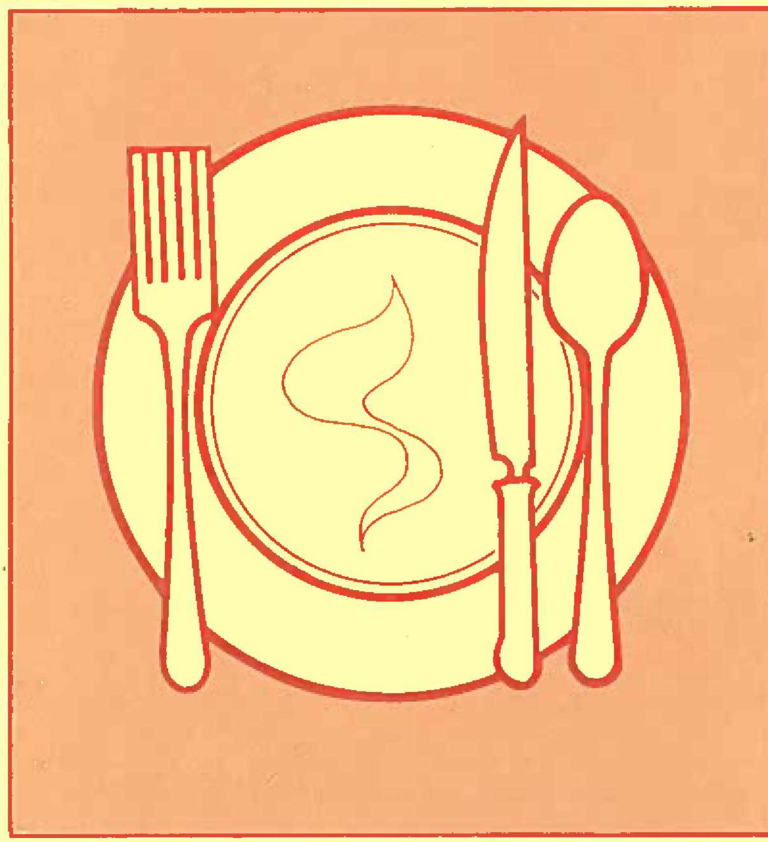
ANNUAL SUMMARY 1982

ISSUED SEPTEMBER 1985

CENTERS FOR DISEASE CONTROL

FOODBORNE DISEASE

SURVEILLANCE



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

PREFACE

This report summarizes information received from state and local health departments, the Food and Drug Administration, the U.S. Department of Agriculture, and private physicians. The information is preliminary and is intended primarily for use by those with responsibility for disease control activities. Anyone desiring to quote this report should contact the Enteric Diseases Branch for confirmation and further interpretation.

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

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SUGGESTED CITATION

Centers for Disease Control: Foodborne Disease Outbreaks
Annual Summary 1982, Issued September 1985

* Through June 1985

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I. BACKGROUND

A. History

The reporting of foodborne and waterborne diseases in the United States began over half a century ago when state and territorial health officers, concerned about the high morbidity and mortality caused by typhoid fever and infantile diarrhea, recommended that cases of enteric fever be investigated and reported. The purpose was to obtain information about the role of food, milk, and water in outbreaks of intestinal illness as the basis for sound public health action. Beginning in 1923, the U.S. Public Health Service published summaries of outbreaks of gastrointestinal illness attributed to milk. In 1938, it added summaries of outbreaks caused by all foods. These early surveillance efforts led to the enactment of important public health measures which had a profound influence in decreasing the incidence of enteric diseases, particularly those transmitted by milk and water.

From 1951 through 1960, the National Office of Vital Statistics reviewed reports of outbreaks of foodborne illness and published summaries of them annually in Public Health Reports. In 1961 the Centers for Disease Control (CDC), then the Communicable Disease Center, assumed responsibility for publishing reports on foodborne illness. For the period 1961-65, CDC discontinued publication of annual reviews, but reported pertinent statistics and detailed individual investigations in the Morbidity and Mortality Weekly Report (MMWR).

In 1966 the present system of surveillance of foodborne and waterborne diseases began with the incorporation of all reports of enteric disease outbreaks attributed to microbial or chemical contamination of food or water into an annual summary. Since 1966 the quality of investigative reports has improved primarily as a result of more active participation by state and federal agencies in the investigation of foodborne and waterborne disease outbreaks. Due to increasing interest and activity in waterborne disease surveillance, foodborne and waterborne disease outbreaks have been reported in separate annual summaries since 1978. This report summarizes data from foodborne disease outbreaks reported to CDC for 1982.

B. Objectives

Foodborne disease surveillance has traditionally served 3 objectives:

1. Disease Prevention and Control: Early identification and removal of contaminated products from the commercial market, correction of faulty food preparation practices in food service establishments and in the home, and identification and appropriate treatment of human carriers of foodborne pathogens are the fundamental prevention and control measures resulting from surveillance of foodborne disease.

2. Knowledge of Disease Causation: The responsible pathogen was not identified in over half of the foodborne disease outbreaks reported to CDC in each of the last 5 years. In many of these outbreaks pathogens known to cause foodborne illness may not have been identified because of late or incomplete laboratory investigation. In others, the responsible pathogen may have escaped detection even when a thorough laboratory investigation was carried out because the pathogen may not have been appreciated as a cause of foodborne disease or because the pathogen could not be identified by available laboratory techniques. When more thorough clinical, epidemiologic, and laboratory investigations are employed, perhaps many of these pathogens can be identified, and suitable measures for prevention and control can be instituted.

3. Administrative Guidance: The collection of data from outbreak investigations permits assessment of trends in etiologic agents and food vehicles and focuses on common errors in food handling. By compiling the data in an annual summary, it is hoped that local and state health departments and others involved in the implementation of food protection programs will be kept informed of the factors involved in foodborne disease outbreaks. Comprehensive surveillance would result in a clearer appreciation of priorities in food protection, institution of better training programs, and more effective use of available resources.

II. FOODBORNE DISEASE OUTBREAKS

A. Definition of Outbreak

For the purpose of this report, a foodborne disease outbreak is defined as an incident in which (1) 2 or more persons experience a similar illness, after ingestion of a common food, and (2) epidemiologic analysis implicates the food as the source of the illness. A few exceptions exist; for example, 1 case of botulism or chemical poisoning constitutes an outbreak.

Outbreaks of known etiology are those in which laboratory evidence of a specific etiologic agent is obtained, and specified criteria are met (see Section F). Outbreaks of unknown etiology are those in which epidemiologic evidence implicates a food source, but adequate laboratory confirmation is not obtained. These outbreaks are subdivided into 4 subgroups by incubation period of the illnesses: less than 1 hour (probable chemical poisoning), 1 to 7 hours (probable *Staphylococcus* food poisoning), 8 to 14 hours (probable *C. perfringens* food poisoning), and greater than 14 hours (other infectious or toxic agents).

B. Source of Data

Outbreaks are reported to CDC on a standard reporting form (Section G). Reports come most frequently from state and local health departments; reports may also be received from federal agencies such as the Food and Drug Administration (FDA), U.S. Department of Agriculture (USDA), the U.S. Armed Forces, and occasionally from private physicians. Forms are reviewed at CDC to determine if a specific etiologic agent for the outbreak can be confirmed and, in some instances, questions about an etiologic agent may be referred back to the reporting agency. Otherwise, data are otherwise accepted as reported on the forms.

C. Interpretation of Data

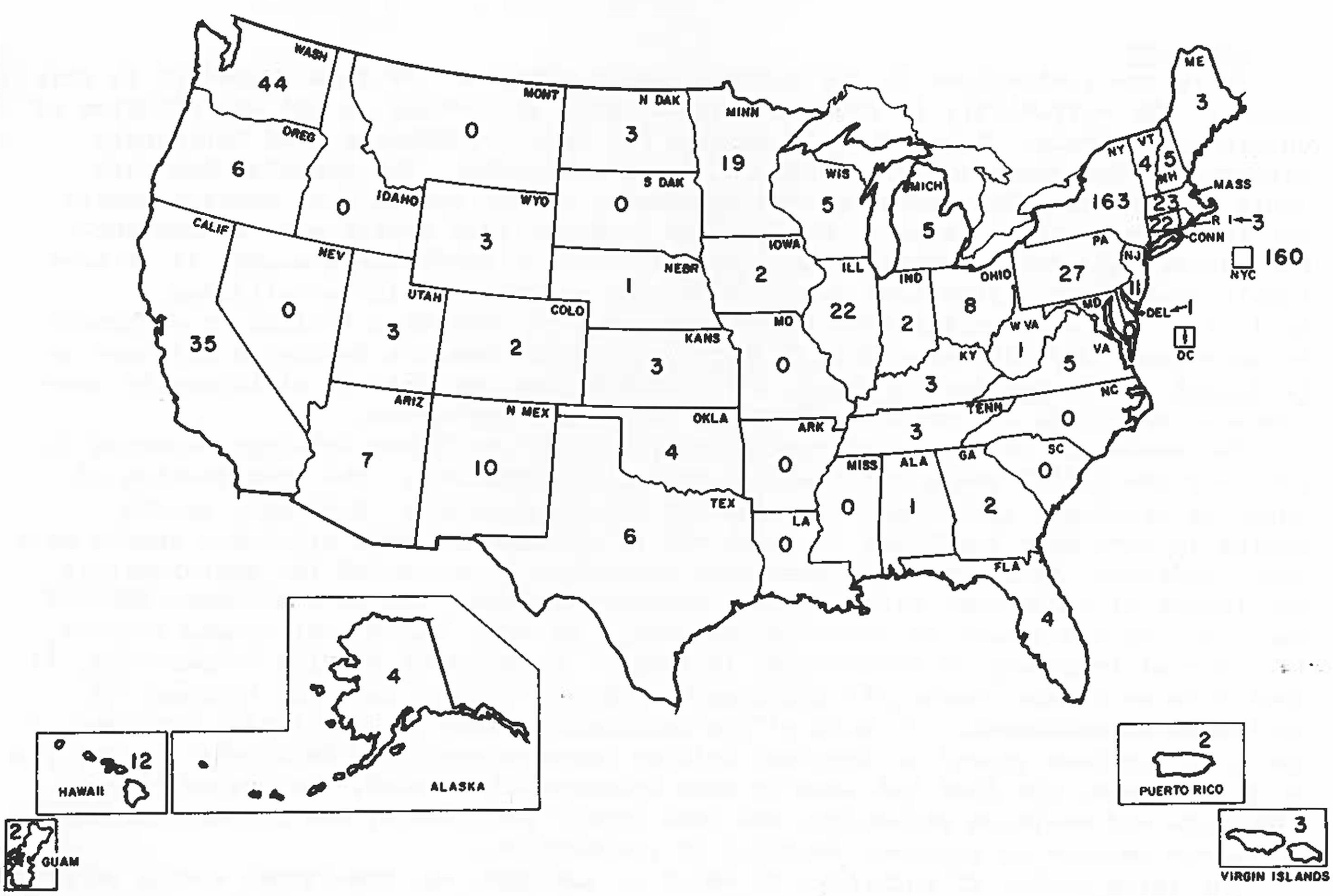
The limitations on the quantity and quality of data presented here must be appreciated to avoid misinterpretation. The number of outbreaks of foodborne disease reported by this surveillance system clearly represents only a small fraction of the total number that occur. The likelihood of an outbreak coming to the attention of health authorities varies considerably depending on consumer and physician awareness, interest, and motivation to report the incident; for example, large outbreaks, interstate outbreaks, restaurant-associated outbreaks, and outbreaks involving serious illness, hospitalizations, or deaths are more likely to come to the attention of health authorities than cases of mild illness following a family cookout.

