CENTERS FOR DISEASE CONTROL

July 1, 1983 / Vol. 32 / No. 25

MMWR

MORBIDITY AND MORTALITY WEEKLY REPORT

Epidemiologic Notes and Reports

Heroin-Related Deaths — District of Columbia, 1980-1982

In the period January 1980-December 1982, 266 deaths occurred in the District of Columbia because of intravenous heroin use (Figure 1).* These deaths represented a substantial increase in numbers beginning in the second quarter of 1979. The median age of all decedents for this 2-year period was 30 years; 93% were black, and 82% were male. These deaths constituted 96% of all deaths due to abuse of narcotics in the District of Columbia during the study period; they clustered significantly in the spring and summer, on Friday and Saturday, and from 6 p.m. through 12 midnight. The median age at which the decedents in this group first used heroin was 19. Analyses of heroin preparations sold on the street indicated that quinine was the only other pharmacologically active substance consistently present in packages of heroin associated with these heroin-related deaths (HRDs).

A comparison was made of autopsy data for persons whose deaths were classified as HRDs and data for a control group consisting of persons who died of natural or traumatic causes (including homicide and suicide) in the same time period and had measurable concentrations of morphine in their blood at autopsy.† Seventy-three percent of persons whose deaths were classified as HRDs and 32% of controls had measurable concentrations of ethanol in blood; 50% of the former and 15% of the latter had concentrations greater than 100 mg/dl. The median concentration of morphine in blood for HRDs at autopsy was 0.03 mg/dl, compared with 0.01 for controls.

Analyses of risk factors during the study period (Table 1) indicated that persons with HRDs were 22 times as likely to have blood ethanol levels greater than 100 mg/dl than levels equal to or less than 100 mg/dl and 15 times as likely to have blood morphine concentrations equal to or greater than 0.02 mg/dl than to have levels of less than 0.02 mg/dl. Analysis of the case-control data showed that the presence of a single, recent needle-injection site or a single track area was significantly associated with a higher risk of HRD than were multiple sites or track areas ($p < 0.05$).

The parameters of deaths among HRDs by quarter year, weight of heroin and quinine in street packages, and price of heroin were used in a multiple linear regression model for an interval that included both endemic and epidemic periods (1976-1982). Analysis indicated a positive association between HRDs and the quarterly average amount of heroin and quinine in street packages, as well as between HRDs and the quarterly average concentration of heroin (percentage dry weight); the same analysis indicated an inverse association between HRDs and the price (dollars/milligram of pure heroin) of heroin.

The above positive association between quinine and HRDs is also supported by pharmacologic data. Doses of quinine estimated from concentrations in street preparations ranged from

*Heroin-related deaths are, by definition, associated with the use of no narcotics other than heroin.
†Morphine is a metabolite of heroin and appears in the blood of all persons who have used heroin.

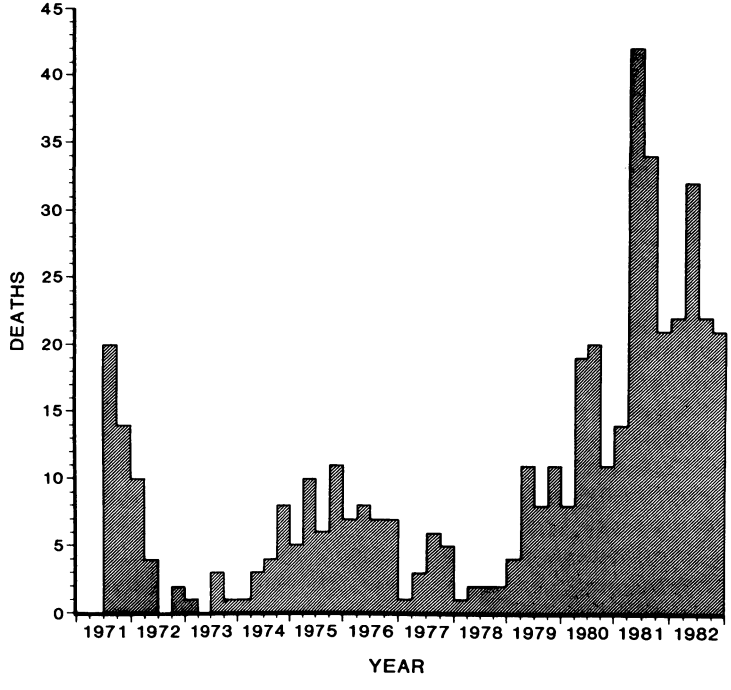
Heroin-Related Deaths – Continued

98 mg to 314 mg. For a 10-second injection, dose rates would range between 10 mg/sec and 131 mg/sec, 59-182 times the currently recommended maximum therapeutic dose rate for quinine dihydrochloride (*1*).

Reported by JL Luke, MD, Chief Medical Examiner, Office of the Chief Medical Examiner, ME Levy, MD, Public Health Svcs Administrator, Office of the Commissioner of Public Health, District of Columbia; Morals Div, Metropolitan Police Dept, District of Columbia; Div of Epidemiology and Statistical Analysis, National Institute on Drug Abuse; Office of Intelligence, Drug Enforcement Administration; Chronic Diseases Div, Center for Environmental Health, CDC.

Editorial Note Epidemiologic features of HRD in previous epidemics have been described (*2-4*). Investigators have attributed these deaths to the high concentration of heroin in street preparations and to a loss of tolerance to heroin. Relatively little is known about why epidemics of HRDs occur, whether particular groups are at high risk for a fatal overdose at such times, or how demographic and toxicologic variables differ during epidemics from those at other times. The 1981 population-based HRD mortality rate of 17.4/100,000 population for the District of Columbia is the highest ever reported in the medical literature. Results from the case-control study described above and the magnitude of morphine concentrations in blood indicate that the pharmacologic effects of heroin played a major role in this epidemic (i.e., on the basis that minimum lethal blood morphine concentration may range from 0.02-0.04 mg/dl and because heroin-related decedents in this study were 15 times more likely than controls to have blood morphine concentrations of 0.02 mg/dl or greater). In addition, analysis of case-control data showed elevated concentrations of morphine in urine and bile significantly more often ($p < 0.05$) among controls than among members of the case group, indicating that the case group used heroin less chronically than did the controls (*6-8*). Likewise, the

FIGURE 1. Heroin-related deaths, District of Columbia, 1971-1982



Heroin-Related Deaths — Continued

case-control data clearly establish that the combination of ethanol and heroin elevate the risk for a fatal overdose—a point that has not been emphasized in past analyses of these epidemics (*3,5*). The acute effects of blood ethanol appear more prominent than the chronic effects, since liver pathology does not significantly increase the risk of HRD after the confounding influence of blood ethanol is removed.

