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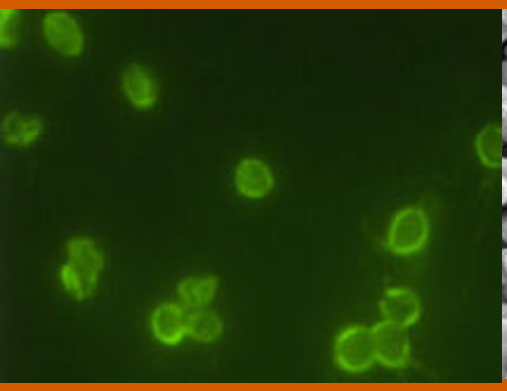
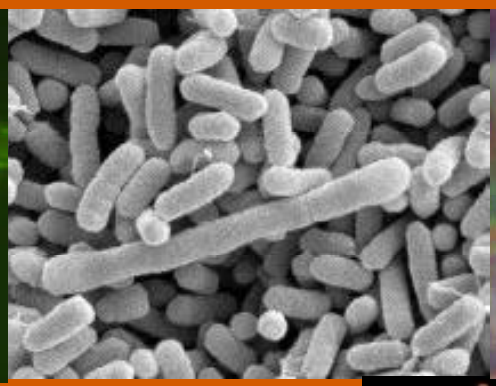
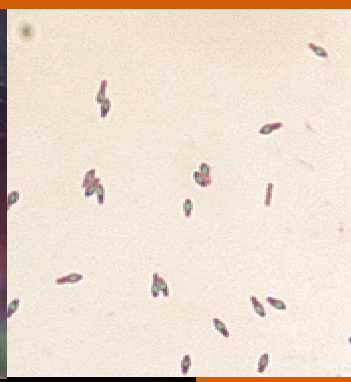
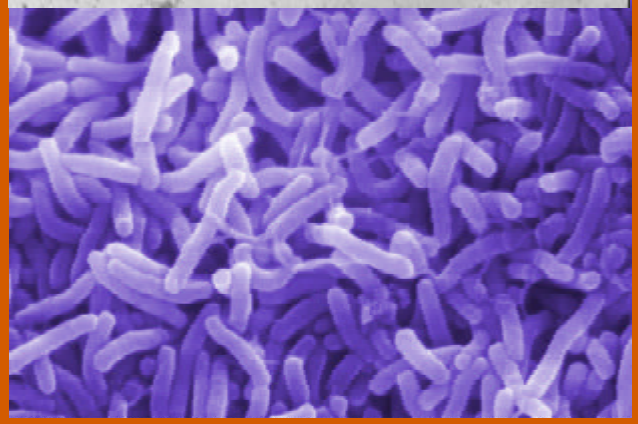





Foodborne Illness Investigation and Control

REFERENCE MANUAL





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Georgia Department of Human Resources - DHR
Division of Public Health - GDPH

January 2005

Foodborne Illness Investigation and Control Reference Manual

A publication of the Georgia Department of Human Resources, Division of Public Health

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2 Peachtree Street, NW
Atlanta, Georgia 30303

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Jamaica Plain, MA 02130

Cover Illustration Key

Clockwise from upper left:

1. Cryptosporidium (http://wilkes.edu/~eqc/crypto.htm)
2. Salmonella (http://biology.udayton.edu/EML/)
3. *E. coli* 0157:H7 (http://49web.uncc.edu/~jedwards/fbillness.htm#E)
4. *Clostridium botulinum* (http://phil.cdc.gov/Phil/detail.asp?id=1932)
5. Giardia (http://www.nps.gov/olym/people/giardia.htm)
6. *Listeria monocytogenes* (http://phil.cdc.gov/Phil/detail.asp?id=2287)
7. *Vibrio cholerae* (http://remf.dartmouth.edu/images/MicromondiImages/index.html)

Table of Contents

Preface

Purpose of the manual

The Georgia Division of Public Health (GDPH) is placing increased emphasis on foodborne illness investigation, control and prevention. This reference manual is part of the GDPH's focus on providing more trainings and technical assistance for local boards of health and health department staff. The purpose of the manual is to guide district health offices, local boards of health and county health department staff through foodborne illness investigation and control. It is designed as a comprehensive reference covering both epidemiologic and environmental aspects of a foodborne illness investigation, and emphasizes the practical and necessary features of investigation and control. Contained within the manual are basic information, guidelines, recommendations and regulatory requirements. This manual is targeted to district and county health department members and staff. Other health professionals can also use the information in this manual to facilitate understanding of how state, county and district health departments operate, and how they themselves play a role in foodborne illness investigation and control.

Organization of the manual

Chapters 1-3 intend to give the reader appropriate background information on foodborne illness.

Chapter 1 presents an overview of the history and trends of foodborne illness, both for the nation and Georgia.

Chapter 2 discusses how foodborne disease is classified and contains descriptions of causative agents and associated illnesses. The focus of the manual is on illness caused by three common microbial food hazards: viruses, bacteria and parasites. Other less common etiological agents such as molds and chemicals are referred to but not specifically addressed.

Chapter 3 provides an overview of the pathogenesis of foodborne illness.

Chapters 4-9 cover the sequential events of investigations.

Chapter 4 explains the concepts of disease surveillance, describes the methods by which foodborne illness data are collected and used, and addresses various data collection issues, including confidentiality.

Chapter 5 addresses how staff should proceed when addressing foodborne illness complaints.

Chapter 6 presents steps in an epidemiologic investigation.

Chapter 7 presents steps in an environmental investigation.

Chapter 8 presents steps in a laboratory investigation (Submission of Clinical Specimens to the Georgia Public Health Laboratory).

Chapter 9 covers an overall written summary of the completed investigation, documenting complaints, writing outbreak reports, recommended strategies for control and using data for prevention.

Chapter 10 is a standalone chapter covering issues regarding food bioterrorism.

NOTE: While Chapters 4-9 are organized in a particular order, an investigation does not necessarily have to be carried out in this order. Several steps may be put into action simultaneously; thus please note the references to other chapters and sections as you read along.

References are listed at the end of each chapter and serve to direct readers to noteworthy publications, both basic and specialized, that further explore the subject of each chapter. The appendices contain additional supplemental information and are referred to within the chapters. The list of acronyms and the glossary may be a useful adjunct to the text.

PLEASE NOTE THE FOLLOWING:

1) This manual is designed to give an overview of foodborne illness investigation and control. As experience has proved, outbreaks can vary greatly from setting to setting, and it is impossible to address all the questions and situations that may come up. Again the Georgia Division of Public Health is available to offer guidance and assistance as needed. (Telephone numbers are listed on page xiii).

2) This reference manual is focused on retail food and food service establishment settings. This includes restaurants, supermarkets, institutional food service operations, catered affairs, temporary food establishments and kitchens in bed and breakfast establishments. Other settings, such as private homes, will be addressed as needed.

3) The terms “foodborne illness” and “foodborne disease” are used interchangeably throughout this manual.

4) The terms “food handler” and “food worker” are used interchangeably throughout this manual.

5) “You” and “your” refers to the people/audience for which this manual is intended, namely, board of health members and health department staff.

6) All information in this manual must be considered in light of newer information available after publication. The three-ring binder format of this manual allows for additional and updated material as available.

List of Acronyms

Aw	Water Activity
AIDS	Acquired Immune Deficiency Syndrome
AR	Attack Rate
ASTHO	Association of State and Territorial Health Officials
CD	Communicable Disease
CDC	U.S. Centers for Disease Control and Prevention
CCP	Critical Control Point
CSTE	Council of State and Territorial Epidemiologists
DHO	District Health Office
EHEC	Enterohemorraghic *Escherichia coli*
FDA	U.S. Food and Drug Administration
GI	Gastrointestinal
GDPH	Georgia Division of Public Health
GPHL	Georgia Public Health Laboratory
HACCP	Hazard Analysis Critical Control Point
HAV	Hepatitis A Virus
HRA	HACCP Risk Assessment
HUS	Hemolytic Uremic Syndrome
IG	Immune Globulin
I&Q	Isolation and Quarantine
MMWR	Morbidity and Mortality Weekly Report
O&P	Ova and Parasites
PIC	Person In Charge
PHF	Potentially Hazardous Food
PSP	Paralytic shellfish poisoning
SE	*Salmonella enteritidis*
USDA	U.S. Department of Agriculture

Reference Materials – How to Obtain Them

There are numerous references to Georgia regulations in this reference manual. Information on how to obtain a copy of each is listed below.