The quality of the data presented here depends upon the commitment to foodborne surveillance by the state or local health departments. The department's interest in foodborne disease and its investigative and laboratory capabilities are central determinants of the quality of the investigation. Furthermore, the likelihood that the findings of the investigation will be reported varies from one locality to another. This report then should not be the basis of firm conclusions about the absolute incidence of foodborne disease, and it should not be used to draw conclusions about the relative incidence of foodborne diseases of various etiologies. For example, foodborne diseases characterized by short incubation periods, such as those caused by a chemical agent or staphylococcal enterotoxin, are more likely to be recognized as common-source foodborne disease outbreaks than those diseases with longer incubation periods, such as hepatitis A. Outbreaks involving less common pathogens, such as Bacillus cereus, Escherichia coli, or Giardia lamblia are less likely to be confirmed because these organisms are often not considered in clinical, epidemiologic, and laboratory investigations of foodborne disease outbreaks. Also, pathogens which generally cause mild illness will be under-represented, while those causing serious illness, such as Clostridium botulinum, are more likely to be identified. Similarly, restaurant- or commercial product-associated outbreaks have a higher likelihood of being reported.

D. Summary

In 1982, 656 outbreaks (19,380 cases) of foodborne disease were reported to the Centers for Disease Control. Reports were received from 39 states, as well as from the District of Columbia, the U.S. Virgin Islands, Guam, and Puerto Rico (Figure 1). New York reported the largest number of outbreaks, 323, with 160 from New York City; Washington reported the next largest number of outbreaks (44), followed by California (35).

Fig.1 OUTBREAKS OF FOODBORNE DISEASE REPORTED TO THE CENTERS FOR DISEASE CONTROL, BY STATE, 1982



The etiologic agent was confirmed in 34% of the outbreaks. Bacterial pathogens accounted for 151 outbreaks (5,501 cases). The most frequently isolated bacterial pathogen was Salmonella (55 outbreaks, 2,056 cases), followed by Staphylococcus aureus (28 outbreaks, 669 cases), and Clostridium perfringens (22 outbreaks, 1,189 cases). During 1982, two outbreaks (one in Oregon and one in Michigan) of a previously unrecognized pathogen, E. coli 0157:H7, were investigated. Both outbreaks were associated with eating hamburger from the same fast-food restaurant chain. The illness was characterized by bloody diarrhea, abdominal cramps and low-grade or absent fever. Since first described, this pathogen has also been associated with non-bloody diarrhea and a spectrum of clinical illness, including hemolytic-uremic syndrome. Viral agents (Hepatitis A and Norwalk virus) accounted for 21 outbreaks and 5,325 cases. The high number of cases resulting from viral agents is predominantly due to 2 large outbreaks of Norwalk gastroenteritis which occurred in Minnesota. One outbreak involved 3,000 cases and was related to eating bakery items with frosting. The second outbreak involved 2,000 cases and was associated with eating cole slaw. Chemical agents were responsible for 47 outbreaks (220 cases). Only 1 outbreak, involving 4 persons with Trichinella spiralis, was attributed to a parasitic agent. Twenty-six deaths were associated with foodborne diseases in 1982: 11 from Vibrio cholerae 01 (all in Guam and the Trust Territories), 8 from Salmonella, 5 from Clostridium botulinum, and 2 from unknown etiologies.

No pathogen was identified in 436 of the outbreaks (8,330 cases) reported in 1982. Incubation periods were known for illnesses in 412 of the outbreaks. In 13 outbreaks, the incubation period was less than 1 hour, in 123 outbreaks, it was 1 to 7 hours, in 91 outbreaks, it was 8 to 14 hours, and in 185 outbreaks, it was 15 hours or more.

E. Comments

There are limitations in the quantity and quality of the data presented in this report. The variability in reporting can be seen by looking at the distribution of outbreaks by state. A few states, such as New York, Washington, and California, reported a disproportionately large number of outbreaks. For example, New York State and New York City reported 323 outbreaks, almost one-half of those reported for the entire United States. While it is possible that states such as New York, Washington, and California have an increased rate of foodborne disease, it is more likely that these differences simply represent differences in surveillance activity. The same variability in reporting can be seen when looking at outbreaks by pathogen. Our data show that C. botulinum is as common a foodborne pathogen as C. jejuni and V. parahaemolyticus, a conclusion that can only be explained by more complete reporting for botulism than for some other pathogens.

The number of outbreaks of foodborne disease of confirmed etiology reported to CDC over the last 5 years has remained relatively constant. The distribution of cases by etiologic agent has also remained fairly constant. Etiologic agents typically have been confirmed in about 40% of outbreaks. When etiologic agents have been confirmed, bacterial pathogens have consistently accounted for approximately two-thirds of outbreaks, with chemical agents accounting for an additional 20%-25%. Many factors contribute to foodborne disease. In 1982, the 5 most common factors, in order of frequency of occurrence, included: 1) improper holding temperature, 2) food from an unsafe source, 3) inadequate cooking, 4) poor personal hygiene, 5) contaminated equipment. In most of the outbreaks caused by a bacterial pathogen, the food had been stored at improper holding temperatures. In outbreaks of botulism or trichinosis, the food had usually been inadequately cooked. In outbreaks of ciguatera and mushroom poisoning, the food itself was unsafe, and illness was not in any sense related to improper handling or preparation.

The large number of outbreaks in which no pathogen was identified serves as a challenge to improve investigative skills so that known pathogens can be identified more frequently and new and as-yet unidentified pathogens may be recognized.

Table 1 Confirmed Foodborne Disease Outbreaks, Cases, and Deaths, by Etiologic Agents, United States, 1982

Etiologic Agent	Outbreaks No.	Outbreaks (%)	Cases No.	Cases (%)	Deaths No.	Deaths (%)
BACTERIAL						
Bacillus cereus	8	(3.6)	200	(1.8)	0	(0.0)
Brucella	1	(0.5)	3	(<0.1)	0	(0.0)
Campylobacter jejuni	2	(0.9)	31	(0.3)	0	(0.0)
Clostridium botulinum	21	(9.5)	30	(0.3)	5	(20.9)
Clostridium perfringens	22	(10.0)	1,189	(10.8)	0	(0.0)
Escherichia coli	2	(0.9)	47	(0.4)	0	(0.0)
Salmonella	55	(25.0)	2,056	(18.6)	8	(33.3)
Shigella	4	(1.8)	116	(1.1)	0	(0.0)
Staphylococcus aureus	28	(12.7)	669	(6.0)	0	(0.0)
Streptococcus Group A	1	(0.5)	34	(0.3)	0	(0.0)
Vibrio cholerae O1	1	(0.5)	892	(8.0)	11	(45.8)
Vibrio cholerae non-O1	1	(0.5)	7	(0.1)	0	(0.0)
Vibrio parahaemolyticus	3	(1.4)	39	(0.4)	0	(0.0)
Yersinia enterocolitica	2	(0.9)	188	(1.7)	0	(0.0)
Total	151	(68.7)	5,501	(49.9)	24	(100.0)
CHEMICAL						
Ciguatoxin	8	(3.6)	37	(0.3)	0	(0.0)
Heavy metals	5	(2.3)	26	(0.2)	0	(0.0)
Monosodium glutamate	3	(1.4)	10	(0.1)	0	(0.0)
Mushroom poisoning	4	(1.8)	9	(0.1)	0	(0.0)
Scombrotoxin	18	(8.2)	58	(0.5)	0	(0.0)
Paralytic shellfish	1	(0.5)	5	(<0.1)	0	(0.0)
Other	8	(3.6)	75	(0.7)	0	(0.0)
Total	47	(21.4)	220	(1.9)	0	(0.0)
PARASITIC						
Trichinella spiralis	1	(0.5)	4	(<0.1)	0	(0.0)
Total	1	(0.5)	4	(<0.1)	0	(0.0)
VIRAL						
Hepatitis A	19	(8.5)	325	(2.9)	0	(0.0)
Norwalk Virus	2	(0.9)	5,000	(45.2)	0	(0.0)
Total	21	(9.4)	5,325	(48.1)	0	(0.0)
CONFIRMED TOTAL	220	(100.0)	11,050	(100.0)	24	(100.0)

Table 2 Confirmed Foodborne Disease Outbreaks, by Etiologic Agent, United States, 1978-1982

Etiologic Agent	1978 No.	1978 (%)	1979 No.	1979 (%)	1980 No.	1980 (%)	1981 No.	1981 (%)	1982 No.	1982 (%)
BACTERIAL										
B. cereus	6	(3.9)	-	-	9	(4.1)	8	(3.2)	8	(3.6)
Brucella	-	-	2	(1.3)	-	-	-	-	1	(0.5)
C. jejuni	-	-	-	-	5	(2.3)	10	(4.0)	2	(0.9)
C. botulinum	12	(7.8)	7	(4.0)	14	(6.3)	11	(4.4)	21	(9.5)
C. perfringens	9	(5.9)	20	(11.6)	25	(11.3)	28	(11.2)	22	(10.0)
E. cloacae	-	-	1	(0.6)	-	-	-	-	-	-
E. coli	1	(0.7)	-	-	1	(0.5)	-	-	2	(0.9)
Salmonella	45	(29.3)	44	(25.5)	39	(17.7)	66	(26.4)	55	(25.0)
Shigella	4	(2.6)	7	(4.0)	11	(5.0)	9	(3.6)	4	(1.8)
S. aureus	23	(14.9)	34	(19.7)	27	(12.2)	44	(17.6)	28	(12.7)
Streptococcus Group A	-	-	-	-	-	-	2	(0.8)	1	(0.5)
Streptococcus Group D	1	(0.7)	-	-	-	-	1	(0.4)	-	-
Streptococcus Group G	-	-	1	(0.6)	-	-	-	-	-	-
V. cholerae 01	1	(0.7)	-	-	-	-	-	-	1	(0.5)
V. cholerae non-01	-	-	1	(0.6)	-	-	1	(0.4)	1	(0.5)
V. parahaemolyticus	2	(1.3)	2	(1.3)	4	(1.8)	2	(0.8)	3	(1.4)
Y. enterocolitica	-	-	-	-	-	-	2	(0.8)	2	(0.9)
Other	1	(0.7)	-	-	1	(0.5)	1	(0.4)	-	-
Total	105	(68.5)	119	(69.2)	136	(61.7)	185	(74.0)	151	(68.7)
CHEMICAL										
Ciguatoxin	19	(12.3)	18	(10.4)	15	(6.8)	15	(6.0)	8	(3.6)
Heavy metals	1	(0.7)	1	(0.6)	1	(0.5)	2	(0.8)	5	(2.3)
Monosodium glutamate	-	-	-	-	-	-	2	(0.8)	3	(1.4)
Mushroom poisoning	1	(0.6)	1	(0.6)	-	-	11	(4.4)	4	(1.8)
Paralytic shellfish	4	(2.6)	-	-	5	(2.2)	-	-	1	(0.5)
Scombrotoxin	7	(4.5)	12	(7.0)	29	(13.0)	7	(2.8)	18	(8.2)
Other	5	(3.2)	4	(2.3)	16	(7.2)	14	(5.6)	8	(3.6)
Total	37	(23.9)	36	(20.9)	66	(29.7)	51	(20.4)	47	(21.4)
PARASITIC										
Trichinella spiralis	7	(4.5)	11	(6.4)	5	(2.3)	7	(2.8)	1	(0.5)
Other	-	-	-	-	2	(0.9)	1	(0.4)	-	-
Total	7	(4.5)	11	(6.4)	7	(3.2)	8	(3.2)	1	(0.5)
VIRAL										
Hepatitis A	5	(3.2)	5	(2.9)	10	(4.5)	6	(2.4)	19	(8.6)
Norwalk Virus	-	-	1	(0.6)	2	(0.9)	-	-	2	(0.9)
Total	5	(3.2)	6	(3.5)	12	(5.4)	6	(2.4)	21	(9.4)
CONFIRMED TOTAL	154	(100.0)	172	(100.0)	221	(100.0)	250	(100.0)	220	(100.0)