The data from the District of Columbia study also suggest that the lack of tolerance to heroin is a risk factor for death from overdose, but that this lack may be due to sporadic use of the drug in combination with ethanol rather than to an addict's resumption of frequent heroin use after a period of abstinence. These data differ from earlier study results that suggest that HRD epidemics are related to the fluctuating strength of heroin sold on the street. The association between quinine and HRDs also conflicts with past reports and merits further consideration (*2,8,9*).

Although the mechanisms for the epidemiologically identified risk factors have not been firmly established, the data from the District of Columbia study support the adoption of public health education measures aimed at reducing heroin-related mortality. The following recommendations should be considered for use by public health care providers:

1) Heroin users should be continually reminded of the well-documented elevation in the risk for death associated with using heroin in any context, using heroin after a period of postaddiction abstinence, and using heroin for recreational (nonaddictive) purposes.

2) The risk of combining heroin use with ethanol ingestion should be made clear to all heroin users. Addiction treatment programs should also address the problem of substituting addiction to ethanol for addiction to heroin, methadone, or other drugs. Heroin addicts under treatment who have problems with ethanol abuse should be treated for both drug problems.

TABLE 1. Effects of blood ethanol, blood morphine, and liver pathology on heroin-related deaths — Washington, D.C., January 1980-December 1982

Variable Adjusted for	Odds ratio*	95% confidence interval†
Blood ethanol§	21.7¶	5.4-187.3
Blood morphine	36.0	8.2-335.0
Gross FM**	16.5	4.1-145.4
FM by microscopy	17.5	4.1-160.1
Blood morphine††	15.2¶	6.6-37.4
Blood ethanol	23.3	9.4-64.0
Gross FM	14.5	6.3-37.3
FM by microscopy	12.4	5.2-32.4
Gross FM	2.8¶	1.4-5.9
Blood ethanol	2.1	0.9-5.7
FM by microscopy	1.9¶	0.8-4.9

*Controls with no measurable blood morphine are excluded from analysis; conditional maximum likelihood estimate of adjusted odds ratio.

†Exact conditional maximum likelihood estimate of confidence interval.

§Blood ethanol $>$ 100 mg/dl compared with $\leq$ 100 mg/dl.

¶Crude odds ratio, not adjusted for another variable.

**Fatty metamorphosis

††Blood morphine $\geq$ 0.02 mg/dl compared with $<$ 0.02 mg/dl.

Heroin-Related Deaths — Continued

3) Measures should be considered to decrease the ready availability of quinine. Heroin users should also be apprised of the potential risks involved when quinine is used as a diluent in preparations of heroin.

References

1. American Medical Association. AMA drug evaluations. 4th ed. New York: John Wiley & Sons, 1980:1390.
2. DuPont RL, Greene MH. The dynamics of a heroin addiction epidemic. Science 1973;181:716-22.
3. Greene MH, Luke JL, DuPont RL. Opiate "overdose" deaths in the District of Columbia I. Heroin-related fatalities. Medical Annals of D.C. 1974;43:175-81.
4. Zimney EL, Luke JL. Narcotic-related deaths in the District of Columbia: 1971-1979. J Forensic Sci 1981;26:462-9.
5. Cherubin C, McCusker J, Baden M, et al. Epidemiology of death in narcotic addicts. Am J Epidemiol 1972;96:11-22.
6. Christopoulos GN, Kirch ER. Isolation and identification of morphine from postmorteum tissues. J Chromatogr 1972;65:507-19.
7. Sapira JD. The narcotic addict as a medical patient. Am J Med 1968;45:555-88.
8. Garriott JC, Sturner WQ. Morphine concentrations and survival periods in acute heroin fatalities. N Engl J Med 1973;289:1276-8.
9. Abramson DH. Bigeminy and heroin intoxication. NY State J Med 1972;72:2888-90.

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

Disease	25th Week Ending			Cumulative, 25th Week Ending		
	June 25, 1983	June 26, 1982	Median 1978-1982	June 25, 1983	June 26, 1982	Median 1978-1982
Aseptic meningitis	164	162	125	2,206	2,154	1,665
Encephalitis: Primary (arthropod-borne & unspec.)	24	28	19	411	447	315
Post-infectious	2	5	4	38	47	101
Gonorrhea: Civilian	15,168	19,268	19,358	417,119	449,368	452,235
Military	349	379	499	11,384	13,219	13,050
Hepatitis: Type A	321	369	578	10,685	10,599	13,023
Type B	430	498	364	10,639	10,075	8,037
Non A, Non B	63	44	N	1,585	1,082	N
Unspecified	162	170	181	3,793	4,062	4,797
Legionellosis	9	6	N	354	217	N
Leprosy	6	1	1	127	90	82
Malaria	13	14	26	323	436	436
Measles: Total	66	57	317	1,022	875	10,288
Indigenous	65	N	N	850	N	N
Imported*	1	N	N	172	N	N
Meningococcal infections: Total	49	38	50	1,634	1,722	1,567
Civilian	49	37	49	1,619	1,714	1,556
Military	-	1	1	15	8	11
Mumps	46	112	158	2,028	3,813	6,389
Pertussis	45	26	26	844	526	529
Rubella (German measles)	17	45	82	656	1,603	2,761
Syphilis (Primary & Secondary): Civilian	579	688	567	15,303	15,862	12,387
Military	10	8	5	217	195	151
Toxic-shock syndrome	10	N	N	211	N	N
Tuberculosis	490	485	613	10,855	12,071	12,698
Tularemia	12	13	7	112	83	82
Typhoid fever	9	7	8	163	182	210
Typhus fever, tick-borne (RMSF)	95	44	48	339	334	325
Rabies, animal	132	162	136	3,061	3,021	3,021

