CENTERS FOR DISEASE CONTROL

November 19, 1982 / Vol. 31 / No. 45

MMWR

MORBIDITY AND MORTALITY WEEKLY REPORT

Epidemiologic Notes and Reports

Staphylococcal Infections among River Guides — Tennessee, South Carolina, and North Carolina

On July 29, 1982, a private physician notified the Tennessee Department of Public Health (TDPH) of six cases of staphylococcal cellulitis among guides employed by a whitewater-rafting company at the Ocoee River in eastern Tennessee. Investigation revealed additional cases among employees at seven rafting operations in Tennessee, North Carolina, and South Carolina.

The first rafting company (Company A) employs approximately 150 persons, including 91 river guides, at sites on the Nantahala, French Broad, Ocoee, and Chattooga rivers. Twenty-three percent of guides are female; most guides are between 18 and 35 years of age. Seventy percent of guides have worked with the company for more than one season. All employees eat and sleep on-site in a communal-like setting, with mess halls, common bathing facilities, and simple wooden bunkhouses at each site, but do not normally share linens, towels, washcloths, clothing, or personal equipment. Employees are assigned randomly to different sites each week.

Twenty-three employees at the Ocoee site were examined. A case was defined as a person who reported lesions compatible with staphylococcal cellulitis, furunculosis, or abscess with onset between April 15 and August 1, 1982. Seven (33%) of 21 guides met this case definition; of these, four had received oral antibiotics, and one had been hospitalized. Employees reported that similar lesions had been common among guides for at least 3 years; many believed that assignment to the Chattooga River site in South Carolina was associated with increased risk of infection. Accordingly, the 20 employees at that site were examined; 12 (71%) of 17 guides met the case definition. At both the Ocoee and Chattooga sites, infections occurred exclusively on the lower extremities, predominantly the anterior lower legs and feet.

A case-control study was conducted of these 38 guides, using uninfected guides as controls. All employees at the Ocoee and Chattooga sites were interviewed, and nasal, palm, and wound cultures were obtained at the Ocoee site. Stepwise logistic regression analysis suggested that a positive culture result and increasing number of weeks worked this season were positively correlated with infection, while experience in prior seasons was protective. Four of six cases from the Ocoee site had had infected roommates, as compared with two of 14 controls.

Work records of these employees were analyzed by the number of weeks worked at each site, and total work weeks at each site were compared for cases and controls. The odds that a given work-week was contributed by a case rather than a control were 2.4 times higher at the Chatooga site than at the Ocoee (odds ratio 2.4, $p < 0.005$). Many employees had not worked at one or more sites; attack rates for those employees with no exposure to certain

Staphylococcal Infections – Continued

river sites ranged from 50% to 66%, except for those never exposed to the Chattooga, for whom the attack rate was 28%. Based on the number of work weeks at that site, employees categorized as having low, medium, or high exposure to the Chattooga site had attack rates of 26%, 58%, and 67%, respectively ($p < 0.05$). Typically, bunkhouses at the Chattooga site are 100% occupied, as compared with 80% at the Ocoee site, and guides at the Chattooga site spend 15% more time per week on the river. Investigation at the two sites failed to reveal any other differences in personnel, equipment, practices, or the challenges of the rivers likely to explain the differing infection rates.

No deviations from accepted standards of housing, food-handling, or hygiene likely to explain these high attack rates were identified. Accordingly, the investigation was extended to include other rafting companies.

Nine other commercial rafting companies operating on the Chattooga, Ocoee, or Nantahala rivers were identified, and interviews were conducted. Four operations had employees who met the case definition; all four had had employees placed on antibiotics, and two had had employees hospitalized. The five remaining operations reported no infections, antibiotic use, or hospitalization among their employees. Affected and unaffected companies at a given site utilized essentially the same techniques and equipment and rafted the same stretches of river at the same times and days. Seven of 12 operations had on-site, multiple-occupancy sleeping units, as well as other "communal" facilities. All seven "communal" sites and none of five "non-communal" ones reported staphylococcal infections and had had employees on antibiotics ($p = 0.001$); five of seven "communal" and none of five "non-communal" sites had had employees hospitalized for staphylococcal infections ($p = 0.0265$).

One other "communal" and one "non-communal" company operating on the Ocoee were selected for further investigation. Nine of 11 employees at the "communal" company (Company B) and 14 of 15 employees of the "non-communal" company (Company C) were interviewed, examined, and cultured as above. Two of nine employees at Company B were cases, as compared with no cases among 14 employees of Company C.

All culture specimens were routinely processed by TDPH laboratories, and isolates of coagulase-positive *Staphylococcus aureus* were phage-typed by CDC. *S. aureus* carriage rates were 56.5% at Company A, 88.9% at Company B, and 42.9% at Company C. Phage typing revealed several co-dominant phage types at Company A, two dominant phage types at Company B, and no pattern of phage types at Company C.

Employees at both affected and unaffected companies reported frequent skin abrasions caused by jamming their legs under the aft thwarts of the raft for stability. Accordingly, further studies were undertaken at Company A. Five of 27 rafts cultured before a trip were positive for *S. aureus*, as were 12 of 22 rafts cultured after a trip (odds ratio = 4.9, $p < 0.025$). Eighteen rafts were cultured both before and after use. Three were positive for *S. aureus* before a trip, and two of these remained positive after the trip. Of the fifteen rafts negative before a trip, eight were positive after the trip (53% conversion) including three of three at the Chattooga site and five of 12 at the Ocoee site ($p = 0.12$). Two of seven rafts in storage over 72 hours were also positive for *S. aureus*.

Recommended control measures were routine hexachlorophene scrubs for all employees, active surveillance for new cases, prompt medical treatment, isolation of active cases, and improved management of linens and equipment. New cases have not been reported since instituting these measures.

