
§Sentinel physicians are members of the American Academy of Family Physicians who have agreed to report influenza-like activity to CDC. A case was defined as an instance of illness in a patient with fever ≥37.8 C (100 F) and at least a cough or sore throat.

¶Louisiana, North Dakota, Rhode Island, South Carolina, South Dakota, and Wyoming have not reported any influenza isolates so far this season.

Update: Influenza — Continued

FIGURE 1. Indicators of Influenza activity, by week — United States, 1986-1987

Influenza-like cases reported by physicians*



Pneumonia and influenza deaths† as percentage of total deaths

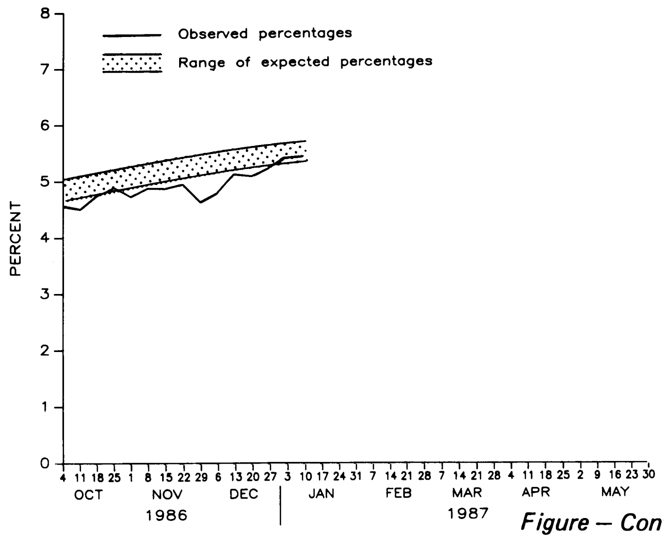


Figure — Continued

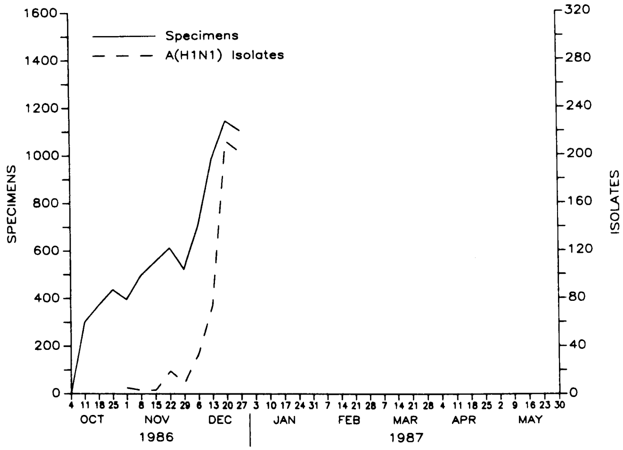
*Reported to CDC by approximately 125 physician members of the American Academy of Family Physicians. A case was defined as an instance of disease in a patient with fever ≥37.8 C (100 F) and at lease cough or sore throat.

†Reported to CDC from 121 cities in the United States. Pneumonia and influenza deaths include all deaths where pneumonia is listed as a primary or underlying cause or where influenza is listed on the death certificate.

Update: Influenza — Continued

Figure 1 — Continued

Laboratory diagnosis of influenza,§ by virus isolations



§Reported to CDC by WHO Collaborating Laboratories (including military sources).

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

Disease	2nd Week Ending			Cumulative, 2nd Week Ending		
	Jan. 17, 1987	Jan. 11, 1986	Median 1982-1986	Jan. 17 1987	Jan. 11, 1986	Median 1982-1986
Acquired Immunodeficiency Syndrome (AIDS)	211	320	N	494	491	N
Aseptic meningitis	61	97	91	164	160	167
Encephalitis: Primary (arthropod-borne & unspec.)	9	19	15	25	33	26
Post-infectious	-	-	-	-	1	2
Gonorrhea: Civilian	14,509	15,140	17,789	30,918	26,316	31,485
Military	204	294	630	676	458	915
Hepatitis: Type A	188	299	314	446	574	605
Type B	270	346	346	587	692	662
Non A, Non B	37	54	N	83	107	N
Unspecified	34	74	74	69	139	139
Legionellosis	11	13	N	25	19	N
Leprosy	1	13	2	1	13	10
Malaria	2	6	9	20	15	16
Measles: Total*	4	32	7	40	33	16
Indigenous	3	30	N	38	31	N
Imported	1	2	N	2	2	N
Meningococcal infections: Total	48	55	55	93	85	90
Civilian	48	55	55	93	85	88
Military	-	-	-	-	-	-
Mumps	111	67	67	169	77	104
Pertussis	20	30	21	44	58	52
Rubella (German measles)	2	6	11	4	8	17
Syphilis (Primary & Secondary): Civilian	247	380	535	822	662	889
Military	-	5	6	2	6	9
Toxic Shock syndrome	5	4	N	7	11	N
Tuberculosis	208	225	283	429	333	496
Tularemia	1	3	1	3	3	3
Typhoid fever	-	5	7	3	7	10
Typhus fever, tick-borne (RMSF)	1	2	2	5	2	2
Rabies, animal	34	108	77	92	132	132

