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Carbon Monoxide Intoxication — A Preventable Environmental Health Hazard

Each year in the United States, an estimated 10,000 persons seek medical attention or lose at least one day of normal activity because of carbon monoxide (CO) intoxication; at least 1,500 persons die from accidental exposure to high concentrations of CO; and approximately 2,300 persons commit suicide with CO (*1*). In addition to acute CO poisoning resulting in death, considerable danger may result from daily exposure to low concentrations of CO in houses, work places, and schools. Prolonged periods of exposure may cause headache, dizziness, and sleepiness. Continued exposure brings on nausea, vomiting, heart palpitations, and, from exposure to high levels of CO for prolonged periods, unconsciousness and death.

Although exhaust from any improperly maintained vehicle can pose serious hazards, the most common source of CO is automobile exhaust or exhaust vented into confined spaces. Because gasoline-powered lawnmowers, charcoal grills, wood stoves, fireplaces, gas space heaters, kerosine or gas powered camp lanterns, heaters, stoves, and similar equipment also produce CO, proper ventilation and prevention of CO build-up in confined areas must be assured (*2*). In 1980, the Consumer Product Safety Commission estimated 7.6 million unvented gas space heaters were in use; CO from such heaters caused approximately 70 deaths in 1980 (*3*). Home gas appliances also produce some CO, but under normal, safe-operating conditions, CO occurs in small amounts and should cause no danger when these appliances are properly installed, adjusted, and operated (*2*).

Numerous studies have demonstrated the seriousness of the CO problem. In 1975, a study to determine usual CO levels during a non-summer month in 80 urban and rural households in Fort Collins, Colorado, showed that 6% of the homes had CO concentrations at or above 10 parts per million (ppm)*, and one had 30 ppm CO in the kitchen and family room. A socioeconomic gradient was found; homes in low socioeconomic areas had the highest CO levels. There was no statistical difference between CO levels in urban and rural housing (*4*).

In the mid-1970s, the Allegheny County Health Department, Pittsburgh, Pennsylvania, conducted an investigation and found that 58% of the 33 CO fatalities during a 7-year period were located in low socioeconomic areas. In an effort to reduce these fatalities, the county health department conducted a multi-phase CO-reduction program consisting of public education, action (including distribution of CO dosimeters to and inspections of housing units), and evaluations. This prevention program resulted in a zero CO-fatality rate for the first winter in 8

*Environmental Protection Agency (EPA) standards for CO are identified at levels of 9 ppm, 8-hour exposure, and 35 ppm, 1-hour exposure, neither to be exceeded more than once per year. EPA is currently considering revisions of these standards.

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years (*5*). A 1978 Harvard School of Public Health study of indoor ice skating rinks in the Boston area found that in over 80% of the hours sampled, gasoline-powered ice-resurfacing machines and improper or inadequate venting of exhaust emissions caused levels of CO exceeding the national air-quality standard for exposure (*6*).

Other studies indicate that CO contamination is not limited to buildings. In 1975, the U.S. Department of Transportation demonstrated that a substantial number of school children and bus drivers may be exposed to harmful levels of CO from school buses. No deaths occurred, but many instances of headache, nausea and non-specific illness were reported (*6*). In 1976, the New Mexico Environmental Improvement Agency and CDC recognized the potential for CO poisoning from recreational vehicles. CO concentrations of ≥ 35 ppm were discovered in 172 (14.5%) of the 1,187 units tested for appliance-produced CO. Overall CO concentrations of this magnitude due to engine exhaust fumes leaking into the camper were found in 4.4% of 69 units tested. Over 44% of the 994 appliances individually tested emitted CO at concentrations of ≥ 35 ppm. Unvented ovens and stoves, LPG lamps, and gasoline lanterns contributed most to high overall CO concentrations (*7*)

Reported by Program Development Br, Environmental Health Svcs Div, Center for Environmental Health, CDC.

Editorial Note: CO is a common and lethal gas produced by the incomplete combustion of a solid, liquid, or gaseous fuel and is increased by inadequate air-fuel mixture, insufficient ventilation of combustion gases, and insufficient fresh air intake. It is odorless, colorless, tasteless, and non-irritating, but is often found combined with other gases that may produce a sharp odor and irritate the eyes (*1,8*). CO is absorbed only through the lungs; toxicity occurs when the gas combines with hemoglobin to form carboxyhemoglobin (COHb). Carbon monoxide-bound hemoglobin is unavailable to transport oxygen. Until CO enters the erythrocytes, it behaves like oxygen. When it contacts the erythrocytes, however, its behavior differs sharply; CO affinity for hemoglobin is approximately 210 times greater than that of oxygen. Death can occur when blood contains from 60% to 80% COHb (*1*).

The following guidelines summarize the most important techniques for prevention of CO poisoning.

1. Provide adequate ventilation when using wood stoves and fireplaces, and ensure that all flame-burning appliances are properly installed, adjusted, and operated. Ovens and gas ranges should not be used for heating purposes.
2. Do not operate gasoline-powered engines (automobiles, lawnmowers, etc.) in confined spaces (such as garages or basements).
3. Never burn charcoal inside a home, cabin, recreational vehicle, or tent, whether in a grill, hibachi pot, or fireplace, for cooking or heating.
4. Have only a qualified technician install or convert fuel-burning equipment from one type of fuel to another (*2*).

CO poisoning may increase in coming years because of potential home-heating fuel shortages, energy costs, extraordinary fuel-conservation measures, and a lack of awareness about the preventability of CO poisoning. Health authorities should implement programs advising the public on the hazards associated with exposure to CO.