Reported by R Baron, MD, Benton Health Center, Benton, W Schaffner, MD, Vanderbilt University, F Hadley, MD, R Kelley, F Jordan, RH Hutcheson, Jr, MD, State Epidemiologist, Tennessee State Dept of Public Health; JN MacCormack, MD, MP Hines, DVM, State Epidemiologist, North Carolina State Dept of

Staphylococcal Infections – Continued

Human Resources; RL Parker, DVM, State Epidemiologist, South Carolina State Dept of Health and Environmental Control; Field Svcs Div, Epidemiology Program Office, Hospital Infections Program, Center for Infectious Diseases, CDC.

Editorial Note: Epidemic staphylococcal disease is an unusual occupational hazard outside of health care settings. Outbreaks similar to this one are reported to have occurred among members of high school football teams, and to have responded to similar control measures. These reports, however, involved persons with direct, violent, physical contact.

In this report, several epidemiologic features apparently contributed to the spread of disease among the river guides. Whitewater rafting is a seasonal sport; each spring, as the guides arrive, strains of *S. aureus* are undoubtedly introduced into the group by human carriers. The guides' constant exposure to river rafts and the associated trauma to their shins and ankles provide sites for inoculation of the organism and subsequent infection. It is particularly noteworthy that some of the same strains of *S. aureus* infecting the guides were readily recoverable from rafts after several hours of alternate submersion in the river and drying in fresh air and sunlight, even when cultured as long as 72 hours after the raft was last used. *S. aureus* is known to be resistant to drying and to be recoverable from environmental sources, such as dust, for long periods of time; however, such environmental sources of *S. aureus* are not usually believed to be epidemiologically important in transmission of infection and disease, especially in comparison with the potential for transmission from human disseminators (including auto-inoculation).

If persistence of the organism on the rafts and direct inoculation of traumatized skin surfaces by this route were the only mechanism of transmission in this outbreak, differences in the frequency of disease among companies with "communal" and "non-communal" living arrangements or among different river sites would not be expected. Differences do exist for each of these factors, as well as for association of disease among roommates in the "communal" facilities. The "communal" living arrangements apparently altered the epidemiology of the disease, perhaps by facilitating the selection and maintenance of more virulent strains of *S. aureus*, by promoting frequent transmission of staphylococci among roommates, or by providing other means of transmission of the organism to traumatized skin sites, i.e., auto-inoculation. Although factors facilitating such transmission were sought, none was identified. Company A's practice of randomly and frequently rotating the employees may have disseminated the more virulent strains of *S. aureus* to all river sites used by the company.

Hearing Protectors: Field Measurements

In 1977 and 1981, the National Institute for Occupational Safety and Health (NIOSH) conducted field investigations to determine the amount of noise reduction (attenuation) afforded to industrial workers who use earplugs. Tests of 420 workers at 15 industrial plants indicated that 50% of the workers received less than half the potential protection demonstrated in laboratory testing.

Earplug distributors label their products with noise-reduction indexes based on data from standard audiometric laboratory tests. Although earplugs can provide adequate protection from noise hazards, workers generally wear earplugs incorrectly; thus, distributors' estimates may greatly exceed the actual protection of earplugs.

The field investigations included evaluations of five general types of earplug design: twin-flanged (pre-formed in "small" and "regular" sizes); single-flanged (pre-formed in five sizes); acoustic wool (two types made of user-formed cotton-like material, one with a pre-formed

Hearing Protectors — Continued

plastic shroud); custom-molded (two types, one vented with a "noise filter"); and expandable acoustic foam (two types differing only in color).

Twenty-eight workers who used the same type of earplug were randomly selected at each plant. The attenuation provided by the earplug was audiometrically measured for each worker and was then plotted against the tested sound frequency (*1,2*). These results were compared with the results of previous laboratory tests of attenuation at the same frequencies, and, in most cases, revealed substantial differences between the attenuation values recorded in the field and those recorded in the laboratory.

The noise reduction afforded each worker was calculated using the attenuation value at each test frequency and a typical industrial noise spectrum adjusted according to a frequency contour (known as "A-weighting") approximating the human ear response (Table 1). Overall, the median reduction value was 13 decibels (dB) under actual working conditions versus 28 dB estimated from data provided by the distributors.

Reported by Div of Biomedical and Behavioral Science, National Institute for Occupation Safety and Health, CDC.

Editorial Note: There are many reasons for differences between the results of field and laboratory testing. Sizing, fit, and method of insertion are usually less than optimal in preformed and user-formed earplugs. Effectiveness of the custom-molded types depends on preparation of the impression materials and fit of the final mold. The expandable foam ear-

(Continued on page 613)

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

Disease	45th Week Ending			Cumulative, First 45 Weeks		
	November 13, 1982	November 14, 1981	Median 1977-1981	November 13, 1982	November 14, 1981	Median 1977-1981
Aseptic meningitis	221	215	176	7,851	8,458	6,756
Brucellosis	2	5	3	142	148	153
Encephalitis: Primary (arthropod-borne & unspec.)	22	32	28	1,228	1,303	1,048
Post-infectious	2	1	2	56	81	190
Gonorrhea: Civilian	15,304	17,153	19,202	825,246	869,298	869,298
Military	554	325	402	22,876	24,114	23,905
Hepatitis: Type A	461	489	573	19,445	21,690	25,203
Type B	412	434	314	18,456	17,698	14,203
Non A, Non B	44	N	N	1,983	N	N
Unspecified	170	218	218	7,648	9,354	8,984
Legionellosis	14	N	N	454	N	N
Leprosy	8	3	1	178	218	150
Malaria	14	11	14	911	1,221	665
Measles (rubeola)	27	50	88	1,525	2,803	13,128
Meningococcal infections: Total	59	68	41	2,544	3,033	2,246
Civilian	59	67	41	2,531	3,021	2,226
Military	-	1	-	13	12	17
Mumps	52	132	144	4,615	3,883	12,161
Pertussis	69	19	30	1,510	1,079	1,486
Rubella (German measles)	11	16	60	2,149	1,899	11,113
Syphilis (Primary & Secondary): Civilian	474	585	540	28,323	26,766	21,596
Military	9	5	5	388	334	272
Tuberculosis	469	467	484	22,173	23,400	23,767
Tularemia	2	2	2	227	238	173
Typhoid fever	7	9	11	347	514	453
Typhus fever, tick-borne (RMSF)	5	6	6	952	1,150	1,085
Rabies, animal	107	92	92	5,436	6,433	4,468

