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CURRENT TRENDS

NEUROPATHOLOGY IN NEWBORN INFANTS BATHED WITH HEXACHLOROPHENE - Washington

Pathologic specimens from all children under 5 years autopsied since 1966 have recently been studied by investigators at the University of Washington. This review revealed a total of 21 infants with a similar specific vacuolar lesion of the brainstem, including the reticular formation. A statistically significant association was demonstrated between the vacuolation of the reticular formation (VRF) and 3 or more 3% hexachlorophene (HCP) exposures.

Autopsy specimens came from university-affiliated hospitals that differed in the composition of their pediatric populations and in their bathing practices. Where 3% HCP was employed, rinsing followed its application. Clinical records on all infants studied were searched for basic demographic data and for the number of HCP baths, which were routinely charted.

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The attack rate of VRF among autopsied babies in the study population exposed 3 or more times to 3% HCP in daily baths was 63% (19/30) (Table 1). Among those exposed to 3% HCP fewer than 3 times or exposed only to 100-fold dilutions of 3% HCP, the attack rate was lower than 1% (2/220); 1 of the cases in this latter group had no documented HCP bath. Eighteen of the 21 cases occurred in premature infants weighing under 1,400 gm at birth.

Important subgroups of the study population are compared in Table 2. Infants weighing 1,400 gm or less at birth who spent more than 3 days of neonatal life in the nursery

TABLE I. CASES OF SPECIFIED NOTIFIABLE DISEASES: UNITED STATES (Cumulative totals include revised and delayed reports through previous weeks)

DISEASE	11th WEEK ENDING		MEDIAN 1968-1972	CUMULATIVE, FIRST 11 WEEKS		
	March 17, 1973	March 18, 1972		1973	1972	MEDIAN 1968-1972
Aseptic meningitis	32	25	29	392	376	318
Brucellosis	1	4	4	18	20	20
Chickenpox	6,778	4,631	---	57,659	40,923	---
Diphtheria	3	—	1	52	25	29
Encephalitis, primary:						
Arthropod-borne and unspecified	18	9	19	182	160	211
Encephalitis, post-infectious	6	3	7	41	48	63
Hepatitis, serum (Hepatitis B)	160	200	138	1,482	2,072	1,358
Hepatitis, infectious (Hepatitis A)	1,012	1,204	1,147	10,537	12,130	11,908
Malaria	9	32	51	45	352	493
Measles (rubeola)	785	972	972	7,288	7,953	7,949
Meningococcal infections, total	43	40	83	362	394	769
Civilian	42	36	67	350	378	707
Military	1	4	7	12	16	62
Mumps	2,236	2,292	3,034	20,680	23,271	28,363
Rubella (German measles)	886	1,088	1,871	6,513	6,774	10,602
Tetanus	—	2	2	10	16	16
Tuberculosis, new active	648	729	---	6,115	6,371	---
Tularemia	—	3	1	15	25	23
Typhoid fever	5	5	6	54	53	49
Typhus, tick-borne (Rky. Mt. spotted fever)	—	1	—	6	11	3
Venereal Diseases:						
Gonorrhea	15,395	11,921	---	158,138	140,425	---
Syphilis, primary and secondary	508	428	---	5,707	4,709	---
Rabies in animals	68	112	86	631	817	796

TABLE II. NOTIFIABLE DISEASES OF LOW FREQUENCY

	Cum.		Cum.
Anthrax:	1	Poliomyelitis, total: *	—
Botulism:	—	Paralytic: *	—
Congenital rubella syndrome: *	7	Psittacosis: *	3
Leprosy: Calif. - 1	24	Rabies in man:	—
Leptospirosis:	9	Trichinosis:	18
Plague:	—	Typhus, murine:	4

*Delayed reports: Congenital rubella syndrome: (1972) Colo. 1
Poliomyelitis, paralytic: (1972) Mich. 1
Psittacosis: (1972) Colo. 1

NEUROPATHOLOGY — Continued

Table 1
Proportion of Children Under 5 Years with Reticular Formation Lesion in University of Washington Hospitals

	Neonates ≤1,400 gm at Birth	Neonates >1,400 gm at Birth	Infants >2,500 gm at Birth Surviving More Than 1 Month
Fewer than 3 baths in 3% HCP or only 0.03% HCP baths	2/72	0/84	0/64
3 or more 3% HCP baths	16/16	3/13	0/1

Table 2
Proportion of Infants with Reticular Formation Lesion Spending More Than 3 Days of Neonatal Life in University of Washington Nurseries

Birth Weight†	No Bath	1 or 2 Baths	3 or More Baths
≤1,400 gm	1/9	1/4	16/16
>1,400 gm	0/23	0/7	3/11

were at highest risk; the attack rate of VRF among infants in this subgroup given 3 or more 3% HCP baths was 100% (16/16). Among infants with 1 of 2 exposures, the attack rate was 25% (1/4), and among those with no documented HCP exposure, the attack rate was 11% (1/9). Thus, for neonates weighing 1,400 gm or less at birth, there is a statistically significant correlation between 3 or more exposures to 3% HCP and the presence of the lesion ($p < .0005$); however, the population size was insufficient to allow firm comparisons of the frequency of the lesion following 1 or 2 documented exposures to 3% HCP with the frequency in the absence of HCP exposure.

