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MORBIDITY AND MORTALITY WEEKLY REPORT

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Epidemiologic Notes and Reports

Common-Source Outbreak of Giardiasis — New Mexico

In April 1988, the Albuquerque Environmental Health Department and the New Mexico Health and Environment Department investigated reports of giardiasis among members of a church youth group in Albuquerque. The first two members to be affected had onset of diarrhea on March 3 and 4, respectively; stool specimens from both were positive for *Giardia lamblia* cysts. These two persons had only church youth group activities in common. Routine surveillance identified no other cases associated with the church youth group.

The youth group had dinner once a week at the church; food was prepared by parents of group members. The number of attendees at each meal varied, and no record of who attended was kept. A survey of all families attending the church sought to identify any family members who had eaten at any youth group dinners in March and any who had had diarrhea since February 1, 1988. One hundred forty-eight persons who attended at least one youth group dinner in March were interviewed about food they had eaten at the meal(s); the 42 persons reporting diarrheal illness were interviewed about details of their illness.

A case was defined as diarrhea and/or abdominal cramping with onset after February 1, 1988, lasting >7 days and/or a stool specimen positive for *Giardia* cysts. Twenty-two (15%) persons met the case definition. Onset of illness occurred from March 3 to March 30 (Figure 1), and illness lasted 1–32 days (median: 20 days). Twenty-one (19%) of 108 persons who ate the youth group dinner on March 2 developed an illness meeting the case definition, compared with one (3%) of 40 who did not eat that meal (relative risk [RR] = 7.8, 95% confidence interval [CI] = 1.1–55.9, $p = 0.02$).

For the 21 ill persons who had eaten the March 2 dinner, the most frequent symptoms reported were fatigue (95%), diarrhea (91%), abdominal cramps (57%), bloating (57%), and weight loss (67%). Patients ranged in age from 11 to 58 years (median: 39 years); 14 (67%) were female; 15 (71%) sought care from a physician. Fourteen (67%) patients submitted stool specimens for ova and parasite examination; 10 (71%) specimens were positive for *Giardia* cysts. Seven of the stool specimens were also tested for *Shigella*, *Salmonella*, *Campylobacter*, and *Yersinia*, and all were negative. One ill person attended a day-care center, one had household contact with a day-care center attendee, and none had consumed surface water.

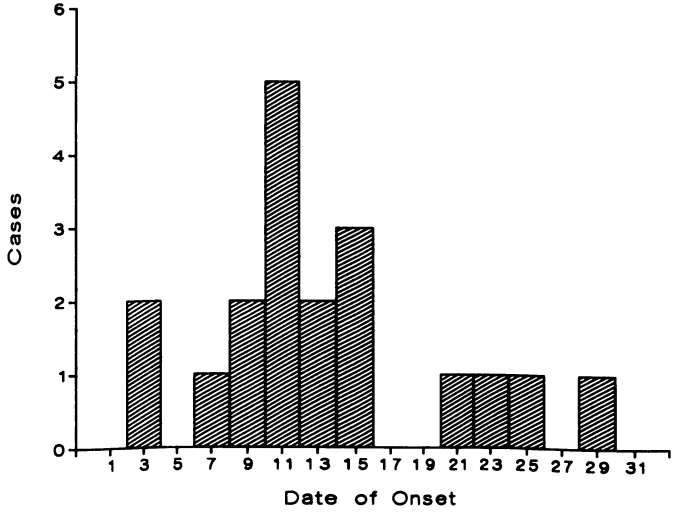
Giardiasis — Continued

The foods served at the dinner on March 2 included tacos (with meat, onions, tomatoes, lettuce, cheese, salsa, sour cream, and tortillas), corn, peaches, cupcakes, soft drinks, coffee, and tea. No food samples were available for microbiologic testing. Persons who became ill were more likely to have reported eating lettuce (RR = 8.1, CI = 1.1–57.3), salsa ($p<0.01$), onions (RR = 4.2, CI = 1.9–9.1), or tomatoes (RR = 3.5, CI = 1.4–8.8) or drinking tea/coffee (RR = 5.5, CI = 2.3–13.4). Water consumption was not associated with illness. Lettuce, onions, and tea/coffee were most strongly associated with illness by logistic regression analysis.

Except for the commercially prepared salsa, the implicated foods were prepared in the church kitchen. The lettuce and tomatoes were rinsed at the kitchen's main sink; the outer leaves of the lettuce were removed; and the lettuce, tomatoes, and onions were chopped on the same cutting board, which was not washed between items. The dinner was prepared by eight women whose children were in the youth group; all ate the meal. Although the woman who prepared the lettuce and tomatoes taught preschool and had a child in preschool, neither she nor her child was ill when the meal was prepared. None of the eight food preparers reported symptoms at the time of meal preparation; however, five became ill with diarrhea after March 8. Three had stool specimens positive for *Giardia* cysts.

The church is on the municipal water system. A survey of possible connections between the church's potable water system and the sanitary sewer system identified five potential cross-connections. However, water samples taken at the time of the cross-connection survey had adequate chlorine levels and were negative for coliform bacteria. On April 4, after the investigation began, the church stopped using municipal water for consumption and began catering meals. After elimination of all cross-connections, every outlet was flushed simultaneously for 3 hours. No new cases occurred after the remediation measures were completed.

FIGURE 1. Giardiasis cases, by date of onset* – Albuquerque, New Mexico, March 1988



*Date of onset unknown for two cases.

Giardiasis — Continued

Reported by: DJ Grabowski, MS, KJ Tiggs, JD Hall, DrPH, HW Senke, AJ Salas, Albuquerque Environmental Health Department; CM Powers, JA Knott, Bernalillo County District Health Office; LJ Nims, Scientific Laboratory Div; CM Sewell, DrPH, Acting State Epidemiologist, New Mexico Health and Environment Dept. Div of Field Svcs, Epidemiology Program Office, CDC.