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Epidemiologic Notes and Reports

Arsenic Contamination in an Abandoned Building — Ohio

Investigators from the National Institute for Occupational Safety and Health (NIOSH) recently re-evaluated residual arsenic contamination in an abandoned building in Norwood, Ohio (*1*). At the request of the local health department, NIOSH had evaluated the same building in 1974 and found it highly contaminated by an arsenic trioxide rodenticide that had been mixed and packaged in the building nearly 40 years earlier.

On October 22, 1981, NIOSH investigators collected 14 dust samples from the floor, walls, and ceiling beams throughout the building and analyzed them for arsenic content by atomic absorption spectrophotometry. Six samples from the floor contained from 3% to 41% arsenic by weight (30,000 to 410,000 parts per million). Five wipe samples from wall surfaces contained from < 0.5 to 310 μg of arsenic per square inch of surface area, and three wipe samples from ceiling-beam surfaces contained from 130 to 2100 μg of arsenic per square inch. (Normal levels are < 0.5 μg.) The highest arsenic concentrations were found in the northeast quadrant of the building—the area where the mixing and packaging had reportedly been done.

On February 2, 1982, NIOSH presented the results to the Norwood City Health Department with recommendations for decontamination and guidelines for protection of workers during decontamination.

Reported by Hazard Evaluations and Technical Assistance Br, Div of Surveillance, Hazard Evaluations, and Field Studies, NIOSH, CDC.

Editorial Note: Although most occupational exposure to arsenic is by inhalation, it can also occur through ingestion or skin absorption. Once absorbed, arsenic is widely distributed throughout the body tissues, including the liver, other abdominal viscera, bone, and skin.

Chronic exposure to arsenic, particularly to the trivalent form, manifests itself by: weakness, weight loss, nausea, diarrhea, constipation, skin disorders, hair loss, abdominal pain, pleuritis, and peripheral neuritis. Numerous studies indicate that arsenic compounds, including arsenic trioxide, can cause cancer of the skin, liver, lung, and possibly the lymphatic system (*2,3*).

Arsenic rodenticides are generally effective against Norway and roof rats, but not against house mice. This lack of broad-spectrum effectiveness, coupled with the inherent toxicity of arsenic compounds to man, has led to a decline in the use of arsenic as a rodenticide (*4*). In August 1967, the United States Environmental Protection Agency (EPA) banned arsenic trioxide for home use in concentrations $> 1.5\%$.

To protect workers removing arsenic from a contaminated building, NIOSH recommends the following procedures:

1. The interior of the building should be decontaminated by collecting all loose material, debris,

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etc., with particular attention to material of a gray to white color, which should be packaged and secured for disposal according to EPA hazardous waste disposal guidelines (*5*).

2. Workers involved in decontamination should be adequately safeguarded against exposure to the arsenic-laden material by air-supplied respirators and disposable full-body protective clothing, including hoods, gloves, and footwear.
3. The effectiveness of the decontamination should be assured by the EPA-recommended toxicity test extraction procedure to define those structures, material, etc., that should be classified and handled as hazardous waste (*6*).

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

Disease	39th Week Ending			Cumulative, First 39 Weeks		
	October 2, 1982	October 3, 1981	Median 1977-1981	October 2, 1982	October 3, 1981	Median 1977-1981
Aseptic meningitis	311	369	314	5,924	6,903	5,160
Brucellosis	2	3	3	119	122	132
Encephalitis: Primary (arthropod-borne & unspec.)	58	74	48	948	1,045	803
Post-infectious	-	-	2	48	70	164
Gonorrhea: Civilian	18,363	19,606	21,532	710,599	751,277	745,038
Millitary	442	329	425	18,937	21,336	20,500
Hepatitis: Type A	474	426	627	16,544	18,731	21,585
Type B	418	354	327	15,725	15,035	12,373
Non A, Non B	56	N	N	1,638	N	N
Unspecified	245	176	197	6,787	8,126	7,635
Legionellosis	7	N	N	390	N	N
Leprosy	3	14	11	146	199	132
Malaria	26	29	14	791	1,084	556
Measles (rubeola)	10	24	86	1,284	2,646	12,918
Meningococcal infections: Total	36	47	34	2,251	2,710	2,044
Civilian	36	47	34	2,239	2,699	2,026
Military	-	-	-	12	11	15
Mumps	46	61	82	4,258	3,362	11,349
Pertussis	40	18	47	1,097	923	1,252
Rubella (German measles)	9	17	49	2,029	1,797	10,783
Syphilis (Primary & Secondary): Civilian	573	655	607	24,414	22,891	18,342
Military	6	10	10	326	286	234
Tuberculosis	587	590	585	19,174	20,144	20,729
Tularemia	12	7	4	193	205	156
Typhoid fever	4	35	16	296	395	374
Typhus fever, tick-borne (RMSF)	29	24	24	886	1,091	1,025
Rabies, animal	113	127	109	4,733	5,777	3,846

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1982		Cum. 1982
Anthrax	-	Poliomyelitis: Total	3
Botulism (Calif. 1)	57	Paralytic	3
Cholera	-	Psittacosis (Iowa 1, Ariz. 1, Hawaii 1)	89
Congenital rubella syndrome (Va. 1)	6	Rabies, human	-
Diphtheria	2	Tetanus (Ups. NY 1, Fla. 1, La. 1)	64
Leptospirosis (Tex. 1)	44	Trichinosis (Tex. 2)	74
Plague	16	Typhus fever, flea-borne (endemic, murine) (Hawaii 1)	31

TABLE III. Cases of specified notifiable diseases, United States, weeks ending October 2, 1982 and October 3, 1981 (39th week)