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1982		Cum. 1982
Anthrax	-	Poliomyelitis: Total	5
Botulism (Calif. 4)	75	Paralytic (NYC 1)	5
Cholera	-	Psittacosis (Calif. 1)	104
Congenital rubella syndrome	6	Rabies, human	-
Diphtheria	2	Tetanus (Calif. 1)	69
Leptospirosis	61	Trichinosis	78
Plague	18	Typhus fever, flea-borne (endemic, murine)	38

TABLE III. Cases of specified notifiable diseases, United States, weeks ending November 13, 1982 and November 14, 1981 (45th 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	221	142	1,228	56	825,246	869,298	461	412	44	170	14	178
NEW ENGLAND	3	3	50	6	19,938	21,285	18	17	1	12	-	1
Maine	-	-	-	-	1,034	1,149	-	1	-	1	-	-
N.H.	1	-	8	-	656	779	1	-	-	-	-	-
Vt.	-	-	-	-	371	384	7	1	1	-	-	-
Mass.	2	-	20	-	8,963	8,983	3	3	-	11	-	-
R.I.	-	-	-	1	1,327	1,274	4	4	-	-	-	-
Conn.	-	3	22	5	7,587	8,716	3	8	-	-	-	1
MID. ATLANTIC	29	3	123	14	104,846	104,901	61	71	4	11	1	9
Upstate N.Y.	5	3	50	3	17,347	18,085	2	7	-	3	-	1
N.Y. City	14	-	19	-	42,915	42,840	7	24	-	-	-	6
N.J.	7	-	22	-	19,105	20,015	11	18	4	3	1	1
Pa.	3	-	32	11	25,479	23,961	41	22	-	5	-	1
E.N. CENTRAL	30	4	311	11	112,873	128,916	52	61	2	10	10	9
Ohio	11	1	118	4	31,292	40,294	26	17	-	3	8	-
Ind.	U	-	83	3	13,924	10,859	U	U	U	U	U	-
Ill.	2	2	15	2	28,875	37,314	14	8	2	-	-	8
Mich.	17	1	66	-	28,308	28,508	12	36	-	7	2	-
Wis.	-	-	29	2	10,474	11,941	-	-	-	-	-	1
W.N. CENTRAL	23	16	88	5	39,072	42,079	8	12	-	4	-	6
Minn.	-	1	27	1	5,681	6,701	3	1	-	-	-	4
Iowa	11	5	44	1	4,134	4,584	2	1	-	-	-	-
Mo.	7	4	7	1	18,533	19,529	1	9	-	4	-	1
N. Dak.	-	-	-	-	510	522	-	-	-	-	-	-
S. Dak.	1	1	-	1	1,030	1,107	-	1	-	-	-	1
Nebr.	1	2	5	-	2,318	3,112	1	-	-	-	-	-
Kans.	3	3	5	1	6,866	6,524	1	-	-	-	-	-
S. ATLANTIC	52	27	184	8	218,615	214,093	60	91	15	14	2	10
Del.	-	-	-	-	3,603	3,424	-	2	2	1	-	-
Md.	2	-	23	-	27,238	25,301	3	7	-	2	1	3
D.C.	-	-	-	-	13,027	12,059	-	-	-	-	-	-
Va.	22	9	38	1	17,512	19,647	7	20	5	-	1	1
W. Va.	4	-	16	-	2,432	3,225	1	2	1	-	-	-
N.C.	9	-	27	1	34,908	33,137	4	8	-	-	-	-
S.C.	-	2	2	-	20,887	20,920	18	12	1	-	-	-
Ga.	1	3	14	-	43,353	44,416	10	25	-	2	-	1
Fla.	14	13	64	6	55,655	51,964	17	15	6	9	-	5
E.S. CENTRAL	10	12	60	2	71,866	72,800	11	25	2	-	-	-
Ky.	-	-	1	-	9,803	9,065	4	4	-	-	-	-
Tenn.	6	7	27	-	28,334	27,491	2	10	2	-	-	-
Ala.	-	4	16	2	20,840	22,166	-	6	-	-	-	-
Miss.	4	1	16	-	12,889	14,078	5	5	-	-	-	-
W.S. CENTRAL	18	44	192	1	114,582	114,576	91	28	1	60	-	27
Ark.	1	7	19	-	9,345	8,755	1	-	-	1	-	-
La.	2	8	24	-	21,395	19,799	6	3	-	5	-	-
Okla.	7	7	35	-	12,549	12,560	19	6	1	20	-	-
Tex.	8	22	114	1	71,293	73,462	65	19	-	34	-	27
MOUNTAIN	18	3	41	3	28,007	34,293	32	14	5	10	-	2
Mont.	-	2	-	-	1,178	1,255	-	-	1	-	-	-
Idaho	1	1	-	-	1,329	1,516	-	-	-	1	-	1
Wyo.	1	-	-	-	851	908	-	-	-	-	-	-
Colo.	5	-	19	1	7,474	9,194	3	7	-	-	-	-
N. Mex.	2	-	1	-	3,882	3,867	10	1	1	2	-	-
Ariz.	-	-	11	-	7,275	10,116	8	3	3	4	-	-
Utah	9	-	5	2	1,386	1,706	10	3	-	1	-	1
Nev.	-	-	5	-	4,632	5,731	1	-	-	2	-	-
PACIFIC	38	30	179	6	115,447	136,355	128	93	14	49	1	114
Wash.	2	1	12	-	9,969	11,516	9	5	-	4	1	8
Oreg.	3	-	4	-	6,853	8,048	12	15	1	2	-	1
Calif.	29	28	149	6	93,418	110,609	106	68	12	43	-	74
Alaska	2	1	10	-	2,975	3,538	1	4	-	-	-	1
Hawaii	2	-	4	-	2,232	2,644	-	1	1	-	-	30
Guam	U	-	-	1	106	98	U	U	U	U	U	1
P.R.	-	-	1	3	2,336	2,825	8	2	-	3	-	1
V.I.	-	-	-	-	209	211	1	-	-	-	-	-
Pac. Trust Terr.	U	-	-	-	338	397	U	U	U	U	U	43