Editorial Note: In this apparent point-source outbreak of giardiasis, the most likely vehicle of transmission was taco ingredients. Although all the ill persons ate the commercially prepared salsa, salsa was unlikely to have transmitted *Giardia* cysts because the cysts would not remain viable after the pasteurization and canning processes.

Two explanations for the contamination are possible. First, if the potable water was contaminated, the lettuce and tomatoes could have been contaminated when washed. Because the lettuce, tomatoes, and onions were all cut on the same board, cross-contamination could have occurred. However, because plumbing changes were made before completion of the epidemiologic investigation, this hypothesis could not be tested. Second, if the woman who prepared the lettuce and tomatoes was infected and excreting *Giardia* cysts, she could have contaminated the vegetables during preparation. However, this mode is less likely because this woman had acute onset of diarrhea 10 days after the meal, suggesting a new infection at that time.

Only two reported outbreaks of giardiasis have been associated with food: canned salmon (*1*) and noodle salad (*2*). In both outbreaks, contamination occurred when food was mixed with bare hands. Waterborne outbreaks of *Giardia* are well documented, and persons consuming untreated surface water are at increased risk for developing giardiasis (*3*). Person-to-person transmission is also well known in day-care and institutional settings (*4*). Public health officials should consider food-borne transmission when investigating outbreaks of giardiasis.

References

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2. Petersen LR, Cartter ML, Hadler JL. A food-borne outbreak of *Giardia lamblia*. J Infect Dis 1988;157:846–8.
3. Craun GF. Waterborne giardiasis in the United States: a review. Am J Pub Health 1979; 69:817–9.
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Current Trends

Problems Created by Heat-Inactivation of Serum Specimens Before HIV-1 Antibody Testing

Among laboratories testing for human immunodeficiency virus type 1 (HIV-1) and participating in CDC's Model Performance Evaluation Program (*1,2*), responses from May and September 1988 survey questionnaires show that 40 (3.9%) of 1034 and 41 (3.9%) of 1052 respondents, respectively, heat-inactivate serum specimens before testing for HIV-1. Heat-inactivation is an effective means of destroying HIV-1 (*3*) and is used both to prepare therapeutic blood products and to produce certain laboratory quality-control testing materials; however, this method is not recommended as a routine means of protecting the safety of laboratory workers exposed to blood and other body fluids while performing their jobs. Instead, laboratorians are urged to follow universal precautions recommending that all blood be considered potentially infective (*4,5*).

Heat-Inactivation — Continued

Heat-inactivation of serum specimens before they are screened by enzyme immunoassay (EIA) for HIV antibody can give false-positive results (*6,7*). Thus, laboratories that continue heat-inactivating serum are likely to obtain false-positive results with some EIA kits (*6,7*). Heat-inactivation can also interfere with Western blot analysis (*8*). Universal precautions preclude the necessity of selective treatment such as heat-inactivation for specimens from persons considered to be at increased risk for infection with HIV-1, hepatitis B virus, or other diseases caused by bloodborne pathogens. Therefore, CDC recommends that laboratories emphasize the practice of universal precautions (*4,5*) rather than heat-inactivation of serum to prevent occupational transmission of HIV.

Reported by: Div of Laboratory Systems, Public Health Practice Program Office, CDC.

References

1. Taylor RN, Przybyszewski VA. Summary of the Centers for Disease Control human immunodeficiency virus (HIV) performance evaluation surveys for 1985 and 1986. Am J Clin Pathol 1988;89:1–13.

(Continued on page 413)

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

Disease	23rd Week Ending			Cumulative, 23rd Week Ending		
	June 10, 1989	June 11, 1988	Median 1984-1988	June 10, 1989	June 11, 1988	Median 1984-1988
Acquired Immunodeficiency Syndrome (AIDS)	179	U*	155	14,324	13,613	5,480
Aseptic meningitis	125	127	127	1,857	1,874	1,874
Encephalitis: Primary (arthropod-borne & unspec)	6	22	21	259	318	357
Post-infectious	1	4	6	35	49	50
Gonorrhea: Civilian	8,928	11,760	15,714	276,037	291,956	349,387
Military	137	217	267	4,627	5,363	7,405
Hepatitis: Type A	666	454	454	14,969	10,800	9,655
Type B	390	442	478	9,488	9,620	10,919
Non A, Non B	35	39	66	1,013	1,155	1,549
Unspecified	50	20	64	1,123	914	2,108
Legionellosis	13	21	21	354	395	287
Leprosy	1	1	2	67	75	105
Malaria	21	27	15	453	309	329
Measles: Total†	225	38	71	5,569	1,391	1,557
Indigenous	213	31	64	5,268	1,245	1,392
Imported	12	7	7	301	146	190
Meningococcal infections	42	62	51	1,459	1,613	1,531
Mumps	122	100	100	2,686	2,711	1,937
Pertussis	44	38	38	916	1,003	895
Rubella (German measles)	-	4	12	161	100	260
Syphilis (Primary & Secondary): Civilian	516	633	493	16,921	16,516	12,198
Military	2	-	2	109	83	90
Toxic Shock syndrome	10	7	7	164	141	156
Tuberculosis	370	445	445	8,368	8,659	8,921
Tularemia	5	11	9	32	64	64
Typhoid Fever	8	10	4	181	155	131
Typhus fever, tick-borne (RMSF)	16	20	31	94	102	140
Rabies, animal	70	108	111	1,984	1,801	2,277