Reporting Area	Aseptic Meningitis	Brucellosis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	1982	Cum. 1982	Cum. 1982	Cum. 1982	Cum. 1982	Cum. 1981	1982	1982	1982	1982	1982	Cum. 1982
UNITED STATES	311	119	948	48	710,599	751,277	474	418	56	245	7	146
NEW ENGLAND	8	3	34	5	17,230	18,542	7	36	1	14	-	1
Maine	-	-	-	-	886	971	1	2	-	-	-	-
N.H.	3	-	5	-	498	667	1	2	-	-	-	-
Vt.	-	-	-	-	325	314	3	-	-	-	-	-
Mass.	4	-	13	-	7,905	7,816	1	10	-	11	-	-
R.I.	1	-	-	1	1,147	1,090	1	5	1	-	-	-
Conn.	-	3	16	4	6,469	7,684	-	17	-	3	-	1
MID. ATLANTIC	39	3	100	10	89,090	90,288	61	81	3	16	-	9
Upstate N.Y.	7	3	38	3	14,972	15,455	8	19	2	-	-	1
N.Y. City	7	-	16	-	36,324	37,592	13	16	-	3	-	6
N.J.	11	-	19	-	16,166	16,641	14	24	1	11	-	1
Pa.	14	-	27	7	21,628	20,600	26	22	-	2	-	1
E.N. CENTRAL	48	1	210	10	96,905	112,525	40	40	-	13	3	3
Ohio	7	1	84	4	27,636	35,090	6	4	-	-	3	-
Ind.	22	-	56	3	12,415	9,730	18	13	-	10	-	-
Ill.	-	-	12	1	23,162	32,691	2	2	-	1	-	3
Mich.	19	-	53	-	24,493	24,697	14	21	-	2	-	-
Wis.	-	-	5	2	9,199	10,317	-	-	-	-	-	-
W.N. CENTRAL	26	14	75	4	33,847	35,496	12	8	3	2	-	4
Minn.	5	1	27	1	4,915	5,556	2	1	1	-	-	2
Iowa	4	3	34	1	3,571	3,928	4	3	1	1	-	-
Mo.	6	4	6	-	16,100	16,417	5	1	-	1	-	1
N. Dak.	-	-	-	-	447	450	-	-	-	-	-	-
S. Dak.	2	1	-	1	914	977	-	-	-	-	-	1
Nebr.	5	2	4	-	1,998	2,604	1	3	-	-	-	-
Kans.	4	3	4	1	5,902	5,564	-	-	1	-	-	-
S. ATLANTIC	47	23	145	8	188,364	185,212	86	110	10	15	1	9
Del.	-	-	-	-	2,995	2,958	1	1	-	-	-	-
Md.	7	-	20	-	23,643	21,705	5	13	2	4	-	3
D.C.	-	-	-	-	10,986	10,583	1	1	-	-	-	-
Va.	6	7	28	1	14,832	17,096	10	19	1	3	-	1
W. Va.	2	-	15	-	2,122	2,817	1	-	-	-	-	-
N.C.	16	-	20	1	29,754	28,461	2	13	-	-	-	-
S.C.	3	2	-	-	18,343	18,068	16	23	1	-	-	-
Ga.	1	3	10	-	36,994	38,532	25	14	1	2	-	1
Fla.	12	11	52	6	48,695	44,992	25	26	5	6	1	4
E.S. CENTRAL	39	11	50	2	62,234	63,089	23	31	11	2	-	-
Ky.	10	-	-	-	8,402	7,786	5	3	1	-	-	-
Tenn.	9	6	25	-	24,497	23,811	9	10	5	-	-	-
Ala.	20	4	15	2	18,330	19,269	7	17	5	2	-	-
Miss.	-	1	10	-	11,005	12,223	2	1	-	-	-	-
W.S. CENTRAL	39	36	159	1	99,253	99,472	106	28	10	128	1	24
Ark.	1	7	16	-	8,150	7,501	1	1	1	6	-	-
La.	10	8	16	-	18,419	17,302	24	-	8	11	-	-
Okla.	11	5	32	-	10,842	10,648	4	2	1	7	1	-
Tex.	17	16	95	1	61,842	64,021	77	25	-	104	-	24
MOUNTAIN	10	-	35	3	24,174	29,236	39	12	2	16	2	2
Mont.	-	-	-	-	994	1,078	1	1	-	-	2	-
Idaho	-	-	-	-	1,174	1,316	1	-	-	-	-	1
Wyo.	-	-	-	-	714	714	1	-	-	-	-	-
Colo.	4	-	17	1	6,559	7,847	8	2	-	3	-	-
N. Mex.	-	-	1	-	3,156	3,180	9	1	-	2	-	-
Ariz.	2	-	8	-	6,315	8,639	11	4	-	7	-	-
Utah	3	-	5	2	1,177	1,466	1	-	-	2	-	1
Nev.	1	-	4	-	4,085	4,996	7	4	2	2	-	-
PACIFIC	55	28	140	5	99,502	117,417	100	72	16	39	-	94
Wash.	2	1	11	-	8,492	9,784	1	4	2	-	-	6
Oreg.	-	-	3	-	5,977	7,034	5	6	-	1	-	1
Calif.	38	26	118	5	80,638	95,248	94	58	12	38	-	65
Alaska	5	1	5	-	2,490	3,002	-	1	1	-	-	1
Hawaii	10	-	3	-	1,905	2,349	-	3	1	-	-	21
Guam	U	-	-	-	93	89	U	U	U	U	U	-
P.R.	U	-	1	-	2,040	2,465	U	U	U	U	U	1
V.I.	U	-	-	-	173	170	U	U	U	U	U	-
Pac. Trust Terr.	U	-	-	-	297	339	U	U	U	U	U	13

