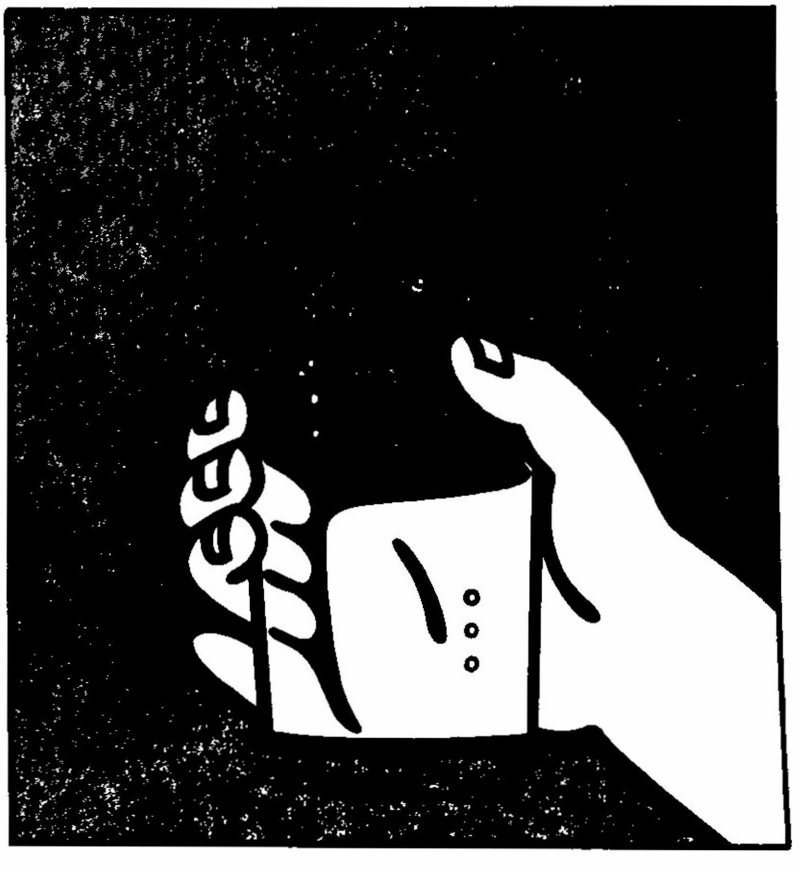
ANNUAL SUMMARY 1982
ISSUED AUGUST 1983

CENTERS FOR DISEASE CONTROL

Water-related Disease Outbreaks

SURVEILLANCE



S. DEPARTMENT OF HEALTH AND HUMAN SERVICES • Public Health Service

PREFACE

This report summarizes information received from state and local health departments and the Environmental Protection Agency. The information is preliminary and is most useful to those persons in disease control activities. Anyone wishing to quote this report should contact the Water-Related Diseases Activity, Enteric Diseases Branch, for further interpretation.

Contributions to the report are most welcome. Please address them to:

Enteric Diseases Branch
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Annual Summary 1982, Issued August 1983

WATER-RELATED DISEASES SURVEILLANCE ANNUAL SUMMARY 1982

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I. INTRODUCTION

Since 1971 the Centers for Disease Control (CDC) has tabulated foodborne and waterborne disease outbreak data separately and reported these data in annual reports. The Water-related Diseases Activity has set the following goals: 1) to determine the frequency of epidemics of water-related diseases in the United States, 2) to characterize the epidemiology of water-related diseases, 3) to disseminate information on prevention and control of water-related diseases to appropriate public health personnel, 4) to train federal, state, and local health department personnel in epidemiologic techniques for the investigation of water-related disease outbreaks, and 5) to collaborate with local, state, other federal and international agencies in initiatives concerning prevention of water-related diseases. Also included in the responsibilities of the Water-related Diseases Activity is the investigation of outbreaks of acute gastrointestinal disease on ocean-going vessels.

II. WATERBORNE DISEASE OUTBREAKS, 1982

In 1982, 20 states reported 40 outbreaks of waterborne disease involving 3,456 cases to the Centers for Disease Control (CDC).

A. Definition of Terms

A waterborne disease outbreak is an incident in which 1) 2 or more persons experienced similar illness after consumption or use of water intended for drinking, and 2) epidemiologic evidence implicated the water as the source of illness. In addition, a single case of chemical poisoning constitutes an outbreak if laboratory studies indicated that the water was contaminated by the chemical. Only outbreaks associated with water intended for drinking are included.

Community public water systems (municipal systems) are public or investor-owned water systems that serve large or small communities, subdivisions or trailer parks of at least 15 service connections or 25 year-round residents. Noncommunity public water systems (semi-public water systems) are those of institutions, industries, camps, parks, hotels, or service stations that may be used by the general public. Individual systems (private water systems), generally wells and springs, are those used by single or several residences or by persons traveling outside populated areas. These definitions correspond to those in the Safe Drinking Water Act (PL 93-523) of 1974.