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1983		Cum. 1983
Anthrax	-	Plague	15
Botulism: Foodborne	10	Poliomyelitis: Total	1
Infant (Calif. 2, Hawaii 1)	34	Paralytic	1
Other	-	Psittacosis (Colo. 2)	57
Brucellosis (Kans. 1, Va. 1, Fla. 2)	76	Rabies, human	2
Cholera	-	Tetanus (N.C. 1)	32
Congenital rubella syndrome (Upstate N.Y. 2)	13	Trichinosis	18
Diphtheria	-	Typhus fever, flea-borne (endemic, murine) (Ga. 1, Tex. 1, Hawaii 3)	19
Leptospirosis (Fla. 1, Hawaii 2)	20		

*One of the 66 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 June 25, 1983 and June 26, 1982 (25th week)

Reporting Area	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy	Malaria
		Primary	Post-infectious			A	B	NA,NB	Unspecified			
	1983	Cum. 1983	Cum. 1983	Cum. 1983	Cum. 1982	1983	1983	1983	1983	1983	Cum. 1983	Cum. 1983
UNITED STATES	164	411	38	417,119	449,368	321	430	63	162	9	127	323
NEW ENGLAND	7	16	-	10,442	10,521	9	35	3	19	1	3	17
Maine	-	-	-	549	490	2	4	-	1	1	-	-
N.H.	-	1	-	310	377	1	1	-	-	-	2	-
Vt.	-	1	-	196	212	-	1	-	-	-	-	1
Mass.	2	8	-	4,491	4,800	4	10	2	17	-	-	7
R.I.	-	-	-	578	722	1	4	1	-	-	-	3
Conn.	5	6	-	4,318	3,920	1	15	-	1	-	1	6
MID ATLANTIC	21	52	3	53,535	54,335	47	69	8	14	-	19	43
Upstate N.Y.	3	13	-	7,860	8,586	8	19	3	-	-	-	13
N.Y. City	1	7	-	22,294	23,078	21	8	-	3	-	18	13
N.J.	10	12	-	10,137	9,794	7	24	2	9	-	-	14
Pa.	7	20	3	13,244	12,877	11	18	3	2	-	1	3
E.N. CENTRAL	11	82	9	55,440	64,835	25	51	5	12	2	5	13
Ohio	4	34	6	16,018	17,803	9	20	-	3	-	1	2
Ind.	-	11	1	6,555	7,477	5	10	1	7	-	-	-
Ill.	1	-	-	12,106	18,725	4	7	-	-	-	2	2
Mich.	6	30	-	15,663	15,011	7	14	4	2	2	2	8
Wis.	-	7	2	5,098	5,819	-	-	-	-	-	-	1
W.N. CENTRAL	4	45	4	19,482	21,170	17	13	1	6	2	4	13
Minn.	-	18	1	2,777	3,187	7	1	1	-	-	3	4
Iowa	1	21	-	2,216	2,268	-	2	-	-	-	-	2
Mo.	3	2	-	9,336	9,822	9	4	-	4	1	-	2
N. Dak.	-	-	-	187	285	-	-	-	-	-	-	1
S. Dak.	-	-	1	545	591	1	-	-	-	-	-	-
Nebr.	-	3	-	1,189	1,303	-	5	-	2	1	-	1
Kans.	-	1	2	3,232	3,714	-	1	-	-	-	1	3
S. ATLANTIC	44	69	13	108,570	117,152	38	90	11	17	1	7	51
Del.	-	-	-	1,926	1,756	-	-	-	1	-	-	-
Md.	2	12	-	13,762	14,588	1	32	4	-	-	1	11
D.C.	-	-	-	7,385	6,195	-	1	-	-	-	-	7
Va.	3	19	2	9,248	10,029	3	10	2	2	1	-	6
W. Va.	-	-	-	1,136	1,308	3	2	-	-	-	-	1
N.C.	20	21	-	15,946	18,444	8	7	-	5	-	-	1
S.C.	-	2	-	10,163	11,083	5	5	-	3	-	-	5
Ga.	1	4	-	23,200	22,757	3	16	-	2	-	1	4
Fla.	18	11	11	25,804	30,992	15	17	5	4	-	5	16
E.S. CENTRAL	5	16	-	35,115	37,542	22	36	4	-	-	-	5
Ky.	-	-	-	4,204	5,084	7	9	-	-	-	-	-
Tenn.	1	3	-	14,172	14,607	6	12	1	-	-	-	-
Ala.	4	13	-	10,848	11,136	7	13	3	-	-	-	3
Miss.	-	-	-	5,891	6,715	2	2	-	-	-	-	2
W.S. CENTRAL	46	44	1	59,781	61,730	57	44	3	57	-	14	37
Ark.	-	4	-	4,603	5,233	-	4	-	7	-	-	1
La.	3	5	-	11,065	11,007	15	10	1	1	-	1	4
Okla.	7	9	1	6,968	6,692	22	10	2	3	-	-	8
Tex.	36	26	-	37,145	38,798	20	20	-	46	-	13	24
MOUNTAIN	2	24	3	12,939	15,497	13	11	2	3	1	12	17
Mont.	-	-	-	562	636	-	-	-	1	1	-	-
Idaho	1	-	-	583	737	-	-	-	-	-	-	2
Wyo.	-	2	-	341	434	-	-	1	1	-	-	1
Colo.	1	11	-	3,696	4,092	9	2	-	-	-	2	5
N. Mex.	-	1	-	1,583	1,958	4	-	1	-	-	-	5
Ariz.	U	2	3	3,524	4,325	U	U	U	U	U	9	3
Utah	-	8	-	633	708	-	3	-	-	-	1	1
Nev.	-	-	-	2,017	2,607	-	6	-	1	-	-	-
PACIFIC	24	63	5	61,815	66,586	93	81	26	34	2	63	127
Wash.	1	4	1	4,394	5,444	3	4	4	5	-	10	2
Oreg.	-	-	2	3,137	3,703	10	3	-	-	1	2	4
Calif.	19	55	2	51,438	54,615	78	72	22	29	1	35	121
Alaska	-	-	-	1,572	1,656	-	-	-	-	-	-	-
Hawaii	4	4	-	1,274	1,168	2	2	-	-	-	16	-
Guam	U	-	-	65	70	U	U	U	U	U	-	2
P.R.	10	-	1	1,393	1,378	9	14	-	3	-	-	1
V.I.	-	-	-	129	121	-	-	-	-	-	-	-
Pac. Trust Terr.	U	-	-	-	222	U	U	U	U	U	-	-