N: Not notifiable U: Unavailable

TABLE III. (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending October 2, 1982 and October 3, 1981 (39th week)

Reporting Area	Malaria		Measles (Rubeola)			Meningococcal Infections (Total)		Mumps		Pertussis	Rubella		
	1982	Cum. 1982	1982	Cum. 1982	Cum. 1981	1982	Cum. 1982	1982	Cum. 1982	1982	1982	Cum. 1982	Cum. 1981
UNITED STATES	26	791	10	1,284	2,646	36	2,251	46	4,258	40	9	2,029	1,797
NEW ENGLAND	2	41	-	12	79	1	117	5	180	-	-	20	115
Maine	-	-	-	-	5	-	9	2	41	-	-	-	33
N.H.	-	1	-	3	6	-	15	1	15	-	-	10	47
Vt.	-	-	-	2	3	-	8	-	7	-	-	-	-
Mass.	-	24	-	4	55	1	30	2	85	-	-	6	23
R.I.	-	3	-	-	-	-	13	-	15	-	-	1	-
Conn.	2	13	-	3	10	-	42	-	17	-	-	3	12
MID. ATLANTIC	4	132	1	159	833	5	399	4	271	8	1	99	213
Upstate N.Y.	-	25	1	110	208	-	140	-	61	1	1	49	103
N.Y. City	1	52	-	41	84	1	75	1	46	3	-	32	53
N.J.	2	28	-	4	57	-	81	1	40	-	-	17	46
Pa.	1	27	-	4	484	4	103	2	124	4	-	1	11
E.N. CENTRAL	2	56	-	76	80	6	270	14	2,188	9	2	170	378
Ohio	-	12	-	1	16	1	94	3	1,566	5	-	-	3
Ind.	1	3	-	2	8	2	28	-	37	-	-	27	130
Ill.	-	11	-	23	23	1	73	2	178	3	-	61	96
Mich.	1	26	-	50	30	2	61	5	303	1	1	49	34
Wis.	-	4	-	-	3	-	14	4	104	-	1	33	115
W.N. CENTRAL	-	19	-	49	10	3	101	3	567	-	-	58	77
Minn.	-	2	-	-	3	2	27	-	437	-	-	5	7
Iowa	-	6	-	-	1	-	9	1	32	-	-	-	4
Mo.	-	5	-	2	1	-	26	1	17	-	-	38	2
N. Dak.	-	1	-	-	-	-	6	-	-	-	-	-	-
S. Dak.	-	-	-	-	-	-	4	-	1	-	-	1	-
Nebr.	-	3	-	3	4	-	12	-	-	-	-	-	1
Kans.	-	2	-	44	1	1	17	1	80	-	-	14	63
S. ATLANTIC	4	113	1	42	419	11	473	5	254	5	-	78	134
Del.	-	4	-	-	-	-	-	-	13	-	-	1	1
Md.	1	18	-	3	5	1	34	1	29	-	-	34	1
D.C.	-	4	-	1	1	-	2	-	-	-	-	-	-
Va.	2	35	-	14	9	-	55	1	34	1	-	13	6
W. Va.	-	7	-	3	9	-	9	1	89	-	-	1	22
N.C.	-	3	-	-	3	5	92	1	13	3	-	1	5
S.C.	-	4	-	-	2	2	54	1	16	-	-	1	8
Ga.	1	15	-	-	111	1	95	-	15	1	-	12	36
Fla.	-	23	1	21	279	2	132	-	45	-	-	15	55
E.S. CENTRAL	1	8	-	7	5	4	145	-	49	2	-	45	35
Ky.	1	5	-	1	1	-	24	-	16	-	-	27	21
Tenn.	-	-	-	6	2	2	63	-	19	2	-	2	13
Ala.	-	-	-	-	2	1	47	-	8	-	-	-	1
Miss.	-	3	-	-	-	1	11	-	6	-	-	16	-
W.S. CENTRAL	2	58	4	50	847	4	276	5	182	11	4	104	153
Ark.	-	4	-	-	13	-	13	-	7	-	-	1	3
La.	-	4	-	2	4	1	58	-	6	8	-	1	9
Okla.	-	8	-	29	5	-	25	-	-	-	-	3	1
Tex.	2	42	4	19	825	3	180	5	169	3	4	99	140
MOUNTAIN	1	27	-	19	34	2	101	3	89	1	-	77	89
Mont.	-	1	-	-	-	-	4	-	3	-	-	5	3
Idaho	-	2	-	-	1	-	7	-	4	-	-	6	4
Wyo.	-	-	-	1	-	-	5	-	2	1	-	7	10
Colo.	-	11	-	6	10	1	42	1	16	-	-	6	30
N. Mex.	-	3	-	-	8	-	14	-	-	-	-	6	5
Ariz.	1	7	-	12	5	-	18	1	38	-	-	14	20
Utah	-	3	-	-	-	1	9	1	20	-	-	21	6
Nev.	-	-	-	-	10	-	2	-	6	-	-	12	11
PACIFIC	10	337	4	870	339	-	369	7	478	4	2	1,378	603
Wash.	-	18	-	40	3	-	42	-	64	-	-	38	89
Oreg.	2	13	-	19	5	-	69	-	-	-	-	6	53
Calif.	8	301	4	805	324	-	243	5	395	4	2	1,321	445
Alaska	-	1	-	1	-	-	11	1	8	-	-	5	1
Hawaii	-	4	-	5	7	-	4	1	11	-	-	8	15
Guam	U	1	U	6	6	U	2	U	3	U	U	2	1
P.R.	U	4	U	110	275	U	8	U	57	U	U	11	4
V.I.	U	-	U	-	24	U	-	U	3	U	U	-	1
Pac. Trust Terr.	U	-	U	-	1	U	2	U	5	U	U	-	1