The same analysis can be made for infants weighing more than 1,400 gm at birth who spent more than 3 days of neonatal life in the nursery. The attack rate of VRF among those bathed 3 or more times in 3% HCP was 27% (3/11), considerably lower than that for infants of 1,400 gm or less with similar exposure. However, this rate is still higher than that for infants weighing more than 1,400 gm who had fewer than 3 HCP baths and among whom no lesion was seen ($p < .02$).

The clinical and extra-neural pathologic findings in the 29 neonates weighing 1,400 gm or less and surviving more than 3 days were also reviewed (Table 2). In 6 of the 18 with the lesion (16 with 3 or more baths and 2 with fewer than 3) fatal diseases or complications could obviously account for death. In contrast, each of the remaining 11 without the lesion showed an obvious cause of death. No specific clinical signs and symptoms have yet been correlated with these neuropathologic lesions.

Another group of 27 infants showed a different, non-specific vacuolation in certain heavily myelinated long tracts but not in the reticular formation. No correlation was established between this nonspecific vacuolation and HCP exposure, and no explanation of this type of lesion has been found.

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Editorial Note

Intensive or extensive exposure to HCP is known to produce neuropathologic changes consisting of spongy vacuolation in myelinated regions of animal brainstem and cerebellar tissue (1). Previously, there has been relatively little evidence of human HCP toxicity, considering its widespread use (2). A recent epidemic of toxic encephalopathy among infants in France was attributed to accidental incorporation of excessive amounts of HCP in a popular baby talcum powder (3). However, until now, no study in human infants with intact skin has demonstrated any significant clinical or neuropathologic abnormalities as a result of exposure to 3% HCP or lower concentrations as routinely applied in hospital nurseries.

The study results reported here raise concern over the use of HCP for infant bathing. An anatomic abnormality has been associated with 3 or more daily baths in 3% HCP, primarily in infants who weighed 1,400 gm or less at birth and who lived in the nursery environment for more than 3 days. Infants receiving fewer than 3 baths with 3% HCP, and infants bathed in a 100-fold dilution of 3% HCP may be at lower risk; no study infant weighing more than 1,400 gm who was bathed fewer than 3 times in 3% HCP or bathed in a 100-fold dilution of 3% HCP demonstrated the lesion.

The clinical correlates of these pathologic findings have not been established. Manifestations of severe prematurity and the many factors involved in neonatal intensive care have not been assessed for their association with the lesions; conversely, 1 infant with the lesion had no known exposure to HCP. The study does not permit inference of the true attack rates from the autopsy population to all infants. It is possible that the neuropathology may be self-limiting or reversible following withdrawal of HCP.

Some hospital nurseries have experienced an increased risk of staphylococcal disease on cessation of infant bathing with HCP (4). In the absence of infection, prophylactic bathing with HCP is not recommended; emphasis should be placed on the basic recommended practices for control of neonatal infections (4): 1) reliable surveillance of neonatal disease, 2) prompt isolation and treatment of disease, 3) adequate handwashing with an antibacterial agent such as HCP or an iodophor, 4) avoidance of crowding, and 5) use of infant cohousing. However, when the best possible practice has been inadequate for infection control, an antibacterial bathing regimen using HCP may be temporarily indicated (4). The urgency of such a regimen will vary in time and place according to the incidence and severity of staphylococcal infection.

The Food and Drug Administration has directed that hospitals confine HCP to prescription use (including handwashing with preparations containing HCP, which must be covered by a physician's order for any hospital department) (3). In light of the information from the University of Washington and until further data are developed, it is recommended that the use of HCP be restricted to personnel handwashing and to the temporary bathing of infants weighing more than 2,500 gm with 2 daily in-hospital applications (1st 2 days) of 3% HCP on normal skin, followed by careful rinsing.

References

1. Kimbrough RD, Gaines TB: Hexachlorophene effects on the rat brain. *Arch Environ Health* 23:114-118, 1971
2. Kimbrough RD: Review of the toxicity of hexachlorophene. *Arch Environ Health* 23:119-122, 1971
3. *Federal Register*, Vol. 37, No. 188, pp. 20160-20164, 1972
4. *Morbidity and Mortality Weekly Report*, Vol. 21, No. 30, p. 253-255, 1972

TABLE III. CASES OF SPECIFIED NOTIFIABLE DISEASES: UNITED STATES
FOR WEEKS ENDING MARCH 17, 1973 AND MARCH 18, 1972 (11th WEEK)