Table 3 Foodborne Outbreaks by Specific Etiologic Agent and Vehicle of Transmission, United States, 1982

Etiologic Agent	Beef	Ham	Pork	Sau-sage	Chick-en	Tur-key	Other Meat	Shell Fish	Tuna	Mahi-Mahi	Other Fish	Milk	Eggs	Ice Cre
BACTERIAL														
B. cereus	1	-	-	-	-	-	-	-	-	-	-	-	-	
Brucella	-	-	-	-	-	-	-	-	-	-	-	-	-	
C. jejuni	-	-	-	-	-	-	-	-	-	-	-	2	-	
C. botulinum	1	-	-	-	-	-	-	-	-	-	1	-	-	
C. perfringens	6	-	-	-	-	4	2	-	-	-	-	-	-	
E. coli	2	-	-	-	-	-	-	-	-	-	-	-	-	
Salmonella	1	-	2	1	2	4	1	-	-	-	1	1	2	
Shigella	-	-	-	-	-	-	-	-	1	-	-	-	-	
S. aureus	5	3	2	1	4	3	1	-	-	-	-	-	-	
Streptococcus Group A	-	-	-	-	-	-	-	-	-	-	-	-	-	
V. cholerae O1	-	-	-	-	-	-	-	-	-	-	-	-	-	
V. cholerae non-O1	-	-	-	-	-	-	-	1	-	-	-	-	-	
V. parahaemolyticus	-	-	-	-	-	-	-	3	-	-	-	-	-	
Y. enterocolitica	-	-	-	-	-	-	-	-	-	-	-	1	-	
Other	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	16	3	4	2	6	11	4	4	1	-	2	4	2	-
CHEMICAL														
Ciguatoxin	-	-	-	-	-	-	-	-	-	-	8	-	-	
Heavy metals	-	-	-	-	-	-	-	-	-	-	-	-	-	
Monosodium glutamate	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mushroom poisoning	-	-	-	-	-	-	-	-	-	-	-	-	-	
Paralytic shellfish	-	-	-	-	-	-	-	1	-	-	-	-	-	
Scombrotoxin	-	-	-	-	-	-	-	-	3	5	10	-	-	
Other	1	-	-	1	-	-	-	-	-	-	-	-	-	
Total	1	-	-	1	-	-	-	1	3	5	18	-	-	-
PARASITIC														
Trichinella spiralis	-	-	1	-	-	-	-	-	-	-	-	-	-	
Total	-	-	1	-	-	-	-	-	-	-	-	-	-	-
VIRAL														
Hepatitis A	-	-	-	-	-	-	-	5	1	-	-	-	-	
Norwalk Virus	-	-	-	-	-	-	-	-	-	-	-	-	-	
Total	-	-	-	-	-	-	-	5	1	-	-	-	-	-
CONFIRMED TOTAL	17	3	5	3	6	11	4	10	5	5	20	4	2	[illegible]
UNKNOWN	5	2	1	1	7	-	-	56	2	-	1	-	1	[illegible]
TOTAL 1982	22	5	6	4	13	11	4	66	7	5	21	4	3	[illegible]

Table 3 Foodborne Outbreaks by Specific Etiologic Agent and Vehicle of Transmission, U.S., 1982 (Contd)

Baked Foods	Fruits & Veg-etable	Potato Salad	Poultry, Fish, Egg Salad	Other Salad	Fried Rice	Chi-nese Food	Mex-ican Food	Carbo-nated Bev	Non-Dairy Bev	Multi-ple Foods	Mush-rooms	Other Foods	Un-known	Total
1	-	-	-	1	3	-	-	-	-	-	-	1	-	8
-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	16	-	-	-	-	-	-	-	-	-	1	1	1	21
-	-	-	-	-	-	-	2	-	-	1	-	-	7	22
-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
-	-	-	1	2	-	-	1	-	-	-	-	3	29	55
-	-	-	-	1	-	-	-	-	-	-	-	-	2	4
2	-	2	1	-	-	-	1	-	-	1	-	-	2	28
-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
-	1	-	-	-	-	-	-	-	-	-	-	-	-	2
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	17	2	2	5	3	-	4	-	-	3	1	5	42	151
-	-	-	-	-	-	-	-	-	-	-	-	-	-	8
-	-	-	-	-	-	-	-	4	1	-	-	-	-	5
-	-	-	-	-	-	2	-	-	-	1	-	-	-	3
-	-	-	-	-	-	-	-	-	-	-	4	-	-	4
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	18
-	1	-	-	-	-	-	-	1	1	-	-	3	-	8
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-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
1	-	-	-	-	-	-	-	-	-	1	-	-	10	19
1	-	-	-	1	-	-	-	-	-	-	-	-	-	2
2	-	-	-	1	-	-	-	-	-	1	-	-	10	21
5	18	2	2	6	3	2	4	5	2	5	5	8	52	220
5	1	3	1	6	1	1	2	-	-	5	1	9	325	436
10	19	5	3	12	4	3	6	5	2	10	6	17	377	656

Table 4 Foodborne Disease Outbreaks, by Specific Etiologic Agent and Place Where Food Was Eaten, United States, 1982

Etiologic Agent	Home	Delicatessen, Cafeteria, or Restaurant	School	Picnic	Church	Camp	Other	Unknown	Total
BACTERIAL									
B. cereus	-	3	2	-	-	1	2	-	8
Brucella	1	-	-	-	-	-	-	-	1
C. jejuni	1	-	-	-	-	-	1	-	2
C. botulinum	21	-	-	-	-	-	-	-	21
C. perfringens	-	9	1	-	-	-	12	-	22
E. coli	-	-	-	-	-	-	2	-	2
Salmonella	12	17	6	3	4	1	12	-	55
Shigella	1	2	-	-	1	-	-	-	4
S. aureus	4	7	2	2	2	1	10	-	28
Streptococcus Group A	-	-	-	-	-	-	1	-	1
V. cholerae 01	1	-	-	-	-	-	-	-	1
V. cholerae non-01	1	-	-	-	-	-	-	-	1
V. parahaemolyticus	1	-	-	1	-	-	1	-	3
Y. enterocolitica	1	-	-	-	-	-	1	-	2
Total	44	38	11	6	7	3	42	-	151
CHEMICAL									
Ciguatoxin	3	5	-	-	-	-	-	-	8
Heavy metals	1	3	-	-	-	-	1	-	5
Monosodium glutamate	1	2	-	-	-	-	-	-	3
Mushroom poisoning	3	-	-	-	-	-	1	-	4
Paralytic shellfish	1	-	-	-	-	-	-	-	1
Scombrotoxin	7	9	-	-	-	-	2	-	18
Other chemical	4	4	-	-	-	-	-	-	8
Total	20	23	-	-	-	-	4	-	47
PARASITIC									
Trichinella spiralis	1	-	-	-	-	-	-	-	1
Total	1	-	-	-	-	-	-	-	1
VIRAL									
Hepatitis A	5	6	-	1	-	1	6	-	19
Norwalk Virus	-	1	-	-	-	-	1	-	2
Total	5	7	-	1	-	1	7	-	21
CONFIRMED TOTAL	70	68	11	7	7	4	53	-	220
UNKNOWN	127	221	17	16	2	1	49	3	436
TOTAL 1982	197	289	28	23	9	5	102	3	656

Table 5 Foodborne Disease Outbreaks by Specific Etiologic Agent and Month of Occurrence, United States, 1982

Etiologic Agent	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Unknown	Total
BACTERIAL														
Brucella	-	-	1	-	-	-	-	-	-	-	-	-	-	1
B. cereus	2	-	-	-	-	-	2	2	2	-	-	-	-	8
C. jejuni	-	-	-	-	-	1	-	-	1	-	-	-	-	2
C. botulinum	-	3	-	-	2	3	3	2	1	1	3	3	-	21
C. perfringens	-	2	1	1	5	2	1	2	2	1	2	3	-	22
E. coli	-	1	-	-	1	-	-	-	-	-	-	-	-	2
Salmonella	2	1	1	5	4	5	10	11	3	5	3	5	-	55
Shigella	-	-	-	1	-	-	-	-	1	1	1	-	-	4
S. aureus	2	1	1	2	2	3	5	5	1	3	1	2	-	28
Streptococcus Group A	-	-	-	-	-	-	1	-	-	-	-	-	-	1
V. cholerae 01	-	-	-	-	-	-	-	1	-	-	-	-	-	1
V. cholerae non-01	-	-	-	-	-	-	-	-	-	-	-	1	-	1
V. parahaemolyticus	-	-	-	-	-	-	2	1	-	-	-	-	-	3
Y. enterocolitica	-	1	-	-	-	1	-	-	-	-	-	-	-	2
Total	6	9	4	9	14	15	24	24	11	11	10	14	-	151
CHEMICAL														
Ciguatoxin	1	-	-	-	-	-	3	3	-	-	1	-	-	8
Heavy metals	1	1	-	-	1	-	-	-	-	-	2	-	-	5
Monosodium glutamate	1	-	1	-	-	-	-	1	-	-	-	-	-	3
Mushroom poisoning	-	-	1	-	-	-	2	-	1	-	-	-	-	4
Paralytic shellfish	-	-	-	-	-	-	-	1	-	-	-	-	-	1
Scombrotoxin	1	-	-	-	-	1	1	4	6	4	-	1	-	18
Other	-	-	2	2	1	-	-	-	1	1	1	-	-	8
Total	4	1	4	2	2	1	6	9	8	5	4	1	-	47
PARASITIC														
Trichinella spiralis	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Total	-	-	-	-	1	-	-	-	-	-	-	-	-	1
VIRAL														
Hepatitis A	3	-	-	-	2	3	3	4	1	1	-	2	-	19
Norwalk Virus	-	-	-	-	-	-	-	1	-	-	1	-	-	2
Total	3	-	-	-	2	3	3	5	1	1	1	2	-	21
CONFIRMED TOTAL	13	10	8	11	19	19	33	38	20	17	15	17	-	220
UNKNOWN	27	31	27	29	43	31	21	32	30	27	26	112	-	436
TOTAL 1982	40	41	35	40	62	50	54	70	50	44	41	129	-	656