U: Unavailable

TABLE III. (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending October 2, 1982 and October 3, 1981 (39th week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Tuberculosis		Tula-remia	Typhoid Fever		Typhus Fever (Tick-borne) (RMSF)		Rabies, Animal
	Cum. 1982	Cum. 1981	1982	Cum. 1982	Cum. 1982	1982	Cum. 1982	1982	Cum. 1982	Cum. 1982
UNITED STATES	24,414	22,891	587	19,174	193	4	296	29	886	4,733
NEW ENGLAND	422	444	16	533	6	-	16	-	9	38
Maine	4	5	2	46	-	-	-	-	-	26
N.H.	1	12	2	20	-	-	-	-	1	1
Vt.	2	13	-	13	-	-	2	-	-	1
Mass.	283	292	8	337	6	-	12	-	5	5
R.I.	19	24	1	24	-	-	-	-	2	-
Conn.	113	98	3	93	-	-	2	-	1	5
MID. ATLANTIC	3,335	3,303	94	3,178	7	-	53	-	34	161
Upstate N.Y.	323	323	5	552	7	-	7	-	12	82
N.Y. City	2,008	1,946	58	1,196	-	-	27	-	1	-
N.J.	461	468	6	627	-	-	11	-	13	15
Pa.	543	566	25	803	-	-	8	-	8	64
E.N. CENTRAL	1,322	1,699	102	2,902	1	-	23	-	77	484
Ohio	228	221	20	490	-	-	11	-	72	72
Ind.	156	220	7	354	-	-	-	-	-	70
Ill.	645	919	49	1,224	-	-	3	-	5	256
Mich.	220	268	23	678	-	-	8	-	-	4
Wis.	73	71	3	156	1	-	1	-	-	82
W.N. CENTRAL	417	496	10	555	28	2	14	1	33	999
Minn.	90	156	-	102	-	-	6	-	-	174
Iowa	24	21	-	56	2	-	1	-	4	321
Mo.	244	276	4	267	20	1	4	-	10	97
N. Dak.	7	7	-	11	-	-	-	-	-	83
S. Dak.	1	2	-	22	1	-	-	-	4	81
Nebr.	11	7	3	23	2	1	2	-	2	110
Kans.	40	27	3	74	3	-	1	1	13	133
S. ATLANTIC	6,703	6,062	142	3,996	11	-	37	21	486	871
Del.	17	12	-	36	-	-	-	-	-	2
Md.	362	452	15	459	1	-	9	2	47	43
D.C.	367	497	4	154	-	-	-	-	-	-
Va.	455	523	10	427	3	-	3	-	72	458
W. Va.	22	17	2	123	-	-	3	-	8	37
N.C.	539	468	29	649	-	-	1	5	205	61
S.C.	403	424	11	378	6	-	3	7	104	50
Ga.	1,401	1,520	25	630	-	-	-	7	47	161
Fla.	3,137	2,149	46	1,140	1	-	18	-	3	59
E.S. CENTRAL	1,712	1,522	44	1,754	8	1	17	3	80	551
Ky.	98	82	16	465	-	1	2	-	1	112
Tenn.	484	559	15	565	6	-	3	2	51	304
Ala.	633	441	7	480	-	-	9	1	13	128
Miss.	497	440	6	244	2	-	3	-	15	7
W.S. CENTRAL	6,437	5,548	95	2,352	99	-	27	4	150	900
Ark.	158	121	12	264	60	-	3	1	26	122
La.	1,456	1,261	9	346	3	-	3	-	2	31
Okla.	138	119	16	273	28	-	2	1	70	160
Tex.	4,685	4,047	58	1,469	8	-	19	2	52	587
MOUNTAIN	602	578	13	534	24	1	13	-	11	246
Mont.	4	11	1	34	3	-	-	-	4	84
Idaho	24	17	-	25	1	-	-	-	2	9
Wyo.	16	8	-	2	3	-	-	-	1	21
Colo.	168	170	5	67	4	-	3	-	1	45
N. Mex.	149	103	1	96	2	-	-	-	1	20
Ariz.	129	145	3	224	-	1	7	-	-	48
Utah	19	22	2	36	11	-	2	-	-	16
Nev.	93	102	1	50	-	-	1	-	2	3
PACIFIC	3,464	3,239	71	3,370	9	-	96	-	6	483
Wash.	109	137	7	216	1	-	6	-	-	6
Oreg.	88	82	5	132	1	-	4	-	1	3
Calif.	3,176	2,954	59	2,741	6	-	82	-	5	396
Alaska	10	11	-	65	1	-	1	-	-	78
Hawaii	81	55	-	216	-	-	3	-	-	-
Guam	1	-	U	35	-	U	-	U	-	-
P.R.	520	505	6	319	-	U	2	U	-	43
V.I.	21	14	U	1	-	U	-	U	-	-
Pac. Trust Terr.	-	-	U	91	-	U	-	U	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending October 2, 1982 (39th week)