B. Sources of Data

State health departments report waterborne disease outbreaks to CDC on a standard reporting form (Section J). In addition, the Health Effects Research Laboratory of the Environmental Protection Agency (EPA) contacts all state water-supply agencies annually to obtain information about waterborne disease outbreaks; information from both sources is included in this report. Representatives from CDC and EPA review and summarize outbreak data and also work together in the investigation and evaluation of waterborne disease outbreaks. In addition, upon request by state health departments, CDC and EPA offer epidemiologic assistance, provide consultation in the engineering and environmental aspects of water treatment, and, when indicated, collect large volume water samples for identification of viruses, parasites, and bacterial pathogens.

C. Interpretation of Data

The limitations of the data in this report must be appreciated to avoid misinterpretation.

The number of waterborne disease outbreaks reported to CDC and EPA clearly represents a fraction of the total number that occur. Since investigations were

sometimes incomplete or conducted long after the outbreak, the waterborne hypothesis could not be proved in all instances; however, it was the most logical explanation in these outbreaks. The likelihood of an outbreak coming to the attention of health authorities varies considerably from 1 locale to another depending largely upon consumer awareness, physician interest, and disease surveillance activities of state and local health and environmental agencies. Large interstate outbreaks and outbreaks of serious illness are more likely to come to the attention of health authorities. The quality of investigation conducted by state or local health departments varies considerably according to the department's interest in waterborne diseases and its budgetary, investigative, and laboratory capabilities. This report should not be the basis for firm conclusions about the true incidence of waterborne disease outbreaks, and it should not be used to draw firm conclusions about the relative incidence of waterborne diseases of various etiologies. The number of reported outbreaks of different etiologies may depend upon the interest of a particular health department or individual. For example, if an epidemiologist or microbiologist becomes interested in Giardia lamblia or Norwalk-like viruses, he is likely to confirm more outbreaks caused by these agents. Furthermore, a few outbreaks involving large numbers of persons may vastly alter the relative proportion of cases attributed to various etiologic agents.

These data are helpful, however, in revealing the etiologies of reported waterborne disease outbreaks, the seasonality of outbreaks, and the deficiencies in water systems that most frequently result in outbreaks. As in the past, the pathogens responsible for many outbreaks in 1982 were not determined. It is hoped that more complete epidemiologic investigations, advances in laboratory techniques, and standardization of reporting of waterborne disease outbreaks will augment our knowledge of waterborne pathogens and the factors responsible for waterborne disease outbreaks.

D. Analysis of Data

In 1982, 40 waterborne disease outbreaks involving an estimated 3,456 persons were reported to CDC and EPA. This is a decline in cases, but an increase in the number of reported outbreaks compared with the previous year (Table 1).

Table 1 Waterborne Disease Outbreaks, by Year and Type of System, United States, 1971-1981

	Community	Noncommunity	Private	TOTAL	TOTAL CASES
1971	5	10	4	19	5182
1972	10	18	2	30	1650
1973	5	16	3	24	1784
1974	11	10	5	26	8363
1975	6	16	2	24	10879
1976	9	23	3	35	5068
1977	12	19	3	34	3860
1978	10	18	4	32	11435
1979	23	14	4	41	9720
1980	23	22	5	50	20008
1981	14	16	2	32	4430
1982	22	12	6	40	3456
TOTAL (%)	150 (39)	194 (50)	43 (11)	387	85835

Twenty states, including Puerto Rico, reported at least 1 outbreak (Section H). Colorado reported more outbreaks than any other state (8/40 - 20%).

Table 2 shows the number of outbreaks and cases by etiology and type of water system. Of the 40 outbreaks, 16 (40%) were of unknown etiology and were designated as "acute gastrointestinal illness" (AGI). This category includes outbreaks characterized by upper or lower gastrointestinal symptoms for which no etiologic agent was identified. The etiologies of the remaining 24 (60%) outbreaks were confirmed: G. lamblia (12), Norwalk agent (4), chemical (2), Hepatitis A (3), Shigella (2), and Yersinia (1).

Table 2 Waterborne Disease Outbreaks by Etiology and Type of Water System, 1982

	Public Water Systems				Private Water Systems		Total	
	Community		Noncommunity					
	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases	Outbreaks	Cases
AGI*	6	669	9	1117	1	50	16	1836
Giardia	9	497	2	60	1	4	12	561
Chemical	0	0	0	0	2	18	2	18
Norwalk	4	750	0	0	0	0	4	750
Hepatitis A	2	93	0	0	1	10	3	103
Shigella	1	19	1	153	0	0	2	172
Yersinia	0	0	0	0	1	16	1	16
Total	22	2028	12	1330	6	98	40	3456

*Acute gastrointestinal illness of unknown etiology

Results of microbiologic testing of water samples were reported in 28 of 37 nonchemical outbreaks; evidence of contamination (presence of coliforms or pathogens) was found in 25 (89%). Water sample filtration for Giardia cysts was performed in 5 of the 12 Giardia outbreaks; cysts were found in all 5.

Most outbreaks involved community (55%) and noncommunity (30%) public water systems. Outbreaks attributed to water from community public water systems affected an average of 92 persons compared with 111 persons in noncommunity public water system outbreaks and 16 persons in outbreaks involving individual water systems (Table 2). Use of untreated or inadequately treated water was documented in 30 (75%) of the outbreaks (Table 3). Outbreaks occurred in every month of the year but most frequently in July through September (Table 4).