Table 6 Foodborne Disease Outbreaks by Etiologic Agent and Contributing Factors, United States, 1982

Etiologic Agent	Number of Reported Outbreaks	Number of Outbreaks In Which Factors Reported	Improper Holding Temperatures	Inadequate Cooking	Contaminated Equipment	Food From Unsafe Source	Poor Personal Hygiene	Other
BACTERIAL								
B. cereus	8	5	5	-	-	-	1	-
Brucella	1	-	-	-	-	-	-	-
C. jejuni	2	2	-	-	-	1	-	1
C. botulinum	21	4	1	-	-	-	-	3
C. perfringens	22	20	19	8	3	-	-	2
E. coli	2	1	1	-	-	-	-	-
Salmonella	55	34	16	18	6	6	7	4
Shigella	4	4	1	-	-	-	4	-
S. aureus	28	21	20	3	4	1	9	1
Streptococcus Group A	1	1	1	-	-	-	1	-
Streptococcus Group D	1	-	-	-	-	-	-	-
V. cholerae 01	1	-	-	-	-	-	-	-
V. cholerae non-01	1	1	-	1	-	-	-	-
V. parahaemolyticus	3	2	-	-	-	2	-	-
Y. enterocolitica	2	-	-	-	-	-	-	-
Total	151	95	64	30	13	10	22	11
CHEMICAL								
Ciguatoxin	8	1	-	-	-	1	-	-
Heavy metals	5	4	-	-	2	-	1	2
Monosodium glutamate	3	2	-	-	-	-	-	2
Mushroom poisoning	4	2	-	-	-	2	-	-
Paralytic shellfish	1	1	-	-	-	1	-	-
Scombrotoxin	18	9	5	-	-	5	-	-
Other	8	6	-	-	3	-	-	3
Total	47	25	5	-	5	9	1	7
PARASITIC								
Trichinella spiralis	1	1	-	1	-	1	-	-
Total	1	1	-	1	-	1	-	-
VIRAL								
Hepatitis A	19	14	2	2	-	6	9	3
Norwalk Virus	2	2	-	-	-	-	2	-
Total	21	16	2	2	-	6	11	3
CONFIRMED TOTAL	220	137	71	33	18	26	34	21
UNKNOWN	436	225	87	73	35	94	59	16
TOTAL 1982	656	362	158	106	53	120	93	37

F. Guidelines for Confirmation of Foodborne Disease Outbreak

BACTERIAL	Clinical Syndrome	Laboratory, clinical, and/or epidemiologic criteria for confirmation
1. Bacillus cereus	Vomiting toxin: a) incubation period 1-6 hrs. b) vomiting, some cases with diarrhea Diarrheal toxin: a) incubation period 6-24 hrs. b) diarrhea, abdominal cramps, some cases with vomiting	a) isolation of $\geq 10^5$ organisms per gram in epidemiologically incriminated food OR b) isolation of organism from stools of ill persons and not in stools of controls
2. Brucella	a) incubation period several days to several months b) clinical syndrome compatible with brucellosis	a) 4-fold increase in titer OR b) positive blood culture
3. Campylobacter jejuni	a) incubation period 2-10 days, usually 4-7 b) gastrointestinal syndrome--abdominal pain, often severe; bloody diarrhea common	Isolation of organisms from stool/blood of ill individuals
4. Clostridium botulinum	a) incubation 2 hours-8 days, usually 12-48 hours b) clinical syndrome compatible with botulism (see CDC Botulism Manual)	a) detection of botulinal toxin in human sera, feces, or food OR b) isolation of C. botulinum organism from stools OR c) clinical syndrome in persons known to have consumed same food as other individuals with laboratory-proven cases
5. Clostridium perfringens	a) incubation period 9-15 hrs. b) lower intestinal syndrome--majority of cases with diarrhea but little vomiting or fever	a) organisms of same serotype in epidemiologically incriminated food and stool of ill individuals. OR b) isolation of organisms with same serotype in stool of most ill individuals and not in stool of controls OR c) $\geq 10^5$ organisms per gram in epidemiologically incriminated food provided specimen properly handled
6. Escherichia coli	a) incubation period 6-36 hrs. b) gastrointestinal syndrome--majority of cases with diarrhea	a) demonstration of organisms of same serotype in epidemiologically incriminated food and stool of ill individuals and not in stool of controls OR b) isolation from stool of most ill individuals, organisms of the same serotype which have been shown to be enterotoxigenic or invasive by laboratory techniques

	Clinical Syndrome	Laboratory, clinical, and/or epidemiologic criteria for confirmation
7. Salmonella	a) incubation period 6-48 hrs. b) gastrointestinal syndrome--majority of cases with diarrhea	a) isolation of Salmonella organism from epidemiologically implicated food OR b) isolation of Salmonella organism from stools of ill individuals
8. Shigella	a) incubation period 12-50 hours b) gastrointestinal syndrome--majority of cases with diarrhea	a) isolation of Shigella organism from epidemiologically implicated food OR b) isolation of Shigella organism from stools of ill individuals
9. Staphylococcus aureus	a) incubation period 30 min.-8 hours (usually 2-4 hrs.) b) gastrointestinal syndrome--majority of cases with vomiting	a) detection of enterotoxin in epidemiologically implicated food OR b) organisms with same phage type in stools or vomitus of ill individuals; isolation from epidemiologically implicated food and/or skin or nose of food handler is supportive evidence OR c) isolation of $\geq 10^5$ organisms per gram in epidemiologically implicated food
10. Streptococcus Group A	a) incubation period 1-4 days b) febrile URI snydrome	a) isolation of organisms with same M and T type from implicated food OR b) isolation of organisms with same M and T type from throats of ill individuals
11. Vibrio cholerae 01	a) incubation period 1-5 days b) gastrointestinal syndrome--majority of cases with diarrhea and without fever	a) isolation of toxigenic V. cholerae 01 from epidemiologically incriminated food OR b) isolation of organisms from stools or vomitus of ill individuals OR c) significant rise in vibriocidal, bacterial agglutinating or antitoxin antibodies in acute and early convalescent sera, or significant fall in vibriocidal antibodies in early and late convalescent sera in persons not recently immunized
Vibrio cholerae Non-01	a) incubation period up to 3 days b) gastrointestinal syndrome--majority of cases with diarrhea	a) isolation of non-01 V. cholerae of same serotype from stools of ill persons; isolation from epidemiologically implicated food is supportive evidence
12. Vibrio parahaemolyticus	a) incubation period 4-30 hrs. b) gastrointestinal syndrome--majority of cases with diarrhea	a) isolation of $\geq 10^5$ organisms from epidemiologically implicated food (usually seafood) OR b) isolation of Kanagawa-positive organisms from stool of ill individuals

	Clinical Syndrome	Laboratory, clinical, and/or epidemiologic criteria for confirmation
13. Others	clinical data appraised in individual circumstances	laboratory data appraised in individual circumstances
CHEMICAL		
1. Heavy metals Antimony Cadmium Copper Iron Tin	a) incubation period 5 min. to 8 hrs. (usually less than 1 hr) b) clinical syndrome compatible with heavy metal poisoning--usually gastrointestinal syndrome and often metallic taste	demonstration of high concentration of metallic ion in epidemiologically incriminated food or beverage
2. Ichthyosarcotoxin		
Ciguatoxin	a) incubation period 1-48 hrs. (usually 2-8 hrs.) b) usually gastrointestinal symptoms followed by neurologic manifestations, including paresthesia of lips, tongue, throat or extremities, and reversal of hot and cold sensation	a) demonstration of ciguatoxin in epidemiologically incriminated fish OR b) clinical syndrome in person(s) who have eaten a type of fish previously associated with ciguatera fish poisoning (e.g., snapper, grouper)
Puffer fish (tetrodotoxin)	a) incubation period 10 min. to 3 hrs. (usually 10-45 min.) b) paresthesia of lips, tongue, face or extremities often followed by numbness, loss of proprioception or a "floating" sensation	a) demonstration of tetrodotoxin in fish OR b) puffer fish epidemiologically incriminated
Scombrotoxin	a) incubation period 1 min. to 3 hours (usually less than 1 hour) b) flushing, headache, dizziness, burning of mouth and throat, upper and lower gastrointestinal symptoms, urticaria and generalized pruritus	a) demonstration of elevated histamine levels in epidemiologically incriminated fish OR b) clinical syndrome in person(s) known to have eaten a fish of order Scombrodei or type of fish previously associated with scombroid poisoning (e.g., mahi-mahi)
3. Monosodium glutamate	a) incubation period 3 min. to 2 hours (usually less than 1 hour) b) burning sensations in chest, neck, abdomen or extremities, sensations of lightness and pressure over face, or a heavy feeling in the chest	history of large amounts (usually $\geq$1.5 grams) of MSG having been added to epidemiologically incriminated food
4. Mushroom poison Group containing ibotenic acid and muscimol	a) incubation period 1-12 hrs. (usually less than 4 hrs.) b) clinical syndrome compatible w/mushroom poisoning by this group--often including confusion, delirium, visual disturbances	a) demonstration of toxic chemical in epidemiologically incriminated mushrooms OR b) epidemiologically incriminated mushrooms identified as a toxic type

	Clinical Syndrome	Laboratory, clinical, and/or epidemiologic criteria for confirmation
Group containing amanitotoxins and phallotoxins, or gyromitrin	a) incubation period 5-18 hrs. b) characteristic clinical syndrome compatible with mushroom poisoning by this group--upper and lower gastrointestinal symptoms followed by hepatic and/or renal failure	a) demonstration of toxic chemical in epidemiologically incriminated mushrooms OR b) epidemiologically incriminated mushrooms identified as a toxic type
Groups containing muscarine, psilocybin and psilocin, gastrointestinal irritants, disulfiram-like compounds	a) characteristic incubation period b) clinical syndrome compatible with mushroom poisoning by these groups	a) demonstration of toxic chemical in epidemiologically incriminated mushrooms OR b) epidemiologically incriminated mushroom identified as toxic type
5. Paralytic or neurotoxic shellfish poison	a) incubation period 30 min. to 3 hours b) paresthesias of lips, mouth or face, and extremities; weakness, including respiratory difficulty in most severe cases; upper and lower gastrointestinal symptoms in some cases	a) detection of toxin in epidemiologically incriminated mollusks OR b) detection of large numbers of shellfish poisoning-associated species of dinoflagellates in water from which epidemiologically incriminated mollusks gathered
6. Other chemical	clinical data appraised in individual circumstances	laboratory data appraised in individual circumstances
PARASITIC AND VIRAL		
1. Trichinella spiralis	a) incubation period 3-30 days b) clinical syndrome compatible with trichinosis--often including fever, high eosinophil count, orbital edema, myalgia	a) muscle biopsy from ill individual OR b) serological tests OR c) demonstration of larvae in incriminated food
2. Hepatitis A	a) incubation period 10-45 days b) clinical syndrome compatible with hepatitis--usually including jaundice, GI symptoms, dark urine	liver function tests compatible with hepatitis in affected persons who consumed the epidemiologically incriminated food
3. Others	clinical evidence appraised in individual circumstances	laboratory evidence appraised in individual circumstances