Reporting Area	All Causes, By Age (Years)						P&I** Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	606	434	114	32	14	12	35
Boston, Mass.	177	105	48	13	5	6	17
Bridgeport, Conn.	42	30	9	2	-	1	2
Cambridge, Mass.	21	17	3	1	-	-	2
Fall River, Mass.	27	21	5	1	-	-	-
Hartford, Conn.	59	42	8	6	2	1	2
Lowell, Mass.	23	17	5	-	1	-	1
Lynn, Mass.	28	21	5	1	-	1	-
New Bedford, Mass.	23	22	1	-	-	-	-
New Haven, Conn.	41	26	12	-	2	1	-
Providence, R.I.	51	36	9	3	1	2	5
Somerville, Mass.	8	7	1	-	-	-	-
Springfield, Mass.	39	34	2	2	1	-	5
Waterbury, Conn.	24	18	3	2	1	-	1
Worcester, Mass.	43	38	3	1	1	-	-
MID. ATLANTIC	2,603	1,665	591	206	72	67	93
Albany, N.Y.	38	28	7	1	-	2	1
Allentown, Pa.	15	13	2	-	-	-	-
Buffalo, N.Y.	147	102	30	7	4	4	10
Camden, N.J.	45	23	14	1	3	3	1
Elizabeth, N.J.	31	19	6	1	1	4	-
Erie, Pa.†	37	23	10	1	1	2	-
Jersey City, N.J.	46	28	9	2	1	6	-
N.Y. City, N.Y.	1,341	849	290	144	37	21	42
Newark, N.J.	62	24	23	7	2	5	5
Paterson, N.J.	23	16	2	3	-	2	1
Philadelphia, Pa.†	365	217	105	25	12	6	20
Pittsburgh, Pa.†	66	42	20	2	1	1	-
Reading, Pa.	25	18	5	1	1	-	4
Rochester, N.Y.	130	96	22	4	4	4	5
Schenectady, N.Y.	30	23	6	1	-	-	-
Scranton, Pa.†	22	17	5	-	-	-	1
Syracuse, N.Y.	81	55	16	4	4	2	-
Trenton, N.J.	37	23	8	1	1	4	1
Utica, N.Y.	35	27	6	1	-	1	1
Yonkers, N.Y.	27	22	5	-	-	-	1
E.N. CENTRAL	2,206	1,387	528	142	67	81	66
Akron, Ohio	60	40	12	5	3	-	-
Canton, Ohio	54	35	13	2	2	2	1
Chicago, Ill	475	302	101	41	16	15	6
Cincinnati, Ohio	104	66	25	12	-	1	8
Cleveland, Ohio	132	79	40	6	5	2	2
Columbus, Ohio	138	88	33	6	4	7	7
Dayton, Ohio	114	79	23	3	6	3	4
Detroit, Mich.	274	158	72	22	7	15	6
Evansville, Ind.	67	44	14	5	2	2	6
Fort Wayne, Ind.	55	37	12	3	1	2	2
Gary, Ind.	11	5	4	1	1	-	-
Grand Rapids, Mich.	59	41	12	1	2	2	2
Indianapolis, Ind.	145	88	35	11	4	7	5
Madison, Wis.	45	34	6	-	2	3	3
Milwaukee, Wis.	141	90	37	8	2	4	4
Peoria, Ill.	42	27	8	-	-	7	1
Rockford, Ill.	48	30	13	1	4	-	2
South Bend, Ind.	46	33	10	-	2	1	3
Toledo, Ohio	122	65	42	11	1	3	4
Youngstown, Ohio	74	46	16	4	3	5	-
W.N. CENTRAL	695	477	138	33	20	27	28
Des Moines, Iowa	55	39	13	2	1	-	7
Duluth, Minn.	30	20	5	2	2	1	2
Kansas City, Kans.	35	21	5	4	2	3	1
Kansas City, Mo.	126	83	30	7	2	4	2
Lincoln, Nebr.	24	19	5	-	-	-	-
Minneapolis, Minn.	76	58	14	1	1	2	1
Omaha, Nebr.	76	49	23	-	3	1	5
St. Louis, Mo.	153	106	25	9	4	9	6
St. Paul, Minn.	71	54	8	3	2	4	-
Wichita, Kans.	49	28	10	5	3	3	4
S. ATLANTIC	1,101	691	244	69	38	55	34
Atlanta, Ga.	122	72	31	14	3	2	3
Baltimore, Md.	157	95	34	14	3	11	2
Charlotte, N.C.	68	33	23	4	4	4	1
Jacksonville, Fla.	121	75	28	9	6	3	4
Miami, Fla.	105	58	27	8	8	4	1
Norfolk, Va.	52	31	12	6	1	2	2
Richmond, Va.	104	50	36	6	1	10	3
Savannah, Ga.	44	22	12	4	3	3	2
St. Petersburg, Fla.	81	65	9	1	3	3	8
Tampa, Fla.	83	51	22	-	2	8	2
Washington, D.C. §	125	111	1	3	3	4	3
Wilmington, Del.	39	28	9	-	1	1	3
E.S. CENTRAL	740	448	184	38	31	39	23
Birmingham, Ala.	127	65	39	10	6	7	3
Chattanooga, Tenn.	53	31	14	5	3	-	5
Knoxville, Tenn.	60	39	17	1	1	2	-
Louisville, Ky.	105	64	26	4	5	6	7
Memphis, Tenn.	183	126	32	8	10	7	2
Mobile, Ala.	63	38	15	5	4	1	3
Montgomery, Ala.	46	28	7	-	-	11	1
Nashville, Tenn.	103	57	34	5	2	5	2
W.S. CENTRAL	1,278	729	313	113	68	54	38
Austin, Tex.	50	33	8	3	5	1	1
Baton Rouge, La.	38	24	8	2	2	2	2
Corpus Christi, Tex.	37	20	10	3	2	2	-
Dallas, Tex.	173	90	49	16	11	7	5
El Paso, Tex.	57	39	9	4	1	3	3
Fort Worth, Tex.	106	60	24	4	7	11	3
Houston, Tex.	254	118	73	36	20	7	10
Little Rock, Ark.	50	30	15	1	3	1	2
New Orleans, La.	169	107	41	12	4	5	-
San Antonio, Tex.	184	116	36	19	5	8	8
Shreveport, La.	57	32	17	4	1	3	1
Tulsa, Okla.	103	60	23	9	7	4	3
MOUNTAIN	641	400	151	39	27	24	29
Albuquerque, N.Mex.	75	43	14	8	7	3	3
Colo. Springs, Colo.	29	20	3	4	1	1	4
Denver, Colo.	124	85	25	8	3	3	8
Las Vegas, Nev.	68	34	29	4	1	-	2
Ogden, Utah	23	17	3	-	1	2	2
Phoenix, Ariz.	138	84	36	7	5	6	2
Pueblo, Colo.	25	19	3	1	2	-	1
Salt Lake City, Utah	62	30	14	5	5	8	1
Tucson, Ariz.	97	68	24	2	2	1	6
PACIFIC	1,680	1,065	390	119	54	52	67
Berkeley, Calif.	20	12	6	-	2	-	-
Fresno, Calif.	79	48	17	8	3	3	3
Glendale, Calif.	13	7	4	2	-	-	-
Honolulu, Hawaii	57	33	18	3	2	1	5
Long Beach, Calif.	101	65	28	4	-	4	1
Los Angeles, Calif.	447	287	95	32	17	16	16
Oakland, Calif.	73	52	13	2	2	4	1
Pasadena, Calif.	29	18	4	4	2	1	2
Portland, Oreg.	106	63	28	9	5	1	1
Sacramento, Calif.	68	46	10	10	2	-	2
San Diego, Calif.	150	90	30	17	5	8	15
San Francisco, Calif.	139	88	40	4	1	6	2
San Jose, Calif.	146	89	42	8	4	3	9
Seattle, Wash.	161	107	32	13	6	3	3
Spokane, Wash.	53	33	16	2	1	1	6
Tacoma, Wash.	38	27	7	1	2	1	1
TOTAL	11,550††	7,296	2,653	791	391	411	413