AREA	ASEPTIC MENIN- GITIS	BRUCEL- LOSIS	CHICKEN- POX	DIPHTHERIA		ENCEPHALITIS			HEPATITIS		
						Primary including unspec. cases		Post In- fectious	Serum (Hepatitis B)	Infectious (Hepatitis A)	
						1973	1972	1973	1973	1973	1972
UNITED STATES	32	1	6,778	3	52	18	9	6	160	1,012	1,204
NEW ENGLAND	-	-	736	-	2	2	1	2	5	65	58
Maine *	-	-	8	-	-	-	-	-	-	-	7
New Hampshire	-	-	17	-	-	-	-	-	-	9	1
Vermont	-	-	12	-	-	-	-	-	1	6	4
Massachusetts	-	-	390	-	-	2	1	-	-	33	22
Rhode Island	-	-	58	-	2	-	-	-	2	6	9
Connecticut	-	-	251	-	-	-	-	2	2	11	14
MIDDLE ATLANTIC	10	-	357	-	-	2	2	-	45	173	246
Upstate New York	3	-	8	-	-	1	1	-	16	54	83
New York City	5	-	163	-	-	-	-	-	7	17	41
New Jersey	2	-	NN	-	-	-	1	-	12	55	63
Pennsylvania	-	-	186	-	-	1	-	-	10	47	59
EAST NORTH CENTRAL	3	-	2,526	-	-	4	2	2	15	150	210
Ohio	-	-	364	-	-	2	2	-	3	23	44
Indiana *	-	-	330	-	-	1	-	-	2	13	5
Illinois	-	-	-	-	-	-	-	-	1	40	62
Michigan	3	-	706	-	-	1	-	2	9	68	86
Wisconsin	-	-	1,126	-	-	-	-	-	-	6	13
WEST NORTH CENTRAL	1	-	1,086	-	4	2	-	-	5	39	39
Minnesota	1	-	14	-	-	1	-	-	2	4	3
Iowa	-	-	924	-	-	-	-	-	-	4	5
Missouri	-	-	46	-	-	-	-	-	1	18	9
North Dakota	-	-	27	-	-	-	-	-	-	1	2
South Dakota	-	-	5	-	4	-	-	-	-	5	10
Nebraska	-	-	24	-	-	1	-	-	-	1	2
Kansas	-	-	46	-	-	-	-	-	2	6	8
SOUTH ATLANTIC	6	1	459	-	-	7	1	-	18	142	172
Delaware	-	-	16	-	-	-	-	-	-	1	1
Maryland *	-	-	39	-	-	1	-	-	3	16	24
District of Columbia	-	-	6	-	-	-	-	-	-	4	2
Virginia	-	1	53	-	-	4	-	-	3	4	20
West Virginia	-	-	293	-	-	-	-	-	1	21	13
North Carolina	2	-	NN	-	-	1	1	-	4	22	35
South Carolina	-	-	52	-	-	-	-	-	1	16	5
Georgia	-	-	-	-	-	-	-	-	-	13	18
Florida	4	-	-	-	-	1	-	-	6	45	54
EAST SOUTH CENTRAL	-	-	257	-	-	-	-	-	3	67	60
Kentucky	-	-	202	-	-	-	-	-	-	21	15
Tennessee	-	-	NN	-	-	-	-	-	2	41	35
Alabama	-	-	24	-	-	-	-	-	-	-	9
Mississippi	-	-	31	-	-	-	-	-	1	5	1
WEST SOUTH CENTRAL	5	-	738	-	1	1	-	1	15	119	152
Arkansas *	-	-	5	-	-	-	-	-	-	6	6
Louisiana *	2	-	NN	-	-	-	-	-	5	12	7
Oklahoma	-	-	93	-	-	-	-	1	2	28	17
Texas	3	-	640	-	1	1	-	-	8	73	122
MOUNTAIN	-	-	114	1	1	-	-	-	3	55	55
Montana	-	-	19	-	-	-	-	-	1	4	10
Idaho	-	-	-	-	-	-	-	-	-	3	2
Wyoming	-	-	30	-	-	-	-	-	-	-	-
Colorado *	-	-	31	-	-	-	-	-	1	14	8
New Mexico	-	-	22	1	1	-	-	-	-	30	2
Arizona *	-	-	-	-	-	-	-	-	1	2	24
Utah	-	-	8	-	-	-	-	-	-	1	9
Nevada	-	-	4	-	-	-	-	-	-	1	-
PACIFIC	7	-	505	2	44	-	3	1	51	202	212
Washington	1	-	453	1	41	-	1	-	2	22	19
Oregon	-	-	1	-	1	-	-	-	3	26	30
California	6	-	-	1	2	-	2	1	46	148	157
Alaska	-	-	17	-	-	-	-	-	-	-	4
Hawaii	-	-	34	-	-	-	-	-	-	6	2
Guam	-	-	-	-	-	-	-	-	-	-	-
Puerto Rico	-	-	3	-	-	-	-	-	1	11	30
Virgin Islands	-	-	-	-	-	-	-	-	-	-	-

*Delayed reports: Brucellosis: (1972) Colo. 1

Chickenpox: Me. 74, Md. 36, Ark: 9

Encephalitis, primary: La. delete 1, (1972) Colo. 2

Hepatitis B: Me. 1, Md. 2, Ark. 1, Ariz. 3

Hepatitis A: Me. 5, Ind. delete 2, Md. 23, Ark. 7, La. delete 3, Ariz. 14

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TABLE III. CASES OF SPECIFIED NOTIFIABLE DISEASES: UNITED STATES FOR WEEKS ENDING MARCH 17, 1973 AND MARCH 18, 1972 (11th WEEK) - Continued