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1989		Cum. 1989
Anthrax	-	Leptospirosis	51
Botulism: Foodborne	6	Plague	-
Infant	4	Poliomyelitis, Paralytic	-
Other	4	Psittacosis (Upstate N.Y. 3, Mich.1, Mo. 1)	44
Brucellosis (Tex. 1)	32	Rabies, human	1
Cholera	-	Tetanus (Fla. 1, Ark. 1)	21
Congenital rubella syndrome	1	Trichinosis	12
Congenital syphilis, ages < 1 year	-		
Diphtheria	-		

*Because AIDS cases are not received weekly from all reporting areas, comparison of weekly figures may be misleading.
†Eight of the 225 reported cases for this week were imported from a foreign country or can be directly traceable to a known internationally imported case within two generations.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending June 10, 1989 and June 11, 1988 (23rd Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1988	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989
UNITED STATES	14,324	1,857	259	35	276,037	291,956	14,969	9,488	1,013	1,123	354	67
NEW ENGLAND	550	82	7	2	8,286	8,802	326	505	42	44	26	5
Maine	33	4	3	-	118	189	5	19	3	1	3	-
N.H.	19	6	-	-	73	128	31	28	7	3	-	-
Vt.	7	3	-	-	29	68	18	37	4	-	-	-
Mass.	263	33	2	2	3,103	3,134	103	304	19	29	17	3
R.I.	34	23	-	-	588	807	21	40	3	3	6	1
Conn.	194	13	2	-	4,375	4,476	148	77	6	8	-	1
MID. ATLANTIC	4,182	226	45	4	39,448	46,672	1,872	1,414	91	147	92	9
Upstate N.Y.	530	103	14	3	7,178	5,466	462	324	42	6	30	1
N.Y. City	2,163	36	2	1	18,047	21,443	161	502	15	123	9	6
N.J.	977	-	29	-	6,257	6,669	209	250	11	5	14	1
Pa.	512	87	-	-	7,966	13,094	1,040	338	23	13	39	1
E.N. CENTRAL	1,122	266	77	1	49,042	46,111	791	1,121	103	37	99	2
Ohio	208	58	18	-	12,629	10,979	185	259	18	5	55	-
Ind.	223	56	19	-	3,861	3,593	58	180	16	13	17	1
Ill.	424	54	16	1	16,215	13,134	351	278	25	11	8	1
Mich.	214	88	19	-	13,783	14,489	150	309	32	8	15	-
Wis.	53	10	5	-	2,554	3,916	47	95	12	-	4	-
W.N. CENTRAL	325	77	11	2	13,234	11,767	498	428	42	11	14	1
Minn.	61	5	-	1	1,363	1,564	54	49	7	2	2	-
Iowa	30	17	2	-	1,046	906	31	22	9	-	3	-
Mo.	172	25	-	-	7,802	6,625	276	289	14	5	3	-
N. Dak.	3	4	1	-	54	79	3	12	3	-	-	-
S. Dak.	4	6	2	-	122	221	3	6	3	-	-	-
Nebr.	13	5	2	-	727	668	52	14	-	2	2	1
Kans.	42	15	4	1	2,120	1,704	79	36	6	2	4	-
S. ATLANTIC	2,982	398	33	9	79,534	82,163	1,271	1,906	150	152	42	-
Del.	46	11	1	-	1,275	1,202	20	69	1	2	3	-
Md.	322	52	9	2	8,586	8,549	290	348	17	16	11	-
D.C.	257	6	-	-	5,171	5,933	2	14	2	-	-	-
Va.	229	67	14	-	6,691	5,758	146	123	24	93	2	-
W. Va.	20	5	5	-	584	610	10	37	2	3	-	-
N.C.	157	44	-	1	12,407	11,839	232	486	48	-	12	-
S.C.	122	11	-	-	6,989	6,128	20	238	3	5	2	-
Ga.	481	30	1	-	15,857	16,173	151	186	9	6	4	-
Fla.	1,348	172	3	6	21,974	25,971	400	405	44	27	8	-
E.S. CENTRAL	343	174	13	1	23,371	22,407	158	667	71	1	13	-
Ky.	58	47	4	1	2,180	2,179	57	184	23	-	3	-
Tenn.	113	23	-	-	7,663	7,453	48	333	17	-	6	-
Ala.	95	78	9	-	7,484	7,274	32	101	28	1	4	-
Miss.	77	26	-	-	6,044	5,501	21	49	3	-	-	-
W.S. CENTRAL	1,352	184	29	2	30,167	32,805	1,744	930	71	272	18	13
Ark.	34	5	-	-	3,028	3,057	101	28	2	1	1	-
La.	220	17	5	-	6,409	6,973	126	160	7	1	4	-
Okla.	75	21	7	-	2,558	2,989	169	79	15	13	10	-
Tex.	1,023	141	17	2	18,172	19,786	1,348	663	47	257	3	13
MOUNTAIN	453	69	8	1	5,949	6,397	2,129	608	106	87	20	1
Mont.	4	2	-	-	96	207	23	21	2	1	2	1
Idaho	12	-	-	-	93	179	81	45	6	2	-	-
Wyo.	8	1	-	-	48	106	17	1	-	-	-	-
Colo.	169	25	2	1	1,289	1,496	290	92	36	37	2	-
N. Mex.	31	6	1	-	625	588	259	93	23	2	1	-
Ariz.	117	27	2	-	2,104	2,236	1,133	221	22	41	9	-
Utah	29	6	1	-	195	258	141	43	10	3	3	-
Nev.	83	2	2	-	1,499	1,327	185	92	7	1	3	-
PACIFIC	3,015	381	36	13	27,006	34,832	6,180	1,909	337	372	30	36
Wash.	270	-	-	1	2,656	2,915	1,434	381	93	33	5	2
Oreg.	110	-	-	-	1,304	1,349	1,073	194	40	8	1	1
Calif.	2,569	357	32	12	22,416	29,781	3,194	1,310	199	327	22	29
Alaska	5	3	3	-	405	481	418	22	5	2	1	-
Hawaii	61	21	1	-	225	306	61	2	-	2	1	4
Guam	1	-	-	-	-	60	-	-	-	-	-	-
P.R.	652	48	2	-	475	661	64	97	8	10	-	6
V.I.	18	-	-	-	270	176	-	4	-	-	-	-
Amer. Samoa	-	-	-	-	-	41	-	-	-	-	-	-
C.N.M.I.	-	-	-	-	-	27	-	-	-	-	-	-