N: Not notifiable U: Unavailable

TABLE III. (Cont.'d). Cases of specified notifiable diseases, United States, weeks ending November 13, 1982 and November 14, 1981 (45th 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	14	911	27	1,525	2,803	59	2,544	52	4,615	69	11	2,149	1,899
NEW ENGLAND	-	44	-	16	83	4	134	-	188	1	-	24	119
Maine	-	-	-	-	5	-	9	-	41	-	-	-	33
N.H.	-	2	-	3	6	-	17	-	18	-	-	10	51
Vt.	-	-	-	2	3	1	11	-	7	-	-	-	-
Mass.	-	24	-	5	59	2	34	-	86	1	-	8	23
R.I.	-	3	-	-	-	-	16	-	16	-	-	1	-
Conn.	-	15	-	6	10	1	47	-	20	-	-	5	12
MID. ATLANTIC	2	151	1	168	909	15	460	6	308	39	-	103	222
Upstate N.Y.	1	28	-	116	214	4	157	2	82	38	-	49	107
N.Y. City	1	58	-	42	90	1	90	-	47	-	-	35	55
N.J.	-	31	1	6	58	4	93	4	51	-	-	18	47
Pa.	-	34	-	4	547	6	120	-	128	1	-	1	13
E.N. CENTRAL	-	83	-	77	84	8	327	18	2,309	19	4	190	406
Ohio	-	13	-	1	16	6	118	6	1,604	1	2	2	3
Ind.	U	3	U	2	9	U	31	U	40	U	U	29	135
Ill.	-	35	-	24	23	1	80	-	196	15	-	69	110
Mich.	-	26	-	50	33	1	75	12	350	3	-	49	37
Wis.	-	6	-	-	3	-	23	-	119	-	2	41	121
W.N. CENTRAL	1	25	-	49	10	6	125	14	603	4	-	60	79
Minn.	-	2	-	-	3	-	31	4	451	-	-	6	8
Iowa	1	8	-	-	1	-	12	10	45	-	-	-	4
Mo.	-	8	-	2	1	4	34	-	19	2	-	38	2
N. Dak.	-	1	-	-	-	-	6	-	-	-	-	-	-
S. Dak.	-	-	-	-	-	1	7	-	1	1	-	1	-
Nebr.	-	3	-	3	4	-	14	-	1	-	-	-	1
Kans.	-	3	-	44	1	1	21	-	86	1	-	15	64
S. ATLANTIC	2	125	20	130	457	8	531	-	280	2	1	89	139
Del.	-	4	-	-	-	-	-	-	12	-	-	1	1
Md.	1	20	-	3	5	1	37	-	30	-	-	34	1
D.C.	-	4	-	1	1	-	4	-	-	-	-	-	-
Va.	-	39	-	14	9	1	64	-	38	-	-	13	6
W. Va.	-	7	-	3	9	1	10	-	97	-	-	2	22
N.C.	-	7	-	1	3	1	102	-	20	1	-	2	5
S.C.	-	4	-	-	2	3	64	-	17	-	-	1	8
Ga.	-	16	-	-	111	1	105	-	20	-	-	16	37
Fla.	1	24	20	108	317	-	145	-	46	1	1	20	59
E.S. CENTRAL	-	9	-	9	5	3	153	3	60	-	1	47	37
Ky.	-	5	-	1	1	-	25	1	20	-	1	29	23
Tenn.	-	-	-	6	2	1	67	1	23	-	-	2	13
Ala.	-	1	-	2	2	-	48	-	9	-	-	-	1
Miss.	-	3	-	-	-	2	13	1	8	-	-	16	-
W.S. CENTRAL	1	62	-	155	870	7	298	1	214	2	-	117	173
Ark.	-	4	-	-	23	1	15	-	7	-	-	1	6
La.	-	5	-	2	4	1	62	-	6	-	-	1	9
Okla.	-	8	-	30	6	-	28	-	-	1	-	3	2
Tex.	1	45	-	123	837	5	193	1	201	1	-	112	156
MOUNTAIN	-	30	-	28	35	3	112	1	103	1	-	80	95
Mont.	-	1	-	-	-	-	6	-	4	-	-	5	3
Idaho	-	2	-	-	1	-	7	-	4	1	-	6	4
Wyo.	-	-	-	1	1	-	5	-	2	-	-	7	12
Colo.	-	12	-	7	10	2	48	-	17	-	-	6	30
N. Mex.	-	3	-	-	8	-	15	-	-	-	-	6	5
Ariz.	-	8	-	17	5	1	20	1	49	-	-	16	21
Utah	-	4	-	3	-	-	9	-	20	-	-	22	9
Nev.	-	-	-	-	10	-	2	-	7	-	-	12	11
PACIFIC	8	382	6	893	350	5	404	9	550	1	5	1,439	629
Wash.	-	23	-	42	3	-	48	5	76	-	-	38	92
Oreg.	-	14	-	23	5	1	75	-	-	-	-	6	53
Calif.	8	340	6	822	335	4	266	3	443	1	5	1,381	468
Alaska	-	1	-	1	-	-	11	1	11	-	-	5	1
Hawaii	-	4	-	5	7	-	4	-	20	-	-	9	15
Guam	U	1	U	6	6	U	2	U	3	U	U	2	2
