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Recommendations of the Public Health Service Advisory Committee on Immunization Practices

BCG Vaccines

INTRODUCTION

Tuberculosis cases and deaths in the United States have declined steadily since reporting began in the 19th century. In 1977 there were approximately 30,000 reported cases and 3,000 deaths, for rates of 13.9 (cases) and 1.4 (deaths) per 100,000 population. These rates are 40% and 60% lower than the corresponding rates for 1967. The rate of infection, judged by the prevalence of positive tuberculin skin tests, has also declined, particularly for susceptible groups, such as young children. The prevalence of positive reactors among children entering school is now estimated to be 0.2%, and among adolescents, 0.7%. The current annual infection rate is estimated to be 0.03%, based on the prevalence among 6-year-olds.

The incidence of tuberculosis cases varies broadly among different segments of the population and in different localities. Cases occur twice as frequently in males as in females. Rates increase sharply with age in both sexes and all races. More than 80% of reported cases are in persons over 25 years of age, most of whom were infected several years previously. Reported cases are generally typical post-primary pulmonary disease. The risk of infection is greatest for those who have repeated exposure to persons with unrecognized or untreated sputum-positive pulmonary tuberculosis. Chemotherapy rapidly reduces the infectivity of cases.

Efforts to control tuberculosis in the United States are directed toward the early identification and treatment of cases and preventive therapy with isoniazid for infected persons at high risk of developing disease. In this country, vaccine prepared from the Bacillus of Calmette and Guérin (BCG) has been used mainly for selected groups of uninfected persons who live or work where they have an unavoidable risk of exposure to tuberculosis.

BCG VACCINES

BCG was derived from a strain of *Mycobacterium bovis* attenuated through years of serial passage in culture by Calmette and Guérin at the Pasteur Institute, Lille, France. It was first administered to humans in 1921.

There are many BCG vaccines* available in the world today; all are derived from the original strain, but they vary in immunogenicity, efficacy, and reactogenicity. Variation probably has been the result of genetic changes in the bacterial strains; differences in

*Official name: BCG Vaccine.

BCG Vaccines – Continued

techniques of production; methods and routes of vaccine administration; and characteristics of the populations and environments in which vaccine has been studied. Controlled trials—all conducted prior to 1955—of liquid vaccines prepared from different BCG strains showed protection ranging from 0 to 80%.

The vaccines now available in the United States differ from products used in the field trials in that additional culture passages have since taken place, and there have been various modifications in methods of preparation and preservation. The efficacy of these current vaccines has not been demonstrated directly and can only be inferred.

Production standards for BCG vaccines (Bureau of Biologics, Food and Drug Administration) specify that they be freeze-dried products containing live bacteria from a documented strain of the Bacillus of Calmette and Guérin. The strain must demonstrate various specified characteristics of safety and potency and be capable of inducing tuberculin sensitivity in guinea pigs and humans. (The assumed relationship between sensitivity and immunity has not been proven.)

Freeze-dried vaccine should be reconstituted, protected from exposure to light, and used within 8 hours.

VACCINE USAGE

General Recommendations

Modern methods of case detection, chemotherapy, and preventive treatment can be highly successful in controlling tuberculosis. Nevertheless, an effective BCG vaccine may be useful under certain circumstances. In particular, BCG may benefit uninfected persons with repeated exposure to infective cases who cannot or will not obtain or accept treatment.

Recommended Vaccine Recipients

1. BCG vaccination should be seriously considered for individuals, such as infants in a household, who are tuberculin skin-test negative (*1*) but who have repeated exposure to persistently untreated or ineffectively treated patients with sputum-positive pulmonary tuberculosis.

2. BCG vaccination should be considered for groups in which an excessive rate of new infections can be demonstrated and the usual surveillance and treatment programs have failed or are not feasible. Such groups might exist among those without a regular source of health care.

Adequate surveillance and control measures should be possible to protect groups such as health workers (*2*). However, some health workers may be at increased risk of repeated exposure, especially those working in institutions serving major urban population centers in which the endemic prevalence of tuberculosis is relatively high. BCG vaccine should be considered when the frequency of skin-test conversion representing new infections (*3*) exceeds 1% annually.

Schedule

BCG should be reserved for persons who are skin-test negative to 5 TU* of tuberculin, PPD.† Those who receive BCG should have a tuberculin skin test 2-3 months later. If that skin test is negative and the indications for BCG remain, a second dose of vaccine should be given. Dosage is indicated by the manufacturer in the package labeling; one-half of the usual dose should be given to persons under 28 days old. If the indications

*Tuberculin unit.

†Purified protein derivative of tuberculin.

BCG Vaccines – Continued

for immunization persist, these children should receive a full dose after attaining 1 year of age.

Administration Technique

The World Health Organization recommends that BCG be given by the intradermal route in order to provide a uniform and reliable dose. In the United States, however, vaccines for intradermal and for percutaneous administration are licensed, and vaccination should be only by the route indicated in the package labeling.

RISKS AND SIDE EFFECTS

BCG vaccine has been associated with adverse reactions including severe or prolonged ulceration at the vaccination site, lymphadenitis, and—very rarely—osteomyelitis, lupoid reactions, disseminated BCG infection, and death. Available data on adverse reactions do not necessarily pertain to the vaccines currently licensed in the United States, and the reported frequency of complications has varied greatly, depending in part on the extent of the surveillance effort. For example, the frequency of ulceration and lymphadenitis has been reported to range from 1% to 10%, depending on the vaccine, the dosage, and the age of vaccinees. Osteomyelitis has been reported to occur in 1 per 1,000,000 vaccinees, although limited information indicates that with newborns it may be higher. Disseminated BCG infection and death are very rare (1-10 per 10,000,000 vaccinees) and occur almost exclusively in children with impaired immune responses.