N: Not notifiable U: Unavailable C.N.M.I.: Commonwealth of the Northern Mariana Islands

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending June 10, 1989 and June 11, 1988 (23rd Week)

Reporting Area	Malaria	Measles (Rubeola)					Menin-gococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1989	1989	Cum. 1989	1989	Cum. 1989	Cum. 1988	Cum. 1989	1989	Cum. 1989	1989	Cum. 1989	Cum. 1988	1989	Cum. 1989	Cum. 1988
UNITED STATES	453	213	5,268	12	301	1,391	1,459	122	2,686	44	916	1,003	-	161	100
NEW ENGLAND	29	3	132	-	16	64	106	-	24	-	206	128	-	5	1
Maine	-	-	-	-	-	-	14	-	-	-	4	11	-	-	-
N.H.	2	-	5	-	-	56	11	-	10	-	5	23	-	3	-
Vt.	1	-	1	-	-	-	6	-	-	-	5	2	-	1	-
Mass.	18	3	17	-	12	1	51	-	13	-	182	82	-	1	-
R.I.	5	-	35	-	2	-	1	-	-	-	2	1	-	-	1
Conn.	3	-	74	-	2	7	23	-	1	-	8	9	-	-	-
MID. ATLANTIC	71	12	399	11	142	469	211	13	162	16	61	36	-	8	9
Upstate N.Y.	16	9	38	10†§	92	6	68	11	96	7	32	21	-	2	1
N.Y. City	22	3	42	1†	14	29	28	2	16	-	2	1	-	6	5
N.J.	13	-	233	-	-	14	42	-	11	-	14	4	-	-	1
Pa.	20	-	86	-	36	420	73	-	39	9	13	10	-	-	2
E.N. CENTRAL	19	-	804	-	41	134	179	5	230	-	36	119	-	17	22
Ohio	6	-	457	-	35	13	75	-	8	-	1	21	-	3	-
Ind.	3	-	17	-	-	43	21	-	18	-	8	50	-	-	-
Ill.	4	-	329	-	-	61	46	-	104	-	-	8	-	13	18
Mich.	4	-	1	-	4	17	30	5	87	-	20	18	-	-	4
Wis.	2	-	-	-	2	-	7	-	13	-	7	22	-	1	-
W.N. CENTRAL	15	-	427	-	4	10	42	10	339	-	21	37	-	4	-
Minn.	6	-	-	-	-	10	10	-	-	-	-	6	-	-	-
Iowa	2	-	4	-	1	-	-	-	18	-	9	14	-	-	-
Mo.	4	-	237	-	-	-	13	-	43	-	10	6	-	3	-
N. Dak.	1	U	-	U	-	-	-	U	-	U	-	6	U	-	-
S. Dak.	-	-	-	-	-	-	4	-	-	-	1	2	-	-	-
Nebr.	1	-	108	-	2	-	10	-	4	-	-	-	-	-	-
Kans.	1	-	78	-	1	-	5	10	274	-	1	3	-	1	-
S. ATLANTIC	79	6	353	-	24	237	247	24	491	2	77	100	-	7	3
Del.	1	-	59	-	1	-	2	-	1	-	1	3	-	-	-
Md.	16	-	34	-	14	7	37	19	297	-	7	17	-	2	-
D.C.	4	-	5	-	3	-	11	1	69	-	-	-	-	-	-
Va.	13	5	11	-	3	131	28	1	61	2	6	16	-	-	-
W. Va.	1	-	28	-	-	6	8	-	9	-	10	1	-	-	-
N.C.	10	-	167	-	-	1	31	2	15	-	18	27	-	1	-
S.C.	3	-	-	-	-	-	15	-	16	-	-	-	-	-	-
Ga.	6	-	-	-	-	-	50	-	5	-	9	17	-	-	-
Fla.	25	1	49	-	3	92	65	1	18	-	26	19	-	4	3
E.S. CENTRAL	4	25	89	-	-	58	42	2	92	1	37	15	-	2	-
Ky.	-	-	2	-	-	32	25	-	9	-	1	-	-	-	-
Tenn.	-	14	46	-	-	-	3	-	26	-	8	8	-	2	-
Ala.	2	11	41	-	-	-	11	2	10	1	26	5	-	-	-
Miss.	2	-	-	-	-	26	3	N	N	-	2	2	-	-	-
W.S. CENTRAL	19	163	2,550	1	31	13	99	62	1,054	-	27	65	-	12	6
Ark.	-	-	-	-	2	-	5	7	108	-	10	5	-	1	2
La.	1	-	6	-	-	-	25	39	394	-	4	9	-	5	-
Okla.	1	15	92	-	-	8	11	2	165	-	13	24	-	1	1
Tex.	17	148	2,452	1†	29	5	58	14	387	-	-	27	-	5	3
MOUNTAIN	16	4	165	-	18	115	39	6	107	19	324	324	-	28	5
Mont.	1	-	12	-	1	-	1	-	2	-	-	1	-	1	-
Idaho	2	-	-	-	1	1	2	1	8	-	37	242	-	26	-
Wyo.	1	-	-	-	-	-	-	1	7	-	-	1	-	-	-
Colo.	2	-	57	-	1	114	15	1	14	-	19	13	-	-	1
N. Mex.	1	-	15	-	15	-	-	N	N	-	4	3	-	-	-
Ariz.	6	4	45	-	-	-	19	3	69	19	257	42	-	-	-
Utah	-	-	36	-	-	-	2	-	3	-	6	21	-	-	3
Nev.	3	-	-	-	-	-	-	-	4	-	1	1	-	1	1
PACIFIC	201	-	349	-	25	291	494	-	187	6	127	179	-	78	54
Wash.	15	-	20	-	12	2	49	-	19	1	25	40	-	-	-
Oreg.	10	-	-	-	6	3	33	N	N	-	5	6	-	1	-
Calif.	171	-	322	-	3	281	408	-	158	5	95	92	-	57	43
Alaska	3	-	-	-	-	-	3	-	1	-	-	4	-	-	-
Hawaii	2	-	7	-	4	5	1	-	9	-	2	37	-	20	11
Guam	-	U	-	U	-	1	-	U	-	U	-	-	U	-	1
P.R.	1	-	363	-	-	174	4	1	6	-	3	7	-	5	1
V.I.	-	U	2	U	-	-	-	U	8	U	-	-	U	-	-
Amer. Samoa	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-
C.N.M.I.	-	U	-	U	-	-	-	U	-	U	-	-	U	-	-