TABLE II. Notifiable diseases of low frequency, United States

	Cum 1987		Cum 1987
Anthrax	-	Leptospirosis (Hawaii 1)	1
Botulism: Foodborne	-	Plague	-
Infant	1	Poliomyelitis, Paralytic	-
Other	-	Psittacosis (Oreg. 1)	3
Brucellosis (Iowa 1, N.C. 1)	6	Rabies, human	-
Cholera	-	Tetanus	-
Congenital rubella syndrome	-	Trichinosis	-
Congenital syphilis, ages < 1 year	-	Typhus fever, flea-borne (endemic, murine)	-
Diphtheria	-		

*One of the 4 reported cases for this week was 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 January 17, 1987 and January 11, 1986 (2nd Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum 1987	1987	Cum 1987	Cum 1987	Cum 1987	Cum 1986	1987	1987	1987	1987	1987	Cum 1987
UNITED STATES	494	61	25	-	30,918	26,316	188	270	37	34	11	1
NEW ENGLAND	43	3	1	-	1,131	537	4	45	4	7	-	1
Maine	2	-	-	-	12	26	-	8	-	-	-	-
N H	1	-	-	-	8	10	-	-	-	-	-	-
Vt	-	1	1	-	8	7	-	1	-	-	-	-
Mass	33	2	-	-	406	193	4	35	4	7	-	1
R I	2	-	-	-	112	55	-	1	-	-	-	-
Conn	5	-	-	-	585	246	-	-	-	-	-	-
MID ATLANTIC	44	4	5	-	5,788	4,632	10	19	2	5	-	-
Upstate N Y	1	2	1	-	328	279	-	3	-	-	-	-
N Y City	2	-	2	-	4,298	3,102	2	11	-	5	-	-
N J	41	2	-	-	499	308	8	5	2	-	-	-
Pa	-	U	2	-	663	943	U	U	U	U	U	-
E N CENTRAL	49	25	11	-	2,996	4,107	19	30	4	4	5	-
Ohio	-	6	9	-	1,154	911	11	7	1	-	2	-
Ind	8	-	-	-	191	649	-	-	-	1	-	-
Ill	41	-	-	-	359	649	-	-	-	-	-	-
Mich	-	19	2	-	1,139	1,379	8	23	3	3	3	-
Wis	-	-	-	-	153	519	-	-	-	-	-	-
W N CENTRAL	3	1	-	-	1,208	1,428	7	5	2	-	-	-
Minn	-	-	-	-	169	289	1	-	-	-	-	-
Iowa	-	-	-	-	119	145	2	1	-	-	-	-
Mo	-	-	-	-	732	690	3	2	1	-	-	-
N Dak	-	-	-	-	6	16	-	-	-	-	-	-
S Dak	-	1	-	-	40	21	-	-	-	-	-	-
Nebr	3	-	-	-	33	15	-	2	-	-	-	-
Kans	-	-	-	-	109	252	1	-	1	-	-	-
S ATLANTIC	144	9	4	-	10,106	4,814	15	43	3	3	4	-
Del	3	-	-	-	126	130	5	-	-	1	-	-
Md	-	2	-	-	917	897	2	8	1	-	-	-
D C	16	-	-	-	649	511	-	-	-	-	-	-
Va	9	-	1	-	957	525	-	-	-	-	-	-
W Va	-	1	2	-	38	88	1	5	-	1	-	-
N C	7	6	1	-	1,841	673	2	13	2	-	4	-
S C	2	-	-	-	1,369	837	-	6	-	1	-	-
Ga	22	-	-	-	1,511	-	5	10	-	-	-	-
Fla	85	-	-	-	2,698	1,153	-	1	-	-	-	-
E S CENTRAL	6	8	-	-	2,367	2,140	5	38	3	-	-	-
Ky	-	3	-	-	240	289	1	5	1	-	-	-
Tenn	-	2	-	-	792	906	1	20	1	-	-	-
Ala	3	2	-	-	765	302	1	11	-	-	-	-
Miss	3	1	-	-	570	643	2	2	1	-	-	-
W S CENTRAL	16	1	1	-	3,719	3,017	11	12	7	3	2	-
Ark	3	-	-	-	419	288	-	-	4	-	-	-
La	11	-	-	-	494	641	1	5	-	-	-	-
Okla	2	-	1	-	389	444	7	6	3	2	2	-
Tex	-	1	-	-	2,417	1,644	3	1	-	1	-	-
MOUNTAIN	27	4	3	-	737	893	65	52	5	9	-	-
Mont	-	-	-	-	17	29	1	1	-	-	-	-
Idaho	-	-	-	-	22	-	1	1	1	-	-	-
Wyo	-	-	-	-	10	18	-	1	-	-	-	-
Colo	17	2	-	-	86	266	3	5	-	3	-	-
N Mex	6	-	1	-	78	74	14	4	1	-	-	-
Ariz	2	2	2	-	260	324	35	26	2	5	-	-
Utah	1	-	-	-	32	44	4	2	1	1	-	-
Nev	1	-	-	-	232	138	7	12	-	-	-	-
PACIFIC	162	6	-	-	2,866	4,748	52	26	7	3	-	-
Wash	11	3	-	-	-	282	7	4	1	-	-	-
Oreg	2	-	-	-	211	150	32	17	5	1	-	-
Calif	141	U	-	-	2,468	4,167	U	U	U	U	U	-
Alaska	1	-	-	-	133	90	13	3	1	2	-	-
Hawaii	7	3	-	-	54	59	-	2	-	-	-	-
Guam	-	U	-	-	3	5	U	U	U	U	U	-
P R	-	3	-	-	91	60	1	8	1	10	-	-
V I	-	-	-	-	15	5	-	-	-	-	-	-
Pac Trust Terr	-	U	-	-	2	-	U	U	U	U	U	-
Amer Samoa	-	U	-	-	4	-	U	U	U	U	U	-