PRECAUTIONS AND CONTRAINDICATIONS

Altered Immune States

BCG for prevention of tuberculosis should not be given to persons with impaired immune responses such as occur with congenital immunodeficiency, leukemia, lymphoma, or generalized malignancy, and when immunologic responses have been suppressed with steroids, alkylating agents, antimetabolites, or radiation.

Pregnancy

Although no harmful effects of BCG on the fetus have been observed, it is prudent to avoid vaccination during pregnancy unless there is an immediate excessive risk of unavoidable exposure to infective tuberculosis.

Interpretation of Tuberculin Test

After BCG vaccination, it is usually not possible to distinguish between a tuberculin reaction caused by virulent supra-infection and one resulting from persistent postvaccination sensitivity. Therefore, caution is advised in attributing a positive skin test to BCG (except in the immediate postvaccination period), especially if the vaccinee has recently been exposed to infective tuberculosis.

Tuberculosis in Vaccinated Persons

Since full, lasting protection from BCG vaccination cannot be assured, tuberculosis should be included in the differential diagnosis of any tuberculosis-like illness in a BCG vaccinee.

SURVEILLANCE

All suspected adverse reactions to BCG should be carefully investigated and reported to health authorities. These reactions occasionally occur as long as a year or more after vaccination.

BCG Vaccines — Continued

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

[Cumulative totals include revised and delayed reports through previous weeks.]

DISEASE	21st WEEK ENDING		MEDIAN 1974-1978**	CUMULATIVE, FIRST 21 WEEKS		
	May 26, 1979	May 27, 1978*		May 26, 1979	May 27, 1978*	MEDIAN 1974-1978**
Aseptic meningitis	45	36	53	1,015	810	769
Brucellosis	2	7	5	39	65	74
Chickenpox	7,635	6,070	5,428	140,652	95,311	95,311
Diphtheria	–	3	3	57	32	101
Encephalitis: Primary (arthropod-borne & unspec.)	9	6	11	190	223	259
Post-infectious	4	8	6	78	79	94
Hepatitis, Viral: Type B	199	246	248	5,456	6,085	5,958
Type A	443	574	665	11,636	11,555	14,344
Type unspecified	187	148	151	4,220	3,257	3,408
Malaria	7	18	8	179	208	137
Measles (rubeola)	615	1,396	1,396	8,153	16,021	16,021
Meningococcal infections: Total	34	59	32	1,268	1,177	784
Civilian	34	58	32	1,261	1,166	775
Military	–	1	1	7	11	11
Mumps	579	563	1,080	8,627	9,725	26,489
Pertussis	12	43	16	496	822	496
Rubella (German measles)	550	1,065	630	7,991	11,228	11,228
Tetanus	2	–	1	18	21	21
Tuberculosis	492	625	680	11,044	11,356	12,110
Tularemia	–	–	4	41	32	34
Typhoid fever	10	7	7	150	202	130
Typhus fever, tick-borne (Rky. Mt. spotted)	26	11	33	111	114	114
Venereal diseases:						
Gonorrhea: Civilian	16,068	19,324	18,426	379,963	374,249	376,561
Military	161	459	451	10,749	9,873	10,745
Syphilis, primary & secondary: Civilian	325	417	417	9,536	8,376	8,400
Military	9	12	7	121	128	128
Rabies in animals	101	76	64	1,817	1,218	1,167

TABLE II. Notifiable diseases of low frequency, United States

	CUM. 1979		CUM. 1979
Anthrax	–	Poliomyelitis: Total	11
Botulism	7	Paralytic (Wis. 1)	8
Congenital rubella syndrome (Ups. NY 1, Ill. 1, Tex. 1)	25	Psittacosis† (Colo. 1, Oreg. 1)	53
Leprosy (Tex. 4, Oreg. 1)	66	Rabies in man	1
Leptospirosis†	21	Trichinosis (Ups. NY 1)	53
Plague	4	Typhus fever, flea-borne (endemic, murine) (Tex. 3)	9

*Delayed reports received for calendar year 1978 are used to update last year's weekly and cumulative totals.

**Medians for gonorrhea and syphilis are based on data for 1976-1978.

†The following delayed reports will be reflected in next week's cumulative totals: Leptospirosis: Hawaii —7; Psittacosis: Ohio +1.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending May 26, 1979, and May 27, 1978 (21st week)