AREA	MALARIA		MEASLES (Rubella)			MENINGOCOCCAL INFECTIONS, TOTAL			MUMPS		RUBELLA	
	1973	Cum. 1973	1973	Cumulative		1973	Cumulative		1973	Cum. 1973	1973	Cum. 1973
				1973	1972		1973	1972				
UNITED STATES	9	45	785	7,288	7,953	43	362	394	2,236	20,680	886	6,513
NEW ENGLAND	-	4	270	2,919	499	3	19	16	131	887	79	639
Maine *	-	-	-	10	79	-	-	2	1	30	3	25
New Hampshire	-	-	15	503	24	1	2	-	9	88	2	7
Vermont	-	2	2	59	56	-	2	-	53	141	-	6
Massachusetts	-	-	156	1,417	64	1	7	7	39	348	49	335
Rhode Island	-	-	16	234	90	-	1	6	5	80	3	42
Connecticut	-	2	81	696	186	1	7	1	24	200	22	224
MIDDLE ATLANTIC	-	6	61	570	457	10	52	42	231	2,019	139	788
Upstate New York	-	3	23	138	38	4	15	11	NN	NN	5	49
New York City	-	1	29	323	83	3	13	10	105	1,230	13	74
New Jersey	-	1	-	58	320	2	11	11	54	420	62	558
Pennsylvania	-	1	9	51	16	1	13	10	72	369	59	107
EAST NORTH CENTRAL	1	5	247	2,039	3,100	6	34	52	608	5,686	254	1,540
Ohio	1	1	14	97	90	5	21	18	83	743	8	126
Indiana	-	-	24	200	608	-	1	8	39	476	28	337
Illinois	-	2	38	585	996	-	3	12	150	1,111	23	176
Michigan *	-	1	121	767	534	1	9	12	107	1,493	134	452
Wisconsin	-	-	50	390	872	-	-	2	229	1,863	61	449
WEST NORTH CENTRAL	1	1	26	195	330	2	31	34	291	2,114	39	506
Minnesota	-	-	1	13	11	-	-	7	3	43	8	70
Iowa	-	-	19	139	172	-	3	-	212	1,512	1	110
Missouri	-	-	1	11	103	2	16	6	6	255	26	194
North Dakota	1	1	2	21	26	-	3	-	2	29	-	30
South Dakota	-	-	-	-	4	-	2	2	-	6	-	2
Nebraska	-	-	-	1	6	-	3	6	12	50	4	79
Kansas	-	-	3	10	8	-	4	13	56	219	-	21
SOUTH ATLANTIC	1	6	41	241	732	8	65	82	273	2,302	89	478
Delaware	-	-	-	1	4	-	-	1	11	133	-	2
Maryland *	-	-	-	-	6	1	12	9	27	273	1	8
District of Columbia	-	-	-	-	-	-	1	2	3	11	-	1
Virginia	-	4	9	17	20	2	8	17	23	188	6	34
West Virginia	-	-	19	71	48	-	1	5	91	858	7	64
North Carolina	-	1	2	6	17	-	12	16	NN	NN	24	32
South Carolina	1	1	-	17	110	1	5	8	25	105	2	15
Georgia	-	-	1	8	46	1	14	-	-	7	-	4
Florida	-	-	10	121	481	3	12	24	93	727	49	318
EAST SOUTH CENTRAL	-	1	17	148	358	1	22	29	92	1,533	23	352
Kentucky	-	-	9	52	141	-	6	6	34	494	-	156
Tennessee	-	-	8	73	58	1	11	13	41	492	16	160
Alabama	-	1	-	-	83	-	2	7	11	186	6	24
Mississippi	-	-	-	23	76	-	3	3	6	361	1	12
WEST SOUTH CENTRAL	-	5	34	291	516	6	56	52	155	1,542	74	602
Arkansas *	-	-	-	5	6	1	6	6	6	57	1	61
Louisiana	-	1	4	27	21	-	8	16	10	32	2	27
Oklahoma	-	-	1	7	2	-	4	3	-	103	10	36
Texas	-	4	29	252	487	5	38	27	139	1,350	61	478
MOUNTAIN	2	4	17	241	634	-	11	6	95	1,076	67	490
Montana	-	1	-	2	12	-	2	-	4	89	32	48
Idaho	-	-	11	99	3	-	1	2	9	70	-	6
Wyoming	-	-	-	5	-	-	-	1	14	248	2	2
Colorado	-	-	6	55	267	-	2	-	2	83	18	269
New Mexico	-	1	-	71	47	-	1	1	55	386	12	93
Arizona	2	2	-	8	199	-	2	1	-	150	-	17
Utah	-	-	-	1	106	-	1	1	6	43	3	53
Nevada	-	-	-	-	-	-	2	-	5	7	-	2
PACIFIC	4	13	72	644	1,327	7	72	81	360	3,521	122	1,118
Washington	-	-	28	292	317	3	6	8	73	451	17	151
Oregon	1	1	14	159	10	-	4	5	55	733	17	151
California	3	10	30	188	955	4	61	67	184	1,998	88	809
Alaska	-	1	-	-	5	-	1	-	31	275	-	-
Hawaii	-	1	-	5	40	-	-	1	17	64	-	7
Guam	-	-	-	2	1	-	-	3	-	1	-	1
Puerto Rico	-	-	35	454	130	2	3	1	17	204	-	13
Virgin Islands	-	-	-	-	-	-	-	2	1	4	-	1