* 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.

§ Data not available. Figures are estimates based on average of past 4 weeks.

TABLE V. Years of potential life lost, deaths, and death rates, by cause of death, and estimated number of physician contacts, by principal diagnosis, United States

Cause of morbidity or mortality (Ninth Revision ICD, 1975)	Years of potential life lost before age 65 by persons dying in 1980[1]	Estimated mortality May 1982		Estimated number of physician contacts May 1982[4]
		Number[2]	Annual Rate/100,000[3]	
ALL CAUSES (TOTAL)	10,006,060	163,773	834.4	94,823,000
Accidents and adverse effects (E800-E807, E810-E825, E826-E949)	2,684,850	7,773	39.6	5,139,000
Malignant neoplasms (140-208)	1,804,120	36,036	183.6	1,836,000
Diseases of heart (390-398, 402, 404-429)	1,636,510	62,004	315.9	5,654,000
Suicides, homicides (E950-E978)	1,401,880	3,965	20.2	—
Chronic liver disease and cirrhosis (571)	301,070	2,316	11.8	181,000
Cerebrovascular diseases (430-438)	280,430	13,504	68.8	933,000
Pneumonia and influenza[5] (480-487)	124,830	4,338	22.1	800,000
Diabetes mellitus (250)	117,340	2,512	12.8	2,338,000
Chronic obstructive pulmonary diseases and allied conditions (490-496)	110,530	5,084	25.9	1,051,000
Prenatal care[6]				1,932,000
Infant mortality[6]		3,400	11.1 /1,000 live births	

[1]Years of potential life lost for persons between 1 year and 65 years old at the time of death are derived from the number of deaths in each age category as reported by the National Center for Health Statistics, *Monthly Vital Statistics Report* (MVSR), Vol. 29, No. 13, September 17, 1981, multiplied by the difference between 65 years and the age at the mid-point of each category. As a measure of mortality, "Years of potential life lost" underestimates the importance of diseases that contribute to death without being the underlying cause of death.

[2]The number of deaths is estimated by CDC by multiplying the estimated annual mortality rates (MVSR Vol. 31, No. 6, September 9, 1982, pp. 8-9) and the provisional U.S. population in that month (MVSR Vol. 31, No. 5, August 12, 1982, p.1) and dividing by the days in the month as a proportion of the days in the year.

[3]Annual mortality rates are estimated by NCHS (MVSR Vol. 31, No. 6, September 9, 1982, pp. 8-9), using the underlying cause of death from a systematic sample of 10% of death certificates received in state vital statistics offices during the month and the provisional population of those states included in the sample for that month.

[4]IMS America *National Disease and Therapeutic Index* (NDTI), Monthly Report, May 1982, Section III. This estimate comprises the number of office, hospital, and nursing home visits and telephone calls prompted by each medical condition based on a stratified random sample of office-based physicians (2,100) who record all private patient contacts for 2 consecutive days each quarter.

[5]Data for "infectious diseases and their sequelae" as a cause of death and physician visits comparable to other multiple-code categories (e.g., "malignant neoplasms") are not presently available.

[6]"Prenatal care" (NDTI) and "Infant mortality" (MVSR Vol. 31, No. 5, August 12, 1982, p.1) are included in the table because "Years of potential life lost" does not reflect deaths of children <1 year.