N: Not notifiable U: Unavailable

TABLE III. (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending June 25, 1983 and June 26, 1982 (25th week)

Reporting Area	Measles (Rubeola)					Menin-gococcal Infections	Mumps			Pertussis			Rubella		
	Indigenous		Imported*		Total										
	1983	Cum. 1983	1983	Cum. 1983	Cum. 1982	Cum. 1983	1983	Cum. 1983	Cum. 1982	1983	Cum. 1983	Cum. 1982	1983	Cum. 1983	Cum. 1982
UNITED STATES	65	850	1	172	875	1,634	46	2,028	3,813	45	844	526	17	656	1,603
NEW ENGLAND	-	2	1	10	10	79	2	79	142	3	30	29	-	8	11
Maine	-	-	-	-	-	8	-	15	33	2	2	3	-	-	-
N.H.	-	-	-	1	2	2	1	16	13	-	5	4	-	2	8
Vt.	-	-	-	-	2	3	-	9	5	1	4	1	-	3	-
Mass.	-	2	-	1	2	28	1	19	65	-	16	10	-	3	-
R.I.	-	-	-	-	-	7	-	9	13	-	3	9	-	-	1
Conn.	-	-	1†	8	4	31	-	11	13	-	-	2	-	-	2
MID ATLANTIC	25	50	-	20	130	273	5	151	237	6	230	85	3	121	78
Upstate N.Y.	-	-	-	6	93	88	1	58	48	4	70	52	-	19	38
N.Y. City	-	25	-	10	29	44	4	17	38	-	31	18	1	85	26
N.J.	25	25	-	1	4	45	-	28	35	-	14	7	-	3	14
Pa.	-	-	-	3	4	96	-	48	116	2	115	8	2	14	-
E.N. CENTRAL	22	497	-	51	54	277	26	1,036	2,141	5	190	151	7	93	148
Ohio	22	66	-	13	1	98	13	520	1,520	3	69	35	-	1	-
Ind.	-	340	-	-	2	33	1	25	33	-	16	11	5	20	26
Ill.	-	91	-	33	16	67	3	116	236	2	82	74	2	41	57
Mich.	-	-	-	5	35	56	9	320	275	-	11	8	-	14	42
Wis.	-	-	-	-	-	23	-	55	77	-	12	23	-	17	23
W.N. CENTRAL	-	-	-	-	38	98	-	126	487	-	54	24	1	30	54
Minn.	-	-	-	-	-	15	-	20	372	-	20	8	1	6	4
Iowa	-	-	-	-	-	11	-	35	29	-	5	3	-	-	-
Mo.	-	-	-	-	2	50	-	20	7	-	8	7	-	-	38
N. Dak.	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-
S. Dak.	-	-	-	-	-	4	-	-	1	-	2	3	-	-	1
Nebr.	-	-	-	-	-	1	-	2	-	-	-	1	-	-	-
Kans.	-	-	-	-	36	15	-	49	78	-	18	2	-	24	11
S. ATLANTIC	4	153	-	23	33	345	2	124	211	11	114	67	1	73	61
Del.	-	-	-	-	-	-	-	5	10	-	2	4	-	-	1
Md.	-	-	-	4	2	36	-	23	21	-	8	4	-	1	31
D.C.	-	-	-	-	1	4	-	-	-	-	-	1	-	-	-
Va.	-	11	-	11	14	49	1	21	30	2	40	9	-	1	11
W. Va.	-	-	-	-	2	3	1	26	79	-	4	3	-	-	1
N.C.	-	-	-	-	-	72	-	5	9	4	9	10	1	8	1
S.C.	-	-	-	4	-	38	-	7	12	1	8	8	-	-	1
Ga.	2	8	-	-	-	56	-	37	11	-	25	10	-	11	5
Fla.	2	134	-	4	14	87	-	-	39	4	18	18	-	52	10
E.S. CENTRAL	-	1	-	5	6	100	1	37	30	-	7	17	2	10	37
Ky.	-	-	-	1	1	19	-	15	9	-	2	2	2	9	21
Tenn.	-	-	-	-	5	39	1	18	11	-	2	6	-	-	-
Ala.	-	1	-	4	-	27	-	1	5	-	1	-	-	1	-
Miss.	-	-	-	-	-	15	-	3	5	-	2	9	-	-	16
W.S. CENTRAL	-	34	-	37	12	183	3	142	134	10	107	33	2	92	77
Ark.	-	-	-	11	-	15	-	2	6	-	4	2	-	-	1
La.	-	-	-	25	2	33	-	-	3	-	2	3	-	9	1
Okla.	-	1	-	-	-	23	-	-	-	10	70	3	-	-	3
Tex.	-	33	-	1	10	112	3	140	125	-	31	25	2	83	72
MOUNTAIN	-	1	-	3	5	62	-	84	60	4	75	34	-	22	54
Mont.	-	-	-	-	-	6	-	2	3	-	1	-	-	3	4
Idaho	-	-	-	-	-	5	-	5	3	-	2	3	-	8	3
Wyo.	-	-	-	-	-	1	-	-	2	-	4	1	-	1	5
Colo.	-	-	-	2	5	25	-	10	13	4	49	9	-	-	5
N. Mex.	-	-	-	-	-	5	-	-	-	-	5	4	-	-	5
Ariz.	U	-	U	1	-	13	U	58	24	U	9	16	U	4	7
Utah	-	-	-	-	-	7	-	6	11	-	5	1	-	5	16
Nev.	-	1	-	-	-	-	-	3	4	-	-	-	-	1	9
PACIFIC	14	112	-	23	587	217	7	249	371	6	37	86	1	207	1,083
Wash.	-	1	-	3	30	29	1	36	58	2	4	15	-	6	32
Oreg.	-	5	-	2	3	33	-	-	-	-	5	20	-	12	4
Calif.	14	105	-	18	550	149	6	190	300	4	28	51	1	189	1,040
Alaska	-	-	-	-	1	-	-	10	6	-	-	-	-	-	1
Hawaii	-	1	-	-	3	6	-	13	7	-	-	-	-	-	6
Guam	U	-	U	1	6	1	U	-	3	U	-	-	U	-	2
P.R.	-	77	-	-	69	9	4	102	39	-	7	12	-	3	5
V.I.	-	-	-	5	-	-	-	-	-	-	-	-	-	1	-
Pac. Trust Terr.	U	-	U	-	-	-	U	-	2	U	-	-	U	-	-