*Delayed reports: Measles: Ark. 1, Mich. 140

Meningococcal infections: Md. 1, Ark. 1

Mumps: Me. 5, Ark. 2

Rubella: Me. 5, Md. 1

TABLE III. CASES OF SPECIFIED NOTIFIABLE DISEASES: UNITED STATES
FOR WEEKS ENDING MARCH 17, 1973 AND MARCH 18, 1972 (11th WEEK) - Continued

AREA	TETANUS Cumulative 1973	TUBERCULOSIS (New Active)		TULA- REMIA Cumulative 1973	TYPHOID FEVER		TYPHUS-FEVER TICK-BORNE (Rky. Mt. spotted fever)		VENEREAL DISEASES		RABIES IN ANIMALS		
		1973	Cum. 1973		1973	1973	Cum. 1973	1973	Cum. 1973	GONOR- RHEA	SYPHILIS (Pri. & Sec.)	1973	Cum. 1973
										1973	1973		
UNITED STATES	10	648	6,115	15	5	54	-	6	15,395	508	68	631	
NEW ENGLAND	-	18	198	-	-	3	-	-	472	11	5	40	
Maine	-	-	11	-	-	-	-	-	15	-	4	32	
New Hampshire	-	-	4	-	-	-	-	-	16	-	1	7	
Vermont	-	2	5	-	-	-	-	-	4	-	-	-	
Massachusetts	-	14	124	-	-	3	-	-	268	6	-	1	
Rhode Island	-	2	12	-	-	-	-	-	38	1	-	-	
Connecticut	-	-	42	-	-	-	-	-	131	4	-	-	
MIDDLE ATLANTIC	3	131	1,248	-	3	9	-	1	2,012	114	-	4	
Upstate New York	-	11	248	-	3	3	-	-	300	7	-	1	
New York City	1	61	420	-	-	6	-	-	956	68	-	-	
New Jersey	2	22	245	-	-	-	-	-	436	20	-	-	
Pennsylvania	-	37	335	-	-	-	-	1	320	19	-	3	
EAST NORTH CENTRAL	1	102	971	1	-	5	-	-	1,883	23	9	55	
Ohio	-	20	349	1	-	3	-	-	763	6	-	9	
Indiana	-	18	140	-	-	-	-	-	176	7	4	11	
Illinois	-	35	278	-	-	1	-	-	222	2	4	19	
Michigan	-	19	160	-	-	1	-	-	545	6	1	1	
Wisconsin	1	10	44	-	-	-	-	-	177	2	-	15	
WEST NORTH CENTRAL	3	26	221	2	-	4	-	1	914	9	12	168	
Minnesota	-	6	25	-	-	-	-	-	183	1	5	61	
Iowa	-	5	31	-	-	-	-	-	131	2	2	54	
Missouri	3	8	103	2	-	2	-	1	320	3	2	16	
North Dakota	-	2	7	-	-	-	-	-	17	1	-	29	
South Dakota *	-	-	14	-	-	1	-	-	22	-	-	3	
Nebraska	-	3	14	-	-	1	-	-	36	-	-	-	
Kansas	-	2	27	-	-	-	-	-	205	2	3	5	
SOUTH ATLANTIC	2	118	1,211	4	1	9	-	1	3,797	185	6	62	
Delaware	-	-	11	-	-	-	-	1	45	-	-	-	
Maryland *	-	12	117	-	-	-	-	-	414	6	-	3	
District of Columbia	-	8	66	-	-	-	-	-	335	13	-	-	
Virginia	-	28	166	1	-	-	-	-	340	69	4	27	
West Virginia	-	7	75	-	-	-	-	-	59	2	-	8	
North Carolina	-	18	206	1	1	2	-	-	543	17	-	-	
South Carolina	-	9	121	-	-	1	-	-	312	15	-	-	
Georgia	-	21	193	2	-	1	-	-	854	26	-	14	
Florida	2	15	256	-	-	5	-	-	895	37	2	10	
EAST SOUTH CENTRAL	1	75	543	4	-	2	-	3	1,445	32	23	159	
Kentucky	-	16	138	1	-	1	-	-	113	6	17	73	
Tennessee	-	14	154	3	-	-	-	1	401	12	4	62	
Alabama	1	23	153	-	-	1	-	2	579	6	2	24	
Mississippi	-	22	98	-	-	-	-	-	352	8	-	-	
WEST SOUTH CENTRAL	-	56	599	4	-	2	-	-	1,870	59	9	92	
Arkansas *	-	9	69	1	-	-	-	-	121	6	2	21	
Louisiana *	-	-	110	-	-	-	-	-	485	21	1	8	
Oklahoma	-	10	56	2	-	1	-	-	200	4	5	25	
Texas	-	37	364	1	-	1	-	-	1,064	28	1	38	
MOUNTAIN	-	25	147	-	-	2	-	-	703	16	-	6	
Montana	-	-	5	-	-	-	-	-	27	-	-	-	
Idaho	-	-	10	-	-	-	-	-	6	-	-	-	
Wyoming	-	1	7	-	-	-	-	-	3	-	-	-	
Colorado	-	3	22	-	-	-	-	-	240	4	-	-	
New Mexico	-	17	57	-	-	1	-	-	109	-	-	-	
Arizona *	-	3	32	-	-	1	-	-	206	2	-	6	
Utah *	-	1	7	-	-	-	-	-	32	1	-	-	
Nevada	-	-	7	-	-	-	-	-	80	9	-	-	
PACIFIC	-	97	977	-	1	18	-	-	2,299	59	4	45	
Washington	-	4	83	-	-	-	-	-	185	3	-	-	
Oregon	-	5	46	-	1	2	-	-	219	2	-	-	
California	-	84	770	-	-	16	-	-	1,825	53	4	43	
Alaska	-	-	25	-	-	-	-	-	52	-	-	2	
Hawaii	-	4	53	-	-	-	-	-	18	1	-	-	
Guam	-	-	4	-	-	-	-	-	-	-	-	-	
Puerto Rico	3	5	115	-	-	-	-	-	133	15	2	8	
Virgin Islands	-	-	-	-	-	-	-	-	8	2	-	-	