REPORTING AREA	ASEPTIC MENINGITIS	BRUCELLOSIS	CHICKENPOX	DIPHTHERIA		ENCEPHALITIS			HEPATITIS (VIRAL), BY TYPE			MALARIA	
						Primary		Post-infectious	B	A	Unspecified		
	1979	1979	1979	1979	CUM. 1979	1979	1978*	1979	1979	1979	1979	1979	CUM. 1979
UNITED STATES	45	2	7,635	–	57	9	6	4	199	443	187	7	179
NEW ENGLAND	1	1	1,039	–	–	1	–	1	3	12	10	–	8
Maine	–	–	138	–	–	–	–	–	–	1	–	–	1
N.H.†	–	–	4	–	–	–	–	–	–	–	–	–	–
Vt.	–	–	50	–	–	–	–	–	–	3	–	–	–
Mass.	–	1	263	–	–	1	–	–	–	4	10	–	3
R.I.	1	–	32	–	–	–	–	–	1	2	–	–	3
Conn.	–	–	552	–	–	–	–	1	2	2	–	–	1
MID. ATLANTIC	4	–	670	–	–	–	2	1	45	56	21	3	22
Upstate N.Y.	–	–	422	–	–	–	–	–	10	21	7	–	3
N.Y. City	–	–	155	–	–	–	1	–	12	17	5	–	12
N.J.†	3	–	NN	–	–	–	–	1	17	13	4	2	3
Pa.	1	–	93	–	–	–	1	–	6	5	5	1	4
E.N. CENTRAL	6	–	3,492	–	–	1	–	–	38	56	4	1	10
Ohio†	–	–	232	–	–	–	–	–	9	16	–	–	2
Ind.†	–	–	156	–	–	–	–	–	3	1	2	–	1
Ill.	4	–	1,314	–	–	–	–	–	11	24	1	1	3
Mich.	2	–	1,197	–	–	1	–	–	10	9	1	–	4
Wis.	–	–	593	–	–	–	–	–	5	6	–	–	–
W.N. CENTRAL	1	1	915	–	–	1	–	–	12	32	7	1	9
Minn.	–	–	2	–	–	–	–	–	2	8	–	–	3
Iowa	–	–	362	–	–	1	–	–	2	7	2	–	–
Mo.	–	–	62	–	–	–	–	–	8	12	5	–	3
N. Dak.	–	–	5	–	–	–	–	–	–	–	–	–	–
S. Dak.	–	–	44	–	–	–	–	–	–	2	–	–	–
Nebr.	1	–	5	–	–	–	–	–	–	2	–	1	2
Kans.†	–	1	435	–	–	–	–	–	–	1	–	–	1
S. ATLANTIC	4	–	387	–	–	2	1	–	43	72	21	1	32
Del.	–	–	5	–	–	–	–	–	–	–	–	–	1
Md.	–	–	38	–	–	–	–	–	9	14	6	–	5
D.C.	–	–	5	–	–	–	–	–	–	2	–	–	5
Va.	1	–	21	–	–	–	–	–	6	7	4	1	9
W. Va.†	–	–	184	–	–	–	–	–	1	–	–	–	1
N.C.	–	–	NN	–	–	2	1	–	10	17	3	–	1
S.C.	–	–	7	–	–	–	–	–	4	5	–	–	1
Ga.†	–	–	–	–	–	–	–	–	–	–	–	–	2
Fla.†	3	–	127	–	–	–	–	–	13	27	8	–	7
E.S. CENTRAL	6	–	283	–	–	1	–	–	18	45	8	–	3
Ky.	1	–	251	–	–	–	–	–	1	–	–	–	–
Tenn.	1	–	NN	–	–	–	–	–	6	10	1	–	–
Ala.	4	–	14	–	–	1	–	–	10	17	7	–	2
Miss.	–	–	18	–	–	–	–	–	1	18	–	–	1
W.S. CENTRAL	16	–	247	–	–	1	1	–	14	79	75	1	13
Ark.	–	–	8	–	–	–	1	–	3	4	6	–	–
La.	4	–	NN	–	–	–	–	–	3	4	–	–	2
Okla.	5	–	–	–	–	1	–	–	2	5	3	1	2
Tex.	7	–	239	–	–	–	–	–	6	66	66	–	9
MOUNTAIN	2	–	137	–	1	–	–	–	19	70	38	–	7
Mont.	–	–	2	–	–	–	–	–	–	–	–	–	1
Idaho	–	–	1	–	–	–	–	–	–	–	1	–	–
Wyo.	–	–	–	–	–	–	–	–	–	5	–	–	1
Colo.	1	–	102	–	–	–	–	–	4	8	7	–	2
N. Mex.	1	–	24	–	–	–	–	–	10	2	–	–	–
Ariz.†	–	–	NN	–	1	–	–	–	3	42	21	–	3
Utah	–	–	5	–	–	–	–	–	2	7	9	–	–
Nev.	–	–	3	–	–	–	–	–	–	6	–	–	–
PACIFIC	5	–	465	–	56	2	2	2	7	21	3	–	75
Wash.	–	–	416	–	55	–	–	–	3	8	3	–	4
Oreg.	2	–	4	–	–	2	–	2	4	13	–	–	4
Calif.	NA	NA	NA	NA	1	NA	2	–	NA	NA	NA	NA	66
Alaska	–	–	3	–	–	–	–	–	–	–	–	–	–
Hawaii†	3	–	42	–	–	–	–	–	–	–	–	–	1
Guam													
P.R.	NA	NA	NA	NA	–	NA	–	–	NA	NA	NA	NA	–
V.I.	–	–	40	–	–	–	1	–	1	2	4	–	1
Pac. Trust Terr.	NA	NA	NA	NA	–	NA	–	–	NA	NA	NA	NA	–

NN: Not notifiable. NA: Not available.

*Delayed reports received for 1978 are not shown below but are used to update last year's weekly and cumulative totals.

†The following delayed reports will be reflected in next week's cumulative totals: Asep. meng.: Ohio +2, Fla. +6; Chickenpox: N.H. +21, Fla. +568, Hawaii +17; Enceph.: Ind. +1; Enceph., post: Fla. +1; Hep. B: N.J. −2, W.Va. +1, Ga. +1, Fla. +27; Hep. A: N.H. +1, N.J. −1, Kans. −1, W.Va. −1, Ga. +15, Fla. +50; Hep. unsp.: N.J. −5, Fla. +36, Ariz. −1.

TABLE III (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending May 26, 1979, and May 27, 1978 (21st week)