*For measles only, imported cases includes both out-of-state and international importations. U: Unavailable †International §Out-of-state

TABLE III. (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending June 25, 1983 and June 26, 1982 (25th week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1983	Cum. 1982	1983	1983	Cum. 1983	Cum. 1983	Cum. 1983	Cum. 1983	Cum. 1983
UNITED STATES	15,303	15,862	10	490	10,855	112	163	339	3,061
NEW ENGLAND	333	265	-	13	295	-	6	1	8
Maine	9	1	-	1	18	-	-	-	2
N.H.	9	2	-	-	23	-	-	-	1
Vt.	2	1	-	-	4	-	-	-	-
Mass.	203	186	-	6	159	-	6	1	2
R.I.	13	12	-	-	21	-	-	-	-
Conn.	97	63	-	6	70	-	-	-	3
MID ATLANTIC	1,904	2,168	1	65	1,938	-	30	7	102
Upstate N.Y.	97	255	-	9	328	-	4	-	37
N.Y. City	1,154	1,280	-	35	802	-	14	1	-
N.J.	383	279	1	21	407	-	10	5	3
Pa.	270	354	-	-	401	-	2	1	62
E.N. CENTRAL	704	1,009	3	88	1,417	2	26	20	245
Ohio	225	145	-	17	223	-	6	13	30
Ind.	73	102	-	29	120	-	1	-	18
Ill.	267	577	2	24	623	1	11	4	129
Mich.	101	132	1	15	376	1	8	3	3
Wis.	38	53	-	3	75	-	-	-	65
W.N. CENTRAL	188	299	1	11	349	31	11	20	462
Minn.	80	56	-	4	74	-	2	-	87
Iowa	7	17	1	-	29	-	-	-	126
Mo.	64	180	-	6	183	23	4	13	58
N. Dak.	1	4	-	-	3	-	-	1	37
S. Dak.	8	-	-	-	22	1	-	2	70
Nebr.	11	8	-	1	9	3	-	-	41
Kans.	17	34	-	-	29	4	5	4	43
S. ATLANTIC	4,100	4,301	-	69	2,129	13	20	134	1,072
Del.	19	8	-	-	16	-	-	-	1
Md.	261	241	-	10	174	5	4	21	436
D.C.	174	257	-	1	81	-	-	-	1
Va.	285	314	-	7	208	1	4	20	404
W. Va.	13	16	-	2	74	-	2	7	76
N.C.	376	291	-	5	288	6	1	36	8
S.C.	259	227	-	-	190	-	1	21	15
Ga.	782	882	-	10	416	1	1	26	113
Fla.	1,931	2,065	-	34	682	-	7	3	18
E.S. CENTRAL	1,061	1,116	-	47	1,028	9	2	18	239
Ky.	61	60	-	18	269	-	-	1	54
Tenn.	301	299	-	16	307	7	1	12	153
Ala.	432	402	-	11	259	-	-	3	32
Miss.	267	355	-	2	193	2	1	2	-
W.S. CENTRAL	4,088	4,014	1	88	1,315	51	17	135	643
Ark.	102	106	-	6	143	35	2	11	108
La.	854	873	-	15	208	2	3	-	19
Okla.	112	83	1	-	126	12	-	87	70
Tex.	3,020	2,952	-	67	838	2	12	37	446
MOUNTAIN	337	404	-	14	290	3	7	3	98
Mont.	5	3	-	-	22	1	1	1	66
Idaho	6	19	-	-	13	1	-	1	-
Wyo.	6	10	-	1	7	-	-	1	1
Colo.	79	110	-	7	31	-	1	-	3
N. Mex.	110	89	-	6	59	1	-	-	5
Ariz.	77	92	U	U	126	-	3	-	23
Utah	11	12	-	-	22	-	1	-	-
Nev.	43	69	-	-	10	-	1	-	-
PACIFIC	2,588	2,286	4	95	2,094	3	44	1	192
Wash.	71	76	-	6	107	2	2	-	2
Oreg.	52	59	2	1	86	-	-	-	-
Calif.	2,424	2,079	2	81	1,747	1	41	1	183
Alaska	7	8	-	-	25	-	-	-	7
Hawaii	34	64	-	7	129	-	1	-	-
Guam	-	1	U	U	2	-	-	-	-
P.R.	400	299	-	-	229	-	-	-	26
V.I.	9	10	-	-	1	-	-	-	-
Pac. Trust Terr.	-	-	U	U	-	-	-	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending June 25, 1983 (25th week)