CDC USE ONLY ☐☐☐☐ (1-4)

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

FORM APPROVED
OMB NO. 0920-0004

G. INVESTIGATION OF A FOODBORNE OUTBREAK

1. Where did the outbreak occur ?

State ________________ (5-6) City or Town ________________ County ________________

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

____
MO / DA / YR (7-12)

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

Persons exposed ________________ (13-17)

Persons ill ________________ (18-22)

Hospitalized ________________ (23-27)

Fatal case ________________ (28-31)

4. History of Exposed Persons;

No. histories obtained ________________ (32-35)

No. persons with symptoms ________________ (36-39)

Nausea ________ (40-43) Diarrhea ________ (44-47)

Vomiting ________ (48-51) Fever ________ (52-55)

Cramps ________ (56-59) Other, specify ________

________________ (60-79)

5. Incubation period (hours):

Shortest ________ (80-83) Longest ________ (84-87)

Approx. for majority ________ (88-91)

6. Duration of illness (hours):

Shortest ________ (92-95) Longest ________ (96-99)

Approx. for majority ________ (101-104)

7. Food - specific attack rates:

Food Items Served	Number of persons who ATE specified food				Number who did NOT eat specified food			
	Ill	Not Ill	Total	Percent Ill	Ill	Not Ill	Total	Percent Ill

8. Vehicle responsible (food item incriminated by epidemiological evidence): (105-106) ________________

9. Manner in which incriminated food was marketed: (Check all Applicable)

	Yes 1	No 2	
(a) Food Industry			
Raw	☐	☐	(107)
Processed	☐	☐	(108)
Home Produced			
Raw	☐	☐	(109)
Processed	☐	☐	(110)
(b) Vending Machine	☐	☐	(111)

	Yes 1	No 2	
(c) Not Wrapped	☐	☐	(112)
Ordinary Wrapping	☐	☐	(113)
Canned	☐	☐	(114)
Canned—Vacuum Sealed	☐	☐	(115)
Other (specify)	☐	☐	(116)
________________ (117-129)			
(d) Room Temperature	☐	☐	(130)
Refigerator	☐	☐	(131)
Frozen	☐	☐	(132)
Heated	☐	☐	(133)

If a commerical product, indicate brand name and lot number

________________ (134-150)

10. Place of Preparation of Contaminated Item: (151)

Restaurant ☐ 1
Delicatessen ☐ 2
Cafeteria ☐ 3
Private Home ☐ 4
Caterer ☐ 5
Institution:
School ☐ 6
Church ☐ 7
Camp ☐ 8
Other, specify ☐ 9

____
________________ (152-171)

11. Place where eaten: (172)

Restaurant ☐ 1
Delicatessen ☐ 2
Cafeteria ☐ 3
Private Home ☐ 4
Picnic ☐ 5
Institution:
School ☐ 6
Church ☐ 7
Camp ☐ 8
Other, specify ☐ 9

____
________________ (173-192)

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

CDC 52.13 REV. 9/83

LABORATORY FINDINGS (Include Negative Results)

12. Food specimens examined: (193)
Specify by "X" whether food examined was original (eaten at time of outbreak) or check-up (prepared in similar manner but not involved in outbreak).

Item	Orig.	Check up	Findings Qualitative	Quantitative
Example: beef	X		C. perfringens Hobbs type 10	2×10^6/gm

13. Enviromental specimens examined: (194)

Item	Findings
Example: meat grinder	C. perfringens, Hobbs Type 10

14. Specimens from patients examined (stool, vomitus, etc.): (195)

Item	No. Persons	Findings
Example: stool	11	C. perfringens, Hobbs Type 10

15. Specimens from food handlers (stool, lesions, etc.): (196)

Item	Findings
Example: lesion	C. perfringens, Hobbs Type 10

16. Factors contributing to outbreak (check all applicable):

	Yes 1	No 2	Unk.	
1. Improper storage or holding temperature	☐	☐	☐	(197)
2. Inadequate cooking	☐	☐	☐	(198)
3. Contaminated equipment or working surfaces	☐	☐	☐	(199)
4. Food obtained from unsafe source	☐	☐	☐	(200)
5. Poor personal hygiene of food handler	☐	☐	☐	(201)
6. Other, specify	☐	☐	☐	(202)

____

17. Etiology: (203-204)

Pathogen ______________________________
Chemical ______________________________
Other ______________________________

Suspected ☐ 1 (205)
Confirmed ☐ 2
Unknown ☐ 3

18. Remarks: Briefly describe aspects of the investigation not covered above, such as unusual age or sex distribution: unusal circumstances leading to contamination of food, water, epidemic curve; etc. (Attach additional page if necessary)

(206-225)

Name of reporting agency: (226)

Investigating offical: ______________________________ Date of Investigation: ______________

NOTE: Epidemic and Laboratory Assistance for the investigation of a foodborne 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: Enteric Diseases Branch
Bacterial Diseases Division
Center for Infectious Diseases
Centers for Disease Control
Atlanta, Georgia 30333

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

CDC 52.13 (back)
REV. 9/83

H. LINE LISTING OF FOODBORNE DISEASE OUTBREAKS, 1982

Etiology	State	Number of Cases	Date of Onset	Lab Data: Patient	Lab Data: Vehicle	Lab Data: Food-Handler	Vehicle	Location Where Food Mishandled and Eaten
BACTERIAL								
Bacillus cereus								
	California	44	7/19		+		H/M ice cream	Camp
	Illinois	9	8/23		+		Fried rice	Restaurant
	Kentucky	7	7/21		+		Reuben sandwich	Hospital Cafeteria
	New Mexico	22	1/18		+		Beef taco	School
	New Mexico	5	8/04	+	+		Fried rice	Restaurant
	New York	100	1/09		+		Steamed rice	Fire Hall
	New York City	6	9/17		+		Baked food	School
	Wyoming	7	9/14		+		Fried rice	Restaurant
Brucella								
	Connecticut	3	3/	+			Unknown	Private home
Campylobacter jejuni								
	Vermont	15	9/22	+			Raw milk	Variety places
	Wisconsin	16	6/27	+			Raw milk	Private home
Clostridium botulinum								
	Alaska	2	8/		+		Fermented fish eggs	Private home
	California	1	2/		+		H/C beans	Private home
	California	2	2/	+	+		C/C mushrooms	Private home
	California	2	6/	+			H/C peppers	Private home
	California	1	7/	+	+		C/C tomatoes	Private home
	California	1	8/03	+	+		Beef pot pie	Private home
	California	4	11/	+	+		H/C swiss chard	Private home
	California	2	12/	+			H/C bean salad	Private home
	Colorado	1	7/	+	+		H/C eggplant	Private home
	Massachusetts	1	11/		+		H/C relish	Private home
	North Dakota	1	9/05	+	+		H/C beans	Private home
	Oregon	3	5/		+		H/C asparagus	Private home
	Utah	1	6/	+			Unknown	Private home
	Utah	1	12/	+			H/C peppers	Private home
	Washington	1	5/09		+		H/C salmon	Private home
	Washington	1	6/07		+		H/C asparagus	Private home
	Washington	1	7/11	+	+		H/C green beans	Private home
	Washington	1	12/16		+		H/C asparagus	Private home
	West Virginia	1	2/		+		H/C green beans	Private home
	Wisconsin	1	10/	+			H/C zucchini	Private home
	Wyoming	1	11/29		+		H/C green beans	Private home
Clostridium perfringens								
	Arizona	300	5/05		+		Tamales, enchiladas	Prison
	Arizona	108	7/25		+		Barbacoa and beans	Meeting hall
	California	166	11/02	+			Spaghetti, meat sauce	Prison
	Connecticut	83	3/08		+		Sloppy Joe	School
	Illinois	39	12/19	+	+		Turkey & gravy	Party rented
	Michigan	35	9/19	+	+	+	Swedish meatballs	Wedding party
	Minnesota	70	9/26	+	+		Beef Bourguignon	Restaurant