REPORTING AREA	MEASLES (RUBEOLA)			MENINGOCOCCAL INFECTIONS TOTAL			MUMPS		PERTUSSIS	RUBELLA		TETANUS
	1979	CUM. 1979	CUM. 1978*	1979	CUM. 1979	CUM. 1978*	1979	CUM. 1979	1979	1979	CUM. 1979	CUM. 1979
UNITED STATES	615	8,153	16,021	34	1,268	1,177	579	8,627	12	550	7,991	18
NEW ENGLAND	7	237	1,694	1	54	65	7	325	1	90	1,129	1
Maine	2	10	1,171	–	1	4	1	116	–	–	57	–
N.H.†	–	28	33	–	5	6	–	4	–	1	82	–
Vt.	1	86	24	–	3	2	–	5	–	10	358	–
Mass.†	1	10	151	–	14	24	1	25	1	52	388	1
R.I.	3	103	4	1	5	12	1	21	–	23	62	–
Conn.	–	–	311	–	26	17	4	154	–	4	182	–
MID. ATLANTIC	99	919	1,260	8	187	172	41	747	3	232	1,441	4
Upstate N.Y.	45	485	830	2	67	55	5	92	2	133	726	1
N.Y. City	49	375	154	4	50	41	8	78	–	23	170	2
N.J.	4	34	58	2	48	35	23	393	–	22	285	–
Pa.	1	21	258	–	22	41	5	184	1	54	260	1
E.N. CENTRAL	283	2,177	6,813	1	114	113	418	3,736	2	100	1,882	1
Ohio†	9	74	289	–	33	21	32	1,207	–	4	75	–
Ind.	12	148	119	–	28	20	16	210	–	26	638	–
Ill.	151	1,049	812	–	3	23	289	757	–	17	116	–
Mich.	16	504	4,502	1	38	40	37	751	2	35	877	1
Wis.	95	402	1,091	–	12	9	44	811	–	18	176	–
W.N. CENTRAL	38	1,020	296	–	37	46	18	576	–	18	301	–
Minn.	34	633	27	–	8	8	–	6	–	–	31	–
Iowa	–	14	49	–	5	9	3	207	–	–	48	–
Mo.	4	354	7	–	17	19	5	158	–	–	28	–
N. Dak.	–	6	167	–	–	3	–	1	–	–	8	–
S. Dak.	–	1	–	–	2	2	–	3	–	–	–	–
Nebr.	–	–	4	–	–	–	–	5	–	12	110	–
Kans.	–	12	42	–	5	5	10	196	–	6	76	–
S. ATLANTIC	86	1,025	3,505	13	309	298	13	296	5	54	869	5
Del.	1	1	5	–	3	1	3	15	–	–	2	–
Md.	1	7	3	–	25	13	3	44	–	–	21	–
D.C.	–	–	47	–	1	1	–	1	–	–	1	–
Va.†	38	168	2,136	–	46	40	2	63	–	23	123	1
W. Va.	–	47	801	1	6	5	–	70	2	10	94	–
N.C.	1	102	83	5	51	60	4	46	–	16	396	2
S.C.†	14	61	167	2	47	19	–	2	1	2	52	–
Ga.†	–	173	12	–	51	38	–	3	–	–	5	–
Fla.†	31	466	251	5	79	121	1	52	2	3	175	2
E.S. CENTRAL	5	130	944	1	100	100	47	859	–	6	221	4
Ky.	–	20	81	–	18	16	45	746	–	1	48	–
Tenn.	1	48	682	–	31	26	1	72	–	1	74	–
Ala.	3	46	61	–	23	30	–	11	–	1	31	4
Miss.	1	16	120	1	28	28	1	30	–	3	68	–
W.S. CENTRAL	21	800	799	8	230	176	14	1,399	–	6	164	3
Ark.	–	6	13	2	19	14	2	746	–	–	4	1
La.	4	205	288	–	96	66	–	34	–	1	25	–
Okla.	–	22	11	1	19	16	–	–	–	–	22	–
Tex.	17	567	487	5	96	80	12	619	–	5	113	2
MOUNTAIN	16	194	176	1	59	27	10	207	1	31	361	–
Mont.	4	52	94	–	4	2	–	5	–	1	49	–
Idaho	1	4	1	–	4	2	–	3	–	4	154	–
Wyo.	–	–	–	–	–	–	–	–	–	–	–	–
Colo.	2	30	20	–	3	2	–	59	–	1	23	–
N. Mex.	2	30	–	–	4	4	–	7	–	–	6	–
Ariz.†	5	55	18	–	32	10	6	39	1	24	109	–
Utah	–	15	31	–	6	4	4	84	–	1	20	–
Nev.	2	8	12	1	6	3	–	10	–	–	–	–
PACIFIC	60	1,651	514	1	178	180	11	482	–	13	1,623	–
Wash.	58	798	46	–	26	32	4	161	–	8	147	–
Oreg.	–	52	126	1	11	9	5	48	–	4	63	–
Calif.	NA	722	339	–	130	132	NA	213	NA	NA	1,400	–
Alaska	–	15	–	–	3	5	–	8	–	–	1	–
Hawaii†	2	64	3	–	8	2	2	52	–	1	12	–
Guam	NA	2	25	–	–	–	NA	5	NA	NA	3	–
P.R.	33	216	128	–	–	2	27	393	–	1	26	3
V.I.	NA	2	6	–	2	–	NA	4	NA	NA	–	–
Pac. Trust Terr.	NA	5	449	–	1	2	NA	16	NA	NA	–	–

NA: Not available.

*Delayed reports received for 1978 are not shown below but are used to update last year's weekly and cumulative totals.

†The following delayed reports will be reflected in next week's cumulative totals: Measles: N.H. +3, Va. –3, S.C. +54, Ga. +145, Fla. +76, Ariz. –1, Hawaii –5. Men. inf: Ohio +10, Va. –1, Ga. +4, Fla. +10; Mumps: Fla. +9; Pertussis: Fla. +2; Rubella: N.H. +1, Mass. –8, Va. –1, Fla. +22, Hawaii –3.

TABLE III (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending May 26, 1979, and May 27, 1978 (21st week)