- **Uniform Code of Georgia: 31-12-2: Reporting of Communicable Diseases.** A free copy can be obtained by calling the GDPH, Notifiable Diseases Epidemiology Section at (404) 657-2588.

- O.C.GA 290-5-14 **Rules of Department of Human Resources, Public Health, Food Service**. Updated version can be found at http://health.state.ga.us/pdfs/environmental/290-5-14.pdf

Additional copies of this manual in PDF format may be found on the GDPH web site at http://health.state.ga.us or you may call the GDPH, Notifiable Diseases Epidemiology Section at (404) 657-2588 to obtain a copy.

Important Telephone Numbers

Georgia Division of Public Health

Epidemiology Branch
(404) 657-2588

Contact for technical assistance with the epidemiologic investigation such as obtaining medical histories, coordinating collection and submission of environmental and clinical specimens and developing questionnaires. On-site investigation assistance is often available for larger outbreaks. The Epidemiology Branch maintains a 7 day/week, 24 hour epidemiologist on-call for emergencies (e.g. outbreak assistance).

Environmental Health Office
(404) 657- 6534

Contact for policy and technical assistance with the environmental investigation such as conducting a HACCP risk assessment, initiating enforcement actions and collecting environmental and clinical samples. On-site investigation assistance is often available for larger outbreaks.

Georgia Public Health Laboratory
(404) 327-7900

Contact for technical assistance with the collection protocol for food and clinical specimens and interpretation of laboratory results.

District Health Departments (Main Numbers)

District 1-1	Rome	(706) 295-6704	District 5-2	Macon	(478) 751-6247
District 1-2	Dalton	(706) 272-2342	District 6	Augusta	(706) 667-4257
District 2	Gainesville	(770) 535-5866	District 7	Columbus	(706) 321-6300
District 3-1	Cobb/Douglas	(770) 514-2330	District 8-1	Valdosta	(229) 333-5290
District 3-2	Fulton	(404) 730-1200	District 8-2	Albany	(229) 430-4127
District 3-3	Clayton	(770) 961-1330	District 9-1	Brunswick	(912) 262-2300
District 3-4	Lawrenceville	(678) 442-6908	District 9-2	Waycross	(912) 285-6010
District 3-5	DeKalb	(404) 294-3787	District 10	Athens	(706) 583-2870
District 4	LaGrange	(706) 845-4035			
District 5-1	Dublin	(478) 275-6565			

District Environmental Health Offices

District 1-1	Rome	(706) 295-6651	District 5-2	Macon	(478) 751-6115
District 1-2	Dalton	(706) 272-2342	District 6	Augusta	(706) 667-4346
District 2	Gainesville	(770) 535-5743	District 7	Columbus	(706) 321-6170
District 3-1	Cobb/Douglas	(770) 435-7815	District 8-1	Valdosta	(229) 333-7827
District 3-2	Fulton	(404) 730-1301	District 8-2	Albany	(229) 430-4129
District 3-3	Clayton	(770) 961-8399	District 9-1	Brunswick	(912) 356-2160
District 3-4	Gwinnett	(678) 376-3212	District 9-2	Waycross	(912) 284-2976
District 3-5	DeKalb	(404) 508-7990	District 10	Athens	(706) 583-2854
District 4	LaGrange	(706) 845-4035			
District 5-1	Dublin	(478) 275-6545			

Summary - Sequential Steps in the Investigation of Foodborne Illness Complaints and Outbreaks

Steps	Reference
1) Be prepared. Designate responsible individual(s) trained in foodborne disease prevention and control to evaluate and investigate foodborne illness complaints and outbreaks.	Chapter 5
2) Maintain a foodborne illness surveillance system. This is necessary to determine any changes in the frequency or distribution of cases and permits early identification of outbreaks or potential outbreaks of foodborne illness.	Chapter 4
3) Record complaints on a *Foodborne Illness Complaint Worksheet*. Log all reports in a logbook or electronic data system. Fax completed worksheets to GDPH Environmental Health Section (404) 657-6533 **and** GDPH Notifiable Disease Section (404) 657-2608 every Thursday.	Chapter 4
4) Decide whether to investigate. *Is the complaint valid?*	Chapter 5
5) Report all clusters or outbreaks to the District Health Office and the Georgia Division of Public Health, Environmental Health Section (404) 657-6534 and to the Georgia Division of Public Health, Notifiable Disease Section (404) 657-2588.	Chapter 5
6) Take steps to verify diagnosis.	
– Collect and store leftover food samples from the food establishment and/or complainant in a timely manner. Work with the lab and epidemiology to determine which foods to submit for laboratory analysis.	Chapter 8
– Obtain clinical samples when appropriate in a timely manner.	Chapter 6
– Obtain case histories.	Chapter 6
– Immediately investigate reports of suspect sick food workers and exclude if necessary. Request all symptomatic food workers to submit stool specimens. Stool samples should be submitted within 48 hours of your request. In an outbreak situation, request ALL food workers to submit stool specimens, especially when an implicated food is not apparent. Food workers who do not submit stool specimens must be restricted from work until they comply.	Chapter 6 and Appendix A

7) Conduct an environmental investigation within 24 hours. Conduct a Hazard Analysis Critical Control Point (HACCP) risk assessment of the implicated foods as part of your investigation.	Chapter 7
8) Develop a case definition and identify cases. Make epidemiological associations (TIME, PLACE, PERSON). Formulate hypotheses.	Chapter 6
9) If necessary, initiate immediate correction or enforcement actions (embargo, disposal, emergency closure, suspension of operations). Coordinate food recalls and trace backs with industry and other local, state and federal regulatory agencies. If necessary, issue a press release or public notice.	Chapter 7
10) Expand investigation. Find and interview additional cases and persons at risk. Collect data, make calculations, and analyze data. Test hypotheses. Take control action.	Chapter 6
11) Complete and submit notifiable disease reports(on reportable diseases) to the Georgia Division of Public Health, Notifiable Disease Section, 2 Peachtree Street NW, 14th floor, Atlanta, GA 30303	Chapter 4
12) Document all actions taken at the county health department. Submit all reports of your investigation including a copy of the last routine food inspection report for the implicated establishment to the District Health Office and the Georgia Division of Public Health, Environmental Health and Notifiable Disease Sections.	Chapter 9

Chapter 1

HISTORY AND TRENDS

1) **Background on Foodborne Illness**

2) **Foodborne Illness: A National Overview**

3) **Foodborne Illness: A Georgia Overview**

HISTORY AND TRENDS

Introduction

Foodborne illness in the United States is a major cause of personal distress, social disruption, preventable death and avoidable economic burden. Foodborne diseases cause an estimated 24 to 81 million sporadic and outbreak-associated cases of human illness and 10,000 deaths annually in the United States. Worldwide, this figure jumps to an estimated 1.5 billion cases and over 3 million deaths each year. The economic impact of illness is staggering since the unpleasant symptoms of even a "mild" case of foodborne illness may require absence from school or work. Some investigators estimate that diarrheal foodborne illnesses cost from $7 to $17 billion a year in the United States. Entire industries have been crippled (i.e., economic loss) as a result of foodborne outbreaks.