*Delayed reports: T.B.: Md. 9, Ark. delete 4, (1972) S. Dak. delete 2
Gonorrhea: S. Dak. delete 2, Md. 283, La. delete 3,
Ariz. 37, Utah 3

Syphilis: Md. 8, Ariz. 1
Rabies: Md. 1

TABLE IV. DEATHS IN 122 UNITED STATES CITIES FOR WEEK ENDING MARCH 17, 1973

Area	All Causes			Pneumonia and Influenza All Ages	Area	All Causes			Pneumonia and Influenza All Ages
	All Ages	65 years and over	Under 1 year			All Ages	65 years and over	Under 1 year	
NEW ENGLAND	687	437	23	40	SOUTH ATLANTIC	1,330	710	49	67
Boston, Mass.	215	127	8	10	Atlanta, Ga.	164	74	10	8
Bridgeport, Conn.	39	27	1	4	Baltimore, Md.	241	128	6	6
Cambridge, Mass.	31	22	1	6	Charlotte, N. C.	62	36	5	-
Fall River, Mass.	24	18	1	-	Jacksonville, Fla.	95	54	4	4
Hartford, Conn.	74	42	5	-	Miami, Fla.	101	53	4	6
Lowell, Mass.	19	16	-	1	Norfolk, Va.	53	27	2	5
Lynn, Mass.	22	12	-	2	Richmond, Va.	100	45	3	9
New Bedford, Mass.	31	23	-	3	Savannah, Ga.	33	19	-	2
New Haven, Conn.	42	27	1	-	St. Petersburg, Fla.	116	86	5	4
Providence, R. I.	64	33	3	9	Tampa, Fla.	79	59	1	10
Somerville, Mass.	15	10	-	-	Washington, D. C.	236	110	9	10
Springfield, Mass.	36	24	-	1	Wilmington, Del.	50	19	-	3
Waterbury, Conn.	31	22	2	-	EAST SOUTH CENTRAL	764	405	58	40
Worcester, Mass.	44	34	1	4	Birmingham, Ala.	150	72	12	5
MIDDLE ATLANTIC	3,436	2,082	96	154	Chattanooga, Tenn.	63	32	7	2
Albany, N. Y.	45	24	-	1	Knoxville, Tenn.	34	25	1	-
Allentown, Pa.	24	18	-	3	Louisville, Ky.	105	55	9	13
Buffalo, N. Y.	140	72	6	11	Memphis, Tenn.	161	83	25	6
Camden, N. J.	43	28	1	3	Mobile, Ala.	74	39	1	4
Elizabeth, N. J.	37	25	-	2	Montgomery, Ala.	42	24	-	4
Erie, Pa.	35	29	2	3	Nashville, Tenn.	135	75	3	6
Jersey City, N. J.	81	43	4	3	WEST SOUTH CENTRAL	1,389	766	68	58
Newark, N. J.	92	42	6	6	Austin, Tex.	42	26	1	4
New York City, N. Y. †	1,768	1,116	30	71	Baton Rouge, La.	61	34	3	2
Paterson, N. J.	41	27	4	3	Corpus Christi, Tex.	36	24	3	1
Philadelphia, Pa.	496	299	18	9	Dallas, Tex.	191	99	6	3
Pittsburgh, Pa.	206	112	7	17	El Paso, Tex.	37	19	5	7
Reading, Pa.	43	28	-	4	Fort Worth, Tex.	105	63	4	4
Rochester, N. Y.	107	65	5	5	Houston, Tex.	267	141	7	7
Schenectady, N. Y.	33	17	-	2	Little Rock, Ark.	65	36	3	3
Scranton, Pa.	36	21	-	2	New Orleans, La.	173	90	14	4
Syracuse, N. Y.	91	45	9	2	Oklahoma City, Okla. *	97	57	5	3
Trenton, N. J.	38	18	3	2	San Antonio, Tex.	160	82	13	4
Utica, N. Y.	33	17	1	3	Shreveport, La.	73	46	3	11
Yonkers, N. Y.	47	36	-	4	Tulsa, Okla.	82	49	1	5
EAST NORTH CENTRAL	2,505	1,422	100	81	MOUNTAIN	567	341	17	29
Akron, Ohio	59	32	2	-	Albuquerque, N. Mex.	49	28	-	12
Canton, Ohio	26	16	-	1	Colorado Springs, Colo.	32	16	1	5
Chicago, Ill.	660	373	19	16	Denver, Colo.	133	87	4	1
Cincinnati, Ohio	156	96	6	2	Las Vegas, Nev.	17	8	-	-
Cleveland, Ohio	195	91	10	6	Ogden, Utah	17	9	1	3
Columbus, Ohio	135	71	9	2	Phoenix, Ariz.	142	85	4	-
Dayton, Ohio	135	69	1	3	Pueblo, Colo.	25	20	-	4