REPORTING AREA	TUBERCULOSIS		TULAREMIA	TYPHOID FEVER		TYPHUS FEVER (Tick-borne) (RMSF)		VENEREAL DISEASES (Civilian)						RABIES (in Animals)
								GONORRHEA			SYPHILIS (Pri. & Sec.)			
	1979	CUM. 1979	CUM. 1979	1979	CUM. 1979	1979	CUM. 1979	1979	CUM. 1979	CUM. 1978*	1979	CUM. 1979	CUM. 1978*	CUM. 1979
UNITED STATES	492	11,044	41	10	150	26	111	16,088	379,963	374,249	325	9,536	8,376	1,817
NEW ENGLAND	5	303	1	2	12	–	–	463	9,820	9,552	7	163	262	20
Maine	1	23	–	–	1	–	–	37	656	733	2	5	5	14
N.H. †	–	8	–	–	–	–	–	14	336	431	–	2	4	1
Vt.	–	14	–	–	–	–	–	18	211	245	–	–	1	–
Mass.	1	171	1	2	8	–	–	189	3,978	4,160	1	104	170	4
R.I.	–	23	–	–	1	–	–	25	802	685	1	6	10	–
Conn.	3	64	–	–	2	–	–	180	3,807	3,298	3	46	72	1
MID. ATLANTIC	80	1,787	1	1	26	–	5	1,920	41,950	40,701	52	1,484	1,136	12
Upstate N.Y.	9	303	1	–	6	–	4	360	7,534	6,486	3	114	84	11
N.Y. City †	33	657	–	1	12	–	1	805	16,016	16,047	36	1,000	807	–
N.J.	17	336	–	–	6	–	–	236	7,556	7,343	6	198	123	1
Pa.	21	491	–	–	2	–	–	519	10,844	10,825	7	172	122	–
E.N. CENTRAL	96	1,559	–	–	10	–	1	3,008	58,529	54,588	31	1,313	905	137
Ohio	7	303	–	–	1	–	–	786	15,952	14,183	–	240	188	9
Ind.	6	216	–	–	–	–	–	371	5,056	5,750	–	74	48	36
Ill.	42	575	–	–	4	–	–	951	18,700	16,898	25	809	555	68
Mich. †	35	401	–	–	5	–	1	578	13,589	12,662	5	147	85	–
Wis.	4	64	–	–	–	–	–	322	5,232	5,095	1	43	29	24
W.N. CENTRAL	22	371	9	–	6	4	6	951	18,631	18,503	1	129	197	378
Minn.	–	50	–	–	2	–	–	188	3,241	3,313	–	39	90	86
Iowa	1	35	–	–	2	2	2	113	2,338	2,138	1	20	20	74
Mo.	16	200	7	–	1	1	2	409	7,903	7,575	–	52	49	121
N. Dak.	–	11	–	–	–	–	–	17	321	362	–	–	2	17
S. Dak. †	–	22	1	–	–	–	–	39	639	684	–	–	1	24
Nebr.	–	3	1	–	–	–	–	83	1,230	1,397	–	1	5	–
Kans.	3	50	–	–	1	1	2	102	2,959	3,034	–	17	30	56
S. ATLANTIC	125	2,561	2	1	20	11	53	4,797	91,256	90,261	93	2,324	2,226	220
Del.	–	26	–	–	–	1	2	138	1,489	1,298	1	13	4	–
Md.	10	348	–	–	6	1	4	517	10,909	11,672	8	162	176	9
D.C.	6	114	–	–	1	–	–	625	5,817	6,140	12	182	166	–
Va.	19	296	–	–	2	5	21	537	8,320	8,296	7	230	196	4
W. Va.	7	100	–	–	1	–	–	74	1,314	1,274	2	32	8	–
N.C. †	13	402	–	–	–	3	18	580	13,572	12,666	5	193	199	1
S.C.	11	133	1	–	3	1	7	416	8,211	8,446	4	110	99	73
Ga.	16	384	1	–	–	–	1	799	17,677	17,113	22	611	547	131
Fla. †	41	758	–	1	7	–	–	1,109	23,447	23,256	32	791	831	2
E.S. CENTRAL	49	1,047	6	–	6	5	22	1,845	32,803	32,639	34	633	402	114
Ky. †	12	261	2	–	2	2	2	209	4,312	3,799	–	65	49	47
Tenn.	8	288	4	–	1	2	14	639	11,543	11,874	6	262	149	39
Ala.	11	242	–	–	3	1	5	528	9,833	9,743	6	127	56	28
Miss.	18	256	–	–	–	–	1	469	7,115	7,223	22	179	148	–
W.S. CENTRAL	74	1,332	11	5	16	6	22	1,714	49,710	52,391	81	1,673	1,265	774
Ark.	1	86	7	–	–	1	14	96	3,955	3,830	2	52	35	182
La.	7	287	1	–	–	–	–	28	8,457	8,709	6	378	254	9
Okla.	5	147	–	–	–	2	3	263	4,575	4,737	–	30	38	114
Tex.	61	812	3	5	16	3	5	1,327	32,725	35,115	73	1,213	938	469
MOUNTAIN	20	319	7	–	8	–	2	700	14,624	13,570	22	187	154	30
Mont.	–	10	1	–	–	–	1	21	699	850	–	6	7	–
Idaho	1	5	–	–	1	–	–	27	610	494	2	14	2	–
Wyo.	–	3	–	–	–	–	–	12	347	315	–	5	4	–
Colo.	4	45	1	–	2	–	–	175	3,774	3,814	–	44	46	3
N. Mex.	5	59	1	–	1	–	–	137	1,950	1,936	5	33	47	20
Ariz.	6	155	–	–	3	–	–	166	3,907	3,268	15	57	25	6
Utah	4	13	4	–	–	–	–	36	771	796	–	3	6	1
Nev.	–	29	–	–	1	–	1	126	2,366	2,077	–	25	17	–
PACIFIC	21	1,765	4	1	46	–	–	670	62,640	62,044	4	1,630	1,829	132
Wash. †	12	93	3	–	1	–	–	259	5,525	4,690	NA	66	76	–
Oreg.	–	89	–	–	–	–	–	262	4,192	4,269	3	79	62	–
Calif.	NA	1,422	1	NA	37	NA	–	NA	49,721	49,857	NA	1,411	1,667	130
Alaska	–	34	–	1	1	–	–	104	2,121	2,005	–	12	7	2
Hawaii	9	127	–	–	7	–	–	45	1,081	1,223	1	42	17	–
Guam	NA	16	–	NA	–	NA	–	NA	29	51	NA	–	–	–
P.R.	9	113	–	–	3	–	–	41	828	1,005	14	201	184	7
V.I.	NA	3	–	NA	1	NA	–	NA	66	89	NA	3	6	–
Pac. Trust Terr.	NA	10	–	NA	–	NA	–	NA	112	195	NA	–	–	–

NA: Not available.
*Delayed reports received for 1978 are not shown below but are used to update last year's weekly and cumulative totals.
†The following delayed reports will be reflected in next week's cumulative totals: TB: Mich. –2, N.C. –1, Ky. –2, Wash. –1; Typhoid fever: Fla. +2; GC: N.H. –1, S. Dak. –1; Syphilis: NYC +1.