1) Background on Foodborne Illness

The microbiologic hazards associated with food and food preparation are receiving increasing public attention. They are causing increasing concern not only among consumers, but also among those involved in all facets of food production and distribution. Historically, most foods were produced and consumed locally, but modern production and distribution of foods have become highly complex and involve global distribution of many kinds of fresh and processed food products. One has to merely browse the aisles of the local grocery store to witness the tremendous influx of food products from throughout the world. While the benefits from the availability of such a variety of foods are many, the potential for the transmission of foodborne pathogens to large populations spread over large geographic areas also increases with modern food production and distribution.

In addition to the dangers inherent in the modern food distribution system, newly emerging or re-emerging infectious diseases influence the occurrence of foodborne illness. Transmission of a new pathogen may be poorly understood and laboratory methods for diagnosis may be difficult or unavailable. Implementation of prevention and control measures may be delayed. The 1996 and 1997 outbreaks of cyclosporiasis in the United States are examples of foodborne outbreaks caused by an emerging pathogen, *Cyclospora cayetanensis*. Approximately 1,465 individuals in 20 states were infected in 1996, while 762 individuals in 13 states were infected in 1997. Since the outbreak, more has been learned about the parasite and laboratory methods of detection have become routine.

Factors Associated With the Increase in Emerging and Reemerging Infectious Diseases

Population growth	Crowding
Changes in agriculture and food practices	Microbial evolution
Changes in ecology and climate	Modern travel
Animal migration	Animal relocation
Inadequacy of public infrastructure	Population shifts

Most foodborne illness occurs through **fecal-oral transmission**. A disease-causing organism is shed in human or animal feces and is deposited on a food item which is then eaten. An infection may result when:

1. raw food contaminated with a pathogen is not cooked long enough to kill the pathogen or is consumed raw (e.g., chicken, eggs or sushi), or
2. cooking utensils are used on a raw food contaminated with a pathogen, then the same utensils are used on another uncooked food (e.g., knife used to cut chicken is also used to cut lettuce for salad), or
3. non-contaminated product may become contaminated when handled by an infected food handler who failed to wash his/her hands after using the bathroom and before handling food.

Any of these routes of contamination may occur in either a home setting or in a commercial operation such as a restaurant, and may result in one or two cases of illness or a large number of ill individuals.

Recent outbreaks of *E. coli* O157:H7 and *Salmonella* clearly demonstrate the potential for the amplification of a pathogen. For example, from November 15, 1992 through February 28, 1993 more than 500 laboratory-confirmed infections with *E. coli* O157:H7 and four associated deaths occurred in the western United States associated with eating hamburgers from one fast food restaurant chain. In addition, it is estimated that over 200,000 people became ill in 1994 after eating a nationally distributed ice cream that was made from an ice cream premix product contaminated with *Salmonella* Enteritidis (SE).

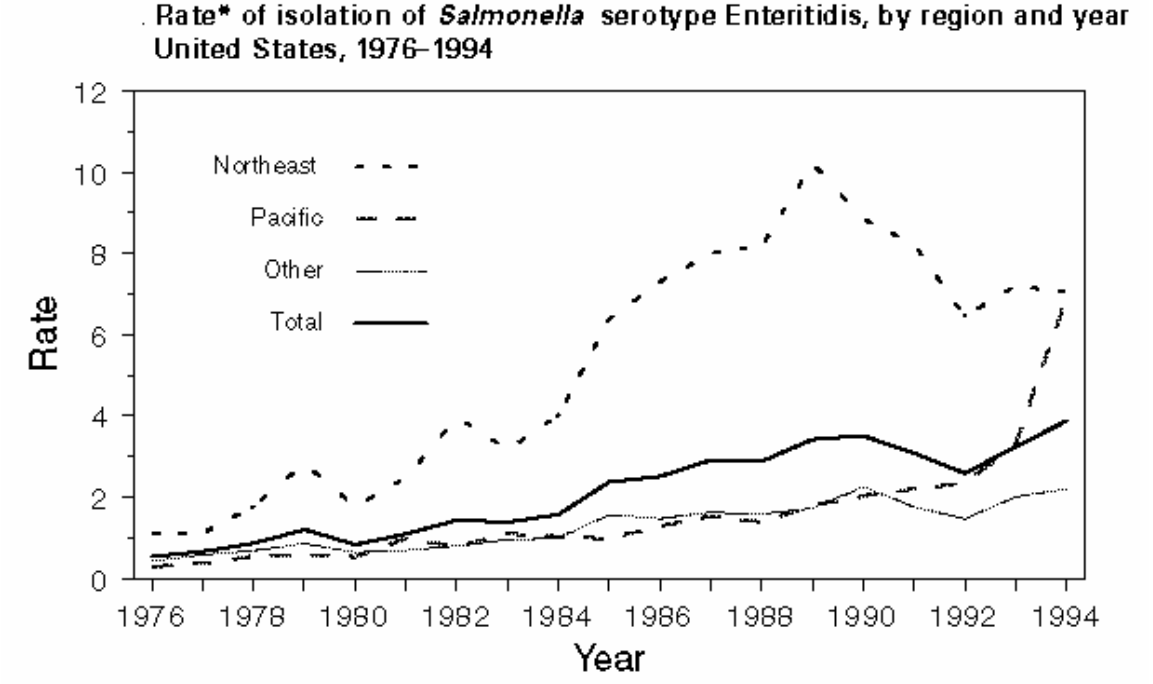
2) Foodborne Illness: A National Overview

Despite the increasing chances for transmission of pathogenic microorganisms, national data on reported outbreaks do not accurately represent the actual occurrence of disease. With limited resources dedicated to investigating incidents of foodborne illness, even recognizing an outbreak is difficult. Resources are limited on both the local and national level, while widespread outbreaks involving many states and even many countries are occurring with increasing frequency. Alfalfa sprouts grown from seeds contaminated

with *Salmonella* caused an international outbreak in 1995. This outbreak was only recognized because it involved a very unusual serotype of *Salmonella*. Even then it required a large expenditure of time, energy and resources at local, national and international levels to investigate the outbreak and identify and control the source of infection. Smaller outbreaks and outbreaks caused by more common organisms may remain unidentified.

The need for resources for foodborne illness investigation at all levels cannot be overstated. A dramatic illustration was the recognition of the increased incidence of *Salmonella* Enteritidis (*SE*) in the Northeast in the mid to late 1980s. A 1988 report by the Centers for Disease Control and Prevention (CDC) reported that the national incidence of *SE* infections had increased significantly during the previous decade. Further investigation revealed a dramatic increase in *SE* in the Northeast. This increase was found to be associated with consumption of whole shell eggs or foods containing shell eggs. Further analysis revealed that the increase in *SE* cases in the Northeast had actually begun around 1984 (see Figure 1.1).

Figure 1.1:



In addition to the common causes of foodborne illness, nationwide outbreaks of "new" pathogens are also being identified. An example of recognition of an emerging pathogen is the 1996 and 1997 nationwide outbreaks of infection due to the parasite *Cyclospora cayetanensis*. For both years, the primary vehicle of infection was raspberries imported from outside this country.

Laboratory testing for many foodborne pathogens is difficult and in some cases non-existent. For example, testing methods for certain parasites and viruses are difficult and often unavailable at most laboratories. Also, testing for staphylococcal, *Bacillus cereus* or *Clostridium perfringens* toxins is not commonly performed at most laboratories. Consequently, laboratory confirmation of the causative organism is not available for a high proportion of the foodborne disease outbreaks reported to the CDC.

Continued surveillance of disease at a national level is imperative and will be achieved only through continued surveillance at state and local levels. The following section will summarize the occurrence of foodborne illness in Georgia.

3) Foodborne Illness: A Georgia Overview

Surveillance Methods:

The Georgia Division of Public Health (GDPH) receives reports of notifiable enteric pathogens in a variety of ways. By Georgia law, physicians, hospitals, and laboratories are responsible for reporting 11 enteric or "foodborne" pathogens to local, district, or state health departments. These passive reports are received by mail, fax, phone and/or electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at http://sendss.state.ga.us. To enhance this passive surveillance system, Georgia has developed an Active Surveillance system in conjunction with the Emerging Infections Program (EIP).