*For measles only, imported cases includes both out-of-state and international importations.
N: Not notifiable U: Unavailable †International §Out-of-state

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending June 10, 1989 and June 11, 1988 (23rd Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1989	Cum. 1988	Cum. 1989	Cum. 1989	Cum. 1988	Cum. 1989	Cum. 1989	Cum. 1989	Cum. 1989
UNITED STATES	16,921	16,516	164	8,368	8,659	32	181	94	1,984
NEW ENGLAND	727	439	5	223	173	-	13	1	2
Maine	5	5	2	3	3	-	-	-	1
N.H.	3	5	-	14	-	-	-	-	-
Vt.	-	1	-	4	1	-	-	-	-
Mass.	221	178	1	114	107	-	6	-	-
R.I.	14	14	-	29	14	-	5	1	-
Conn.	484	236	2	59	48	-	2	-	1
MID. ATLANTIC	3,146	3,444	26	1,703	1,634	1	49	5	266
Upstate N.Y.	382	219	4	144	253	-	5	3	5
N.Y. City	1,479	2,224	2	986	788	-	33	-	-
N.J.	603	367	7	254	305	-	7	-	-
Pa.	682	634	13	319	288	1	4	2	261
E.N. CENTRAL	672	490	22	967	942	3	17	13	42
Ohio	51	50	7	181	175	-	4	9	2
Ind.	30	25	4	83	101	1	1	3	2
Ill.	305	242	2	415	394	-	8	1	5
Mich.	266	156	9	236	219	1	3	-	6
Wis.	20	17	-	52	53	1	1	-	27
W.N. CENTRAL	147	98	24	244	223	11	5	10	245
Minn.	11	8	7	51	38	-	1	-	58
Iowa	17	10	4	28	16	-	2	1	63
Mo.	73	59	4	104	113	5	1	9	21
N. Dak.	1	2	-	9	4	-	-	-	14
S. Dak.	-	-	3	12	19	3	-	-	40
Nebr.	17	13	5	10	7	-	-	-	21
Kans.	28	6	1	30	26	3	1	-	28
S. ATLANTIC	6,578	5,884	16	1,823	1,869	2	15	27	627
Del.	77	57	-	19	18	-	2	-	16
Md.	335	311	1	167	190	-	4	4	175
D.C.	408	263	1	74	80	-	2	-	2
Va.	248	199	4	159	187	2	2	1	127
W. Va.	7	6	-	38	37	-	-	-	30
N.C.	401	340	4	204	156	-	2	14	2
S.C.	346	269	3	199	206	-	-	4	104
Ga.	1,373	951	2	266	301	-	-	3	107
Fla.	3,383	3,488	1	697	694	-	3	1	64
E.S. CENTRAL	1,142	873	3	758	716	3	1	13	185
Ky.	24	31	1	169	177	1	1	4	88
Tenn.	479	366	1	231	193	1	-	6	48
Ala.	385	255	1	214	218	-	-	3	49
Miss.	254	221	-	144	128	1	-	-	-
W.S. CENTRAL	2,370	1,795	13	1,042	1,105	7	7	15	322
Ark.	149	98	1	111	115	3	-	1	40
La.	531	349	-	138	159	-	1	-	3
Okla.	36	73	7	86	100	4	1	13	48
Tex.	1,654	1,275	5	707	731	-	5	1	231
MOUNTAIN	330	304	22	207	212	3	3	8	97
Mont.	1	2	-	8	5	-	-	6	38
Idaho	-	-	2	8	-	-	-	-	-
Wyo.	4	1	1	-	1	-	-	1	29
Colo.	51	45	4	12	33	1	1	1	2
N. Mex.	12	22	2	36	41	-	-	-	14
Ariz.	88	78	9	102	98	-	1	-	12
Utah	11	9	3	19	10	2	1	-	1
Nev.	163	147	1	22	24	-	-	-	1
PACIFIC	1,809	3,189	33	1,401	1,785	2	71	2	198
Wash.	91	101	2	90	103	-	3	-	-
Oreg.	125	125	-	57	63	-	4	1	-
Calif.	1,584	2,937	30	1,165	1,533	2	62	1	141
Alaska	3	7	-	19	16	-	-	-	57
Hawaii	6	19	1	70	70	-	2	-	-
Guam	-	3	-	-	8	-	-	-	-
P.R.	232	288	-	151	100	-	-	-	29
V.I.	1	1	-	3	3	-	-	-	-
Amer. Samoa	-	-	-	-	3	-	-	-	-
C.N.M.I.	-	1	-	-	12	-	-	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending June 10, 1989 (23rd Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	≥65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	606	416	113	41	19	17	54
Boston, Mass.	181	107	46	14	7	7	20
Bridgeport, Conn.	53	42	3	5	3	-	2
Cambridge, Mass.	13	10	1	1	1	-	2
Fall River, Mass.	24	21	2	1	-	-	1
Hartford, Conn.	64	47	10	5	1	1	5
Lowell, Mass.	31	20	10	1	-	-	2
Lynn, Mass.	14	8	4	1	1	-	1
New Bedford, Mass.	16	14	2	-	-	-	1
New Haven, Conn.	47	33	8	1	2	3	6
Providence, R.I.	41	31	6	1	1	2	2
Somerville, Mass.	6	4	2	-	-	-	-
Springfield, Mass.	31	17	10	3	-	1	6
Waterbury, Conn.	27	19	4	3	-	1	2
Worcester, Mass.	58	43	5	5	3	2	4
MID. ATLANTIC	2,696	1,740	544	273	62	77	146
Albany, N.Y.	46	38	5	-	2	1	-
Allentown, Pa.§	22	18	3	1	-	-	-
Buffalo, N.Y.§	122	80	26	11	3	2	7
Camden, N.J.	34	22	8	2	-	2	-
Elizabeth, N.J.	30	24	4	2	-	-	1
Erie, Pa.†	58	44	10	3	-	1	4
Jersey City, N.J.	60	33	16	8	1	2	2
N.Y. City, N.Y.	1,415	875	277	182	34	47	62
Newark, N.J.	51	17	14	13	2	5	2
Paterson, N.J.	38	16	15	6	-	1	-