TABLE IV. Deaths in 121 U.S. cities,* week ending May 26, 1979 (21st week)

REPORTING AREA	ALL CAUSES, BY AGE (YEARS)					P&I** TOTAL
	ALL AGES	>65	45-64	25-44	<1	
NEW ENGLAND	618	407	148	32	13	39
Boston, Mass.	173	106	45	12	4	13
Bridgeport, Conn.	45	27	15	2	-	2
Cambridge, Mass.	24	20	4	-	-	1
Fall River, Mass.	19	14	4	-	-	-
Hartford, Conn.	49	29	14	4	-	2
Lowell, Mass.	22	14	6	2	-	1
Lynn, Mass.	14	8	6	-	-	-
New Bedford, Mass.	18	15	2	1	-	1
New Haven, Conn.	53	34	8	9	2	2
Providence, R.I.	56	37	16	1	2	6
Somerville, Mass.	4	4	-	-	-	-
Springfield, Mass.	49	31	11	3	4	2
Waterbury, Conn.	22	18	4	-	-	6
Worcester, Mass.	70	50	13	2	1	3
MID. ATLANTIC	2,434	1,562	542	157	96	104
Albany, N.Y.	53	34	7	3	4	-
Allentown, Pa.	21	14	6	1	-	-
Buffalo, N.Y.	122	70	33	8	8	6
Camden, N.J.	31	13	11	3	4	1
Elizabeth, N.J.	26	12	11	1	2	-
Erie, Pa.†	40	32	6	1	1	3
Jersey City, N.J.	43	27	7	4	3	-
Newark, N.J.	52	27	13	4	7	1
N.Y. City, N.Y.	1,240	826	251	92	32	42
Paterson, N.J.	33	12	4	2	13	1
Philadelphia, Pa.†	328	207	88	15	10	23
Pittsburgh, Pa.†	61	38	20	2	-	4
Reading, Pa.	35	25	6	1	1	3
Rochester, N.Y.	114	79	21	8	2	6
Schenectady, N.Y.	26	16	8	1	-	1
Scranton, Pa.†	37	26	8	3	-	3
Syracuse, N.Y.	74	40	17	6	6	1
Trenton, N.J.	50	34	11	1	2	3
Utica, N.Y.	22	14	6	1	-	3
Yonkers, N.Y.	26	16	8	-	1	1
E.N. CENTRAL	2,251	1,340	570	134	125	58
Akron, Ohio	59	33	11	6	7	-
Canton, Ohio	36	27	4	4	-	-
Chicago, Ill.	541	297	147	37	38	10
Cincinnati, Ohio	146	91	36	8	6	3
Cleveland, Ohio	198	109	62	13	5	5
Columbus, Ohio	95	57	25	1	6	5
Dayton, Ohio	82	45	24	6	5	2
Detroit, Mich.	268	152	74	22	14	5
Evansville, Ind.	45	31	13	1	-	2
Fort Wayne, Ind.	67	42	14	2	6	5
Gary, Ind.	19	8	7	1	2	-
Grand Rapids, Mich.	53	33	14	-	2	-
Indianapolis, Ind.	183	115	36	13	14	5
Madison, Wis.	32	16	10	1	2	1
Milwaukee, Wis.	152	102	36	7	2	6
Peoria, Ill.	39	27	7	1	2	3
Rockford, Ill.	36	16	7	5	3	1
South Bend, Ind.	39	25	7	1	2	-
Toledo, Ohio	96	67	19	4	2	2
Youngstown, Ohio	65	43	13	1	7	3
W.N. CENTRAL	742	468	158	47	40	28
Des Moines, Iowa	59	40	11	3	3	1
Duluth, Minn.	18	13	4	1	-	3
Kansas City, Kans.	43	26	11	3	2	1
Kansas City, Mo.	135	80	32	13	5	3
Lincoln, Nebr.	35	29	5	-	1	4
Minneapolis, Minn.	78	56	11	5	4	5
Omaha, Nebr.	76	45	22	2	3	1
St. Louis, Mo.	152	88	35	13	14	6
St. Paul, Minn.	90	64	14	3	3	3
Wichita, Kans.	56	27	13	4	5	1
S. ATLANTIC	1,065	621	295	86	26	43
Atlanta, Ga.	142	68	51	11	4	2
Baltimore, Md.	133	74	34	15	3	3
Charlotte, N.C.	60	31	17	7	2	2
Jacksonville, Fla.	85	56	18	5	2	2
Miami, Fla.	111	67	29	10	-	2
Norfolk, Va.	52	24	16	3	3	6
Richmond, Va.	70	46	21	3	-	3
Savannah, Ga.	39	21	13	3	-	8
St. Petersburg, Fla.	87	71	11	5	-	6
Tampa, Fla.	65	44	11	2	6	5
Washington, D.C.	175	88	58	19	6	1
Wilmington, Del.	46	31	9	3	-	
E.S. CENTRAL	732	430	187	59	22	39
Birmingham, Ala.	125	68	37	10	5	1
Chattanooga, Tenn.	80	47	23	6	-	9
Knoxville, Tenn.	37	25	8	2	1	-
Louisville, Ky.	106	59	33	6	5	7
Memphis, Tenn.	139	87	30	12	1	7
Mobile, Ala.	78	53	11	9	3	4
Montgomery, Ala.	46	30	12	4	1	1
Nashville, Tenn.	119	61	33	10	6	10
W.S. CENTRAL	1,486	776	430	133	66	40
Austin, Tex.	43	31	7	4	-	1
Baton Rouge, La.	35	16	16	2	1	1
Corpus Christi, Tex.	40	21	11	4	1	4
Dallas, Tex.	174	97	50	13	6	5
El Paso, Tex.	48	22	16	1	4	7
Fort Worth, Tex.	81	42	25	10	1	12
Houston, Tex.	571	258	175	64	35	5
Little Rock, Ark.	62	27	24	6	3	-
New Orleans, La.	154	93	43	7	5	5
San Antonio, Tex.	135	83	27	9	6	4
Shreveport, La.	58	35	14	6	3	4
Tulsa, Okla.	85	51	22	7	1	
MOUNTAIN	588	342	150	47	25	24
Albuquerque, N. Mex.	61	25	18	12	1	3
Colo. Springs, Colo.	38	29	7	1	1	3
Denver, Colo.	121	74	34	9	1	5
Las Vegas, Nev.	56	28	19	3	3	3
Ogden, Utah	16	13	1	1	-	-
Phoenix, Ariz.	143	82	36	10	9	3
Pueblo, Colo.	24	16	4	3	-	1
Salt Lake City, Utah	43	16	13	4	8	1
Tucson, Ariz.	86	59	18	4	2	5
PACIFIC	1,628	1,000	385	132	54	58
Berkeley, Calif.	15	10	2	3	-	1
Fresno, Calif.	63	32	16	6	6	6
Glendale, Calif.	22	14	5	1	-	-
Honolulu, Hawaii	36	20	10	2	5	2
Long Beach, Calif.	104	68	23	9	2	3
Los Angeles, Calif.	514	309	118	47	13	17
Oakland, Calif.	51	27	15	5	2	4
Pasadena, Calif.	28	19	4	-	4	-
Portland, Oreg.	126	80	34	5	3	3
Sacramento, Calif.	71	47	11	6	5	3
San Diego, Calif.	92	55	25	8	1	-
San Francisco, Calif.	129	83	33	9	3	5
San Jose, Calif.	145	77	40	15	7	5
Seattle, Wash.	146	92	37	12	3	3
Spokane, Wash.	45	35	8	2	-	3
Tacoma, Wash.	41	32	4	2	2	
TOTAL	11,544	6,946	2,865	827	467	442