The EIP is a cooperative venture among the Centers for Disease Control, the United States Department of Agriculture, the Food and Drug Administration, and 11 states including Georgia. The EIP's goal is to provide reliable population-based infectious disease data. The Foodborne Diseases Active Surveillance Network (FoodNet) is a program within EIP that specifically focuses on foodborne diseases. Within the structure of the EIP, Active Surveillance is conducted in approximately 100 laboratories/hospitals statewide to obtain more timely and complete disease reporting and to ensure that proper isolates are forwarded to the Georgia Public Health Laboratory (GPHL). Ten of the 11 notifiable enteric pathogens are included in the Active Surveillance system (see Figure 1.2). Laboratories or infection control practitioners in participating hospitals/laboratories are contacted at least once a month to collect demographic and laboratory data on each illness. Communication between public health and Active Surveillance contacts at each hospital/lab occurs in person, by phone, by fax, or by email – whichever way the contact prefers.

Table 1.2: List of notifiable enteric organisms under active surveillance as part of the FoodNet project, Georgia.

Campylobacter
Cryptosporidium
*Cyclospora**
*E. coli O157**
*Listeria**
*Salmonella**
Shiga toxin positives*
*Shigella**
*Vibrio**
*Yersinia**

*Request that isolate or specimen is sent to GPHL

The active surveillance activities in the 20-county Metropolitan Statistical Area of Atlanta (MSA) is conducted by personnel at the Veterans Administration Hospital & Emory University, who are designated as agents of GDPH. Employees of the VA/Emory collect all requested isolates from most MSA hospitals and deliver them to GPHL twice a week. Active Surveillance for Georgia outside the metropolitan statistical area of Atlanta (GOA) is conducted by the Notifiable Disease Section of GDPH throughout the remaining 139 counties. In GOA, participating clinical labs ship isolates to GPHL. All data collected through active surveillance is incorporated into SENDSS for in-state use and is transmitted to CDC without identifiers for EIP use. Active Surveillance is a key component in obtaining the best available surveillance data for Georgia notifiable enteric pathogens.

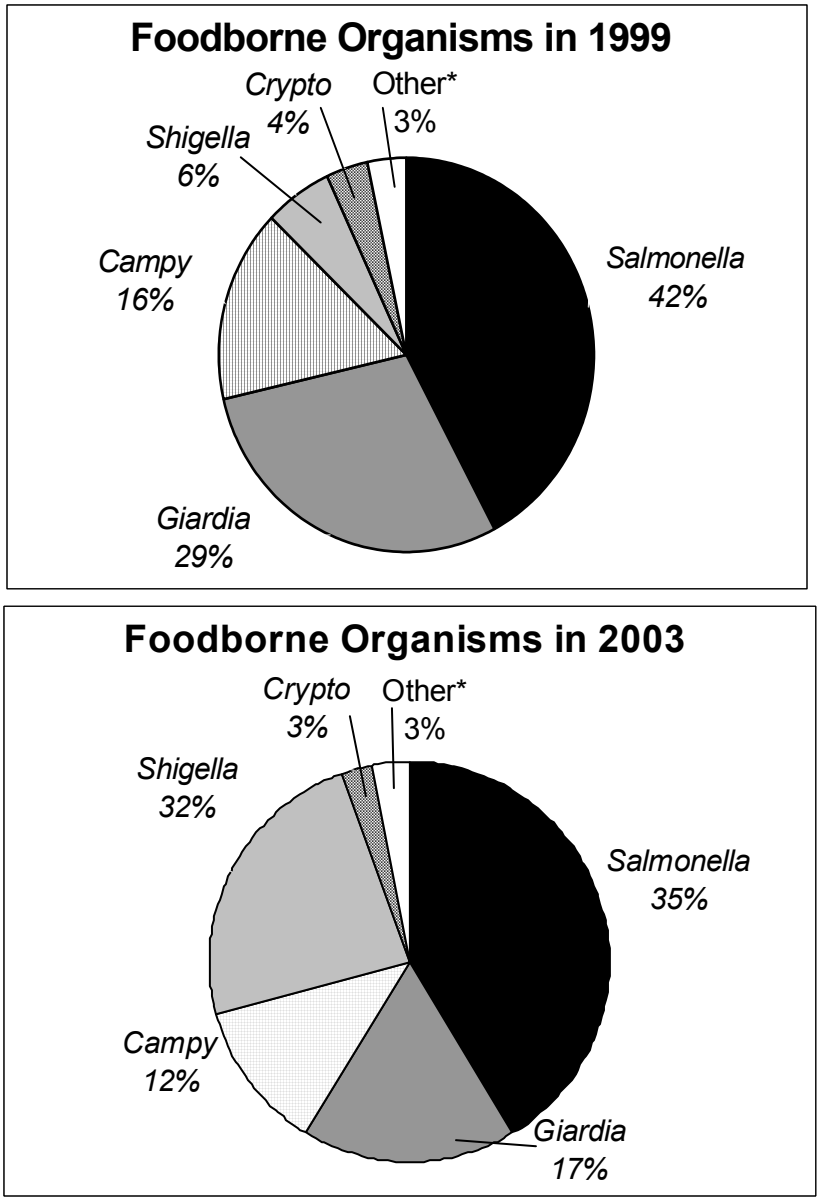
Through active surveillance activities, many outbreaks have been detected and surveillance data have improved drastically. With the collection of isolates, Georgia now has access to Pulse-Field Gel Electrophoresis (PFGE) for all *Listeria* and *Escherichia coli* O157 cases. In 2001, a small outbreak of *E. coli* O157 was recognized through the use of PFGE, which linked the outbreak to a ground beef product that was eventually recalled through the cooperation of district, state, and federal agencies. Georgia also receives serotypes for all *Salmonella* isolates submitted to GPHL, which allows us to examine the epidemiology of *Salmonella* by serotype, identifying trends and geographic distribution.

Active Surveillance has also allowed GDPH to improve our general surveillance data quality. For example, before statewide active surveillance began in 1999, 22% of all reported *Salmonella* infections in 1998 did not have a county of residence reported. By 2002, the percentage of cases of salmonellosis without address decreased to <2%. Knowing the patient's county of residence allows GDPH to examine and describe statewide distribution of disease more precisely and to follow-up cases regarding exposure history as needed.

Surveillance Data

From 1997 to 2002, an average of 4,800 cases per year (range 4,177-5,671) of foodborne diseases have been reported to Georgia Division of Public Health. *Salmonella* infection is the most commonly reported foodborne disease in Georgia making up 35% on average of all foodborne diseases. While *Giardia*, *Campylobacter*, and *Shigella* are the next most common foodborne pathogens, their frequency may change from year to year (See Figure 1.3).

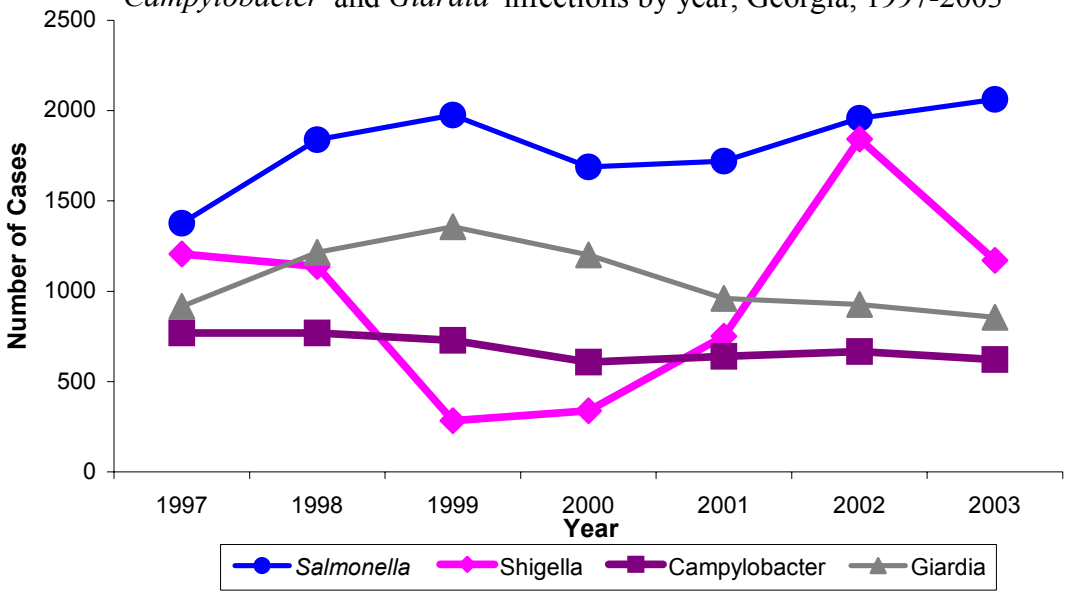
Figure 1.3: Percentage of reported foodborne organisms in Georgia, in 1999 and 2003.