Table 3 Waterborne Disease Outbreaks, by Type of System and Type of Deficiency, 1982

	Public Water Systems		Private Water Systems	Total
	Community Outbreaks	Noncommunity Outbreaks	Outbreaks	Outbreaks
Untreated surface water	2	3	0	5
Untreated ground water	4	3	4	11
Treatment deficiencies	9	5	0	14
Deficiencies in distribution system	5	0	0	5
Miscellaneous	1	0	2	3
Multiple deficiencies	1	1	0	2
TOTAL	22	12	6	40

Table 4 Waterborne Disease Outbreaks, by Month of Occurrence, United States, 1982

Month	Number of Outbreaks	Month	Number of Outbreaks
January	3	July	7
February	3	August	4
March	2	September	5
April	5	October	3
May	3	November	2
June	3	December	0
		Total:	40

Outbreaks in recreational areas continued to be a problem in 1982, accounting for 15 (38%) of the outbreaks. Of the 12 outbreaks associated with noncommunity public water systems, 8 implicated water supplies at recreational areas at camps and campgrounds (4), ski or ranch resorts (2), 1 truck stop/restaurant, and 1 country club.

In 8 of the 16 outbreaks of acute gastroenteritis of unknown etiology an incubation period was reported. In all but 1 instance the median incubation period was less than or equal to 48 hours, and the mean was approximately 33 hours.

Two interesting episodes that did not meet the definition of a waterborne outbreak, but may well have been examples of waterborne transmission, occurred in 1982. In December over 200 cases of acute gastrointestinal illness in children in a middle school in Ohio were suspected but not proven to be related to the water system. Salmonella typhimurium was isolated from 45-50 residents of 1 district in Oklahoma in late 1982; epidemiologic investigation suggested that residents using tap water in the town had higher a incidence of diarrhea than did persons using municipal water in a neighboring town.

E. Comments

The increase in the number of outbreaks reported in 1982 may well be due to more complete reporting rather than an actual increase. The waterborne disease surveillance system is, for the most part, a passive one. There is evidence to suggest that this report contains only a small and variable fraction of the outbreaks and cases that occur each year in the United States. Supporting this is the fact that 4 states reported a full 46% of all the outbreaks in 1982. Three of these, Colorado, Vermont, and Washington, received federal funds for surveillance in 1982 through contracts with EPA, and the fourth, Pennsylvania, has a well-developed surveillance system. Colorado received these federal funds for surveillance in both 1980 and 1981, and in those years reported an average of 7 outbreaks per year, in contrast to its previous average, reported in 1971-1979, of 2 outbreaks per year.

Water systems used on a seasonal basis such as those in camps, parks, and resorts have an abnormal demand placed upon them by large numbers of visitors during specific periods of the year and in some instances cannot meet such demands. For the most part these are noncommunity systems. Such water supply systems, especially those at campgrounds and parks, must be reevaluated and monitored, and corrections made to ensure the continued provision of safe water during periods of increased demand. The large outbreaks that occurred in 1975 in Crater Lake National Park (1) and Yellowstone National Park (2) underscore the problems related to water supplies that can occur in recreational areas.

In 1982, the number of outbreaks related to noncommunity systems was 55% of the number related to community systems. EPA estimates, however, that there are 20 million noncommunity, 180 million community, and 30 million individual water system users in the United States, so that the rate of illness was far greater among noncommunity system users than among community system users. Two pathogens followed recent trends in 1982. G. lamblia was the most frequently identified pathogen for the fifth consecutive year. It caused 30% of the outbreaks, the highest percentage since the present surveillance system began in 1971. Hepatitis A--from fecally contaminated wells--caused 3 outbreaks in 1982, 2 of which occurred in trailer parks.

Outbreaks caused by Norwalk agent were not reported in 1981, but accounted for 3 outbreaks in 1982. Fourfold rises in antibody titer to the Norwalk agent were found in at least 4 persons involved in each outbreak. The increase in identified Norwalk outbreaks in recent years probably represents, at least in part, an increasing awareness and diagnostic ability rather than a real increase. Although rotavirus was identified as the cause of 1 outbreak in 1981, it was not found in investigated outbreaks in 1982. It is possible that many acute gastrointestinal illnesses of unknown etiology (AGIs) represent undiagnosed Norwalk, rotavirus, and other viral disease outbreaks.

Two chemical outbreaks were recorded in 1982, caused by benzene and copper. The benzene-related outbreak was apparently caused by leakage into nearby private wells from a pit into which spillage from an exploded railway car had been diverted many years previous. The outbreak related to copper may have occurred after a drop in water line pressure allowed back siphonage of carbon dioxide and carbonated water from a soda machine into copper pipes. In another chemically caused outbreak, involving water but technically a foodborne outbreak, antimony was leached from an enamelware coffee pot in which acidic punch had been held for a prolonged period. Similarly, acidic punch left in metal containers that had galvanized metal linings with large areas of corrosion resulted in illness in 18 students in a home economics class (3).

Outbreaks caused by waterborne Campylobacter were reported in 1980 and 1981 (4), but not in 1982. However, 2 possible outbreaks of campylobacteriosis in Washington State were suspected, but not proven, to have been waterborne.