Detroit, Mich.	319	162	20	16	Salt Lake City, Utah	75	45	5	4
Evansville, Ind.	37	24	1	2	Tucson, Ariz.	77	43	2	-
Fort Wayne, Ind.	51	34	3	5	PACIFIC	1,803	1,141	73	58
Gary, Ind.	41	17	4	1	Berkeley, Calif.	13	9	-	-
Grand Rapids, Mich.	51	35	1	5	Fresno, Calif.	54	32	2	1
Indianapolis, Ind.	163	94	6	4	Glendale, Calif.	45	34	3	-
Madison, Wis.	33	15	3	4	Honolulu, Hawaii	53	29	7	-
Milwaukee, Wis.	161	108	6	4	Long Beach, Calif.	105	68	3	1
Peoria, Ill.	45	28	3	-	Los Angeles, Calif.	585	380	11	18
Rockford, Ill.	44	32	-	3	Oakland, Calif.	73	51	3	-
South Bend, Ind.	30	23	-	6	Pasadena, Calif.	53	38	1	1
Toledo, Ohio	102	62	4	1	Portland, Ore.	139	95	5	7
Youngstown, Ohio	62	40	2	-	Sacramento, Calif.	66	45	-	3
WEST NORTH CENTRAL	776	491	26	37	San Diego, Calif.	126	71	11	3
Des Moines, Iowa	51	35	3	1	San Francisco, Calif.	172	97	10	5
Duluth, Minn.	20	15	-	1	San Jose, Calif.	52	22	-	2
Kansas City, Kans.	29	14	2	3	Seattle, Wash.	142	85	7	4
Kansas City, Mo.	149	100	4	2	Spokane, Wash.	74	49	6	8
Lincoln, Nebr.	17	12	-	1	Tacoma, Wash.	51	36	4	5
Minneapolis, Minn.	98	59	7	4	Total	13,257	7,795	510	564
Omaha, Nebr.	82	50	3	-	Expected Number	13,289	7,758	540	557
St. Louis, Mo.	201	116	6	19	Cumulative Total (includes reported corrections for previous weeks)	157,322	94,553	5,608	8,590
St. Paul, Minn.	63	45	-	2					
Wichita, Kans.	66	45	1	4					

†Delayed report for week ending March 10, 1973.

*Estimate based on average percent of divisional total.

EPIDEMIOLOGIC NOTES AND REPORTS
SEPTICEMIAS ASSOCIATED WITH CONTAMINATED INTRAVENOUS FLUIDS — Wisconsin, Ohio

On March 5, 1973, a hospital in Milwaukee, Wisconsin requested CDC's assistance in investigating 3 cases of septicemia felt to be related to the infusion of intrinsically contaminated intravenous products. *Citrobacter freundii* was recovered from the blood of 2 patients and *Enterobacter agglomerans* (formerly classified as *Erwinia*) and *E. cloacae* from the blood of 1 patient. Investigation revealed that all 3 patients developed septicemia within 3 hours after receiving infusions from 1,000 cc bottles of 5% Dextrose in Lactated Ringer's Injection, Cutter (D5LR). Clinical manifestations of septicemia included rapid onset of shaking chills, fever, nausea, headache, and shock. One patient recovered following discontinuation of the infusion and administration of antibiotics, 1 patient died, and the other remains critically ill. Clinical, microbiologic, and epidemiologic data strongly suggest that D5LR contaminated with *Enterobacter* and *Citrobacter* was responsible for these cases of septicemia.

In addition, in the past 2 weeks CDC has learned of 2 other instances of contaminated D5LR, 1 at another Wisconsin hospital and 1 in Ohio. In 1 case the patient developed septicemia following infusion of D5LR. Identification of the organisms isolated from the patient's blood and the fluid in use is pending.