Philadelphia, Pa.	393	256	92	23	12	10	33
Pittsburgh, Pa.†	47	36	8	2	1	-	4
Reading, Pa.	37	28	6	2	1	-	5
Rochester, N.Y.	119	81	24	10	3	1	11
Schenectady, N.Y.	35	26	8	1	-	-	1
Scranton, Pa.†	27	21	3	1	1	1	5
Syracuse, N.Y.	82	64	13	1	1	3	3
Trenton, N.J.	38	26	8	3	-	1	5
Utica, N.Y.	22	19	2	-	1	-	1
Yonkers, N.Y.	20	16	2	2	-	-	-
E.N. CENTRAL	2,393	1,581	490	175	64	82	102
Akron, Ohio	87	64	10	4	2	7	5
Canton, Ohio	38	30	7	1	-	-	4
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	144	100	28	10	4	2	17
Cleveland, Ohio	178	104	47	16	5	6	7
Columbus, Ohio	183	119	34	12	8	9	2
Dayton, Ohio	104	74	23	5	1	1	8
Detroit, Mich.	210	109	48	33	12	8	5
Evansville, Ind.	24	21	2	-	-	1	3
Fort Wayne, Ind.	63	42	15	4	1	1	1
Gary, Ind.	16	8	4	3	-	1	-
Grand Rapids, Mich.	53	38	10	1	1	3	2
Indianapolis, Ind.	205	138	45	8	3	11	1
Madison, Wis.	40	28	6	3	1	2	-
Milwaukee, Wis.	153	109	33	9	1	1	5
Peoria, Ill.	57	34	14	4	3	2	5
Rockford, Ill.	41	31	6	2	-	2	2
South Bend, Ind.	32	24	5	-	3	-	4
Toledo, Ohio	122	84	20	12	3	3	10
Youngstown, Ohio	79	62	8	3	6	-	5
W.N. CENTRAL	751	517	124	63	30	17	28
Des Moines, Iowa	87	64	12	7	3	1	4
Duluth, Minn.	37	24	3	6	4	-	2
Kansas City, Kans.	29	19	5	3	2	-	-
Kansas City, Mo.	100	60	20	10	5	5	6
Lincoln, Nebr.	28	25	1	1	1	-	2
Minneapolis, Minn.	159	107	32	13	4	3	10
Omaha, Nebr.	91	64	18	2	3	4	3
St. Louis, Mo.	111	72	17	13	6	3	-
St. Paul, Minn.	59	46	6	5	2	-	1
Wichita, Kans.	50	36	10	3	-	1	-
S. ATLANTIC	1,229	701	292	142	38	54	59
Atlanta, Ga.	143	71	39	25	6	2	9
Baltimore, Md.	193	105	58	23	4	3	7
Charlotte, N.C.	85	44	26	8	4	3	6
Jacksonville, Fla.	103	62	24	13	2	2	6
Miami, Fla.	104	57	29	16	1	1	1
Norfolk, Va.	67	30	18	7	4	8	6
Richmond, Va.	82	47	21	9	3	2	3
Savannah, Ga.	56	43	10	1	1	1	3
St. Petersburg, Fla.	81	69	7	1	2	2	7
Tampa, Fla.	99	57	21	11	4	5	7
Washington, D.C.	189	94	35	27	7	25	4
Wilmington, Del.	27	22	4	1	-	-	-
E.S. CENTRAL	771	484	162	74	23	28	59
Birmingham, Ala.	112	61	24	9	8	10	7
Chattanooga, Tenn.	44	28	12	1	1	2	3
Knoxville, Tenn.	81	55	15	8	2	1	9
Louisville, Ky.	119	85	17	13	1	3	8
Memphis, Tenn.	170	115	35	12	4	4	17
Mobile, Ala.	70	37	19	8	2	4	3
Montgomery, Ala.	57	35	16	3	3	-	4
Nashville, Tenn.	118	68	24	20	2	4	8
W.S. CENTRAL	1,770	1,090	376	187	68	49	58
Austin, Tex.	58	32	14	7	4	1	3
Baton Rouge, La.	21	11	3	4	1	2	-
Corpus Christi, Tex.§	46	36	8	2	-	-	1
Dallas, Tex.	193	109	37	25	15	7	8
El Paso, Tex.§	58	36	13	5	1	3	4
Fort Worth, Tex	99	61	16	10	5	7	8
Houston, Tex.§	734	436	169	89	24	16	18
Little Rock, Ark.	63	37	16	4	1	5	6
New Orleans, La.	149	93	30	17	8	1	-
San Antonio, Tex.	217	144	41	20	7	5	3
Shreveport, La.	41	30	11	-	-	-	2
Tulsa, Okla.	91	65	18	4	2	2	5
MOUNTAIN	718	454	134	65	36	29	43
Albuquerque, N. Mex.	89	60	19	5	1	4	9
Colo. Springs, Colo.	41	30	10	1	-	-	7
Denver, Colo.	121	74	24	14	7	2	5
Las Vegas, Nev.	103	59	20	13	7	4	9
Ogden, Utah	22	15	5	-	-	2	3
Phoenix, Ariz.	178	106	32	18	12	10	4
Pueblo, Colo.	28	23	3	2	-	-	2
Salt Lake City, Utah	34	19	6	5	3	1	1
Tucson, Ariz.	102	68	15	7	6	6	3
PACIFIC	1,917	1,280	353	162	51	62	133
Berkeley, Calif.	12	7	3	2	-	-	1
Fresno, Calif.	70	48	13	5	1	3	8
Glendale, Calif.	10	6	1	-	-	2	1
Honolulu, Hawaii	81	60	13	4	3	1	12
Long Beach, Calif.§	80	52	17	8	1	2	9
Los Angeles Calif.	419	249	94	47	19	6	16
Oakland, Calif.	66	37	15	7	2	5	8
Pasadena, Calif.	22	17	1	2	1	1	4
Portland, Oreg.	137	100	21	4	2	10	4
Sacramento, Calif.	147	102	27	7	6	5	18
San Diego, Calif.	165	103	33	17	3	6	23
San Francisco, Calif.	159	100	30	21	1	7	8
San Jose, Calif.	197	140	40	12	1	4	11
Seattle, Wash.	229	164	31	20	7	7	3
Spokane, Wash.	59	47	7	3	2	-	4
Tacoma, Wash.	64	48	7	3	2	3	3
TOTAL	12,851††	8,263	2,588	1,182	391	415	682