Two pathogens were identified as causes of U.S. waterborne outbreaks not reported in 1981. Tap water, used for soaking and rinsing bean sprouts eaten by patients, was shown to contain Yersinia enterocolitica which caused an outbreak in at least 15 persons in Pennsylvania. Shigella sonnei was isolated from mobile home park residents in West Virginia who were obtaining drinking water from an improperly protected well with pooled raw sewage within 25 feet of it.

In addition to 40 outbreaks related to drinking water systems, 4 outbreaks, involving 155 cases, were reported that resulted from contaminated water not meant for drinking (Table 5). Three resulted from swimming in untreated or inadequately treated surface waters. Entamoeba and Giardia were recovered from the stools of police and fire department divers working in polluted waters of the Hudson River. In an outbreak of S. sonnei gastroenteritis in Oklahoma, swimming in a local reservoir was significantly associated with increased risk of infection. In an outbreak related to a community swimming pool, ill children who had used the pool had Giardia recovered from their stools. In an episode of diarrheal illness associated with non-potable water, power plant workers in Virginia were drinking water from an unlabeled tap which was delivering untreated water from the Potomac River. No bacterial pathogen was isolated from the stools of these workers, many of whom had recovered by the time of the investigation. As in the past (5), this probably represented an outbreak caused by multiple pathogens after an episode of "sewage poisoning."

Table 5 Waterborne Disease Outbreaks Not Related to Potable Water Systems, United States, 1982

State	Month	Etiology	Cases	Water Source	Location
NYC	July	Giardia, Entamoeba	12	river	city
OK	June	Shigella sonnei	49	reservoir	community
VA	June	AGI	16	river	power plant
WA	May	Giardia	78	swimming pool	community
		Total	155		

F. References

1. Rosenberg ML, Koplan, JP, Wachsmuth IK, et al. Epidemic diarrhea at Crater Lake from enterotoxigenic Escherichia coli. Ann Intern Med 1977;86:714-8.

2. Center for Disease Control. Gastroenteritis--Yellowstone National Park, Wyoming. Morbidity and Mortality Weekly Rep 1977;26:283.

3. Centers for Disease Control. Illness associated with elevated levels of zinc in fruit punch- New Mexico. Morbidity and Mortality Weekly Rep 1983;32:257-8.

4. Taylor DN, Brown M, McDermott KT. Waterborne transmission of Camphylobacter enteritis. Microb Ecol 1982;8:347-54.

5. Center for Disease Control. Shigellosis and Salmonellosis--Morocco. Morbidity and Mortality Weekly Rep 1963;12:438-9.

G. Listing of Waterborne Outbreak Articles, 1982, from the Morbidity and Mortality Weekly Report

Centers for Disease Control. Community outbreak of Norwalk gastroenteritis-Georgia. Morbidity and Mortality Weekly Rep 1982;31:405-6.

H. Line Listing of Reported* Waterborne Outbreaks, United States, 1982

State	Month	Etiology†	Cases	Type of System¶	Deficiency§	Location of Outbreak	Source
AL	May	Norwalk	55	C	4	community	wells
AL	Sep	Benzene	16	I	5	community	wells
AK	Nov	AGI	35	C	2	community	well
AK	Jan	Copper	2	I	5	restaurant	soda machine
AZ	May	AGI	24	NC	2	truck stop	well
CA	Apr	Norwalk	25	C	3	reservation	storage tank
CA	Apr	Norwalk	170	C	4	USMC depot	broken main
CO	Jan	Giardia	10	C	3	ski resort	stream
CO	Feb	Giardia	17	C	3	ski resort	stream
CO	Mar	Giardia	4	C	3	ski resort	stream
CO	Apr	Giardia	8	C	5	ski resort	stream
CO	Jul	Giardia	72	C	3	family reunion	stream
CO	Aug	Giardia	28	NC	3	ranch resort	river
CO	Aug	AGI	36	C	4	trailer park	broken main
CO	Sep	Giardia	32	NC	1	ski resort	stream
GA	Jan	Norwalk	500	C	1	community	spring
GA	Jun	Hepatitis A	10	I	2	day-care center	well
GA	Jul	Hepatitis A	35	C	2	trailer park	well
IN	May	AGI	400	C	4	convention	reservoir
KY	Nov	Hepatitis A	58	C	2	community	spring
ME	Aug	AGI	25	C	3	trailer park	well
ME	Oct	AGI	50	I	2	hotel	well
NC	Sep	Shigella	153	NC	3	school	well
NV	Aug	Giardia	342	C	3,4	community	reservoir
NH	Oct	Giardia	13	C	3	community	lake
OR	Sep	Giardia	9	C	3	community	---
PA	Feb	Yersinia	16	I	2	home	well
PA	Apr	AGI	16	NC	3	---	well
PA	Jun	AGI	48	NC	3	country club	well
PA	Jul	AGI	71	NC	2	camp	well
PA	Jul	AGI	31	NC	2	camp	well
PR	Jun	AGI	500	NC	3,4	community	wells
TX	Sep	AGI	65	NC	1	campground	springs
VT	Oct	Giardia	22	C	2	community	springs
VT	July	AGI	105	C	1	recreation area	lake
VT	July	AGI	340	NC	1	camp	pond
VT	Feb	AGI	22	NC	3	subdivisions	well
VA	April	Giardia	4	I	2	home	well
WA	March	AGI	68	C	3	community	well
WV	July	Shigella	19	C	4	trailer park	well