N Not notifiable U Unavailable

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending January 17, 1987 and January 11, 1986 (2nd Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported *		Total									
	Cum 1987	1987	Cum 1987	1987	Cum 1987	Cum 1986	Cum 1987	1987	Cum 1987	1987	Cum 1987	Cum 1986	1987	Cum 1987	Cum 1986
UNITED STATES	20	3	38	1	2	33	93	111	169	20	44	58	2	4	8
NEW ENGLAND	1	1	1	-	1	-	11	-	-	-	-	6	-	-	-
Maine	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
N H	-	-	-	-	-	-	3	-	-	-	-	4	-	-	-
Vt	-	1	1	-	-	-	1	-	-	-	-	-	-	-	-
Mass	1	-	-	-	1	-	5	-	-	-	-	1	-	-	-
R I	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Conn	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
MID ATLANTIC	-	-	-	1	1	4	7	1	7	3	7	14	-	-	2
Upstate N Y	-	-	-	-	-	1	7	1	2	3	6	8	-	-	1
N Y City	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
N J	-	-	-	1†	1	-	-	-	2	-	-	-	-	-	1
Pa	-	U	-	U	-	-	-	U	3	U	1	6	U	-	-
E N CENTRAL	-	1	19	-	-	4	23	95	133	3	8	9	-	-	1
Ohio	-	-	-	-	-	-	13	-	4	2	7	-	-	-	-
Ind	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ill	-	-	-	-	-	4	-	55	80	-	-	5	-	-	-
Mich	-	1	19	-	-	-	10	38	45	1	1	-	-	-	-
Wis	-	-	-	-	-	-	-	2	4	-	-	4	-	-	1
W N CENTRAL	-	-	-	-	-	20	4	10	16	1	6	8	-	-	-
Minn	-	-	-	-	-	-	1	-	-	-	-	5	-	-	-
Iowa	-	-	-	-	-	-	-	7	8	-	2	1	-	-	-
Mo	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-
N Dak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S Dak	-	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Nebr	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kans	-	-	-	-	-	20	2	-	4	1	4	2	-	-	-
S ATLANTIC	2	-	-	-	-	-	16	1	2	5	8	5	-	-	-
Del	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Md	-	-	-	-	-	-	3	1	1	-	-	-	-	-	-
D C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Va	2	-	-	-	-	-	1	-	-	-	-	2	-	-	-
W Va	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-
N C	-	-	-	-	-	-	3	-	-	4	6	1	-	-	-
S C	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-
Ga	-	-	-	-	-	-	4	-	-	-	1	-	-	-	-
Fla	-	-	-	-	-	-	3	-	-	-	-	1	-	-	-
E S CENTRAL	1	-	-	-	-	-	8	-	5	1	1	3	-	2	1
Ky	-	-	-	-	-	-	-	-	2	-	-	1	-	2	1
Tenn	-	-	-	-	-	-	4	-	3	-	-	1	-	-	-
Ala	-	-	-	-	-	-	3	-	-	-	-	1	-	-	-
Miss	1	-	-	-	-	-	1	-	-	1	1	-	-	-	-
W S CENTRAL	-	-	-	-	-	-	4	2	2	-	-	-	-	-	-
Ark	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
La	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Okla	-	-	-	-	-	-	2	N	N	-	-	-	-	-	-
Tex	-	-	-	-	-	-	1	2	2	-	-	-	-	-	-
MOUNTAIN	-	-	-	-	-	-	5	1	1	-	3	3	1	1	-
Mont	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Idaho	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wyo	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-
Colo	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
N Mex	-	-	-	-	-	-	1	N	N	-	1	1	-	-	-