Reporting Area	All Causes, By Age (Years)						P&I** Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	648	435	144	30	20	19	56
Boston, Mass.	188	117	49	10	6	6	16
Bridgeport, Conn.	31	19	8	2	1	1	2
Cambridge, Mass.	23	19	4	-	-	-	4
Fall River, Mass.	26	23	3	-	-	-	-
Hartford, Conn.	59	40	11	1	5	2	3
Lowell, Mass.	36	26	9	-	1	-	1
Lynn, Mass.	12	9	2	1	-	-	-
New Bedford, Mass.	24	15	6	2	1	-	2
New Haven, Conn.	58	32	14	4	3	5	4
Providence, R.I.	48	34	8	5	-	1	5
Somerville, Mass.	14	12	2	-	-	-	3
Springfield, Mass.	38	24	10	2	1	1	4
Waterbury, Conn.	33	28	4	1	-	-	6
Worcester, Mass.	58	37	14	2	2	3	6
MID. ATLANTIC	2,652	1,755	563	189	80	65	127
Albany, N.Y.	52	36	8	3	3	2	1
Allentown, Pa.	21	16	5	-	-	-	-
Buffalo, N.Y.	134	84	33	8	4	5	9
Camden, N.J.	47	34	9	1	2	1	2
Elizabeth, N.J.	19	15	3	1	-	-	-
Erie, Pa.†	44	32	9	-	2	1	1
Jersey City, N.J.	46	24	17	1	2	2	1
N.Y. City, N.Y.	1,324	862	274	119	42	27	58
Newark, N.J.	49	24	16	8	1	-	8
Paterson, N.J.	18	11	3	1	-	3	1
Philadelphia, Pa.†	411	264	98	28	12	9	17
Pittsburgh, Pa.†	67	48	17	1	1	-	1
Reading, Pa.	28	21	7	-	-	-	-
Rochester, N.Y.	156	108	26	8	7	7	16
Schenectady, N.Y.	31	22	9	-	-	-	1
Scranton, Pa.†	21	18	2	-	-	1	1
Syracuse, N.Y.	87	61	16	5	1	4	1
Trenton, N.J.	37	26	5	2	2	2	5
Utica, N.Y.	31	24	3	2	1	1	1
Yonkers, N.Y.	29	25	3	1	-	-	3
E.N. CENTRAL	2,264	1,417	559	132	84	72	52
Akron, Ohio	56	42	11	1	2	-	-
Canton, Ohio	33	25	7	1	-	-	2
Chicago, Ill	534	322	135	50	16	11	7
Cincinnati, Ohio	151	98	42	6	2	3	10
Cleveland, Ohio	156	89	48	10	3	6	3
Columbus, Ohio	138	68	43	12	9	6	-
Dayton, Ohio	111	70	30	5	3	3	2
Detroit, Mich.	285	172	66	19	16	12	6
Evansville, Ind.	41	22	11	4	2	2	3
Fort Wayne, Ind.	51	34	6	3	7	1	2
Gary, Ind.	25	19	3	2	-	1	-
Grand Rapids, Mich.	47	26	15	3	1	2	2
Indianapolis, Ind.	169	104	45	3	6	11	2
Madison, Wis.	40	28	7	3	2	-	2
Milwaukee, Wis.	123	81	31	4	4	3	3
Peoria, Ill.	44	33	9	1	-	1	2
Rockford, Ill.	32	24	4	-	3	1	1
South Bend, Ind.	55	39	13	1	2	-	2
Toledo, Ohio	98	61	24	3	3	7	1
Youngstown, Ohio	75	60	9	1	3	2	2
W.N. CENTRAL	717	479	142	38	26	29	38
Des Moines, Iowa	66	44	13	4	3	2	7
Duluth, Minn.	25	19	5	1	-	-	-
Kansas City, Kans.	30	16	8	2	1	2	2
Kansas City, Mo.	106	64	26	3	7	4	6
Lincoln, Nebr.	35	25	5	2	3	-	2
Minneapolis, Minn.	92	61	17	6	4	4	1
Omaha, Nebr.	83	52	17	5	3	6	4
St. Louis, Mo.	138	94	30	7	1	6	7
St. Paul, Minn.	74	56	12	3	1	2	3
Wichita, Kans.	68	48	9	5	3	3	6
S. ATLANTIC	1,089	667	283	59	33	46	35
Atlanta, Ga.	128	80	34	2	5	7	3
Baltimore, Md.	222	152	45	15	7	3	4
Charlotte, N.C.	65	43	12	2	4	4	6
Jacksonville, Fla.	86	42	31	6	3	4	2
Miami, Fla.	82	45	26	5	1	5	-
Norfolk, Va.	57	31	14	3	4	5	2
Richmond, Va.	75	42	25	1	3	4	4
Savannah, Ga.	44	27	10	6	1	-	4
St. Petersburg, Fla.	74	65	9	-	-	-	4
Tampa, Fla.	58	32	16	1	1	7	1
Washington, D.C.	167	88	55	14	3	7	3
Wilmington, Del.	31	20	6	4	1	-	2
E.S. CENTRAL	698	424	171	54	33	16	42
Birmingham, Ala.	85	45	21	12	4	3	4
Chattanooga, Tenn.	43	30	7	1	4	1	3
Knoxville, Tenn.	49	37	9	2	-	1	1
Louisville, Ky.	112	70	27	8	3	4	11
Memphis, Tenn.	183	114	42	14	10	3	11
Mobile, Ala.	88	45	28	7	5	3	7
Montgomery, Ala.	27	20	5	1	1	-	1
Nashville, Tenn.	111	63	32	9	6	1	4
W.S. CENTRAL	1,231	705	321	100	55	50	31
Austin, Tex.	29	18	8	2	-	1	2
Baton Rouge, La.	54	31	8	10	1	4	2
Corpus Christi, Tex.	52	36	10	1	3	2	-
Dallas, Tex.	168	89	41	22	7	9	4
El Paso, Tex.	75	38	20	8	7	2	5
Fort Worth, Tex.	96	54	23	10	6	3	3
Houston, Tex.	259	133	77	23	12	14	3
Little Rock, Ark.	73	38	24	7	1	3	3
New Orleans, La.	130	73	43	4	7	3	-
San Antonio, Tex.	157	96	39	10	7	5	5
Shreveport, La.	66	43	18	1	2	2	1
Tulsa, Okla.	72	56	10	2	2	2	3
MOUNTAIN	608	388	124	43	27	26	33
Albuquerque, N.Mex.	74	46	12	8	6	2	3
Colo. Springs, Colo.	35	22	7	3	3	-	3
Denver, Colo.	108	74	19	5	1	9	5
Las Vegas, Nev.	93	56	24	10	3	-	6
Ogden, Utah	11	5	2	2	1	1	1
Phoenix, Ariz.	137	89	30	7	7	4	5
Pueblo, Colo.	33	29	3	1	-	-	5
Salt Lake City, Utah	41	21	6	6	2	6	-
Tucson, Ariz.	76	46	21	1	4	4	5
PACIFIC	1,653	1,118	326	100	46	62	88
Berkeley, Calif.	15	8	5	-	-	2	-
Fresno, Calif.	62	32	15	5	3	7	4
Glendale, Calif.	34	26	3	1	2	1	2
Honolulu, Hawaii	57	39	10	4	3	1	6
Long Beach, Calif.	85	57	19	6	2	1	5
Los Angeles, Calif.	464	322	89	26	11	16	21
Oakland, Calif.	72	53	14	4	-	1	5
Pasadena, Calif.	36	28	4	1	-	3	4
Portland, Oreg.	123	90	21	4	4	4	4
Sacramento, Calif.	53	27	14	7	2	3	3
San Diego, Calif.	119	79	18	10	5	7	6
San Francisco, Calif.	141	95	28	11	2	5	5
San Jose, Calif.	165	106	34	14	7	4	12
Seattle, Wash.	142	91	36	6	4	5	3
Spokane, Wash.	37	27	8	1	-	1	5
Tacoma, Wash.	48	38	8	-	1	1	3
TOTAL	11,560††	7,388	2,633	745	404	385	502