Non-O1 *Vibrio cholerae* Gastroenteritis — New Hampshire

In September 1981, an isolated case of non-O1 *Vibrio cholerae* gastroenteritis occurred in a Laconia, New Hampshire, resident following consumption of raw clams harvested from New England coastal waters. The patient was a previously healthy 40-year-old woman; her recent travel and personal-contact histories were unremarkable. Within 26 hours after eating the clams, she developed acute abdominal cramps, followed by fever and bloody diarrhea. She was treated symptomatically with rest and oral hydration and recovered without sequelae. Her stool culture grew *V. cholerae* (Smith serotype 361) and no other enteric pathogens. Studies for production of heat-labile and heat-stable toxins were negative. The asymptomatic family members had also eaten the clams; their stool cultures grew only normal flora. Subsequent cultures of shellfish harvested from the same coastal area were negative for vibrio organisms.

The market where the clams were purchased provided names of eight restaurants it routinely supplies, none of which reported any recent gastrointestinal illness among customers or employees. A retrospective review of hospital emergency-room records identified 36 other patients who had presented with gastrointestinal symptoms during the week the index case occurred. Only one had had a stool culture, which grew *Campylobacter jejuni.* All patients were sent food-history questionnaires; none of the 14 respondents reported eating raw shellfish before onset of symptoms or eating at any of the restaurants supplied by the market. After the index case was reported, prospective surveillance was initiated for patients presenting with diarrheal disease at the local emergency room and at a regional medical clinic. Stool cultures were obtained from these patients and screened on thiosulfate-citrate bile salts sucrose (TCBS) agar, a selective medium for vibrio species. No further cases were identified.

This represents the first reported case of non-O1 *V. cholerae* gastroenteritis apparently caused by shellfish from New England waters.

Reported by S MacRae, Dept of Microbiology, T Clements, Dept of Infection Control, Lakes Region General Hospital, J Cournoyer, New Hampshire State Dept of Health and Welfare; Field Svcs Div, Epidemiology Program Office, CDC.

Editorial Note: Isolated cases of non-O1 *V. cholerae* gastroenteritis have been reported previously in the United States (*1,2*), and outbreaks of intestinal illness caused by this organism have occurred elsewhere (*3-5*). Investigations of recent isolated cases in the United States have demonstrated a statistically significant association between eating raw shellfish and development of disease (*1,2*). Most of these cases have been associated with Gulf Coast oysters.

Environmental studies have demonstrated that the organisms can be found in brackish surface waters and are more numerous during warmer summer months (*1*). A Food and Drug Administration study of 790 samples of randomly selected oysters collected between June 1979 and May 1980 revealed non-O1 *V. cholerae* in 111 samples (14%) (*6*). Some investigators have demonstrated an association between fecal contamination of water and presence of the organism (*1*), but non-O1 *V. cholerae* has been found in waters free of fecal contamination and thus may be a constituent of normal marine flora (*7*).

Although no outbreaks of illness due to this organism have been reported in the United States, it is possible that common-source exposures have occurred in which milder cases have gone undetected and unreported. Non-O1 *V. cholerae* should be included in the differential diagnosis of acute gastroenteritis following ingestion of raw seafood. Diagnosis can be facilitated by culture of stool specimens on TCBS medium.

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Vibrio cholerae gastroenteritis – Continued

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International Notes

Vibrio cholerae—Truk, Federated States of Micronesia

Between August 1 and October 3, 1982, 892 cases of diarrhea and 11 deaths due to diarrhea were reported from Truk, Federated States of Micronesia, Trust Territories of the Pacific Islands. *Vibrio cholerae* O1 has been isolated from stool cultures of 109 persons. CDC has confirmed four of these isolates as biotype El Tor, serotype Inaba.

The outbreak began in early August in the four western outer islands of Pulap, Pulusuk, Puluwat, and Tamatan, where it affected 265 (20%) of 1,300 persons. In early September the outbreak spread to Moen, the capital of Truk, and nine of 17 islands in the Truk lagoon. Control measures have included boiling water, avoiding raw shellfish, and discouraging travel between islands and to other areas of the Pacific. The principal therapy has been oral rehydration solution. Epidemiologic investigations to determine the modes of transmission are underway.

Reported by F Nocon, Guam Dept of Public Health and Social Svcs; N Kansou, MPH, Health Svcs, R Gelder, Laboratory Svcs, Truk, K Aniol, MPH, Medical Svcs, AH Polloi, Territorial Epidemiologist, Federated States of Micronesia, D Kay, Office of Health Svcs, Trust Territories of the Pacific Islands, Saipan; Field Svcs Div, Epidemiology Program Office, Enteric Diseases Br, Div of Bacterial Diseases, Center for Infectious Diseases, CDC.

Erratum, Vol. 31, No. 32

p. 433. In the article, "Arboviral Encephalitis—United States, 1982," three New York State presumptive cases of California encephalitis were reported in persons who died. Follow-up of these serologically presumptive cases has essentially ruled out California encephalitis: one had a 4-fold rise in diagnostic titer to herpes simplex; one had carcinomatous meningitis; and one presented with mental confusion secondary to pneumonia.

Erratum, Vol 31, No. 30

p. 407. In the article, "Dengue Type 2 Virus in East Africa," the sentence beginning on line 6 of the first paragraph should read: "Since the end of March 1982, 15 acute-phase serum samples have been obtained from people who developed febrile illnesses during or after visiting Somalia (2 samples) or coastal Kenya (13 samples)."

The *Morbidity and Mortality Weekly Report* is published by the Centers for Disease Control, Atlanta, Georgia. The data in this report are provisional, based on weekly telegraphs 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 on interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Send reports to: Attn: Editor, *Morbidity and Mortality Weekly Report,* Centers for Disease Control, Atlanta, Georgia 30333.

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