H/M = home-made   H/C = home-canned   C/C = commercial-canned

Etiology	State	Number of Cases	Date of Onset	Lab Data: Patient	Lab Data: Vehicle	Lab Data: Food-Handler	Vehicle	Location Where Food Mishandled and Eaten
Clostridium perfringens (Cont'd)								
	Minnesota	32	12/23	+	+		Moose	Lodge hall
	New Jersey	17	6/28		+		Meatloaf	Hospital
	New Mexico	14	5/13		+		Enchiladas	Cafeteria
	New York	10	6/29	+			Unknown	Restaurant
	Pennsylvania	12	5/09	+			Turkey	Restaurant
	Pennsylvania	25	5/22	+			Unknown	Banquet
	Pennsylvania	25	8/14	+	+		Roast beef	Banquet
	Tennessee	34	12/23	+	+		Turkey	Christmas party
	Washington	5	2/23	+			Beef enchiladas	Restaurant
	Washington	73	2/26	+			Unknown	Prison
	Washington	2	4/26	+			Unknown	Restaurant
	Washington	5	5/09	+			Unknown	Restaurant
	Washington	3	8/04	+			Unknown	Restaurant
	Washington	6	10/16	+			Unknown	Restaurant
	Washington	125	11/06	+			Turkey salad spread	Reformatory
Escherichia coli								
	Michigan	21	5/28	+	+		Ground beef	Restaurant
	Oregon	26	2/05	+			Ground beef	Restaurant
Salmonella								
S. typhimurium, infantis	Arizona	19	12/05	+	+		Raw milk	Private home
S. montevideo	California	63	7/18	+		+	Unknown	Restaurant
Group B	California	120	10/23	+			Chicken salad	Picnic
S. enteritidis*	Connecticut	15	4/12	+		+	Unknown	Hospital
S. typhimurium	Connecticut	3	6/19	+			Unknown	Restaurant
S. heidelberg	Connecticut	15	8/08	+		+	Macaroni/cheese	Hosp cafeteria
S. enteritidis	Connecticut	7	8/09	+		+	Unknown	Restaurant
S. typhimurium, copenhagen	D. C.	55	2/18	+	+	+	Prime rib	School
S. thompson	Florida	36	4/06	+		+	Unknown	Restaurant
S. montevideo	Georgia	13	7/11	+	+		H/M chocolate	Church
S. heidelberg	Hawaii	4	8/07	+			Unknown	Restaurant
S. typhimurium	Illinois	7	6/19	+		+	Refried beans	Restaurant
S. anatum, infantis	Illinois	9	8/08	+	+		H/M ice cream	Private home
S. montevideo	Illinois	5	9/09	+		+	Salad bar	Restaurant
S. typhimurium, hadar	Kansas	30	5/30	+			Unknown	Picnic
S. unspecified	Kentucky	15	10/23	+			Unknown	Restaurant
S. enteritidis	Maine	160	11/25	+	+	+	Turkey and giblets	Restaurant
S. meleagridis	Massachusetts	104	3/	+			Unknown	Statewide
S. typhimurium	Massachusetts	10	5/	+		+	Unknown	Nursing home
S. enteritidis	Massachusetts	72	7/	+			Unknown	School
S. enteritidis	Massachusetts	428	7/	+		+	Unknown	Statewide
S. thompson	Massachusetts	3	8/	+			Unknown	Buffet lunch
S. enteritidis	Massachusetts	48	8/	+			Unknown	School
S. heidelberg	Massachusetts	30	8/31	+		+	Unknown	Training camp
S. enteritidis	Massachusetts	33	9/15	+		+	Unknown	Hospital
S. hadar, agona	Massachusetts	24	11/25	+		+	Turkey	Restaurant
S. enteritidis	Massachusetts	34	12/09	+	+	+	Cornish hens	School
Group D	Massachusetts	10	12/17	+			Unknown	Hospital
S. unspecified	Minnesota	47	8/22	+			Pistachio nut salad	Church
S. enteritidis	New Hampshire	5	7/	+			Unknown	Restaurant
S. enteritidis	New Hampshire	26	7/24	+		+	Scrambled eggs	Nursing home
S. unspecified	New Jersey	5	4/30	+			Unknown	Restaurant
S. enteritidis	New Jersey	47	6/05	+		+	Seafood combo	Restaurant
Groups B, C	New York	16	5/08	+			Unknown	School
Group B	New York	8	7/10	+		+	Tuna macaroni salad	Restaurant
Group B	New York	31	7/11	+			Chicken	Private home

Etiology	State	Number of Cases	Date of Onset	Lab Data: Patient	Lab Data: Vehicle	Lab Data: Food-Handler	Vehicle	Location Where Food Mishandled and Eaten
Salmonella (Cont'd)								
S. enteritidis	New York	114	7/19	+	+		Chicken/turkey salad	Camp
Group B	New York	2	7/24	+			Unknown	Private home
Group B	New York	21	8/01	+			Unknown	Private camp
S. enteritidis CZ	New York	3	12/26	+			Unknown	Private home
S. uganda	New York City	2	1/23		+		Pork	Restaurant
S. chester	North Dakota	18	1/31	+	+		Unknown	Picnic
S. typhimurium, heidelberg	North Dakota	24	4/22	+			Unknown	Nursing home
S. thompson	Oklahoma	16	10/02	+	+		Strawberry ice cream	Private home
S. poona	Oregon	38	6/01	+		+	Unknown	Church
S. typhimurium	Pennsylvania	156	4/24	+		+	Turkey	School
S. heidelberg	Pennsylvania	15	8/30	+			Lasagna	Restaurant
S. Arizona hinshawii	Pennsylvania	21	11/03	+	+	+	Turkey	Church
S. typhimurium	Texas	16	8/10	+	+		H/M ice cream	Private home
S. typhimurium	Washington	13	5/30	+			Unknown	Private home
S. typhimurium	Washington	2	9/21	+			Unknown	Private home
S. enteritidis	Washington	11	10/25	+	+		Pork	Private home
S. typhimurium	Washington	17	10/30	+		+	Unknown	Restaurant
S. typhimurium	Washington	2	12/28	+	+		H/M sausage	Private home
S. typhimurium	Wyoming	8	6/27	+	+		Eggs in h/m ice cream	Private home
Shigella								
S. flexneri 31	California	7	4/21	+		+	Unknown	Church
S. sonnei	Colorado	75	10/14	+		+	Salad bar	Restaurant
S. sonnei	Hawaii	11	11/28	+			Unknown	Private home
S. sonnei	Pennsylvania	23	9/27	+		+	Tuna salad	Restaurant
Staphylococcus aureus								
	California	26	1/01	+	+		Beef tacos	Church
	Connecticut	70	10/29		+		Turkey roast	School
	Delaware	42	9/24		+		Chicken	Retirement home
	Hawaii	24	10/10		+		Coconut-cream cake	Hospital
	Hawaii	2	10/22		+		Chicken	Private home
	Illinois	108	4/22		+	+	Turkey	School
	Illinois	37	8/15	+		+	Potato salad	Nursing home
	Iowa	40	8/01	+	+		Bologna sandwich	Bus
	Kansas	6	5/27		+		Ham	Restaurant
	Massachusetts	8	4/	+	+		Turkey	State Hospital
	Massachusetts	19	8/	+			Unknown	Camp
	Minnesota	5	5/04		+		Chicken pot pie	Restaurant
	New Mexico	4	7/22		+		Beef jerky	Private home
	New York	8	6/20	+	+		Cream puffs	Private home
	New York	2	7/23		+		Pastrami	Private home
	Pennsylvania	52	6/06	+	+	+	Ham	Street fair
	Pennsylvania	14	7/03	+	+	+	Ground beef taco mix	Restaurant
	Pennsylvania	14	7/21	+	+		Ham/cheese sandwich	Chartered bus
	Pennsylvania	33	7/22	+	+		Stuffed chicken breast	Picnic
	Pennsylvania	51	8/04	+	+		Pork	Boat trip
	Pennsylvania	29	8/07		+	+	Potato salad	Private club
	Pennsylvania	13	11/21	+	+		Roast beef	Firehouse
	Pennsylvania	15	12/01	+	+	+	Chicken salad	Church
	Tennessee	4	2/05	+	+		Hot dogs	Restaurant
	Tennessee	6	3/04		+		BBQ pork	Private home
	Texas	25	6/21		+		Unknown	Picnic
	Vermont	6	12/13		+	+	Refried beans	Restaurant
	Washington	6	1/20	+		+	Roast beef sandwich	Restaurant

Etiology	State	Number of Cases	Date of Onset	Lab Data Patient	Lab Data Vehicle	Lab Data Food-Handler	Vehicle	Location Where Food Mishandled and Eaten
Streptococcus								
Group A B-Hemolytic	New Hampshire	34	7/18	+			Onion and clam dip	Party
Vibrios								
V. cholerae 01	Guam/Trust Ter.	892	8/01	+			Uncooked shellfish	Private home
V. cholerae non-01	Guam/Trust Ter.	7	12/08	+			Shrimp	Private home
V. parahaemolyticus	Massachusetts	26	8/	+			Raw clams	Clam bake
V. parahaemolyticus	New York	10	7/06	+			Raw clams	Picnic
V. parahaemolyticus	New York	3	7/16		+		Steamed clams	Private home
Yersinia enterocolitica								
	Pennsylvania	16	2/10	+			Bean sprouts	Brownie meeting
	Multiple	172	6/11	+			Pasteurized milk	Private home
CHEMICAL								
Ciguatera								
	Hawaii	2	7/30				Forktailed snapper	Private home
	Hawaii	8	8/16				Barracuda	Private home
	Hawaii	6	11/12				Royal seabass	Private home
	Virgin Islands	5	7/30				Fish chowder	Restaurant
	Virgin Islands	4	8/01				Other fish	Restaurant
	Virgin Islands	7	8/08				Barracuda	Restaurant
	Puerto Rico	15	3/27				Other fish	Unknown
	Puerto Rico	15	3/28				Other fish	Private home
Heavy metals								
Copper	Illinois	3	1/11		+		Soft drink	Private home
Copper	New York	1	11/09				Water fountain	Restaurant
Copper	Washington	3	5/16				Carbonated drink	Restaurant
Zinc	New York City	1	2/07		+		Ginger ale	Restaurant
Zinc and iron	New Mexico	18	11/19		+		Punch	Class party
Monosodium glutamate								
	Minnesota	2	1/19				Chinese food	Restaurant
	Washington	2	8/21				Chinese food	Restaurant
	New York City	6	3/28		+		Turkey stuffing/gravy	
	Private home							
Mushroom poisoning								
Amanita bruenscens	California	5	3/07	+	+		Mushrooms	Private home
Amanita muscaria	New York	1	9/		+		Wild mushrooms	Private home
Leucoacaricus naucin	New York	2	7/		+		Wild mushrooms	Private home
T. platyphylla	New York	1	7/		+		Wild mushrooms	Outside
Paralytic Shellfish								
	Alaska	5	8/10		+		Mussels	Private home

Etiology	State	Number of Cases	Date of Onset	Lab Data: Patient	Lab Data: Vehicle	Lab Data: Food-Handler	Vehicle	Location Where Food Mishandled and Eaten
Scombrotoxin								
	Alaska	2	8/03				Raw salmon	Private home
	Alaska	9	8/09				Raw fish	Ship
	California	2	9/26		+		Mahi-Mahi	Private home
	Connecticut	2	9/06		+		Bluefish	Restaurant
	Connecticut	1	9/08		+		Bluefish	Restaurant
	Connecticut	8	9/15		+		Bluefish	Work
	Connecticut	4	10/		+		Bluefish	Restaurant
	Connecticut	5	10/13		+		Bluefish	Cafeteria
	Hawaii	2	6/14				Blue ulua	Private home
	Hawaii	4	12/09				Mahi-Mahi	Restaurant
	New York	2	1/20		+		Mahi-Mahi	Restaurant
	New York	3	7/15				Bluefish	Restaurant
	New York	2	8/04		+		Tuna	Private home
	New York	2	8/06		+		Bluefish	Restaurant
	New York	1	9/13				Tuna sandwich	Private home
	New York	3	10/03				Tuna	Private home
	Washington	4	9/03		+		Mahi-Mahi	Private home
	Washington	2	10/29				Mahi-Mahi	Restaurant
Other chemical								
Calcium chloride	Hawaii	2	11/17		+		Frozen snack	Private home
Hot peppers	Minnesota	2	10/21				Fruit or vegetables	Restaurant
Lye	New Jersey	5	5/12		+		Tea	Restaurant
Nitrites	New York City	1	4/01		+		Franks and sauerkraut	Restaurant
Sodium hydroxide	Ohio	4	3/27		+		Soft drink	Private home
Cardol cashew shell	Pennsylvania	54	4/06	+	+		Cashew cardol oil	Private home
Nitrite	Utah	6	9/26		+		Beef jerky	Private home
Trisodium phosphate	Washington	1	3/23		+		Cleaning compound	Restaurant
PARASITIC								
Trichinella spiralis								
	Hawaii	4	5/28	+			Smoked wild pork	Private home
VIRAL								
Hepatitis A								
	California	6	10/28	+		+	Unknown	Hosp. cafeteria
	Connecticut	30	8/08	+			Unknown	Camp
	Florida	9	1/27	+		+	Unknown	Restaurant
	Florida	11	12/25	+			Oysters	Store
	Hawaii	6	12/01	+			Unknown	Private home
	Iowa	16	7/18	+		+	Unknown	Army Reserve
	Massachusetts	6	1/01	+		+	Unknown	Corporate party
	Massachusetts	7	1/25	+		+	Unknown	Cafeteria
	Michigan	10	7/12	+			Peanut butter cake	Natl Guard Camp
	Michigan	3	8/13	+			Ice cream	Beach
	Minnesota	24	5/10	+		+	Salad and ice	Restaurant
	Minnesota	24	6/10	+			Unknown	Restaurant
	New York	18	5/30				Raw & steamed clams	Private home
	New York	5	6/01	+			Raw clams	Private home
	New York	46	6/06	+			Clams	Picnic
	New York	7	7/05	+			Raw clams	Private home
	New York	2	8/01	+			Unknown	Private home
	New York	10	9/01	+			Unknown	Restaurant
	New York City	85	8/04	+		+	Tuna fish salad	Restaurant