*Mortality data in this table are voluntarily reported from 121 cities in the United States, most of which have populations of 100,000 or more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are not included.

**Pneumonia and influenza.

†Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current week. Complete counts will be available in 4 to 6 weeks.

††Total includes unknown ages.

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

Heat-Inactivation — Continued

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Epidemiologic Notes and Reports

Work-Related Injuries and Illnesses in an Automotive Parts Manufacturing Company — Chicago

In 1985, 146 work-related injuries and illnesses occurred among the 349 full-time workers in an automotive parts manufacturing company in Chicago. The company's injury/illness rate of 41.8 cases per 100 full-time workers per year was more than four times greater than the 1985 industry average of 10.1 cases per 100 workers, as reported by the Bureau of Labor Statistics (BLS), for companies manufacturing motor vehicle parts (*1*).

In March 1986, the company requested that the Rush-Presbyterian-St. Luke's Occupational Health Centers in Chicago evaluate its 1985 injury experience. Examination of workers' compensation records, Occupational Safety and Health Administration (OSHA) records, medical reports, and insurance records showed high rates of musculoskeletal and dermatologic injuries, including sprains/strains (11.2 per 100 full-time workers), contusions (10.0), and cuts/lacerations (5.4). The most commonly affected body parts were the finger (10.3 per 100 full-time workers), back (6.3), and hand (4.6).

The most prevalent nature-of-injury categories (e.g., sprains/strains, contusions, cuts/lacerations) were further evaluated for the most common sources (e.g., boxes, metal items, machines) and types (e.g., overexertion, being struck by an object) of injury. Fifty-four percent of sprains/strains were associated with boxes; 87%, with overexertion (i.e., excessive physical effort associated with the lifting, pushing, or pulling of an external object). Forty percent of contusions were associated with boxes; 46% resulted from having been struck by an object. Fifty-eight percent of cuts/lacerations were associated with contact with metal items.

In March 1986, simultaneous with the analysis of its 1985 injuries, the company modified its procedures for handling materials. These changes included 1) a decrease in the size of the boxes used to transport automotive parts, 2) a decrease in the average weight of the boxes from 50 to 25 pounds, and 3) the installation of manual

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conveyors and lift assists designed to decrease manual lifting requirements. The company also sponsored regular plant inspections, safety films, lectures, and various safety contests.

In April 1988, the company's 1986 injury experience was analyzed to evaluate the effectiveness of the interventions. From workers' compensation forms, OSHA records, and medical reports, 44 work-related injuries and illnesses were identified among the company's 321 full-time workers. Even though the populations in 1985 and 1986 were not fully independent, the injury/illness rate of 13.7 cases per 100 workers for 1986 represents a statistically significant decrease of 67% from the company's 1985 rate of 41.8 (chi-square test, $p<0.05$) (Table 1).