*Other includes *E. coli* O157, Shiga toxin producing *E. coli*, *Cyclospora*, *Vibrio*, & *Yersinia*

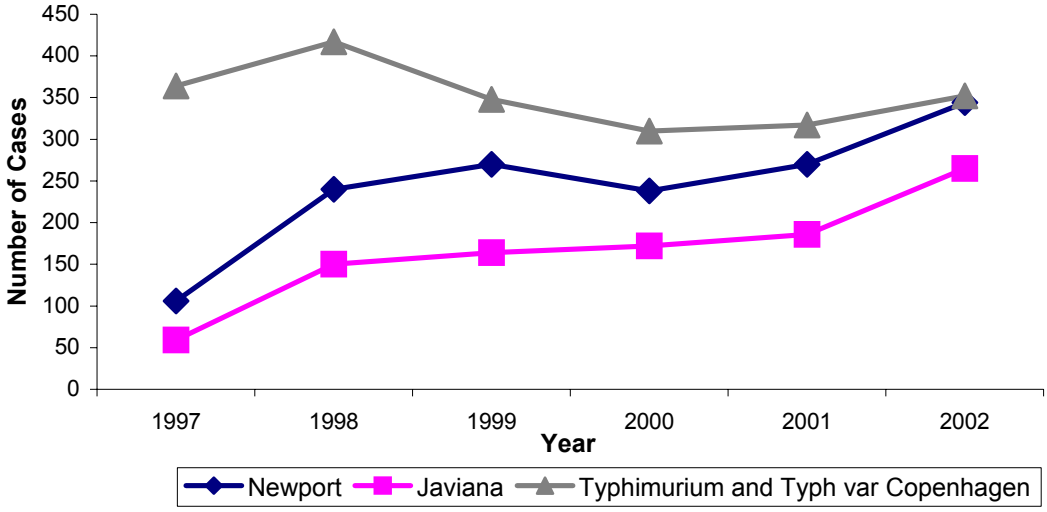
Variations in disease frequency can be related to many factors, such as outbreaks and introduction of new strain among a susceptible population. In Georgia, for example, the incidence of shigellosis increases and decreases in cycles. Substantial increases in shigellosis began in Georgia in 1987, 1994 and in 2001. Figure 1.4 shows organism specific trends over time (from 1997 to 2002). From 1997 to 2002, the number of *Giardia* infections softly peaked in 1999, while *Campylobacter* has been decreasing, and *Salmonella* has been generally increasing.

Figure 1.4: Total number of reported *Salmonella, Shigella, Campylobacter* and *Giardia* infections by year, Georgia, 1997-2003



Due to the high number of cases of salmonellosis reported in Georgia and the diversity of its epidemiology, *Salmonella* is better examined by serotype (See Figure 1.5). The three most common serotypes of *Salmonella* in Georgia are the Typhimuriums (Typhimurium and Typhimurium var Copenhagen), Newport and Javiana. As in the United States as a whole, the Typhimuriums are the most common serotype in Georgia, and *Salmonella* ser Newport is steadily increasing. *Salmonella* serotype Javiana appears to be a serotype that is commonly found in the southeastern U.S. and is also steadily increasing in Georgia. Both Newport and Javiana are seasonal serotypes in Georgia, with high number of cases reported during the fall.

Figure 1.5: Total number of Salmonella Typhimurium/var Copenhagen, Newport and Javiana infections by year, Georgia, 1997-2002



The remaining enteric/foodborne diseases under active surveillance in Georgia are not seen in very high numbers; however, some of the organisms can cause severe and/or prolonged disease (See Figure 1.6). *Cryptosporidium* infections, which can cause prolonged diarrhea, are generally more commonly reported from the MSA, possibly due to the higher numbers of immunocompromised individuals residing in this area. The high number of *Cryptosporidium* infections reported in Georgia in 2000 was related to numerous swimming pool associated outbreaks identified in the metropolitan area. *E. coli* O157 and other shiga toxin producing *E. coli* (STEC) cause severe bloody diarrhea and can lead to dangerous kidney complications. The number of *E. coli* O157 and STEC infections peaked in 1998 in Georgia because of a large water park outbreak and consequently post-event increased awareness of the disease among physicians. *Listeria* also causes severe illness and can lead to miscarriage in pregnant women. *Listeria* infections had been slightly decreasing during the last 6 years, and after an increase in 2003, the number of cases has returned to baseline.

Yersinia, Vibrio, and *Cyclospora* constitute the lowest number of foodborne illnesses reported in Georgia, and they all have well-defined risk factors (See Figure 1.7). Yersiniosis in Georgia is seen mostly in African-American children during the winter holiday time period. Most infections in this population have been linked to chitterlings preparation in the household. Since *Cyclospora* became notifiable in 1999, the number reported to GDPH has increased steadily. Georgia experienced a *Cyclospora* outbreak in 2000 associated with eating fresh berries. Along with berry consumption, international travel is a common exposure associated with *Cyclospora* infections. The number of *Vibrio* infections varies widely from year to year. Many infections have been associated with eating oysters, which is a commonly identified source of *Vibrio* infections throughout the United States.

Figure 1.6: Total number of reported *Cryptosporidium,* STEC, and *Listeria* infections by year, Georgia, 1997-2003