* Please see section I.C. for discussion of reporting variables.
† (AGI) acute gastrointestinal illness of unknown etiology
¶ (C) community (municipal); (NC) non-community (semi-public); (I) individual
§ (1) untreated surface water (2) untreated ground water (3) treatment deficiencies (4) distribution system deficiencies (5) miscellaneous

I. Guidelines for Confirmation of Waterborne Disease Outbreaks

Etiologic Agent	Clinical Syndrome	Epidemiologic Criteria
BACTERIAL		
1. *Escherichia coli*	a) Incubation period: 6-36 hours b) Gastrointestinal syndrome: majority of cases have diarrhea	a) Demonstration of organisms of same serotype in epidemiologically incriminated water and stools of ill persons but not in stools of controls. -OR- b) Isolation of organisms of the same serotype which have been shown to be enterotoxigenic or invasive by special laboratory techniques from stools of most ill persons.
2. *Salmonella*	a) Incubation period: 6-48 hours b) Gastrointestinal syndrome: majority of cases have diarrhea	a) Isolation of *Salmonella* organism from epidemiologically implicated water. -OR- b) Isolation of *Salmonella* organism from stools or tissues of ill persons.
3. *Shigella*	a) Incubation period: 12-48 hours b) Gastrointestinal syndrome: majority of patients have diarrhea	a) Isolation of *Shigella* organism from epidemiologically implicated water. -OR- b) Isolation of *Shigella* organism from stools of ill persons.
4. *Campylobacter jejuni*	a) Incubation period: usually 2-5 days b) Gastrointestinal syndrome: majority of patients have diarrhea	a) Isolation of *Campylobacter* organisms from epidemiologically implicated water. -OR- b) Isolation of *Campylobacter* organisms from stools of ill persons
5. *Yersinia enterocolitica*	a) Incubation period: 3-7 days b) Gastrointestinal syndrome: majority of patients have diarrhea or cramps	a) Isolation of *Yersinia* organisms from epidemiologically implicated water. -OR- b) Isolation of *Yersinia* organisms from stools of ill persons. -OR- c) Significant rise in bacterial agglutinating antibodies in acute and early convalescent sera

Etiologic Agent	Clinical Syndrome	Epidemiologic Criteria
6. Others	Clinical and laboratory data appraised in individual circumstances	
PARASITIC		
1. *Giardia lamblia*	a) Incubation period: 1-4 weeks b) Gastrointestinal syndrome: chronic diarrhea, cramps, fatigue and weight loss	a) Demonstration of *Giardia* cysts in epidemiologically incriminated water. -OR- b) Demonstration of *Giardia* trophs or cysts in stools or duodenal aspirates of ill persons.
2. *Entameba histolytica*	a) Incubation period: usually 2-4 weeks b) Gastrointestinal syndrome: variable from acute fulminating dysentery with fever, chills, and bloody stools to mild abdominal discomfort with diarrhea	a) Demonstration of *Entamoeba histolytica* cysts in epidemiologically incriminated water. -OR- b) Demonstration of *Entamoeba histolytica* trophs or cysts in stools of affected persons.
3. Others	Clinical and laboratory data appraised in individual circumstances	
CHEMICAL		
1. Heavy metals Antimony Cadmium Copper Iron Tin, Zinc, etc.	a) Incubation period: 5 min. to 8 hours b) Clinical syndrome compatible with heavy metal poisoning--usually gastrointestinal symptoms, often metallic taste (usually <1 hour)	Demonstration of high concentration of metallic ion in epidemiologically incriminated water.
2. Fluoride	a) Incubation period: usually <1 hour b) Gastrointestinal illness: usually nausea, vomiting, abdominal pain	Demonstration of high concentration of flouride ion in epidemiologically incriminated water.
3. Other chemicals	Clinical and laboratory data appraised in individual circumstances	

Etiologic Agent	Clinical Syndrome	Epidemiologic Criteria
VIRAL		
1. Hepatitis A	a) Incubation period: 14-28 days b) Clinical Syndrome: compatible with hepatitis symptoms, dark urine	Liver function tests compatible with hepatitis in affected persons who consumed the epidemiologically incriminated water
2. Norwalk and Norwalk-like	a) Incubation period: 24-48 hours (range 4-77 hours) b) Gastrointestinal syndrome: vomiting, watery diarrhea, abdominal cramps, often headache	a) Significant rise in antiviral antibody in paired sera -OR- b) Demonstration of virus particles in stools of ill persons by immune-electron microscopy
3. Rotavirus	a) Incubation period: 24-72 hours b) Gastrointestinal syndrome: vomiting, watery diarrhea, abdominal cramps, often with significant dehydration	a) Demonstration of virus in the stools of ill persons by ELISA or electron microscopy or electron microscopy. -OR- b) Significant rise in antiviral antibody in paired sera.
4. Enterovirus	a) Incubation period: 5-10 days (range 3-15 days) b) Syndrome: Enteroviral gastroenteritis is uncommon, although it does occur. Enteroviral infection usually includes other syndromes; poliomyelitis, aseptic meningitis, herpangina, etc.	a) Isolation of virus from ill persons -OR- b) Isolation of virus from epidemiologically implicated water.
5. Others	Clinical and laboratory data appraised in individual circumstances	