Ariz	-	-	-	-	-	-	4	-	-	-	-	2	-	-	-
Utah	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
Nev	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PACIFIC	16	1	18	-	-	5	15	1	3	7	11	10	1	1	4
Wash	-	-	-	-	-	-	6	-	2	1	1	5	-	-	-
Oreg	-	1	1	-	-	-	4	N	N	5	5	-	1	1	4
Calif	16	U	17	U	-	5	5	U	-	U	4	5	U	-	-
Alaska	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hawaii	-	-	-	-	-	-	-	1	1	1	1	-	-	-	-
Guam	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
P R	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
V I	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-
Pac Trust Terr	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
Amer Samoa	-	U	-	U	-	-	-	U	-	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 January 17, 1987 and January 11, 1986 (2nd Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tularemia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum 1987	Cum 1986	1987	Cum 1987	Cum 1986	Cum 1987	Cum 1987	Cum 1987	Cum 1987
UNITED STATES	822	662	5	429	333	3	3	5	92
NEW ENGLAND	22	21	1	10	12	-	2	-	-
Maine	-	1	-	-	3	-	-	-	-
N H	5	-	-	-	1	-	-	-	-
Vt	-	-	-	1	1	-	-	-	-
Mass	13	11	1	2	-	-	2	-	-
R I	-	-	-	-	-	-	-	-	-
Conn	4	9	-	7	7	-	-	-	-
MID ATLANTIC	105	74	1	103	60	-	-	-	9
Upstate N Y	3	1	-	30	10	-	-	-	1
N Y City	71	57	1	59	33	-	-	-	-
N J	17	13	-	10	-	-	-	-	-
Pa	14	3	U	4	17	-	-	-	8
E N CENTRAL	2	22	1	75	42	1	-	1	1
Ohio	1	-	-	15	7	1	-	1	-
Ind	1	17	-	1	3	-	-	-	-
Ill	-	2	-	35	27	-	-	-	-
Mich	-	-	1	22	-	-	-	-	-
Wis	-	3	-	2	5	-	-	-	1
W N CENTRAL	7	6	-	10	3	1	-	-	17
Minn	4	1	-	-	1	-	-	-	4
Iowa	-	2	-	4	-	1	-	-	5
Mo	3	1	-	6	2	-	-	-	1
N Dak	-	2	-	-	-	-	-	-	4
S Dak	-	-	-	-	-	-	-	-	-
Nebr	-	-	-	-	-	-	-	-	-
Kans	-	-	-	-	-	-	-	-	3
S ATLANTIC	232	160	1	86	70	-	1	-	23
Del	3	-	-	-	-	-	-	-	-
Md	22	17	-	7	7	-	-	-	5
D C	4	7	-	6	6	-	-	-	3
Va	12	26	-	4	-	-	-	-	5
W Va	-	1	-	7	-	-	-	-	3
N C	34	19	-	14	17	-	1	-	-
S C	30	38	-	19	8	-	-	-	2
Ga	73	-	-	-	-	-	-	-	5
Fla	54	52	1	29	32	-	-	-	-
E S CENTRAL	56	40	-	66	40	-	-	1	9
Ky	-	3	-	-	4	-	-	-	6
Tenn	30	18	-	-	3	-	-	-	-
Ala	26	19	-	31	33	-	-	-	3
Miss	-	-	-	35	-	-	-	1	-
W S CENTRAL	175	168	-	12	-	1	-	3	19
Ark	8	10	-	-	-	-	-	-	8
La	26	33	-	-	-	-	-	-	1
Okla	8	-	-	5	-	1	-	3	-
Tex	133	125	-	7	-	-	-	-	10
MOUNTAIN	7	14	1	3	10	-	-	-	9
Mont	-	-	-	-	-	-	-	-	3
Idaho	-	-	-	-	-	-	-	-	-
Wyo	-	-	-	-	-	-	-	-	4
Colo	2	8	-	-	1	-	-	-	-
N Mex	-	-	-	1	2	-	-	-	-
Ariz	5	6	-	1	3	-	-	-	2
Utah	-	-	-	-	-	-	-	-	-
Nev	-	-	1	1	4	-	-	-	-
PACIFIC	216	157	-	64	96	-	-	-	5
Wash	-	8	-	3	7	-	-	-	-
Oreg	4	3	-	4	5	-	-	-	-
Calif	211	144	U	37	82	-	-	-	4
Alaska	-	-	-	7	-	-	-	-	1
Hawaii	1	2	-	13	2	-	-	-	-
Guam	-	1	U	-	-	-	-	-	-
P R	18	25	-	3	6	-	-	-	2
V I	-	-	-	-	-	-	-	-	-
Pac Trust Terr	-	-	U	-	-	-	-	-	-
Amer Samoa	-	-	U	-	-	-	-	-	-

U Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending January 17, 1987 (2nd Week)

Reporting Area	All Causes, By Age (Years) All Ages	≥65	45-64	25-44	1-24	<1	P&I** Total
NEW ENGLAND	737	501	135	48	20	32	82
Boston, Mass	176	105	34	13	9	15	28
Bridgeport, Conn	45	33	8	3	-	1	9
Cambridge, Mass §	32	29	2	1	-	-	3
Fall River, Mass	32	29	3	-	-	-	1
Hartford, Conn	86	49	16	8	3	9	6
Lowell, Mass	27	21	4	2	-	-	3
Lynn, Mass	17	13	2	1	1	-	1
New Bedford, Mass	28	25	2	1	-	-	3
New Haven, Conn	53	35	11	5	-	2	7
Providence, R I	57	40	10	1	3	3	8
Somerville, Mass	7	4	1	1	1	-	-
Springfield, Mass	61	38	13	8	1	1	7
Waterbury, Conn	37	24	8	4	-	1	3
Worcester, Mass	79	56	21	-	2	-	3
MID ATLANTIC	3,172	2,129	649	271	59	61	164
Albany, N Y	70	42	19	3	2	4	1
Allentown, Pa	25	22	3	-	-	-	2
Buffalo, N Y	134	102	22	6	2	2	14
Camden, N J	43	32	10	1	-	-	1
Elizabeth, N J	26	19	5	2	-	-	2
Erie, Pa †	46	26	13	2	5	-	4
Jersey City, N J	56	33	12	8	2	1	1
N Y City, N Y	1,694	1,131	328	175	29	31	82
Newark, N J	97	43	24	22	5	3	5
Paterson, N J	29	19	4	3	-	3	3
Philadelphia, Pa	407	256	110	21	10	10	13
Pittsburgh, Pa †	90	67	16	3	1	3	2
Reading, Pa	43	35	5	2	1	-	3
Rochester, N Y	119	86	22	8	1	2	13
Schenectady, N Y	42	37	4	1	-	-	3
Scranton, Pa †	26	15	5	2	-	1	5
Syracuse, N Y	99	72	19	6	1	1	2
Trenton, N J	51	30	18	3	-	-	3
Utica, N Y	30	25	5	-	-	-	3
Yonkers, N Y	45	37	5	3	-	-	2
E.N. CENTRAL	2,687	1,745	582	191	66	103	129
Akron, Ohio	92	63	23	1	2	3	-
Canton, Ohio	36	28	6	2	-	-	6
Chicago, Ill §	564	362	125	45	10	22	16
Cincinnati, Ohio	186	132	35	9	4	6	23
Cleveland, Ohio	198	116	48	16	11	7	1
Columbus, Ohio	127	76	26	10	5	10	3
Dayton, Ohio	155	99	44	6	4	2	8
Detroit, Mich	305	181	61	41	7	15	11
Evansville, Ind	59	43	10	2	1	3	4
Fort Wayne, Ind	70	50	12	6	-	2	6
Gary, Ind	20	13	4	2	-	1	-
Grand Rapids, Mich	93	58	25	6	2	2	8
Indianapolis, Ind	190	119	42	14	7	8	4
Madison, Wis	46	28	10	4	3	1	3
Milwaukee, Wis	209	144	49	6	3	7	6
Peoria, Ill	64	39	17	2	1	5	6
Rockford, Ill	45	31	9	2	1	2	6
South Bend, Ind	47	34	6	6	-	1	3
Toledo, Ohio	119	83	19	9	3	5	9
Youngstown, Ohio	62	46	11	2	2	1	6
W.N. CENTRAL	958	693	162	42	29	32	46
Des Moines, Iowa	108	79	17	6	2	4	5
Duluth, Minn	30	22	4	1	-	3	2
Kansas City, Kans	44	25	10	4	5	-	-
Kansas City, Mo	158	117	29	7	4	1	7
Lincoln, Nebr	47	36	8	1	-	2	2
Minneapolis, Minn	111	82	21	5	1	2	7
Omaha, Nebr	113	85	13	7	4	4	7
St Louis, Mo	190	135	33	8	5	9	7
St Paul, Minn	71	56	10	-	2	3	2
Wichita, Kans	86	56	17	3	6	4	7

Reporting Area	All Causes, By Age (Years) All Ages	≥65	45-64	25-44	1-24	<1	P&I** Total
S ATLANTIC	1,310	837	288	120	40	23	56
Atlanta, Ga	221	136	49	26	6	4	6
Baltimore, Md	152	105	28	16	2	1	7
Charlotte, N C	86	45	30	9	2	-	4
Jacksonville, Fla	123	79	31	8	3	2	5
Miami, Fla	95	54	19	17	4	1	-
Norfolk, Va	66	34	19	4	6	3	6
Richmond, Va	124	72	35	8	7	2	9
Savannah, Ga	54	37	8	6	2	1	5
St Petersburg, Fla	131	109	18	3	1	-	3
Tampa, Fla	87	54	17	4	3	7	5
Washington, D C	133	82	29	16	4	2	4
Wilmington, Del	38	30	5	3	-	-	2
E S CENTRAL	973	647	212	56	24	34	69
Birmingham, Ala	172	97	49	11	4	11	5
Chattanooga, Tenn	85	65	16	3	-	1	7
Knoxville, Tenn	106	71	24	6	5	-	11
Louisville, Ky	161	118	31	6	2	4	9
Memphis, Tenn	174	101	46	15	9	3	19
Mobile, Ala	64	48	11	2	1	2	4
Montgomery, Ala	63	50	8	2	1	2	2
Nashville, Tenn	148	97	27	11	2	11	12
W S CENTRAL	1,468	957	309	117	51	34	97
Austin, Tex	69	42	19	6	2	-	7
Baton Rouge, La	54	40	8	3	3	-	2
Corpus Christi, Tex	49	34	11	3	1	-	2
Dallas, Tex	214	125	49	20	10	10	7
El Paso, Tex	88	57	16	6	7	2	7
Fort Worth, Tex	148	96	38	7	2	5	13
Houston, Tex §	250	139	66	31	8	6	6
Little Rock, Ark	66	51	7	4	2	2	7
New Orleans, La	98	64	17	9	5	3	1
San Antonio, Tex	273	188	51	19	9	6	29
Shreveport, La	43	34	8	1	-	-	5
Tulsa, Okla	116	87	19	8	2	-	11
MOUNTAIN	782	519	150	64	27	21	44
Albuquerque, N Mex	87	51	17	10	8	1	1
Colo Springs, Colo	45	30	7	5	-	3	5
Denver, Colo	123	87	19	11	5	1	6
Las Vegas, Nev	92	61	21	7	1	2	5
Ogden, Utah	24	19	3	1	-	1	2
Phoenix, Ariz	175	102	48	13	3	8	5
Pueblo, Colo	41	34	4	1	2	-	13
Salt Lake City, Utah	48	34	6	3	2	3	-
Tucson, Ariz	147	101	25	13	6	2	7
PACIFIC	2,368	1,581	437	203	72	62	153
Berkeley, Calif	17	9	4	3	-	1	3
Fresno, Calif	85	49	18	13	1	4	16
Glendale, Calif	28	23	4	1	-	-	-
Honolulu, Hawaii	87	61	17	4	3	2	9
Long Beach, Calif	51	42	7	1	1	-	10
Los Angeles, Calif	689	443	128	70	30	8	23
Oakland, Calif	89	60	17	6	4	2	6
Pasadena, Calif	47	37	7	3	-	-	4
Portland, Oreg	182	128	28	11	6	8	7
Sacramento, Calif	170	115	31	15	3	4	10
San Diego, Calif	223	150	37	16	9	11	23
San Francisco, Calif	197	123	43	27	1	3	12
San Jose, Calif	225	150	47	18	6	4	15
Seattle, Wash	164	110	26	9	7	12	5
Spokane, Wash	55	36	15	3	-	1	6
Tacoma, Wash	59	45	8	3	1	2	4
TOTAL	14,455††	9,609	2,924	1,112	388	402	840