P.R.	-	4	-	132	288	-	8	-	78	-	-	11	4
V.I.	-	-	-	-	24	-	-	-	3	-	1	2	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 November 13, 1982 and November 14, 1981 (45th 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	28,323	26,766	469	22,173	227	7	347	5	952	5,436
NEW ENGLAND	508	507	14	618	6	-	17	-	11	41
Maine	7	5	1	53	-	-	-	-	-	26
N.H.	1	12	3	26	-	-	-	-	1	1
Vt.	4	16	-	10	-	-	2	-	-	2
Mass.	345	324	7	392	6	-	13	-	6	6
R.I.	22	32	-	26	-	-	-	-	2	-
Conn.	129	118	3	111	-	-	2	-	2	6
MID. ATLANTIC	3,824	3,815	92	3,742	7	-	63	-	44	189
Upstate N.Y.	387	374	20	643	7	-	9	-	16	103
N.Y. City	2,269	2,261	32	1,449	-	-	34	-	3	-
N.J.	563	536	18	725	-	-	12	-	13	17
Pa.	605	644	22	925	-	-	8	-	12	69
E.N. CENTRAL	1,559	2,022	56	3,359	1	1	32	-	84	547
Ohio	268	268	3	549	-	1	12	-	76	76
Ind.	174	267	U	397	-	U	2	U	2	70
Ill.	774	1,079	34	1,473	-	-	6	-	6	280
Mich.	257	329	12	754	-	-	9	-	-	6
Wis.	86	79	7	186	1	-	3	-	-	115
W.N. CENTRAL	482	587	27	662	35	-	16	-	33	1,102
Minn.	116	175	13	120	-	-	8	-	-	188
Iowa	29	24	1	67	3	-	1	-	4	358
Mo.	264	336	7	320	22	-	4	-	12	113
N. Dak.	7	9	-	13	-	-	-	-	-	91
S. Dak.	2	2	2	29	1	-	-	-	4	95
Nebr.	14	10	-	26	4	-	2	-	2	116
Kans.	50	31	4	87	5	-	1	-	11	141
S. ATLANTIC	7,794	7,148	99	4,611	12	1	41	2	510	1,099
Del.	21	13	-	42	-	-	-	-	-	2
Md.	428	513	11	534	1	-	9	-	49	53
D.C.	413	572	1	228	-	-	-	-	-	-
Va.	544	619	22	509	4	-	3	1	73	612
W. Va.	28	23	4	137	-	-	4	-	8	42
N.C.	632	571	8	684	-	1	3	1	219	65
S.C.	488	491	12	441	6	-	3	-	105	64
Ga.	1,624	1,759	18	743	-	-	-	-	50	195
Fla.	3,616	2,587	23	1,293	1	-	19	-	6	66
E.S. CENTRAL	1,969	1,755	42	2,026	8	1	20	2	94	594
Ky.	119	94	4	536	-	-	4	-	1	123
Tenn.	553	623	23	663	6	1	4	-	59	329
Ala.	742	527	11	546	-	-	9	-	15	135
Miss.	555	511	4	281	2	-	3	2	19	7
W.S. CENTRAL	7,488	6,440	42	2,657	118	2	37	1	157	1,045
Ark.	186	142	2	310	72	2	7	-	22	143
La.	1,634	1,469	21	412	3	-	3	-	2	31
Okla.	161	153	.	291	33	-	3	-	76	181
Tex.	5,507	4,676	19	1,644	10	-	24	1	57	690
MOUNTAIN	716	654	15	614	30	-	14	-	13	264
Mont.	5	11	-	38	4	-	-	-	4	84
Idaho	25	18	-	28	1	-	-	-	4	10
Wyo.	16	16	-	6	5	-	-	-	1	21
Colo.	187	192	2	79	7	-	3	-	1	48
N. Mex.	170	113	-	101	2	-	-	-	1	23
Ariz.	197	163	9	258	-	-	8	-	-	56
Utah	21	26	1	41	11	-	2	-	-	18
Nev.	95	115	3	63	-	-	1	-	2	4
PACIFIC	3,983	3,838	82	3,884	10	2	107	-	6	555
Wash.	128	165	2	234	1	1	7	-	-	8
Oreg.	96	102	6	171	2	-	4	-	1	4
Calif.	3,646	3,498	71	3,159	6	1	92	-	5	464
Alaska	16	11	-	80	1	-	1	-	-	79
Hawaii	97	62	3	240	-	-	3	-	-	-
Guam	1	-	U	38	-	U	-	U	-	-
P.R.	724	564	-	383	-	-	2	-	-	45
V.I.	22	16	-	1	-	-	-	-	-	-
Pac. Trust Terr.	-	-	U	108	-	U	-	U	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending November 13, 1982 (45th week)