* 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.

†† Total includes unknown ages.

Human Plague — United States, 1983

Between April 21 and June 17, 1983, 16 human plague cases, resulting from exposure to wild-rodent plague, were reported in the western United States (Table 2). The plague season began with two cases reported in late April, two in the first 2 weeks of May, four in the last 2 weeks of May, and eight in the first 2 weeks of June.

Four patients (25%) have died, two (13%) have contracted secondary plague pneumonia, and at least two (13%) have become septicemic. Disease has not spread to contacts of patients with plague pneumonia, and no cases of primary pneumonic plague have occurred. Nine patients were American Indians, three (33%) of whom died; seven were Caucasians, accounting for one (14%) fatality. Eight patients were under 20 years old (three fatalities), four were 21-50 years old, and four were over 50 years old (one fatality). Thirteen patients were male.

Seven patients each were exposed to wild-rodent plague in Arizona and New Mexico, and one each, in Utah and Oregon. Although most patients were exposed in areas reporting plague in previous years, three acquired infection in locations where human plague has not previously been reported—the southwestern quadrant of New Mexico (one case) and north central Arizona near Lake Powell (two cases).

Surveillance for evidence of wild-rodent plague indicates increased levels of activity in many areas of Arizona, New Mexico, Nevada, Utah, California, and Oregon. Animal plague also has been detected in Colorado, Wyoming, western Texas, and Washington. Wyoming is currently experiencing a widespread plague epizootic among ground squirrels in and near Cheyenne.

Reported by Respective state health depts; Plague Br, Div of Vector-Borne Viral Diseases, Center for Infectious Diseases, CDC.

Editorial Note: The large number of plague cases this season appears to reflect widespread

TABLE 2. Human plague cases — United States, 1983

Case No.	Date of onset	Age	Sex	Race*	Type	Status†	County	State
1	Apr 21	19	M	AI	Bubonic	C	McKinley	NM
2	Apr 28	22	M	AI	Bubonic	C	McKinley	NM
3	Apr 30-May 1	39	M	AI	Bubonic	C	Coconino	AZ
4	May 11	22	M	C	Bubonic/Pneumonic	C	Coconino	AZ
5	May 13	18	M	AI	Pneumonic (Fatal June 11)	C	Apache	AZ
6	May 19	11	F	C	Bubonic	C	Grant	NM
7§	May 24	58	F	AI	Bubonic	C	Coconino	AZ
8	May 26	56	M	AI	Bubonic (Fatal May 29)		Coconino	AZ
9	June 2	57	M	AI	Bubonic	C	Apache	AZ
10	June 3	63	M	C	Bubonic	P	San Miguel	NM
11	June 7	12	F	C	Bubonic	C	Rio Arriba	NM
12	June 4	13	M	C	Bubonic	C	Tooele	UT
13	June 5	9	M	C	Bubonic (Fatal June 8)	C	Klamath	OR
14	June 13	22	M	AI	Bubonic	C	Taos	NM
15	June 13	5	M	AI	Septicemic (Fatal June 16)	C	Apache	AZ
16	June 15	5	M	C	Septicemic	C	Rio Arriba	NM

*AI = American Indian; C = Caucasian

†Status of the case: C = confirmed; P = presumptive.

§Patient hospitalized May 23 for elective arthritis treatment.

Human Plague – Continued

epizootic plague in 10 western states. Unseasonably cool, moist weather in the western United States early in 1983 appears to have resulted in longer survival for infective fleas, thus extending the plague season in areas where it normally would have subsided earlier.

Human plague infections occur most frequently in the southwestern states, particularly northern New Mexico, northeastern Arizona, southern California, Colorado, and southen Utah because of sociocultural factors that increase human exposure to the rodent/flea environment and the propensity for fleas of certain wild rodents to bite humans. Clinicians in the other western states should maintain a high degree of suspicion when a compatible clinical/epidemiologic syndrome is seen, despite the apparent paucity of cases in these states. Physicians in nonendemic areas in the eastern two-thirds of the United States should consider plague in the differential diagnosis for febrile patients who have recently traveled to the western states. If plague is reasonably included in the differential diagnosis, acute-phase serum and blood and other appropriate specimens for culture should be obtained. Oral tetracycline is effective early in the course of illness and in relatively uncomplicated bubonic plague cases. Streptomycin is the drug of choice for inpatient therapy. If intravenous antibiotics are indicated, as for hypotensive patients, gentamicin or chloramphenicol are preferred. When outpatient treatment is given, the patient should be followed actively for 1-3 days to ensure he has responded satisfactorily and to mount an appropriate public health response if laboratory tests support the diagnosis of plague.