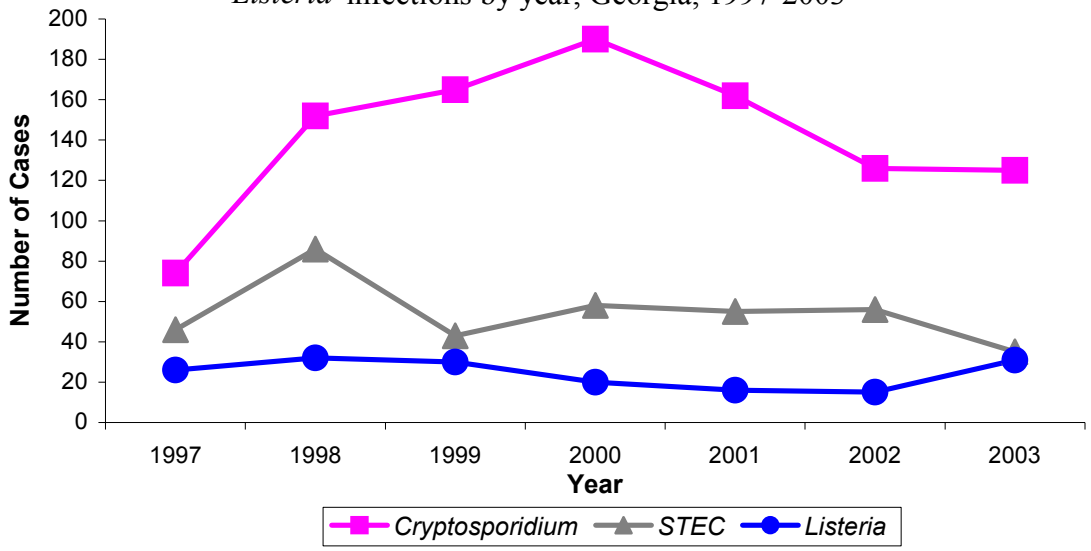
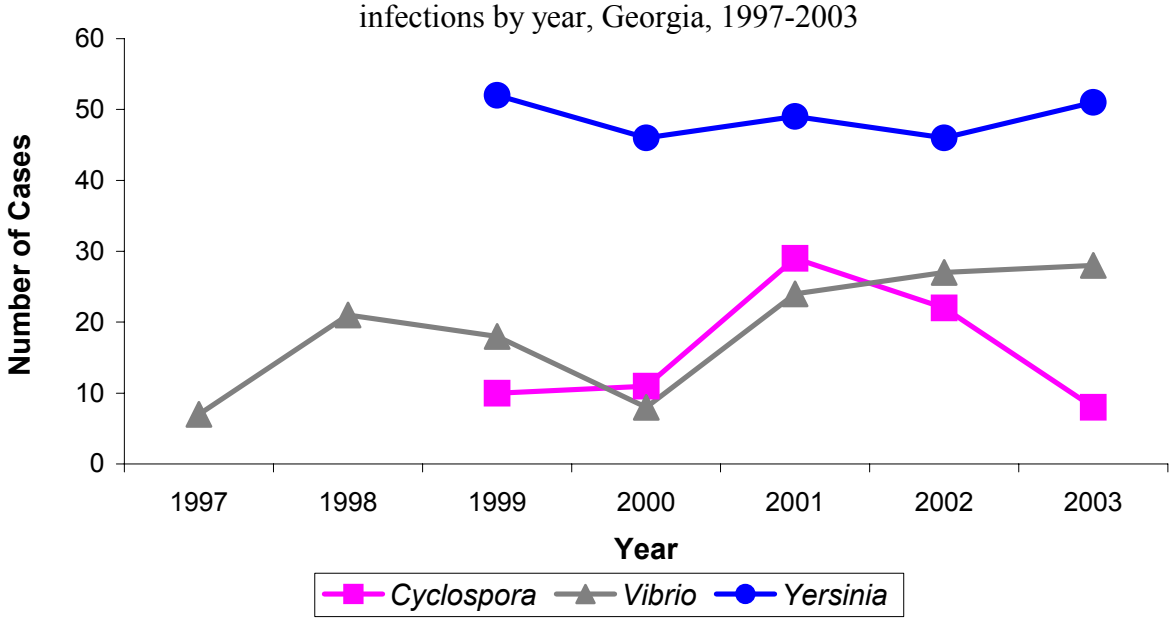


Figure 1.7: Total number of reported *Yersinia, Cyclospora* and *Vibrio* infections by year, Georgia, 1997-2003



****Cyclospora** and *Yersinia* surveillance began in 1999 in Georgia

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NOTES

Chapter 2

DISEASE CHARACTERIZATION

1) **Characteristics of Viruses, Bacteria and Parasites**
2) **Classification of Foodborne Illness**
3) **Clinical Features of Foodborne Illness**
4) **The Carrier State**

DISEASE CHARACTERIZATION

Introduction
The majority of foodborne diseases are caused by microbial pathogens such as **viruses**, **bacteria** and **parasites**. Although foodborne diseases are also caused by physical and/or chemical contamination, this chapter will focus primarily on the microbial agents.
One way of categorizing foodborne illness is:
foodborne infection (the organism in ingested food invades and multiplies in the intestinal lining OR the organism in ingested food invades, multiplies and produces a toxin while in the intestinal tract), and **foodborne intoxication** (organism produces a toxin in food that is subsequently ingested).
These two categories are discussed further in this chapter.

1) Characteristics of Viruses, Bacteria and Parasites

A. Viruses
Viruses are minute organisms, smaller than bacteria and parasites. **Viruses can only reproduce within living cells in the body of the host and cannot multiply in foods. However, some viruses remain infectious in the environment and can thus be transported through food.**

Viruses that are associated with foodborne diseases are characterized by growth in the intestinal cells and subsequent excretion in the feces. More than 100 types of enteric viruses exist, although only a few have been proven to cause foodborne disease (e.g., rotavirus, hepatitis A, and "small found-structured viruses," such as the noroviruses). Although other viruses such as adenovirus can cause gastrointestinal illness, the mode of transmission is believed to be primarily person-to-person. **Foodborne viruses can cause infection, not intoxication.**

Documentation of viral foodborne disease is scant. This is because of diverse symptoms, often mild illness, difficulty of detection of viruses in food, and difficulty of routine, conclusive diagnosis through stool specimens. Food usually becomes contaminated when it is handled by a person infected with a virus who has poor personal hygiene or when the food comes in contact with virus-laden sewage. It does not take a large quantity of virus for infection. For example, a person with rotavirus diarrhea may excrete approximately a trillion infectious particles per milliliter of stool, but as few a 10 particles can cause illness. Additionally, excretion of viruses in feces may occur even if a person has no symptoms of GI illness.

Viruses are increasingly being recognized as significant causes of foodborne illness in the United States. Outbreaks of hepatitis A transmitted through food are recorded every year. During the 5-year period of 1988-1992, hepatitis A virus ranked between fourth and seventh among the identified causes of foodborne outbreaks in the United States. In 2000, over 100 people became ill with norovirus after consumption of frosting.

B. Bacteria

Bacteria are one-celled living microorganisms that have a cell wall. Bacterial cells vary in shape and range in size from about 1 micrometer (μm), which equals one millionth of a meter, to 5 or 10 micrometers in length. In contrast to viruses, bacteria can be seen with a conventional microscope. **Bacterial cells increase when each cell divides into two, which grow to full size and divide into two again (two-fold division). Unlike viruses or parasites, bacteria ARE able to multiply in or on food. Under optimum conditions, large numbers can easily be achieved.** (See Chapter 7, Section 2-B for additional information on growth of bacteria.)

Some pathogenic bacteria, including *Bacillus cereus, Clostridium botulinum, and Clostridium perfringens,* form spores that can survive adverse environmental conditions. The spores germinate to form viable cells that increase to large numbers. Spore-forming pathogens are significant because when the spores occur in foods, they are more difficult to kill. For example, although *Bacillus cereus* bacteria survive up to 122°F, much higher temperatures are required to kill the spores of *B. cereus*. (See Chapter 7, Section 2-B for additional information on spores.)

Pathogenic bacteria can cause foodborne infections OR intoxications. For example, *Salmonella* is the leading documented cause of foodborne **infections** in this country. The bacteria that produce foodborne **intoxications** most often in the United States include *Bacillus cereus, Clostridium botulinum*, and *Staphylococcus aureus* (although some bacteria such as *B. cereus* may cause intoxication and infection).

C. Parasites

Parasites are single- or multi-celled organisms that live within or upon but always at the expense of a host. They are larger than viruses and bacteria, with dimensions usually greater than 10 micrometers (μm). One-celled parasites are commonly termed "parasitic protozoa," although for the purposes of simplicity, "parasites" will be used throughout this manual to refer to both one-celled and other types. **With regard to foodborne illness, parasites only cause infection, not intoxication. Similar to viruses, parasites do not multiply in foods, but can survive in the environment and thus be transported through food.**

Often, parasites go through structural changes during their life cycles. The structural form transmissible through food often is a cyst that is inert and resistant to desiccation in the outside environment. However, they are less resistant to heat than a bacterial spore. Once the cyst enters the body of a new host via ingestion, it can multiply.

One-celled parasites occurring in foodborne outbreaks in the United States include *Entamoeba histolytica, Toxoplasma gondii* and *Giardia lamblia. Cryptosporidium parvum* is becoming more common and is also a problem in immunocompromised people, e.g., patients with acquired immune deficiency syndrome (AIDS). *Cyclospora cayetanensis* is a newly recognized parasite that was first reported in the medical literature in 1979. Cases have been identified and reported with increased frequency since the mid-1980s. During the summers of 1996 and 1997, nationwide outbreaks of cyclosporiasis occurred from the consumption of imported, contaminated berries.