Reporting Area	All Causes, By Age (Years)						P&I** Total
	All Ages	≥65	45-64	25-44	1-24	<1	
NEW ENGLAND	590	379	148	27	15	21	56
Boston, Mass.	185	118	42	11	6	8	25
Bridgeport, Conn.	43	30	8	4	-	1	4
Cambridge, Mass.	23	12	11	-	-	-	4
Fall River, Mass.	20	11	6	2	-	1	1
Hartford, Conn.	33	15	16	1	-	1	2
Lowell, Mass.	27	18	8	1	-	-	2
Lynn, Mass.	20	10	8	1	1	-	1
New Bedford, Mass	20	15	4	-	-	1	1
New Haven, Conn.	39	27	5	-	3	4	2
Providence, R.I.	44	23	17	2	-	2	3
Somerville, Mass.	4	2	2	-	-	-	-
Springfield, Mass.	37	27	6	2	1	1	6
Waterbury, Conn.	30	25	2	2	1	-	4
Worcester, Mass.	65	46	13	1	3	2	1
MID. ATLANTIC	2,354	1,539	547	160	58	47	76
Albany, N.Y.	40	31	5	2	1	1	-
Allentown, Pa.	16	12	4	-	-	-	1
Buffalo, N.Y.	102	76	19	1	3	3	6
Camden, N.J.	51	31	15	4	-	1	-
Elizabeth, N.J.	30	21	4	3	1	1	-
Erie, Pa.†	43	20	17	3	2	1	-
Jersey City, N.J.	48	31	13	1	1	2	-
N.Y. City, N.Y.	1,261	821	294	102	28	16	35
Newark, N.J.	64	23	20	9	4	5	2
Paterson, N.J.	23	14	5	2	-	2	-
Philadelphia, Pa.†	211	129	52	14	11	5	11
Pittsburgh, Pa.†	48	26	18	3	-	1	4
Reading, Pa.	41	33	6	-	-	2	2
Rochester, N.Y.	117	79	27	6	3	2	4
Schenectady, N.Y.	33	28	3	1	-	1	1
Scranton, Pa.†	37	27	8	1	1	-	2
Syracuse, N.Y.	99	70	23	3	-	3	3
Trenton, N.J.	32	23	5	3	-	1	-
Utica, N.Y.	23	19	2	2	-	-	2
Yonkers, N.Y.	35	25	7	-	3	-	3
E.N. CENTRAL	1,976	1,254	488	114	55	65	51
Akron, Ohio	23	13	7	2	-	1	-
Canton, Ohio	31	22	6	-	1	2	1
Chicago, Ill	474	286	126	31	15	16	10
Cincinnati, Ohio	105	78	21	3	1	2	10
Cleveland, Ohio	141	93	34	3	5	6	4
Columbus, Ohio	141	87	41	3	7	3	1
Dayton, Ohio	103	63	26	6	5	3	-
Detroit, Mich.	235	138	53	24	7	13	7
Evansville, Ind.	26	20	3	2	-	1	-
Fort Wayne, Ind.	40	19	11	6	2	2	-
Gary, Ind.	25	15	4	4	1	1	-
Grand Rapids, Mich.	40	26	7	2	-	5	-
Indianapolis, Ind.	165	103	51	9	1	1	3
Madison, Wis.	36	19	12	2	1	2	2
Milwaukee, Wis.	118	83	29	4	2	-	3
Peoria, Ill.	51	31	11	4	2	3	6
Rockford, Ill.	48	34	9	4	1	-	2
South Bend, Ind.	40	24	13	1	-	2	-
Toledo, Ohio	74	58	10	3	2	1	1
Youngstown, Ohio	60	42	14	1	2	1	1
W.N. CENTRAL	601	400	137	24	12	28	26
Des Moines, Iowa	45	28	12	-	1	4	5
Duluth, Minn.	14	10	3	1	-	-	-
Kansas City, Kans.	24	13	8	2	-	1	-
Kansas City, Mo.	94	61	22	5	1	5	4
Lincoln, Nebr.	25	18	7	-	-	-	2
Minneapolis, Minn.	69	45	13	2	2	7	3
Omaha, Nebr.	64	40	19	1	-	4	5
St. Louis, Mo.	137	100	26	6	2	3	4
St. Paul, Minn.	66	46	13	4	3	-	1
Wichita, Kans.	63	39	14	3	3	4	2
S. ATLANTIC	1,130	697	273	71	34	52	47
Atlanta, Ga.	132	64	44	17	4	3	3
Baltimore, Md.	302	170	91	14	13	14	3
Charlotte, N.C.	56	31	15	5	3	1	9
Jacksonville, Fla.	110	67	26	9	4	4	4
Miami, Fla.	50	26	15	5	1	3	2
Norfolk, Va.	48	27	11	3	2	5	3
Richmond, Va.	84	52	24	4	1	3	2
Savannah, Ga.	47	27	15	4	-	1	7
St. Petersburg, Fla.	75	65	7	-	1	2	3
Tampa, Fla.	45	23	12	2	1	7	2
Washington, D.C. §	126	112	1	4	2	5	2
Wilmington, Del.	55	33	12	4	2	4	7
E.S. CENTRAL	633	385	148	41	22	37	32
Birmingham, Ala.	75	42	20	5	4	4	-
Chattanooga, Tenn.	64	42	16	6	-	-	5
Knoxville, Tenn.	39	31	4	2	2	-	4
Louisville, Ky.	93	59	22	4	2	6	6
Memphis, Tenn.	127	68	34	11	5	9	7
Mobile, Ala.	91	55	21	6	2	7	4
Montgomery, Ala.	37	20	8	1	2	6	2
Nashville, Tenn.	107	68	23	6	5	5	4
W.S. CENTRAL	1,180	691	300	102	47	39	33
Austin, Tex.	35	25	6	3	1	-	3
Baton Rouge, La.	26	17	6	3	-	-	1
Corpus Christi, Tex.	48	32	11	2	-	3	-
Dallas, Tex.	166	105	39	11	2	9	1
El Paso, Tex.	49	26	16	2	4	1	2
Fort Worth, Tex.	78	49	17	8	2	2	3
Houston, Tex.	292	145	77	38	19	13	-
Little Rock, Ark.	58	35	16	3	1	3	5
New Orleans, La.	155	98	35	14	7	1	-
San Antonio, Tex.	121	63	40	8	7	3	6
Shreveport, La.	70	40	24	2	1	3	4
Tulsa, Okla.	82	56	13	8	3	1	8
MOUNTAIN	534	344	120	35	16	18	26
Albuquerque, N.Mex.	72	39	19	7	3	4	3
Colo. Springs, Colo.§	32	30	-	-	1	-	5
Denver, Colo.	104	65	21	8	2	8	1
Las Vegas, Nev.	53	35	11	6	1	-	3
Ogden, Utah	21	15	4	1	-	1	2
Phoenix, Ariz.	129	82	31	8	7	1	2
Pueblo, Colo.	17	10	6	1	-	-	3
Salt Lake City, Utah	39	20	13	2	-	4	2
Tucson, Ariz.	67	48	15	2	2	-	5
PACIFIC	1,629	1,079	346	103	49	52	55
Berkeley, Calif.	15	13	1	1	-	-	1
Fresno, Calif.	67	43	15	4	2	3	4
Glendale, Calif.	17	13	2	1	-	1	-
Honolulu, Hawaii	60	45	10	3	1	1	3
Long Beach, Calif.	90	54	31	3	-	2	1
Los Angeles, Calif.	489	329	95	39	16	10	6
Oakland, Calif.	80	51	19	3	3	4	3
Pasadena, Calif.	24	20	2	-	1	1	2
Portland, Oreg.	119	79	30	4	4	2	4
Sacramento, Calif.	68	43	14	3	3	5	1
San Diego, Calif.	98	60	21	8	5	4	9
San Francisco, Calif.	128	77	30	13	3	5	4
San Jose, Calif.	134	79	34	11	6	4	9
Seattle, Wash.	153	104	35	6	1	7	2
Spokane, Wash.	49	40	3	2	3	1	4
Tacoma, Wash.	38	29	4	2	1	2	2
TOTAL	10,627††	6,768	2,507	677	308	359	402