*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 4 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

Epidemiologic Notes and Reports

Nosocomial Meningitis Caused by *Citrobacter diversus* -- Connecticut, Florida

Five cases of hospital-related meningitis due to *Citrobacter diversus* have recently occurred in 2 institutions.

Connecticut: A 37-week infant boy, weighing 1,930 grams, was born August 29, 1978, by cesarean section 36 hours after the mother's membranes ruptured. He was discharged when he was 10 days old. Two days later, he became febrile and lethargic; he also fed poorly. When he was readmitted to the hospital, he was found to have sepsis and meningitis due to *C. diversus.* Computerized tomographic scan of the head showed multiple brain abscesses. After a prolonged hospitalization he died.

The second patient, a full-term infant boy, was born September 20 after a normal pregnancy, labor, and delivery. Discharged at 3 days of age, he was readmitted September 26 with sepsis and meningitis due to *C. diversus.* A subdural empyema was present. He died after a short illness.

No isolates of *C. diversus* from children had been identified in the hospital during the preceding 12 months. However, when nasal, throat, rectal, and umbilical cultures were obtained from all newborns born in the period October 10-29, 1978, 9 infants with umbilical colonization by *C. diversus* of the same antibiogram as the isolates from the 2 described cases (resistant to ampicillin and carbenicillin only) were identified.

Colonized infants did not differ from controls in respect to sex, maternal room number, exposure to nursery personnel, obstetrician, pediatrician, internal monitoring, method of feeding, or care of their umbilicus. Multiple environmental cultures, 109 throat and rectal cultures from all patient-care personnel in contact with the infants or their mothers, and rectal and vaginal cultures from the mothers of the 2 patients were negative for *C. diversus.* A culture of the hands of 1 nurse yielded *C. diversus* and *Klebsiella pneumoniae,* however, and she was sent home on medical leave. She had a dermatitis, aggravated by frequent handwashing and low humidity; for this condition, she applied an emollient cream and wore plastic gloves each night. The *C. diversus,* but not the *K. pneumoniae,* disappeared from her hands when she stopped wearing gloves. In the next 3 months no other infants were identified with *C. diversus* colonization of the umbilicus, nor were there any cases of neonatal *C. diversus* meningitis or sepsis.

Florida: Florida's 3 cases were also all in infants born at 1 hospital. The first, a full-term infant boy weighing 3,060 grams, was born December 11, 1977. His mother had a normal pregnancy, labor, and vaginal delivery. Three days after birth, he was discharged. On December 22, however, he was admitted with jaundice and lethargy. Spinal fluid cultures yielded *C. diversus.* After a long hospitalization, in which drainage of brain abscesses was required, he recovered fully.

Another infant boy, a 2,185-gram male, was delivered vaginally to a mother with endometritis on October 10, 1978. Eleven days later, while still in the hospital, he became lethargic and was found to have meningitis and ventriculitis due to *C. diversus.* In January 1979, he had residual parietal encephalomalacia and right hemiparesis. Maternal endometrial cultures at delivery yielded only alpha-hemolytic *Streptococcus* and *Lactobacillus.*

The third Florida case was in a 2,780-gram, full-term infant girl, delivered on December 29, 1978, and discharged 3 days later. On January 5, she was readmitted for meningitis due to *C. diversus;* she died that day.

No isolates of *C. diversus* had been identified among nursery inpatients at this hospital until July and August 1978, when it was recovered from 2 infants with mild omphalitis.

Citrobacter Infection – Continued

On January 24, 1979, 45 of 57 (79%) infants in the nursery were found to have asymptomatic stool colonization by *C. diversus*. Environmental cultures were negative for the organism. Cultures of the next 27 infants born at the hospital revealed that all 27 had negative nasal cultures at the time of delivery, although 3 eventually became colonized in their stools. Four of 110 nurses (none with dermatitis) carried the organism on their hands, even when cultured 2 days after leaving the hospital, and 2 other nurses carried *C. diversus* in their stools.