*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.

Epidemiologic Notes and Reports

Occupational Asthma from Inhaled Egg Protein — Iowa

In January 1984, workers at an Iowa egg processing plant requested an investigation by the National Institute for Occupational Safety and Health (NIOSH) of the causes of "asthma-like" symptoms (wheezing, shortness of breath, tightness in chest) believed to be work-related (*1*). This plant daily processes up to a million and a half raw eggs into powdered whole egg or powdered egg yolk and liquid egg white.

After an initial site visit in March 1984, NIOSH investigators returned in August 1984 for an environmental and questionnaire survey (Table 1). They sampled for total and respirable dust and for several chemicals because the original request had listed cleaners, sanitizers, and germicides as possible irritants.

Results showed employees' levels of exposures to dust near the American Conference of Governmental Industrial Hygienists' guideline of 10 mg/m^3 for total dust. Dust samples had a 50% protein content and an amino acid composition resembling egg yolk protein.

Ninety-four employees completed a screening questionnaire covering demographics, occupational history, personal habits, past medical history, and symptoms suggestive of asthma. Based on self-reporting, respondents were divided into two groups: Group 1 was made up of employees (23) experiencing at least one of the following symptoms—wheezing, shortness of breath, or tightness in the chest—in the preceding month; Group 2 was made up of employees (71) who had not experienced any of these symptoms.

In March 1985, NIOSH conducted a follow-up medical evaluation consisting of pulmonary function tests, skin-stick tests for sensitivity to egg protein, determinations of serum IgE and IgG antibodies to egg protein (whole egg, egg yolk, egg white, and egg fractions), and physical examinations and clinical histories by a physician trained in internal and occupational medicine. Because of attrition and the reluctance of some employees to participate, only 19 employees—10 in Group 1 and nine in Group 2—underwent full examination.

TABLE 1. Investigation of 94 employees who completed questionnaires following exposure to egg protein dust — Iowa, 1984-1985

Stages of Investigation	Group 1 (symptoms)	Group 2 (no symptoms)	Total
Stage I — August 1984			
Questionnaire administration:			
Report of asthma-like symptoms	23	71	94
Stage II — March 1985			
Medical examination/clinical history:			
Complete examination	10	9	19
Diagnosed as work-related asthma	5	0	5
Diagnosed as nonasthmatic or non-work-related asthma	5	9	14
Stage III — April, 1986			
Re-examination of questionnaire:			
Identified as additional cases of work-related asthma using modified case definition*	5	0	5

*Wheezing temporally related to work.

Occupational Asthma — Continued

Based on medical examinations and clinical histories showing temporal association with workplace exposures*, the physician diagnosed five employees as having occupational asthma. All five were in Group 1. Results of antibody and skin-stick tests were consistent with these diagnoses. Three of the five employees were nonsmokers, and the other two each had a smoking history of <5 pack-years†; one had a history of atopy. Based on the medical examinations and clinical histories of the other five employees in Group 1, the physician judged their symptoms as nonasthmatic; this was also consistent with laboratory results. Using a modified case definition of "wheezing temporally related to work", the investigators identified five additional cases from a re-examination of the questionnaires (overall prevalence of 10/94 [10.6%]).

NIOSH made specific recommendations for local exhaust ventilation to control egg dust during plant operations and recommended appropriate medical therapy for selected individuals (*2*). They also reported the problem to all other plants producing dried egg products in the United States, to the trade association representing the companies, and to major trade unions representing the workers.

Reported by Hazard Evaluations and Technical Assistance Br, Div of Surveillance, Hazard Evaluations, and Field Studies, National Institute for Occupational Safety and Health, CDC.

Editorial Note: Chicken egg white is a common allergen; ingestion may provoke pruritus in atopic individuals and exacerbation of atopic dermatitis, rhinitis, urticaria, angioedema, and bronchial asthma (*3*). Egg yolk also contains proteins antigenically related to proteins in egg white (*4*). A previous report of allergy to inhaled egg protein involved eight of 13 bakery workers who developed respiratory symptoms from spraying meat rolls with a 25% mixture of egg white and yolk in water. Four of these workers were atopic with increased total serum IgE levels; one had changes in pulmonary function consistent with reversible airway obstruction (*5*). The current investigation, by contrast, identified five asthmatic individuals at the egg-processing plant: four were nonatopic; all had evidence of IgE-mediated allergic reactions to egg protein; and only one had an elevated total serum IgE level.