On March 19, as a result of these investigations and the concern of CDC, Cutter Laboratories, Inc., recalled the following 1,000 cc bottles of D5LR produced at its Chattanooga plant: 1) product code 495-05, lot numbers TK1159, TK1426, TK3115, TK3248, and TK3263; 2) product code 423-30, lot number TK3497 and all higher numbers prefixed by TK. Lot numbers prefixed by the letters US are not involved in the recall. Only D5LR is being recalled since there is no indication that any other Cutter intravenous fluids are contaminated. The recalled D5LR was prepared using a modified process which included exposure of the bottles to increased pressure during autoclaving; other types of intravenous fluids manufactured by Cutter are produced by a different method.

(Reported by a Milwaukee hospital; George H. Handy, M.D., State Health Officer, Wisconsin Department of Health and Social Services; John H. Ackerman, M.D., State Epidemiologist, Ohio Department of Health; Microbiological Control Section, Hospital Infections Laboratory; the Bacteriology Section, Microbiology Branch, Laboratory Division, CDC; and 2 EIS Officers.)

Editorial Note

Septicemia caused by *C. freundii* or *E. agglomerans* is very rare. Alert physicians at the Milwaukee hospital realized that the occurrence of 3 cases of septicemia due to these organisms within a short period of time was an unusual event. Appropriate epidemiologic investigations were quickly initiated which led to the request for CDC assistance and the implication of contaminated intravenous fluid. It is possible that intravenous-associated septicemia has gone unrecognized in some hospitals because of the low incidence of disease. The scope of the problem has not yet been defined, but the prompt action of Cutter in recalling all D5LR produced using the modified process should terminate the problem.

Hospitals noting cases of septicemia possibly related to D5LR therapy should carefully record the lot numbers of involved bottles. Since the identification of *E. agglomerans*,

E. cloacae, and *C. freundii* may be difficult for some hospital laboratories, blood and intravenous fluid isolates should be saved for microbiologic confirmation. Table 3 should be of assistance in the identification of these organisms.

Table 3
 Identification Schema for *Citrobacter freundii* (variant), *Enterobacter agglomerans*, *Enterobacter cloacae*

	<i>Citrobacter freundii</i> (H ₂ S and Nitrate negative variant)	<i>Enterobacter</i> <i>agglomerans</i>	<i>Enterobacter</i> <i>cloacae</i>
Gas from glucose	+	— or +	+
Glucose	+	+	+
Lactose	+	d	+
Sucrose	+	d	+
Mannitol	+	+	+
Salicin	(+)	d	+
Dulcitol	—	—	— or +
Maltose	+	d	+
Sorbitol	+	d	+
Raffinose	+	d	+
Adonitol	—	—	— or +
Methyl-Red	+	— or +	—
Voges-Proskauer	—	+ or —	+
Indole	—	— or +	—
Citrate	+	+ or —	+
Urea	—	— or (+)	+ or —
Motility	+	+ or —	+
Lysine decarboxylase	—	—	—
Arginine dihydrolase	+	—	+
Ornithine decarboxylase	—	—	+
Malonate	+	+ or —	+ or —
H ₂ S (TSI)	—	—	—
Nitrate	—	+ or —	+
Gelatin	—	(+) or —	(+)
Oxidase	—	—	—
Yellow Pigment	—	+ or —	—

+ , positive within 1-2 days incubation; (+), positive reaction after 3 or more days; — , negative reaction; + or — , majority are positive but occasional negative reaction; — or + , majority are negative but occasional positive reaction; d, different reactions.

This is the 2nd outbreak of septicemia associated with contaminated intravenous infusion products investigated by CDC. In 1971, a nationwide epidemic of *E. agglomerans* and *E. cloacae* septicemia was attributed to contaminated dextrose-containing infusion products of another manufacturer (1,2,3). In addition, an outbreak of septicemia due to dextrose-containing intravenous fluid contaminated with gram-negative bacteria, including *E. agglomerans*, occurred in England in 1972 (4).

References

- Center for Disease Control: Nosocomial bacteremias associated with intravenous fluid therapy — USA. *Morbidity and Mortality Weekly Rep* 20: Special Supplement to No. 9, March 1971
- Center for Disease Control: Follow-up on septicemias associated with contaminated Abbott intravenous solutions — United States. *Morbidity and Mortality Weekly Rep* 20(11):91-92, March 1971
- Center for Disease Control: Follow-up on septicemia associated with contaminated intravenous fluid from Abbott Laboratories. *Morbidity and Mortality Weekly Rep* 20(12):110, March 1971
- Report of the committee appointed to inquire into the circumstances, including the production, which led to the use of contaminated infusion fluids in the Devenport Section of Plymouth General Hospital. London, Her Majesty's Stationery Office, 1972

Note to Readers:

The format of the MMWR has been changed slightly to improve printing efficiency and for the convenience of our readers. Beginning with this issue, the statistical tables will appear on the 4 center pages of every issue, whether 8 or 12 pages. This way, all 4 tables will be on 1 sheet, which can be detached and kept separately and the text used for other purposes. We hope that our readers will find this arrangement more useful.

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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.

In addition to the established procedures for reporting morbidity and mortality, the editor welcomes accounts of interesting outbreaks or case investigations of current interest to health officials.

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