The multi-celled parasites found in food may occur as eggs, larvae, or other forms. They can be ingested into the body where they may hatch, leading to the development of new parasites. *Trichinella spiralis* is reported to cause a few cases of foodborne illness (trichinosis) in the United States each year. Formerly, this was an important pathogen associated with undercooked pork. Tapeworm species occurring in the United States include the beef tapeworm (*Taenia saginata),* the pork tapeworm (*Taenia solium)*, and the fish tapeworm (*Diphyllobothrium species)*. Infection from these is rare.

2) Classification of Foodborne Illness

Foodborne Infection

A foodborne infection is caused by ingestion of food contaminated by either viruses, bacteria or parasites, and occurs in one of two ways:

1) Viruses, bacteria or parasites in ingested food invade and multiply in the intestinal mucosa and/or other tissues.

2) Bacteria in ingested food invade and multiply in the intestinal tract and then release a toxin or toxins that damage surrounding tissues or interfere with normal organ or tissue function. This type of infection is sometimes referred to as a **toxin-mediated infection**. *Viruses and parasites are not able to cause a toxin-mediated infection.*

Foodborne Intoxication

A foodborne intoxication is caused by ingestion of food already contaminated by a toxin. Sources of toxin are:

1) certain bacteria,

2) poisonous chemicals (e.g., heavy metals like copper), or

3) toxins found naturally or formed in animals, plants or fungi (e.g., certain fish and shellfish, certain wild mushrooms).

Viruses and parasites are unable to cause intoxications.

3) Clinical Features of Foodborne Illness

A. Transmission of Pathogens

Most foodborne illness occurs through **fecal-oral transmission**. A disease-causing organism is shed in human or animal feces and is deposited on a food item, which is then eaten. A contaminated food item may result in infection if:

1. raw food contaminated with a pathogen is not cooked long enough to kill the pathogen or is consumed raw (e.g., chicken, eggs or sushi), or
2. cooking utensils are used on a raw food contaminated with a pathogen, and then the same utensils are used on another uncooked food (e.g., knife used to cut raw chicken is also used to cut lettuce for salad).

In addition, a non-contaminated product may become contaminated when handled by an infected food handler who failed to wash his/her hands after using the bathroom and before handling food. Any of these routes of contamination may occur in either a home setting or in a commercial operation such as a restaurant and may result in one or two cases of illness or a large number of ill individuals.

B. Recognizing Foodborne Illness

The site of illness is usually limited to the gastrointestinal tract, but certain pathogens can move beyond the GI tract to infect other areas of the body. The majority of cases can be described as short-term (24-48 hours) gastroenteritis of abrupt and sometimes violent onset, with median incubation periods ranging from 2 to 36 hours. Signs and symptoms of foodborne illness can range from mild gastrointestinal discomfort to severe reactions that can result in death. **Although signs and symptoms vary, the most common are vomiting, abdominal cramps and diarrhea.** The severity of symptoms depends on many factors discussed throughout Chapter 3. **Because many pathogens are excreted into the feces, infected persons not only experience illness themselves but also may be sources of infection to others.**

Investigators often face the problem of having to **implement control measures** before an etiologic agent has been identified. It may be difficult to differentiate between the illnesses and pathogens involved without clinical or lab confirmation. Laboratory analysis is required to make a firm diagnosis, but attention to the symptoms (the time of onset and the presence or absence of some symptoms) may indicate the likely cause and permit a more efficient investigation.

Most cases of foodborne disease are single cases, and not associated with a recognized outbreak. Most occur secondary to exposures in the home or at a party, barbecue or picnic as opposed to restaurant exposure. **Single cases are difficult to associate with a particular food or establishment unless there is a distinctive clinical syndrome OR the same agent responsible for the illness is also identified in the food.** An example of a distinctive clinical syndrome is fish-borne ciguatera poisoning that produces GI symptoms as well as pronounced and persistent neurosensory symptoms such as a sensation of loose teeth, the inability to identify hot by taste or touch, and numbness and pain in the extremities.

Outbreaks of foodborne disease are usually recognized by the occurrence of illness among people who eat one or more foods in common AND the illness occurs within a short period of time from each other. While laboratory analysis is pending, it is important to focus on the incubation period. The incubation period in relation with the clinical symptoms is useful in determining an etiologic agent.

C. Foodborne Infections

Foodborne infections are a consequence of the growth of a microorganism in the human body, and this growth can take varying amounts of time. **Thus, the incubation period is generally rather long, usually measured in days compared to hours with that for most foodborne intoxications**. (For example, the incubation period for salmonellosis is usually 12-48 hours, but can be four days.) **Symptoms of infection usually include diarrhea, nausea, vomiting and abdominal cramps. Fever is often associated with infection.** See table 2-4 and appendix H for details.

The organisms causing infection often possess colonization or adherence factors, allowing them to attach and to multiply in specific parts of the intestine. For example, *Giardia lamblia* trophozoites attach to the upper small bowel. When the numbers become large, they can cover the absorptive surface and interfere with nutrient uptake. *Vibrio cholerae*, the agent of cholera, colonizes the intestine and produces a toxin (choleragen) causing an outpouring of fluid from the exposed cells. Death of the patient from dehydration is possible. *Shigella* species erode the intestinal lining, causing shigellosis, or "bacillary dysentery."

Other organisms can move beyond the GI tract to infect other tissues. Hepatitis A virus appears to infect intestinal cells and then spread to liver cells leading to the predominant manifestation of the disease, inflammation of the liver. *Salmonella typhi* may enter the bloodstream and spread throughout the body, causing typhoid fever. However, most serotypes of *Salmonella* penetrate the intestinal lining without progressing beyond the deeper layers into other tissues. Toxins produced by *E. coli* O157:H7 and other toxigenic *E. coli* can adhere to cells in the intestines, kidneys, and central nervous system, prevent protein synthesis, and cause cell death. Depending on the site of action, the result can be hemorrhagic colitis, hemolytic uremic syndrome, or thrombotic thrombocytopenic purpura.

TABLE 2.1 Classification of *Escherichia coli* Associated with Diarrhea

Types of *E. coli*	Epidemiology	Type of Diarrhea
Enteropathogenic	Acute and chronic endemic and epidemic diarrhea in infants	Watery
Enterotoxigenic	Infantile diarrhea in developing countries and traveler's diarrhea	Watery
Enteroinvasive	Diarrhea with fever in all ages	Bloody or nonbloody
Enterohemorrhagic (e.g., E. coli O157:H7)	Hemorrhagic colitis and hemolytic uremic syndrome (see Table 2.2) in all ages and thrombotic thrombocytopenic purpura in adults	Bloody or nonbloody

Source: Data adapted from American Academy of Pediatrics, 1994 Red Book.

TABLE 2.2 What is Hemolytic Uremic Syndrome (HUS)?

- Life threatening illness affecting the kidneys and clotting mechanisms of blood.
- In North America occurs commonly after an *E. coli* O157:H7 infection.
- First described in 1955, but first linked to *E. coli* O157:H7 in 1983.
- Predominantly affects infants and children.
- Most common cause of acute renal failure in children.

Sequelae may be associated with infections from foodborne pathogens. The incidence of sequelae after foodborne illness is unknown but probably less than 5%. Susceptibilities to a poor outcome differ and may be linked to several host risk factors that are discussed further in Chapter 3.

D. Foodborne Intoxications

Foodborne intoxications most often result from bacteria that release toxins into food during growth in the food. The preformed toxin is ingested, thus, live bacteria do not need to be consumed to cause illness. Microbial toxins such as botulinum toxin and many of the marine algal toxins are some of the most potent toxins known. Indications that a food contains a preformed toxin (changes in appearance, odor or taste) are rare.