Liquid egg products are dried at 23 plants in the United States. An estimated 1,600 workers may be exposed to powdered egg dust in this industry (U.S. Department of Agriculture, personal communication). Currently, no standard exists for occupational exposure to egg protein, and no generic standard has been established for occupational exposure to dust of organic origin. The only enforceable standard applicable to this situation is the Occupational Safety and Health Administration's nuisance dust standard of 15 mg/m^3. By definition, nuisance dusts are presumed to be biologically inert (*6*). Consideration must be given to developing a strategy for controlling adverse health effects from exposure to powdered egg dust in this industry.

References

1. NIOSH. Health hazard evaluation report no. HETA 84-163-1657. Cincinnati, Ohio: National Institute for Occupational Safety and Health, 1986.
2. Gilman AG, Goodman LS, eds. The pharmacological basis of therapeutics. 7th ed. New York: McMillan Publishing Co., 1985.
3. Langeland T. A clinical and immunological study of allergy to hen's egg white—I: a clinical study of egg allergy. Clin Allergy 1983;13:371-82.

*First symptoms appeared after beginning work at the plant; symptoms abated on leaving the worksite; and symptoms reduced in frequency while at home, on days off, and on vacation.

†One pack-year is the equivalent of smoking 20 cigarettes a day for one year.

Occupational Asthma — Continued

4. Langeland T. A clinical and immunological study of allergy to hen's egg white—IV: specific IgE-antibodies to individual allergens in hen's egg white related to clinical and immunological parameters in egg-allergic patients. Allergy 1983;38:493-500.
5. Edwards JH, McConnochie K, Trotman DM, Collins G, Saunders MJ, Latham SM. Allergy to inhaled egg material. Clin Allergy 1983;13:427-32.
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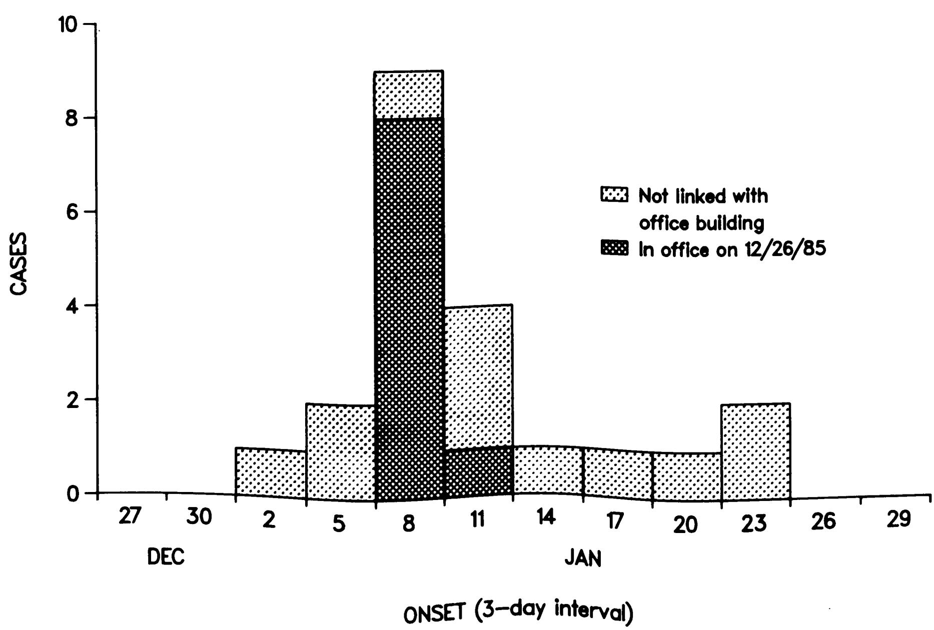
Epidemiologic Notes and Reports

Measles Transmitted in a Medical Office Building — New Mexico, 1986

On January 11, 1986, the Office of Epidemiology of the New Mexico Health and Environment Department received a report from a Santa Fe pediatrician of three suspected measles cases among patients in his group's practice. An active surveillance system was established, and over the ensuing 2 weeks, 24 patients meeting the standard Centers for Disease Control (CDC) clinical case definition for measles (*1*) were identified in New Mexico (Figure 2). These 24 patients had dates of onset ranging from January 4, 1986, to January 25, 1986. Three of the cases were excluded from analysis because of probable exposure outside the United States.

FIGURE 2. Measles cases, by date of rash onset and epidemiologic linkage — New Mexico, 1986



Measles Transmitted — Continued

The patients with outbreak-related disease ranged from 5 months to 59 years of age (median 13.7 months). Seventeen cases occurred in patients who were < 16 months old; one occurred in a 19-year-old patient who had been vaccinated; and one occurred in a patient who was born before 1957*. Nineteen cases were not preventable by CDC criteria (*1*). The two preventable cases were both in unvaccinated 16-month-old patients.

Nine of the 21 patients with outbreak-related disease had a known common exposure. Eight were seen in one pediatric practice between 8:30 a.m. and 2:00 p.m. on December 26, 1985. One was seen at 1:40 p.m. on the same day in an adjoining family practice clinic that is connected to the pediatric clinic by two hallways; these two clinics share a bathroom and laboratory. These nine patients ranged in age from 5 to 15 months. Seven of these nine cases were serologically confirmed. All nine patients developed a rash 13 to 17 days after their December 26 clinic visit (median = 14 days).