After intervention, sprains/strains decreased 80% to 2.2 injuries per 100 workers, contusions decreased 63% to 3.7, scratches/abrasions decreased 85% to 0.6, and other injuries (e.g., multiple injuries, inflamed joints, burns) decreased 58% to 3.4 (Table 1). Injuries to the finger, back, hand, and other body parts (e.g., shoulders, arms, toes) also showed statistically significant declines (chi-square test, $p<0.005$) (Table 1). These analyses take into account the effect of multiple comparisons on the significance level.

The turnover rate for the company's workforce between 1985 and 1986 was 4%, and the composition of the workforce remained stable. Hourly workers accounted for 295 (85%) of the company's 349 full-time employees in 1985 and for 268 (83%) of 321 full-time workers in 1986. Age and sex distributions for the hourly workforce were comparable between 1985 and 1986. Machine operators and assemblers were the

TABLE 1. Occupational injury and illness incidence rates per 100 full-time workers, by nature of injury and body part affected – Chicago automotive parts manufacturing company, 1985 and 1986

Injury category	Incidence rate 1985 (N=349)	Incidence rate 1986 (N=321)	Percent change 1985–1986
Nature of injury			
Sprains/strains	11.2	2.2	-80.4*
Contusions	10.0	3.7	-63.0*
Cuts/lacerations	5.4	2.5	-53.7
Scratches/abrasions	4.0	0.6	-85.0*
Dermatitis (contact)	3.2	1.2	-62.5
Other	8.0	3.4	-57.5*
Total	**41.8**	**13.7**	**-67.2***
Body part affected			
Finger(s)	10.3	4.4	-57.3*
Back	6.3	1.6	-74.6*
Hand(s)	4.6	0.9	-80.4*
Eye(s)	3.7	0.9	-75.7
Wrist(s)	2.3	0.3	-87.0
Other	14.6	5.6	-61.6*
Total	**41.8**	**13.7**	**-67.2***

*Chi-square test, $p<0.005$.

Injuries and Illnesses – Continued

most frequently injured workers in both years, accounting for 42% and 25%, respectively, of the injuries in 1985, and for 57% and 16%, respectively, of the injuries in 1986.

Direct costs associated with the implementation of changes in the company's procedures for handling materials totaled $190,000; however, on its 1986 workers' compensation insurance premium, the company received a $100,000 rebate, which was attributed to an improvement in its safety record.

Reported by: R Brewer, MD, D Oleske, PhD, J Hahn, MD, P Doan, M Leibold, Rush-Presbyterian-St. Luke's Medical Center, Chicago, Illinois. Div of Safety Research, National Institute for Occupational Safety and Health; Div of Injury Epidemiology and Control, Center for Environmental Health and Injury Control, CDC.

Editorial Note: Workplace injury rates can be reduced by changing the procedures governing the handling of materials. This report describes the approach taken by an automotive parts manufacturing company in characterizing injuries related to materials handling, targeting interventions, and evaluating the impact of intervention measures.

Musculoskeletal injuries (sprains/strains; inflammation and irritation of joints; fractures and dislocations) and dermatologic injuries (contusions; cuts/lacerations; scratches/abrasions) are common, sometimes disabling, work-related health problems. According to data provided by the BLS, musculoskeletal injuries accounted for 57% and dermatologic injuries for 23% of the total occupational injuries and illnesses reported nationwide in 1985 (*2*). Sprains/strains accounted for 43%, and contusions accounted for 10% of the total (*2*).

Poorly designed procedures for handling materials are associated with an increased risk of both musculoskeletal and dermatologic injuries (*3*). The weight of the material being handled has been identified as the factor most associated with an increased risk of injury (*4*).

Given the relatively stable workforce of the Chicago automotive parts company, the decline in injury rates from 1985 to 1986, particularly for sprains/strains and for contusions, suggests that the changes in procedures for handling materials were effective. These changes are generally consistent with findings of previous epidemiologic and ergonomic studies that identified associations between injury rates and materials handling procedures (*5,6*). However, the declines may also reflect the effect of the workers' additional on-the-job experience.

The experience of this company illustrates the impact that changes in procedures for handling materials may have on the occurrence of work-related injuries. Ergonomic interventions, taking into account worker capabilities and limitations, were applied to specific tasks associated with the most frequent injuries. The company's rebate on its 1986 workers' compensation insurance premium helped to offset the initial expense associated with the implementation of changes in procedures for handling materials. Thus, the potential for substantial cost savings exists when effective injury-control programs are implemented in the workplace.

Ergonomic interventions can also be applied to the control of injuries in other worksites. To measure the effectiveness of ergonomic interventions, the age, sex, job training, and job experience of the workforce should be identified both before and after intervention. Also, the extent and severity of the injuries should be measured before and after intervention measures. Ergonomic interventions should be applied separately from health education programs (e.g., safety films and lectures) if their

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individual effect on injury rates is to be evaluated. Broader application of both epidemiologic and ergonomic models to the planning and evaluation of injury-control programs should be encouraged to reduce the incidence and cost of work-related injuries.

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The data in this report are provisional, based on weekly reports to CDC by state health departments. The reporting week concludes at close of business on Friday; compiled data on a national basis are officially released to the public on the succeeding Friday. The editor welcomes accounts of interesting cases, outbreaks, environmental hazards, or other public health problems of current interest to health officials. Such reports and any other matters pertaining to editorial or other textual considerations should be addressed to: Editor, *Morbidity and Mortality Weekly Report*, Centers for Disease Control, Atlanta, Georgia 30333; telephone (404) 332-4555.

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