DEPARTMENT OF
HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
CENTERS FOR DISEASE CONTROL
CENTER FOR INFECTIOUS DISEASES
ATLANTA, GEORGIA 30333

INVESTIGATION OF A WATERBORNE OUTBREAK

Form Approved
OMB No. 0920-0004

1. Where did the outbreak occur?

_____ (1-2) City or Town _____ County _____

2. Date of outbreak: (Date of onset of 1st case)

_____ (3-8)

3. Indicate actual (a) or estimated (e) numbers:

Persons exposed _____ (9-11)
Persons ill _____ (12-14)
Hospitalized _____ (15-16)
Fatal cases _____ (17)

4. History of exposed persons:

No. histories obtained _____ (18-20)
No. persons with symptoms _____ (21-23)
Nausea _____ (24-26) Diarrhea _____ (33-35)
Vomiting _____ (27-29) Fever _____ (36-38)
Cramps _____ (30-32)
Other, specify (39) _____

5. Incubation period (hours):

Shortest _____ (40-42) Longest _____ (43-45)
Median _____ (46-48)

Shortest _____ (49-51) Longest _____ (52-54)
Median _____ (55-57)

7. Epidemiologic data (e.g., attack rates [number ill/number exposed] for persons who did or did not eat or drink specific food items or water, attack rate by quantity of water consumed, anecdotal information) * (58)

ITEMS SERVED	NUMBER OF PERSONS WHO ATE OR DRANK SPECIFIED FOOD OR WATER				NUMBER WHO DID NOT EAT OR DRINK SPECIFIED FOOD OR WATER			
	ILL	NOT ILL	TOTAL	PERCENT ILL	ILL	NOT ILL	TOTAL	PERCENT ILL

8. Vehicle responsible (item incriminated by epidemiologic evidence): (59-60)

9. Water supply characteristics

(A) Type of water supply** (61)

- ☐ Municipal or community supply (Name _____)
- ☐ Individual household supply
- ☐ Semi-public water supply
  - ☐ Institution, school, church
  - ☐ Camp, recreational area
  - ☐ Other, _____
- ☐ Bottled water

(B) Water source *(check all applicable)*:

- ☐ Well
- ☐ Spring
- ☐ Lake, pond
- ☐ River, stream

(C) Treatment provided *(circle treatment of each source checked in B)*:

a	b	c	d	a. no treatment
a	b	c	d	b. disinfection only
a	b	c	d	c. purification plant – coagulation, settling, filtration, disinfection *(circle those applicable)*
a	b	c	d	d. other _____

10. Point where contamination occurred: (66)

☐ Raw water source ☐ Treatment plant ☐ Distribution system

*See CDC 52.13 (Formerly 4.245) Investigation of a Foodborne Outbreak, Item 7.

**Municipal or community water supplies are public or investor owned utilities. Individual water supplies are wells or springs used by single residences. Semipublic water systems are individual-type water supplies serving a group of residences or locations where the general public is likely to have access to drinking water. These locations include schools, camps, parks, resorts, hotels, industries, institutions, subdivisions, trailer parks, etc., that do not obtain water from a municipal water system but have developed and maintain their own water supply.

CDC 52.12 (f. 4.46f)
REV. 7-81

This report is authorized by law (Public Health Service Act, 42 USC 241).
While your response is voluntary, your cooperation is necessary for the understanding and control of the disease.

11. Water specimens examined: (67)

(Specify by "X" whether water examined was original (drunk at time of outbreak) or check-up (collected before or after outbreak occurred)

ITEM	ORIGINAL	CHECK UP	DATE	FINDINGS		BACTERIOLOGIC TECHNIQUE (e.g., fermentation tube, membrane filter)
				Quantitative	Qualitative	
Examples: Tap water	X		6/12/74	10 fecal coliforms per 100 ml.		
Raw water		X	6/2/74	23 total coliforms per 100 ml.		

12. Treatment records: *(Indicate method used to determine chlorine residual):*

Example: Chlorine residual – One sample from treatment plant effluent on 6/11/74 – trace of free chlorine

Three samples from distribution system on 6/12/74 – no residual found

13. Specimens from patients examined (stool, vomitus, etc.) (68)

SPECIMEN	NO. PERSONS	FINDINGS
Example: Stool	11	8 *Salmonella typhi*
		3 negative

14. Unusual occurrence of events:

Example: Repair of water main 6/11/74; pit contaminated with sewage, no main disinfection. Turbid water reported by consumers 6/12/74.