Eighty-four patients were seen in the pediatric clinic on December 26, 1985, and 34 patients were seen in the adjoining family practice clinic. Attack rates were 8/84 (10%) for the pediatric patients, 1/34 (3%) for the family practice patients, and 9/118 (8%) overall. However, there were no cases among the 85 patients over 15 months of age in either clinic. The attack rate among all patients aged 0 to 15 months was 9/33 (27%); among those aged 6 to 15 months the rate was 8/14 (57%). Arrival times of eight of the nine measles patients with a common exposure were clustered between 11:15 a.m. and 2:00 p.m. The one exception was a patient who arrived at about 8:30 a.m. but did not leave until about 10:30 a.m. Four of the six 6- to 15-month-old patients who did not contract measles arrived before 11:15 a.m. or after 2:00 p.m. From about 12:30 to 1:00 p.m. there were no patients in either waiting room, and the few patients remaining in the building during that time had no contact with each other.

Efforts to identify an index case were unsuccessful. Charts were reviewed on all 118 patients seen in the two clinics on December 26, and on 51 siblings of the pediatric patients and approximately 20 relatives of the family practice patients. Also, the parents of all patients who signed in at the pediatric practice between 9:30 a.m. and 1:00 p.m. were interviewed for information about rash-type illnesses in other household members.

The pediatric suite has a small (360 square foot), passive solar-heated waiting room with minimal air circulation. The child seen in the family practice suite who developed measles did not enter the pediatric waiting room, but probably did enter the bathroom which is 6 feet away from that waiting room. Examination rooms in both the pediatric and family practice areas are equipped with exhaust fans, but they generally are not used during the cold winter months.

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Editorial Note: The proportion of measles cases acquired in medical settings increased from 0.7% during the period 1980-1982 (*3*) to 4.7% in 1985 (*4*). Medical settings may promote transmission by clustering in close quarters susceptible children who are too young to be vaccinated. No index case was identified in this outbreak. This raises the possibility that subclinical infection may have occurred in the index patient. Although acquisition of disease could be explained by close contact with an unidentified index case, airborne transmission almost certainly occurred in this outbreak (*5*). No patient who arrived before 12:30 p.m. was

*The Immunization Practices Advisory Committee has not recommended vaccination of persons born before 1957 because they "are likely to have been infected naturally and generally need not be considered susceptible" (*2*).

Measles Transmitted — Continued

still in the office at 1:00 p.m. The index patient must, therefore, have arrived before lunch and departed before 1:00 p.m. The last patient to be infected arrived at 2:00 p.m., at least 60 minutes after departure of the hypothetical index case. Spread of virus between the pediatric and family practice areas probably occurred because of the open access between the two areas.

There have been at least two reports which give strong evidence for airborne transmission of the measles virus in physicians' offices (*6, 7*). These reports identified several common factors: 50% or more of the cases were among children under 16 months of age; transmission occurred during cool autumn or winter months when there was low humidity; there was inadequate fresh air ventilation in the offices; and there was a maximum interval of 60 to 75 minutes between departure of the index case and infection of a later arriving patient. The outbreak in Santa Fe had similar features. Nine of the cases were in children $<$ 16 months of age; there was probably at least an hour between departure of the hypothetical index case and arrival of the last patient to be infected that day; and transmission occurred on a cool day in December (high temperature was 10 C [50 F]), in a small waiting room with virtually no air circulation. In addition, well children were not separated from sick children.

Transmission in Santa Fe County ceased after only two generations of infection. This is probably due to New Mexico's high measles immunization rate, which is 99.8% for the 14,000 children aged 12 months to 5 years in New Mexico's 327 licensed day-care centers and 98.6% for the 277,795 students in New Mexico's public schools.

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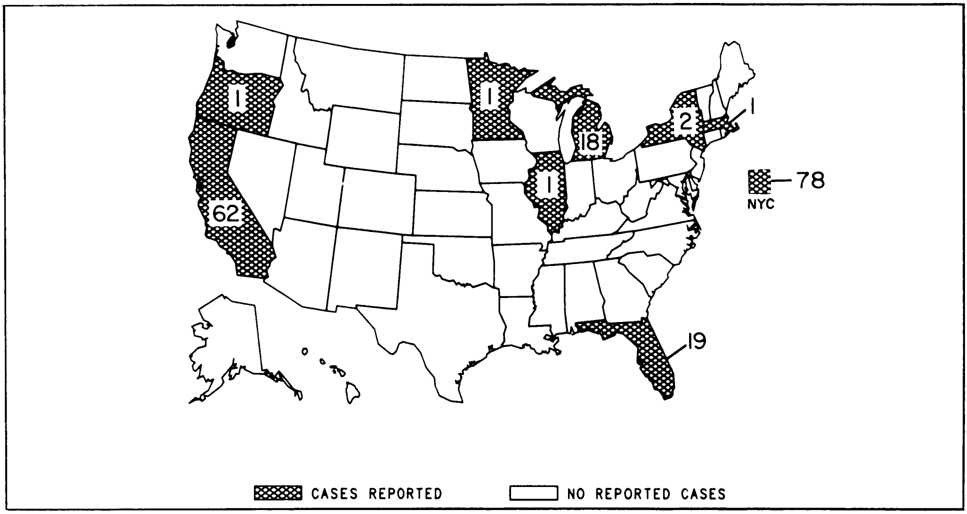
FIGURE I. Reported measles cases — United States, weeks 51-54, 1986



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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.

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