* 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.

Hearing Protectors — Continued

plugs may not be inserted fully and are often not held in place to prevent slippage as they expand.

Noise-induced hearing loss is one of the most serious and common occupational diseases. More than three million workers wear hearing protectors in industrial environments where adequate engineering controls are unavailable to reduce noise to acceptable limits. The large differences between the laboratory-derived attenuation values provided by distributors and actual attenuation in industrial settings should be considered by employers when choosing earplugs for their employees. Workers can be endangered from excessive noise exposure if employers assume that workers will be protected to the extent indicated by laboratory tests.

References

1. NIOSH. A field investigation of noise reduction afforded by insert-type hearing protectors. (Pub #79-115): National Institute for Occupational Safety and Health, CDC, 1978.
2. NIOSH. A second field investigation of noise reduction afforded by insert-type hearing protectors, final report (#210-81-3001, unpublished). National Institute for Occupational Safety and Health, CDC, 1982.

TABLE 1. Median A-weighted noise reduction

Earplug type	Number of plants	Field tests (dB)*	Laboratory tests† (dB)
Twin-flanged	1	3	30
Single-flanged	3	8	29
Acoustic wool, type A	2	9	22
Acoustic wool, type B	1	11	30
Custom-molded, type A	2	12	20
Custom-molded, type B	2	15	19
Acoustic foam, type A	2	21	36
Acoustic foam, type B	2	17	36

*decibels

†Estimated from data provided by the distributor.

Current Trends

Human *Salmonella* Isolates — United States, 1981

In 1981, 35,625 salmonellae isolations (including *Salmonella typhi*) from humans were reported to CDC. This represents an increase of 18.7% over the 30,004 isolates reported in 1980. The ten most frequently isolated serotypes comprised 68.7% of the total isolates (Table 1). Four of these accounted for 53% of the increase; *S. typhimurium** alone accounted for over 30% (10,443 to 12,176) of the increase; *S. enteritidis* for 11% (1,904 to 2,554); *S. newport* for 8% (1,651 to 2,134); and *S. muenchen* for 4% (374 to 644). Increases were also reported in some of the less frequently isolated serotypes. For example, *S. drypool* increased 476% (17 to 98 isolations) from 1980; *S. chester*, 231% (55 to 182); *S. hadar*, 194% (47 to 138); and *S. seftenberg*, 138% (87 to 207).

The increase in isolates was not confined to one state or region. California, Georgia, Illinois, Louisiana, Massachusetts, Michigan, New York, and Ohio, accounted for 71% of the 18.7% increase. For some serotypes, increases were attributed to outbreaks in one or more states.

*Includes *S. typhimurium* var. *copenhagen*

Michigan and Ohio accounted for 44.8% of the increase in *S. muenchen*, part of which may be attributed to an outbreak associated with marijuana contaminated with *S. muenchen* (*1*). Seventy-nine percent of the increase in *S. chester* occurred in Massachusetts and Vermont; an outbreak associated with this serotype was traced to roast beef in Vermont (*2*). A 39% increase in *S. newport* occurred in New Jersey, Pennsylvania, and Washington; increases were associated with eating pre-cooked roast beef in New Jersey and Pennsylvania (*3*). An outbreak of *S. newport* was reported in Washington, but no vehicle was identified. Eighty-seven percent of the increase in *S. drypool* occurred in California, Ohio, and Texas; outbreaks were reported in Ohio and Texas (*4*). Illinois, which accounted for 90% of the increase in *S. seftenberg*, reported an outbreak of this serotype in a prison system. Increases in *S. hadar*, *S. typhimurium*, and *S. enteritidis* were not confined to any single state.