Etiology	State	Number of Cases	Date of Onset	Lab Data Patient	Lab Data Vehicle	Lab Data Food-Handler	Vehicle	Location Where Food Mishandled and Eaten
Norwalk Virus								
	Minnesota	3000	8/21	+		+	Cake/frosting	Variety places
	Minnesota	2000	11/11	+			Cole slaw	Restaurant

UNKNOWN

A line listing of outbreaks of unknown etiology may be obtained by writing to the Enteric Diseases Branch, Division of Bacterial Diseases, Center for Infectious Diseases, Centers for Disease Control, Atlanta, Georgia 30333.

I. Selected Foodborne Outbreak Articles Taken From Morbidity and Mortality Weekly Report, 1982

Botulism and Commercial Pot Pie--California
MMWR 1983;32:39-45

On August 3, 1982, a 56-year-old woman residing in Los Angeles County, California, developed diplopia, weakness, difficulty breathing, and chest pain. She had respiratory arrest on admission to the hospital but was intubated, resuscitated, and placed in intensive care. Examination showed complete bilateral ptosis, ophthalmoplegia, facial muscle weakness, and areflexia. Cerebrospinal fluid was normal except for increased glucose; Tensilon test was negative. She had a history of seizure disorder, diabetes mellitus, and organic brain syndrome. An infectious disease consultant thought her subsequent fever was due to pneumonia secondary to aspiration, and he suspected botulism as the underlying cause of her illness.

The patient lives with her husband and grown son who both prepare meals for her and attempt a strict diet in consideration of her diabetes. When asked about the patient's food history before onset of illness, the husband and son named no likely suspects for botulism. No home-preserved foods had been served, and, with one exception, she had not eaten other foods that were not freshly prepared for her or were not also consumed by her husband and son. The exception was commercial beef pot pie, which was accidentally mishandled, then consumed by the patient 1 day before illness began.

The son had prepared the pot pie for an earlier evening meal. The frozen pie was baked in an oven for 40-45 minutes. As he was about to serve it to his mother, his father came home with some freshly cooked hamburgers just purchased at a take-out restaurant. The pot pie was put aside on an unrefrigerated shelf. Two and one-half days later, the son came home and found his mother had just consumed this pot pie without reheating it.

An uneaten portion of the pot pie, still in its metal plate, was retrieved by the family members. Type A botulism toxin was found in this pie by a mouse-inoculation test performed at a U.S. Department of Agriculture laboratory in Beltsville, Maryland, and type A toxin was also demonstrated in the patient's serum by the state's Microbial Disease Laboratory.

Editorial Note: This is the third case of botulism associated with commercial pot pies reported from California (1,2); one other episode (involving two clinically diagnosed patients) was reported from Minnesota in 1960 (3). Mishandling of the pot pies occurred in three of these episodes, and mishandling was also suspected in the fourth. The known mishandlings consisted of leaving the baked pot pie in the oven with the pilot light on, thereby maintaining "incubator" temperatures overnight. The pies were then eaten with no (or insufficient) reheating to destroy toxin. Or, as in the present case, the baked pie sat out at room temperature for over 2 days during hot weather--conditions that also could simulate an incubator.

In these situations, it is suspected that the original baking killed competing organisms in the pies and eliminated much of the oxygen. The heat-resistant, anaerobic Clostridium botulinum, which was evidently present and can be found in many fresh, frozen, and other food products, was then presumably able to germinate and produce toxin under the crust during storage at warm, incubator-like temperatures. Products such as pot pies should be kept frozen before heating and ideally should be served hot after the first cooking. If any such products are to be saved, they should be quickly refrigerated, then reheated to hot temperatures. This would minimize any risk of botulinal poisoning.

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Ciguatera Fish Poisoning--Bahamas, Miami
MMWR 1982;28:391-2

On March 6, 1982, the U.S. Coast Guard in Miami, Florida, received a request for medical assistance from an Italian freighter located in waters off Freeport, Bahamas. Numerous crew members were ill with nausea, vomiting, and muscle weakness and required medical evacuation for hospitalization and treatment.

A total of 14 ill crew members were airlifted to three Florida hospitals. Three were seen in emergency rooms and later released. Eleven were hospitalized; seven required admission to intensive care units. All patients were Italian males, age 24-40 years; symptoms included diarrhea--12 patients (86%), vomiting--11 (79%), paresthesias--11 (79%), hypotension--10 (71%), peripheral muscular weakness--9 (65%), nausea--8 (57%), abdominal cramping--6 (43%), pruritis--4 (29%), and peripheral numbness--2 (14%). These findings were consistent with ciguatera fish poisoning, and an epidemiologic investigation was initiated.

The ship employed 26 crew members and is permanently based near Freeport, where it ferries petroleum products ashore from large tankers. On March 4, a crew member caught a 25-pound barracuda while fishing from the ship. On March 6, 14 crew members cooked and ate the barracuda; all became ill within 6 hours. None of the 12 crew members who did not eat the barracuda became ill. Six of the ill crew members reported becoming sick 45 minutes to 6 hours after the implicated meal (median: 2.5 hours). All 14 crew members eventually recovered without sequelae and returned to work. Median length of hospital stay was 6 days.

Editorial Note: Ciguatera is a human intoxication syndrome associated with the consumption of marine tropical reef fishes. Although recent surveys indicate that poisonings are relatively uncommon in Florida (1,2), one investigator recorded 280 intoxications from January 1978 to June 1980 (2).

The ichthyosarcotoxins are thought to be accumulated through the food chain, the toxins being produced by microalgae known as dinoflagellates (3,4). The toxins are lipid-soluble and appear to accumulate in the flesh, fatty tissue, and viscera of large predatory species of fish, such as barracuda, grouper, and snapper (5,6). The isolation, purification, and characterization of the suspected toxins have been hampered by limited availability of authentic ciguatoxic fish, lack of a specific sensitive assay, and the low concentration and heterogeneity of toxins present in specimens.

The assessment of toxicity most often used is the mouse bio-assay. Based on signs elicited following intraperitoneal (IP) injection, it includes, but is not limited to inactivity, diarrhea, labored breathing, cyanosis, piloerection, tremors, paralysis, and staggering gait. Death occurs when the injection is given in higher doses, with a lethal dose, 50% kill (LD_{50}), of 0.45 ug/kg for purified toxin (5). Thus, ciguatoxin is one of the most potent marine toxins known. The barracuda's head was toxic by mouse bio-assay with an LD_{50} (IP) of 2-5 gram equivalents of original fish meat. Thin-layer chromatographic separation of extracts revealed the presence of at least two major toxins. Further purification is under way to define more clearly the toxin(s) implicated in this outbreak.

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Enteric Illness Associated with Raw Clam Consumption--New York

MMWR 1982;31:449-51

Since June 1, 1982, the New York State Health Department has received reports of at least 14 separate outbreaks of gastroenteritis associated with consumption of raw clams. Approximately 150 persons have been affected. Typical symptoms have included diarrhea and abdominal cramps beginning 12-72 hours after eating clams, with nausea, vomiting, and fever occurring less often. In three of these outbreaks, seven individuals subsequently developed hepatitis A 21-37 days after eating clams. Three other persons developed hepatitis A without initial gastrointestinal symptoms. Eight of the 10 cases were verified by the presence of IgM antibody to hepatitis A virus (HAV); results on the others are pending.

A summary of four of these outbreaks follows:

Outbreak A: On May 29, 24 individuals attended a private party in Albany County at which raw clams were served. Within 6-24 hours, 18 (90%) of 20 persons who had eaten clams developed diarrhea and abdominal cramps, which lasted 1-3 days. None of four persons who remained well had consumed clams. Stool specimens obtained shortly after onset of illness from seven persons with gastroenteritis were negative for Salmonella, Shigella, and Campylobacter. Two persons who ate clams from the same lot as those consumed at the party were evaluated at the New York State Health Department's laboratory. Although cultures of extracts from these clams did not grow enteric bacterial pathogens, both 27-nm and 40-nm virus-like particles were observed by electron microscopy.

Outbreak B: On May 30, fourteen people attended a private party in Rensselaer County at which clams were served. Five (83%) of six persons who ate raw clams developed diarrhea, nausea, vomiting, and abdominal cramps 36-72 hours later; symptoms persisted for 1-2 days. None of the eight persons who did not eat raw clams became ill. One of the five individuals with gastroenteritis, who worked as a food handler, developed hepatitis A (confirmed by the presence of HAV-specific IgM antibody) 34 days after eating clams, prompting county health officers to administer immunoglobulin (IG) as a preventive measure to 850 people exposed to foods he had prepared.

Outbreak C: On June 5, members of multiple bowling leagues attended a picnic in Albany County. Many of the approximately 200 attendees developed diarrhea, nausea, vomiting, and abdominal cramps 12-72 hours after the event. Forty-five of 126 persons interviewed reported gastroenteritis; 42 (89%) of these had eaten raw clams. Only raw clams were significantly associated with illness ($p<0.001$). Four persons who consumed clams and were affected by gastroenteritis developed hepatitis A 29-37 days later. This outbreak was not recognized in time to obtain specimens from persons with acute gastrointestinal illness.

Outbreak D: On July 11, 11 persons attended a party in Schenectady County at which raw clams were served. All seven individuals who ate clams developed diarrhea and abdominal cramps 15-60 hours later; none had fever or vomiting. Diarrhea persisted for up to 1 week in several persons. None of four persons who did not eat clams became ill. Thus, clams were epidemiologically implicated as the vehicle of transmission. Stool samples from five ill individuals were negative for enteric bacterial pathogens (Salmonella, Shigella, Vibrio, Campylobacter, and Yersinia). Examination of stools for virus is pending.

Inadequate or absent tagging of the clams implicated in these outbreaks has made it difficult to accurately determine the clams' source. However, current information indicates clams responsible for the outbreaks originated in coastal waters from at least three states: Massachusetts, New York, and Rhode Island. The timing of these outbreaks may be related to contamination of harvesting beds by the heavy rains and subsequent runoff that occurred in the Northeast during May and early June. Preliminary data from New York and Rhode Island indicate an increase in coliform counts in clam-harvesting waters monitored during this time.