In response to the current increase in plague in wild rodents and humans, public health authorities are initiating a number of preventive measures. These include: 1) educating the public to avoid sick or dead rodents and rabbits, to avoid burrows, to deflea household pets (cats and dogs) that can transport fleas of wild rodents to humans, and to eliminate trash, which can harbor rodents, near living areas; 2) conducting surveillance for evidence of wild-rodent plague; 3) dusting with insecticides to eliminate wild-rodent fleas in populated, residential, or recreational areas where plague is found or appears active. Suspected cases of human or animal plague should be reported to CDC through state and local health departments.

International Notes

Diarrheal Diseases Control Program: Global Activities, 1981-1982

From May 1981 to December 1982, Diarrheal Diseases Control (CDD) Programs continued to emphasize the organization of well-planned national CDD programs and the support of goal-oriented health services and biomedical research.

Some abstractions from the recently issued Third Program Report, 1981-1982,* follow.

HEALTH SERVICES COMPONENT

Country programming and implementation: An additional 31 countries developed plans of operation for national CDD programs, bringing the total to 55. In 38 (69%) of these countries, CDD programs are already in operation.

Training: A further 467 persons from 100 countries received training in national program managers' training courses, 14 of which were held during this period. An additional training

*The activities and progress of the Diarrheal Diseases Control Program during this period are described in the recently issued Third Program Report, 1981-1982. The complete report (unpublished document WHO/CDD/83.8) is available in English and French and may be obtained from the Program Manager, CDD Program, World Health Organization, 1211 Geneva 27, Switzerland.

Diarrheal Diseases Program — Continued

course was developed for first-line supervisors of national staffs. In the technical training area, courses on oral rehydration therapy (ORT) were held in 45 countries; six courses were held on laboratory diagnosis of enteric pathogens, and two, on epidemiological aspects of diarrheal diseases. Many of the above activities took place at regional and national training centers, which have so far been established in 27 countries.

Production of Oral Rehydration Solution (ORS): An estimated 41 million packets of ORS were supplied by the United Nations International Children's Emergency Fund (UNICEF) in 1981 and 1982 in 87 countries. UNICEF and/or the World Health Organization (WHO) initiated collaboration with 21 countries in local ORS production, and by December 1982, production was under way in 30 developing countries. Steps were also taken to increase the stability of ORS to prolong their shelf-life and reduce the packaging costs.

Communications support: Activities were initiated in this area, including the issue of a catalogue containing examples of health education materials produced by different countries, and support to 13 countries in the development of such materials.

Evaluation: A management information system to measure progress in achieving objectives and to provide information for program management at global, regional, and national levels was introduced in 1982, and information was received from 65 countries. Morbidity and mortality surveys to provide baseline data for planning national programs were carried out in 11 countries, and comprehensive program reviews, in four countries. A number of countries have accumulated data documenting that the use of ORT in hospitals leads to a significant decrease in intravenous fluid usage and case-fatality rates. In collaboration with the Environmental Health Division, "Minimum Evaluation Procedures" were developed for use in assessing the functioning and use of water supplies and sanitation facilities.

RESEARCH COMPONENT

Activities of the Scientific Working Groups (SWGs): The three global SWGs on Bacterial Enteric Infections, Viral Diarrhea, and Drug Development Management of Acute Diarrheas each met in 1982 to review a topic of current interest. Regional SWGs were established at the regional offices for Africa and Europe, thus completing the plans to establish such groups in all six WHO regions; all regional groups met at least once during the period under review and established a work plan and a list of priority research areas.

Support of research projects: As of December 31, 1982, the program had awarded support to 158 research projects in 59 countries, 64% of which are being carried out in developing countries. Ninety-six biomedical research projects in 37 countries were awarded support by the global SWGs; 44 (46%) of these are under way in developing countries, and six are co-supported with one of the regional SWGs. At the same time, 62 health services research projects in 42 countries were awarded support by the regional SWGs; of these projects, 92% are under way in developing countries. In April 1982, the program convened a meeting to coordinate the research activities of the regional SWGs. Coordination among all regions and between regional and global levels was further assured through a computer-based research management information system.

Research areas: Because most of the supported projects are still in their first to second year, it is possible only to provide an overview of the main areas where research is currently being supported: 1) ORT and feeding during diarrhea, 2) community and family attitudes and practices regarding diarrheal diseases, 3) etiology and epidemiology of acute diarrhea, 4) development and evaluation of improved diagnostic procedures, 5) development and testing of vaccines, and 6) development and testing of new and existing antidiarrheal drugs. A full list of projects funded in 1981-1982 is provided in the Third Program Report, as well as a summary of the results of some completed projects.

Diarrheal Diseases Program — Continued

Collaboration with the pharmaceutical industry: Active collaboration has been established to date with eight pharmaceutical companies in the development of diagnostic tests, vaccines, and drugs. In addition, 14 companies sent representatives as observers to the second meeting of the SWG on Drug Development and Management of Acute Diarrheas.

Collaborating centers: Two new centers were established—a Collaborating Center for Environmental and Epidemiological Aspects of Diarrheal Diseases at the Ross Institute for Tropical Hygiene, London, United Kingdom, and a Collaborating Center for Training and Research on Oral Rehydration Therapy at the National Children's Hospital, San Jose, Costa Rica.

GENERAL

Information services: The program further expanded its activities concerned with information dissemination and collaborated with a number of other organizations with an interest in promoting diarrheal disease control.

The resources available to the program for 1980-1981 and 1982 amounted to approximately 135 million, contributed by 17 countries and agencies.

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. DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE / CENTERS FOR DISEASE CONTROL
ATLANTA, GEORGIA 30333
OFFICIAL BUSINESS

Postage and Fees Paid
U.S. Department of HHS
HHS 396

S 6HCRH3MCDJ73 8129 X
JOSEPH MC DADE PHD
LEGIONNAIRE ACTIVITY
LEPROSY & RICKETTSIAL BR
VIROLOGY DIV, CID
7-85

HHS Publication No. (CDC) 83-8017