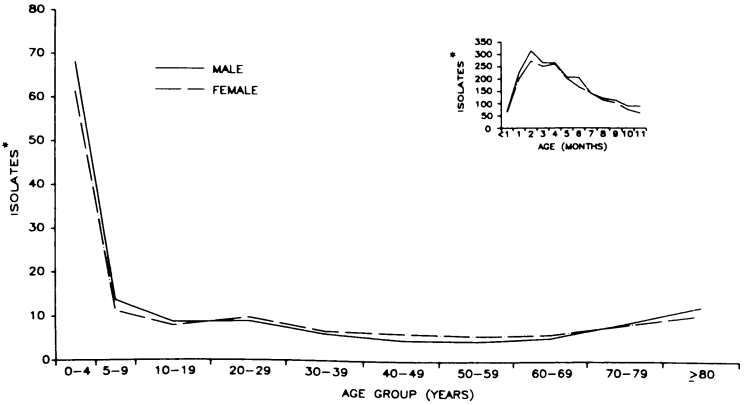
Figure 1 shows the reported age distribution of persons from whom isolates were obtained. The rate was highest for 2- to 4-month old infants, decreased abruptly among age groups of early childhood, and then remained constant through the adult years. The rate of

TABLE 1. The 10 serotypes of *Salmonella* most frequently isolated from humans — United States, 1981.

Serotype	Number of isolates	Percentage of total	Median age of persons from whom isolates were obtained
*S. typhimurium**	12,176	34.2	8.0
S. enteritidis	2,554	7.2	19.0
S. newport	2,134	6.0	15.0
S. heidelberg	2,049	5.8	4.0
S. infantis	1,497	4.2	5.0
S. agona	1,205	3.4	2.0
S. saint-paul	861	2.4	17.5
S. montevideo	739	2.1	18.5
S. muenchen	644	1.8	15.5
S. typhi	604	1.7	26.0
Subtotal	24,463	68.8	
Total	35,625		12.0

*Includes *S. typhimurium* var. copenhagen.

FIGURE 1. *Salmonella* isolation rates* by age and sex of patient — United States, 1981



*Per 100,000 population.

Salmonella — Continued

Salmonella isolation was slightly higher among males than among females in the < 20-year age groups; it was slightly higher among females than among males in the 20-69 year age groups. This is consistent with data from previous years. The increase in reported isolates occurred in all age groups; however, the largest increases occurred in the 20-29, 30-39, and 40-49-year age groups. During the past 14 years, the median age of all persons from whom isolates were obtained has continued to increase, from a median of 6 years in 1968 to 12 years in 1981. Table 1 reports the median age of persons from whom isolates were obtained for the 10 serotypes of *Salmonella* most frequently isolated.

In 1981, 38 of 604 reported isolates of *S. typhi* were from carriers, 195 from cases, and the remaining 371, undesignated. The carriers' median age was 61.0, while that of the new cases was 23.0.

Reported by Statistical Svcs Activity, Enteric Diseases Br, Div of Bacterial Diseases, Center for Infectious Diseases, CDC.

Editorial Note: This report is based on the Salmonella Surveillance Activity conducted by the Association of State and Territorial Epidemiologists and by CDC. It is a passive laboratory-based system that receives weekly reports from the 50 states and the District of Columbia and regular summaries from the U.S. Department of Agriculture. The reports do not distinguish between clinical and subclinical infections or between chronic and convalescent carriers. Many selective factors affect whether an infection will be reported. Despite such restrictions, these data provide a basis for comparison with past and future tabulations.

The number of reported *Salmonella* isolations has been steadily increasing since 1977, but the 1981 annual increase of 18.7% is larger than in previous years. Some of this may be artifactual, but increases seen annually are probably not all the result of artifacts. The disproportionately greater increase among young adults in certain states suggests possible recent increases in exposure of this age group to specific contaminated vehicles in certain areas of the country. The gradual increase in the median age of all cases of salmonellosis in the last few years may also indicate a shift in relative rates of exposure of different age groups to contaminated vehicles.

In many outbreaks, the cause was a relatively uncommon serotype, which points to the importance of serotyping *Salmonella*. Recent application of molecular biologic techniques to epidemiologic studies has assisted in providing means of identifying outbreaks caused by common serotypes, and further uses of these techniques are currently being evaluated. In this way, the surveillance data will serve as indicators of the effectiveness of various public health control measures.

References

1. Taylor DN, Wachsmuth IK, Shangkuan Y-H, *et al.* Salmonellosis associated with marijuana: a multistate outbreak traced by plasmid fingerprinting. N Engl J Med 1982;306:1249-53.
2. CDC. Multiple outbreaks of salmonellosis associated with precooked roast beef—Pennsylvania, New York, Vermont. MMWR 1981;30:569-70.
3. CDC. Multistate outbreak of salmonellosis caused by precooked roast beef. MMWR 1981;30:391-2.
4. Riley LW, Cohen ML. Plasmid profiles and *Salmonella* epidemiology. Lancet 1982;1:573. Letter.

The *Morbidity and Mortality Weekly Report* is prepared by the Centers for Disease Control, Atlanta, Georgia, and distributed by the National Technical Information Service, Springfield, Virginia. The data in this report are provisional, based on weekly telegrams 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. Government Printing Office: 1982-740-185/970 Region IV

HHS Publication No. (CDC) 83-8017