Several corrective measures were begun: all patients who were carriers were separated from other patients; persons were instructed to wear gloves when feeding and diapering these patients; and the 2 adult intestinal carriers were treated with trimethoprim-sulfamethoxazole. By April 16, the prevalence of *C. diversus* had fallen from 79% to 0.

Reported by MF Parry, MD, J Hutchinson, RN, Stamford Hospital, Stamford, Connecticut; RM Gofstein, MD, MPH, R Murray, Stamford Health Dept; PJ Checko, SM, A Bruce, MS, JN Lewis, MD, MPH, State Epidemiologist, Connecticut State Dept of Health; H Boer, MD, HR, MPH, FE Ariel, RN, Broward General Medical Center, Fort Lauderdale, Florida; RM Yeller, MD, Acting State Epidemiologist, Florida State Dept of Health and Rehabilitative Services; Field Services Div, Epidemiologic Investigations Laboratory Br, Hospital Infections Br, and Special Pathogens Br, Bacterial Diseases Div, Bur of Epidemiology, CDC.

Editorial Note: *Citrobacter* is an uncommon cause of nosocomial neonatal meningitis (*1*). However, the association of personnel with dermatitis and epidemic nosocomial infections has been documented frequently. Dermatitic lesions on the hands of medical personnel may be heavily colonized with gram-positive or gram-negative bacteria; virus transmission has also been implicated. These organisms may be transmitted to patients during routine patient-care activities and may result in colonization of the patients or in sporadic or epidemic disease (*2-5*).

In neither hospital were nurse carriers proven to be primary sources of the organism for all patients with meningitis. However, in Connecticut, 2 observations suggest that the nurse may have been the carrier: (1) she was associated with the second patient as well as with the colonized neonates, and (2) once she was removed from the hospital, there were no more cases or colonizations. How the carrier's hands initially became colonized with *C. diversus* could not be determined. Colonization could have occurred during her exposure to the first patient, or the first patient may have acquired the organism from the carrier. It is also not clear how the 6 Florida nurses became colonized, though they may have acquired the organism changing the diapers of colonized infants.

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Follow-up on Poliomyelitis – United States, Canada

Since the last report (*1*), the United States and Canada have reported 3 more cases of poliomyelitis caused by the type 1 virus; 3 more suspected cases have also been reported.

Poliomyelitis – Continued

Five of these new patients are Amish, and the other belongs to an old-order Mennonite sect. To date, 8 cases (6 U.S., 2 Canadian) of type 1 polio and 4 suspected cases (all U.S.) have been identified.

United States: Since May 22, Wisconsin has reported a case of polio in a 20-year-old, unvaccinated Amish man from Vernon County. He became ill on May 5 and developed paralysis of both legs on May 11. Although no virus was isolated from this patient, poliovirus type 1 was cultured from a stool specimen of 1 of 20 unvaccinated family members. The second U.S. patient is a 34-year-old, unvaccinated Mennonite man from Lancaster County, Pennsylvania. He developed aseptic meningitis on approximately April 26; poliovirus type 1 was isolated from a stool specimen.

Pennsylvania, Wisconsin, and Iowa have each reported a new suspected case of paralytic poliomyelitis since May 22. All 3 are in Amish persons, with dates of onset April 5, May 16, and May 23, respectively. The Pennsylvania and Iowa patients are from areas where suspected or confirmed polio cases have been previously reported. The Wisconsin patient is from Taylor County.

Canada: Polio has now been confirmed in the 20-year-old brother of the Amish patient reported last week from Ontario, Canada (*1*). The patient had a 4-fold rise in polio type 1 antibody. Although poliovirus type 1 has now been isolated from additional family members and unvaccinated neighbors, no new cases have been reported from Canada.

Reported by R Gens, MD, WE Parkin, DVM, DrPH, State Epidemiologist, Pennsylvania Dept of Health; LA Wintermeyer, MD, State Epidemiologist, Iowa State Dept of Health; JP Davis, MD, State Epidemiologist, Wisconsin State Dept of Health and Social Services; Bur of State Services, Viral Diseases Div, Bur of Epidemiology, CDC.

Editorial Note: Transmission of poliovirus is continuing among unvaccinated populations, but apparently not to any significant degree among the surrounding communities with their presumably high levels of immunization. In order to interrupt the ongoing transmission among Amish groups, all states with known Amish populations are now planning or beginning immunization campaigns for these unvaccinated communities. Trivalent oral poliovirus vaccine (TOPV) is recommended for all U.S. Amish residents, regardless of age, and for all who are in regular close contact with these persons. TOPV may also be offered to any unimmunized person living in a community from which a wild-type poliovirus is isolated.

Before traveling to affected Amish areas, children should complete their routine polio vaccination. Routine polio immunization for adults in the United States is not currently recommended, and adult travelers to affected Amish areas who anticipate short stays and little close personal contact with the Amish are probably at minimal increased risk. However, unimmunized adults who anticipate prolonged stays or close contact should ensure that they are protected. This can be accomplished by receipt of at least 2 doses of inactivated poliovirus vaccine (IPV) a month apart before travel or, if IPV is not readily available, at least 2 doses of TOPV, 6-8 weeks apart. If there is time for only 1 dose of vaccine

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

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Poliomyelitis – Continued

before travel, a single dose of TOPV should be given.

Reference

1. MMWR 28:229, 1979

Erratum, Vol. 28, No. 17

p 203 In the article "Measles Importations into Montana—1977-1979," the following 2 names were inadvertently not included in the credits: MR Skeels, PhD, Chief, and JJ Williams, MS, Virologist, Microbiology Bureau, Montana State Laboratory, Montana State Dept of Health and Environmental Sciences.

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