15. Factors contributing to outbreak *(check all applicable):*

- ☐ Overflow of sewage
- ☐ Seepage of sewage
- ☐ Flooding, heavy rains
- ☐ Use of untreated water
- ☐ Use of supplementary source
- ☐ Water inadequately treated
- ☐ Interruption of disinfection
- ☐ Inadequate disinfection
- ☐ Deficiencies in other treatment processes
- ☐ Cross-connection
- ☐ Back-siphonage
- ☐ Contamination of mains during construction or repair
- ☐ Improper construction, location of well/spring
- ☐ Use of water not intended for drinking
- ☐ Contamination of storage facility
- ☐ Contamination through creviced limestone or fissured rock
- ☐ Other (specify) _____

16. Etiology: (69-70)

Pathogen _____

Chemical _____

Other _____

(71)

Suspected 1

Confirmed . . . . . 2 *(Circle one)*

Unknown 3

17. Remarks: *Briefly describe aspects of the investigation not covered above, such as unusual age or sex distribution; unusual circumstances leading to contamination of water; epidemic curve; control measures implemented; etc. (Attack additional page if necessary)*

Name of reporting agency: (72)

Investigating Official:

Date of investigation:

Note: Epidemic and Laboratory assistance for the investigation of a waterborne outbreak is available upon request by the State Health Department to the Centers for Disease Control, Atlanta, Georgia 30333.

To improve national surveillance, please send a copy of this report to: Centers for Disease Control
Attn: Enteric Diseases Branch, Bacterial Diseases Division
Center for Infectious Diseases
Atlanta, Georgia 30333

Submitted copies should include as much information as possible, but the completion of every item is not required.

III. DISEASE OUTBREAKS RELATED TO RECREATIONAL WATER USE, 1982

A. Sources of Data

As with disease outbreaks associated with drinking water, the sources of data for outbreaks associated with recreational water use are the state epidemiologists and their staffs. However, reporting of these disease outbreaks is not systematic; therefore, the outbreaks reported here also represent a small fraction of the total number that occur. The likelihood of an outbreak coming to the attention of health authorities varies considerably from 1 locale to another, depending largely upon consumer awareness and physician interest. We have included in this section infections or intoxications related to recreational water, but have excluded wound infections caused by water-related organisms.

B. Comments

Twenty-seven outbreaks related to recreational use of water were reported to CDC in 1982 (Section C); this represents the largest number of such outbreaks reported since surveillance began in 1971. Of the 27 outbreaks, 25 were outbreaks of dermatitis, and there was 1 outbreak each of Pontiac fever (*Legionella pneumophila*) and adenoviral pharyngitis.

Twenty-four of the 25 dermatitis outbreaks were caused by *Pseudomonas aeruginosa*. This is the largest number of *Pseudomonas* dermatitis outbreaks reported to CDC since routine tabulation of outbreaks related to recreational water use began in 1978. Eight of these outbreaks in 1982 were identified in a survey of recreational water use dermatitis (personal communication: K Spitalny, Vt. Dept. of Health), and may have been diagnosed by the presence of pathognomonic pustular folliculitis after common use of a hot tub or whirlpool. The first such outbreak was reported in 1975 (6). This outbreak and the majority of outbreaks since have been related to whirlpool or hot tub use, although outbreaks related to swimming pool use have been reported (7). CDC recently published suggested health and safety guidelines for public spas and hot tubs (8). There are no known reports of outbreaks having occurred at facilities in which the pool water has been continuously maintained at pH 7.2-7.8 with free residual chlorine levels of at least 1.0 mg/L (9). The seventh dermatitis outbreak was a cluster of 7 persons with "swimmer's itch" in Alaska in 1982. This dermatitis, caused by schistosomal cercariae, usually occurs as a sporadic illness.

The Pontiac fever outbreak is the second such outbreak to be associated with whirlpool use. The first outbreak occurred in Vermont at a spa; *Legionella* was isolated from the whirlpool water. In 1982, a group using a health club's facilities in Michigan developed Pontiac fever (10), and *L. pneumophila* serogroup 6 was recovered from whirlpool water.

Fever and pharyngitis developed in children using a community swimming pool, and adenovirus 7A was recovered by throat culturing of 7 of them. Adenoviral disease associated with water use has not been reported in the last 2 years.

C. Line Listing of Disease Outbreaks Related to Recreational Water Use, 1982

State	Month	Illness	Cases	Etiology	Location	Source
AK	Oct	dermatitis	15	Pseudomonas	communities	mobile hot tub
AK	Aug	dermatitis	7	cercarial	lake	lake
FL	Feb	dermatitis	10	Pseudomonas	private res.	hot tub
IL	May	dermatitis	40	Pseudomonas	motel/hotel	whirlpool
IA	Jan	dermatitis	2	Pseudomonas	motel	whirlpool
KS	Jan	dermatitis	15	Pseudomonas	motel	hot tub
ME	Jan	dermatitis	8	Pseudomonas	motel	hot tub
MA	April	dermatitis	5	Pseudomonas	motor inn	hot tub
MA	April	dermatitis	32	Pseudomonas	conference at hotel	hot tub, sauna
MI	April	dermatitis	2	Pseudomonas	motel/hotel	-----
MI	May	Pontiac fever	14	Legionella	health club	whirlpool
MN	Jan	dermatitis	13	Pseudomonas	motel	hot tub
MN	April	dermatitis, otitis	26	Pseudomonas	motel/hotel	------
MT	Jan	dermatitis	9	Pseudomonas	motel/hotel	-------
NM	Mar	dermatitis	61	Pseudomonas	health spa	hot tub
NY	May	dermatitis	117	Pseudomonas	resort	pool
NC	March	dermatitis, otitis	6	Pseudomonas	fraternity	rented hot tub
OH	March	dermatitis		Pseudomonas	motel	whirlpool
OK	July	fever, pharyngitis	66	adenovirus	community	swimming
PA	Jan	dermatitis	127	Pseudomonas	motel	whirlpool
PA	Oct	dermatitis	36	Pseudomonas	motel	whirlpool
PA	Dec	dermatitis	68	Pseudomonas	hotel	3 pools
PA	Dec	dermatitis	14	Pseudomonas	motel/hotel	pool
SD	Jan	dermatitis	13	Pseudomonas	motel	whirlpool
VT	Jan	dermatitis	7	Pseudomonas	motel	whirlpool
VA	Feb	dermatitis	12	Pseudomonas	club	whirlpool
WI	Jan	dermatitis	59	Pseudomonas	motel	whirlpool