Since December 1981, the New York State Department of Health has been informed of 33 outbreaks of clam-related illness involving more than 250 cases of gastroenteritis and 20 cases of hepatitis A. One county where clams are harvested has noted a two-fold increase in reported cases of hepatitis A. One county where clams are harvested has noted a two-fold increase in reported cases of hepatitis A for the first 6 months of this year compared with the same period last year (60 in 1982 vs 31 in 1981); 45% of the 1982 patients had histories of clam consumption consistent with the incubation period of hepatitis A. An intensive evaluation of 1,559 food establishments, conducted between July 22 and July 29, revealed that 125 (14%) of 908 that stock shellfish sold clams that were untagged or improperly certified (to identify their waters of origin).

Because these outbreaks suggested a recent problem of clam contamination, New York State Health Department officials currently advise individuals to refrain from eating raw clams. In addition, they advise giving IG to persons involved in clam-associated outbreaks of gastroenteritis, provided it can be administered within 2 weeks of clam consumption.

Editorial Note: Ingestion of shellfish has been known for over 50 years to cause outbreaks of bacterial and viral enteric diseases (1). Typhoid fever (2), hepatitis A (3,4), cholera (5), and Vibrio parahaemolytic (6) have long been associated with ingestion of raw clams and oysters. More recently, raw shellfish contaminated with non-01 V. cholerae (7) and Norwalk virus (8,9) have also been reported as causes of gastroenteritis outbreaks. Although gastroenteritis (due to bacterial pathogens) and hepatitis A have recently been reported among persons drinking contaminated water (10), this is the first report in several years of outbreaks of these illnesses occurring jointly after shellfish consumption (11,12). Viral gastroenteritis in association with hepatitis A is not known to have been reported following shellfish consumption. The clinical findings observed in several of the New York outbreaks are compatible with a viral etiology, such as the Norwalk virus: a short incubation period, abrupt onset of upper and/or lower gastrointestinal illness, and brief duration (1-2 days). The absence of bacterial pathogens and the visualization of virus-like particles in clams from one outbreak further support a viral etiology in several of these outbreaks.

The recent New York State outbreaks may be related to periods of heavy rain and flooding. Run-off at these times, especially when sewage systems overflow, characteristically increases coliform counts in monitored coastal waters. However, the numerous outbreaks in New York before the May-June flooding suggest an endemic degree of clam contamination, some of which may be attributable to harvesting from uncertified, sewage-contaminated waters. This practice is likely to continue, because taking clams from highly populated, polluted beds is economically profitable and difficult to prevent. These outbreaks emphasize that clams may contain multiple enteric pathogens, including viruses, and consumption of clams--especially raw or partially cooked--continues to pose substantial risk of transmitting disease. Although the most effective way of avoiding the problem is to prevent the distribution of illegally gathered, untagged clams, such measures are not always possible. Therefore, because steaming or other forms of cooking do not always kill the enteric viruses in clams (13,14), the most effective means of preventing clam-associated illness is to adequately depurate them.

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Outbreak of Yersinia enterocolitica--Washington State

MMWR 1982;31:562-4

In December 1981 and January 1982, an outbreak of predominantly gastroenteritis caused by Yersinia enterocolitica occurred among 87 persons in Washington state. The illness was associated with the ingestion of a locally produced brand of tofu, an oriental soybean curd, packed in untreated spring water. It was sold primarily in western Washington with limited distribution in Alaska, Idaho, and Oregon. Y.

enterocolitica was isolated from the tofu, the processing plant's water supply, and several sites within the plant.

In mid-January 1982, the Seattle-King County Health Department received reports from two hospital laboratories of 12 positive stool cultures of Y. enterocolitica associated with gastrointestinal illness; during the previous year, 10 Y. enterocolitica isolates were reported in the entire county. Increased surveillance by Seattle-King County and the Washington State Department of Social and Health Services over several months identified additional cases, for a total of 87. A case was defined as anyone who was culture-positive and/or who had had contact with a case and had fever in conjunction with diarrhea or abdominal cramps.

Of the 87 cases, 56 were culture-positive; 38 patients had enteritis, six had only extra-intestinal infections, four had both extra-intestinal infections and enteritis, and eight were asymptomatic carriers. The 10 cases of extra-intestinal infection included patients with wound ulcers (two), inguinal lymphadenopathy (two, one with a perineal ulcer), pneumonia (two), labial infection (one), arthritis (one), septicemia (one), and pharyngitis (one). Nine (16.1%) of the 56 culture-positive patients were < 1 year of age, 12 (21.4%) were 1 to 4 years old, 7 (12.5%) were 5 to 18 years old, and 28 (50.0%) were > 18 years old. Among 38 culture-positive cases with enteritis, who tended to have more severe illness and on whom more complete information was available, the following were reported: fever (91%), abdominal pain (81%), diarrhea (76%), nausea (54%), vomiting (39%), bloody stools (27%), joint pain (42%), and skin rash (43%). Symptoms lasted from 1 day to 4 weeks (mean 10 days). Two patients, however, were ill for over 2 months. Seventeen patients were hospitalized for from 2 to 11 days (average 9.7 days); two of those hospitalized had appendectomies and one, a partial colectomy. One patient was also culture-positive for Salmonella typhimurium and one for rotavirus, as well as for Y. enterocolitica.

A neighborhood case-control study of 11 ill persons and 11 controls revealed an association between Y. enterocolitica infection and tofu consumption ($p < 0.01$). Questions regarding animal contacts, water sources, raw milk consumption, travel, and day-care settings, as well as extensive food histories, did not identify any other common sources. Further investigation revealed that 70 (80.5%) of the 87 persons interviewed had consumed the same brand of tofu within the 2 weeks before onset of symptoms. For five culture-positive persons who had consumed only one meal of tofu, the incubation period averaged 6.6 days (range 4-11 days).

The tofu plant in King County is located on a rural island in Puget Sound. The plant water supply, which originates from a spring approximately 0.5 mile from the plant, is shared by four residences and an apple-cider plant. No illness was reported among consumers of the cider. Inspection of the tofu plant on January 20, 1982, disclosed unsanitary conditions, including poor personal hygiene, use of an outdoor privy, and unsanitary equipment. Samples of tofu and the plant water supply were positive for Y. enterocolitica, as were stool specimens collected from two of 12 employees; both employees were asymptomatic.

A voluntary recall of the product was instituted from January 21 to January 25. Further sampling and laboratory analysis of the tofu demonstrated high fecal-coliform counts. Production was resumed after a water-purification system was installed. Laboratory results of plasmid analysis, determination of enterotoxin production, and serotyping are pending.

Multi-State Outbreak of Yersiniosis

MMWR 1982;31:505-6

Between June 11 and July 29, 1982, a large interstate outbreak of enteritis cau by Yersinia enterocolitica occurred. State health departments became aware of a potential problem when hospitals reported increased numbers of Y. enterocolitica isolates. Epidemiologic investigation implicated milk pasteurized at a plant in Memphis, Tennessee, as the vehicle of infection.

One hundred seventy-two culture-positive Y. enterocolitica infections were identified; 67 in the Little Rock, Arkansas, area; 80 in Memphis, Tennessee, and its northern Mississippi suburbs; and 25 in the Greenwood, Mississippi, area. One hundred forty-eight (86%) patients had enteric infections with diarrhea and/or abdominal pain, usually accompanied by fever; 24 patients had extra-intestinal infections of throat, blood, urinary tract, central nervous system, and wounds. Forty-one percent of cases occurred among children less than 5 years of age. Most patients required hospitalization, and 17 underwent appendectomies. The epidemic strain is agglutinated most strongly by antisera to Y. enterocolitica O groups 13 and 18.

Separate case-control studies in each city showed that drinking milk pasteurized by a milk plant in Memphis was associated with illness (in Little Rock, $p=0.03$; in Memphis, $p=0.01$; in Greenwood, $p=0.004$). Overall, 71% of cases and 39% of controls recalled drinking milk from the plant in the 2 weeks before onset of symptoms.

In an effort to estimate the size of the outbreak, a survey was made by telephone of 100 randomly chosen households in Greenwood. Heads of household were queried concerning illness and milk drinking history within the last two months. Eleven cases of yersiniosis-like illness, defined as either 1) fever $\geq$ 101 F (38.3 C) and diarrhea or 2) fever $\geq$ 101 F and abdominal pain at any time during the previous 6 weeks, were identified among the 260 members of these households. All patients resided in households that used milk from the implicated plant, and 10 of the 11 (91%) recalled drinking its milk within the previous 2 months. Illness occurred in 6 of 50 (12%) households that used milk from the implicated plant and in none of 50 that did not use its milk ($p=0.02$, Fisher's exact test). Of those individuals who drank milk from that plant, 8.7% had a yersiniosis-like illness. Based on a census of 20,115 and the number of the Memphis plant milk drinkers in Greenwood, it was estimated that 857 cases (95% confidence limits 363.5-1,351.7) may have occurred in Greenwood where only 3.9% of the plant's milk is sold. The total number of cases in all three states, therefore, would appear to be higher than the 172 cases reported.

The outbreak appeared to end spontaneously. Milk from suspected lots was not available for culture, and Y. enterocolitica was not isolated from subsequent lots. A Food and Drug Administration laboratory isolated Y. enterocolitica of the same serotype found in the outbreak from a milk crate on a hog farm where outdated milk from the implicated plant is fed to hogs. Inspection of the plant identified neither a breach in pasteurizing technique nor an obvious source of contamination. Surveillance for new cases and surveillance of milk for Yersinia have continued.

Editorial Note: In this investigation pasteurized milk was epidemiologically implicated as the vehicle of transmission of Y. enterocolitica. The temporal and geographic clustering of cases and the negative cultures of subsequent lots of milk are consistent with contamination of a single lot. The mechanism of contamination is unknown.

Y. enterocolitica may be found in raw milk (1,2); contaminated raw milk was responsible for an outbreak of yersiniosis among children in Montreal (3). The organism has also been found in pasteurized milk (1,4) although not associated with illness. Y. enterocolitica generally does not survive standard pasteurization (5); however, if present in large enough numbers, viable Yersinia may persist after pasteurization (4-6). Once present in a pasteurized product, the organism grows well at refrigeration temperature (7). Therefore, pasteurization and proper handling of pasteurized milk may not ensure against enteric disease due to Y. enterocolitica.

Only two other well documented food-borne outbreaks of Y. enterocolitica enteritis have been reported in the United States: one in New York state in 1976 caused by contaminated chocolate milk (8) and one in Washington state in 1982 caused by tofu (9). Food-borne transmission of yersiniosis has also been suspected in other outbreaks (10-12). This is the largest outbreak of yersiniosis ever reported in the United States.

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STATE AND TERRITORIAL EPIDEMIOLOGISTS AND STATE PUBLIC HEALTH 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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HHS Publication No. (CDC) 85-8185