D. References

6. McCausland WJ, Cox PJ. Pseudomonas infection traced to motel whirlpool. J Environ Health 1975;37:455-9.

7. Hopkins RS, Abbott DO, Wallace LE. Follicular dermatitis outbreak caused by Pseudomonas aeruginosa associated with a motel's indoor swimming pool. Pub Health Rep 1981;96:246-9.

8. Centers for Disease Control. Suggested health and safety guidelines for public spas and hot tubs. Atlanta: Centers for Disease Control, 1981 (HHS publication no. 99-960).

9. Centers for Disease Control. Outbreak of Pseudomonas aeruginosa serotype O:9 associated with a whirlpool. Morbidity and Mortality Weekly Rep 1981;30:329-31.

10. Remis RS, Jones EE, Tait KA, et al. An outbreak of Pontiac fever related to whirlpool use, Michigan, 1982. In:Program and Abstracts of the 83rd Annual Meeting of the American Society for Microbiology. Washington, D.C.: American Society for Microbiology, 1983 (Abstract C 359).

IV. OUTBREAKS OF ACUTE GASTROINTESTINAL DISEASE ON OCEAN-GOING VESSELS

A. Sources of Data

After shipboard outbreaks of typhoid fever (11), viral gastroenteritis, and shigellosis (12) occurred in 1971-1973, a review of ships' medical logs revealed an incidence of gastrointestinal illness on passenger cruise ships of 1% or less on 92% of cruises and 5% or greater on 2% of cruises (13). Shortly thereafter, the Bacterial Diseases Division and Quarantine Division, Bureau of Epidemiology, Center for Disease Control, established a surveillance system for shipboard gastrointestinal illness which required vessel masters to report all persons with diarrheal illness seen by the ship's physician as a part of his request for radio pratique (permission to enter a port). These reports are made by radio 4 to 24 hours before arrival in port and are logged by quarantine officers for forwarding to CDC monthly. In the event that 3% or more passengers on any 1 cruise visit the ship's physician with gastrointestinal illness, a quarantine officer will board and inspect the ship and then telephone a report to the Centers for Disease Control. Based on his report, the Enteric Diseases Branch, Division of Bacterial Diseases, Center for Infectious Diseases, may perform an in-depth investigation of the outbreak.

The Quarantine Division, Center for Prevention Services, performs a vessel sanitation inspection on each cruise ship semiannually or more frequently if indicated by poor sanitary ratings. Since the sanitation rating represents the results of an inspection carried out dockside on a given day, this rating may not reflect the sanitary conditions at sea. In 1978, however, results of the ships' reports of diarrheal illness since 1975 were compared with the vessel sanitation inspection reports for the same period. Outbreaks of diarrheal illness were significantly less frequent on vessels with sanitation scores that met the Public Health Service standards than on vessels which did not (14).

B. Comments

In 1982, CDC personnel investigated 3 outbreaks of diarrheal illness on cruise ships calling at U. S. ports. In the first outbreak, at least 31 passengers complained of diarrhea onboard a cruise ship traveling from Acapulco, Mexico, to Los Angeles, California; water was suspected as the vehicle, but neither a pathogen nor vehicle could be identified as the source of the outbreak. Similarly, acute gastroenteritis of unknown etiology occurred in 228 passengers on a cruise ship traveling from Southampton, United Kingdom: the outbreak was investigated in July while the vessel was berthed in New York City. In the third outbreak at least 247 passengers became ill after attending a buffet in Puerto Plata, Dominican Republic, in December. *Shigella flexneri* was recovered from the stools of 40 passengers.

C. References

11. Davies JW, Cox KC, Simon WR, et al. Typhoid at sea: Epidemic aboard an ocean liner. Canad Med Assoc J 1972;106:877-83.

12. Merson MH, Tenney JH, Meyers JD, et al. Shigellosis at sea: An outbreak aboard a passenger cruise ship. Am J Epidemiol 1975;101:165-75.

13. Merson MH, Hughes JM, Wood BT, Yashuk JC, Wells JG. Gastrointestinal illness on passenger cruise ships. JAMA 1975;231:723-7.

14. Dannenberg AL, Yashuk JC, Feldman RA. Gastrointestinal illness on passenger cruise ships, 1975-1978. Am J Pub Hlth 1982;72:484-8.

STATE AND TERRITORIAL EPIDEMIOLOGISTS AND STATE LABORATORY DIRECTORS

The State and Territorial Epidemiologists are the key to all disease surveillance activities, and their contributions to this report are gratefully acknowledged. In addition, valuable contributions are made by State Laboratory Directors.

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