Illness from intoxication manifests more rapidly because the body is affected quickly by the toxin or wants to expel it. Time for growth and invasion of the intestinal lining, as in an infection, is not required. The incubation period for an intoxication is often measured in minutes or hours. For example, the incubation period for *Staphylococcus aureus* toxin-related illness is one to six hours, with a mean of four hours. In cases of paralytic shellfish poisoning (PSP) (caused by the eating of shellfish containing a potent algal toxin) symptoms may be experienced within 15 minutes of ingestion.

The most common or sometimes only symptom of an intoxication is vomiting. Other symptoms can range from nausea and diarrhea to interference with sensory and motor functions (e.g., taste, touch, muscle movements). These include: double vision, weakness, respiratory failure, numbness, tingling of the face and disorientation. **Fever is rarely present with intoxication**. Absence of fever is important when trying to determine cause of illness.

TABLE 2.3 Clinical Features of the Main Types of Foodborne Illness

Usual Incubation	Typical Symptoms	Possible Cause
Short		
1-5 hours	Vomiting, nausea, sometimes diarrhea and cramps	*Bacillus cereus*
2-6 hours	Vomiting, nausea, diarrhea	*Staphylococcal aureus*
Intermediate		
8-18 hours	Diarrhea, abdominal pain	*Clostridium perfringens*
8-16 hours	Diarrhea, abdominal pain	*Bacillus cereus*
Long		
12-24 hours	Nausea, vomiting, diarrhea lasting 1-2 days	Small round structured viruses (Norovirus*)
12-24 hours	Diarrhea, abdominal pain	*Vibrio parahaemolyticus*
12-36 hours	Weakness, double vision, difficulty swallowing, dry mouth	*Clostridium botulinum*
12-48 hours	Diarrhea, fever, abdominal pain lasting several days	Salmonella species
1-2 days	Diarrhea, often bloody	*E. coli* (toxigenic species)
1-3 days	Abdominal pain, bloody and mucoid diarrhea, fever	Shigella species
2-5 days	Diarrhea (sometimes bloody), abdominal pain, fever	Campylobacter species
7-10 days	Very watery diarrhea, nausea, vomiting, gas, malaise, weight loss	Cyclospora
1-2 weeks	Diarrhea, bloating	*Cryptosporidium parvum*
1-3 weeks	Fever, rash, constipation	*Salmonella typhi*
15-50 days	Jaundice, malaise, fever, diarrhea	Hepatitis A
1-10 weeks	Mild "flu," malaise, meningitis	**Listeria monocytogenes*

**a diarrheal type of L. monocytogenes with a shorter incubation period also exists*

Source: Data adapted from Department of Health, *Mgt. of Outbreaks of Foodborne Illness*, London, 1994.
*Norovirus: formally called Norwalk like virus (NLV)

For a typical intoxication to occur, bacteria must be able to multiply and produce toxins in food. In some cases, toxigenic bacteria can contaminate foods and not produce toxin. Therefore, the presence of bacteria does not always mean that the food is hazardous to eat. On the other hand, bacteria may have grown in a food and produced the toxin, yet the bacteria are no longer viable or recoverable. Nevertheless, the toxin remains and causes illness.

The ability to detect the toxin in food, therefore, is more important than the ability to detect bacterial cells. It is more expensive and technologically difficult to detect toxins than bacteria. Currently, animal bioassays are being replaced by new molecular methods. A type of bioassay using mice is still required for detection of botulinum toxin. (See Chapter 6, Section 4-F for information on botulism testing.) **When testing for toxin in food or clinical samples is unavailable, identification of a large number of bacteria can be circumstantial evidence of toxin presence.**

TABLE 2.4 Summary of Foodborne Infection and Foodborne Intoxication

	Foodborne Infection	Foodborne Intoxication
Incubation Period	Generally rather long, usually measured in days	Generally rather short, often measured in minutes or hours
Typical Symptoms	Diarrhea, nausea, vomiting, abdominal cramps. Fever is often present.	Vomiting is more common. Can range from nausea to vomiting to interference with taste, touch and muscle movements (e.g., double vision, weakness, numbness, tingling of face, disorentiation, flushing)
Pathogens	Infection: *Salmonella* species, Hepatitis A, *Shigella* species, *Giardia lamblia* *Campylobacter* species, *Yersinia* species, *Listeria monocytogenes*, *Vibrio parahaemolyticus*, *Vibrio vulnificus*, rotavirus, Norovirus, *Toxoplasma gondii, Cyclospora cayetanensis, Cryptosporidium parvum* Toxin-mediated infection: ***C. botulinum*** (infant), ***B. cereus*** (long incubation), *E. coli* species, *V. cholerae*, *C. perfringens*	***C. botulinum*** (adult), *S. aureus* ***B. cereus*** (short incubation), certain metals, certain wild mushrooms, certain fish and *shellfish*

E. Examples of Seafood Intoxications

In North America, several kinds of seafood-associated toxins can cause illness.

- **Paralytic shellfish poisoning (PSP)** is transmitted to humans through mussels, clams, and scallops that have ingested and concentrated toxic marine protozoa. The toxin is found mainly in coastal waters and is often associated with a red discoloration of seawater due to algal bloom known as "red tide."

- **Diarrhetic shellfish poisoning** is also caused by ingestion of seafood containing toxic marine protozoa. Illnesses have occurred in eastern Canada, Japan and Western Europe.

- **Amnesic shellfish poisoning** can result from eating shellfish that are contaminated with algae that produces domoic acid. It was responsible for over 100 cases and 3 deaths in eastern Canada in a 1987 outbreak.

- **Ciguatera poisoning** is a result of ingestion of ciguatoxin and related toxins, produced in tropical fish, but also implicated in farm-raised salmon. Areas of higher risk are the Pacific and northern Caribbean. However, imported fish have occasionally caused outbreaks in the United States.

- **Scombroid poisoning**, arising from bacterial spoilage of fish and subsequent production of histamine and related compounds, occurs more frequently than other seafood toxin poisonings. Tuna, mackerel, mahi-mahi and marlin are often implicated.

None of these toxins mentioned above are destroyed by heat or cold storage, and control depends on the preprocessing stages.

NOTE: The quantity (also called "dose") of viruses, bacteria and parasites necessary to cause illness depends on a number of factors that are discussed further throughout Chapter 3. Table 3.3 also provides the infective/toxic dose of various agents.

F. Other foodborne toxins causing disease

Many other toxins, either naturally occurring or manufactured, can end up in food and water. This can occur intentionally or unintentionally. Examples of such toxins include heavy metals, mushroom toxins, and pesticides. An important thing to consider is the short incubation period of such toxins. This varies from minutes for substances such as nicotinic acid and Cadmium, to a few hours for vitamin A toxicity. Multiple symptoms may be present, depending on the intoxication. Gastrointestinal symptoms such as nausea and vomiting can be present, but a variety of neurological complaints may also occur.

4) The Carrier State

Foodborne disease carriers are individuals who harbor a specific infectious agent but do not exhibit symptoms of illness or disease. **Because the agent is excreted in the feces, a carrier is a potential source of infection for others**.

Characteristics of carriers are listed below.

- Carriers may be people in the incubation phase (the period before symptoms appear) of an infection. In the period before illness, an infected person may excrete the infective agent (e.g., the hepatitis A virus is excreted for as long as two weeks before symptoms appear).
- Certain individuals who are exposed to a contaminated food or become infected never show signs of illness, but as healthy carriers can spread pathogens unknowingly to others. They may show no symptoms either because they have a subclinical infection or because they are only mildly infected. This is particularly dangerous in a food-handling setting.
- Carriers may be people in the convalescent (recovery) stages of an illness. Certain microorganisms can be excreted into feces during the convalescent period, often 24-72 hours after symptoms cease. This is true for viruses, *Salmonella* species, and *Shigella* species. Approximately 1% of patients continue to excrete nontyphoidal Salmonella for more than 1 year.
- The carrier state can be of short or long duration (temporary or chronic carrier). The carrier state usually ceases spontaneously after several weeks or a few months, but some individuals may become chronic carriers (e.g., for periods exceeding a year, for agents such as *Salmonella typhi*).

Carrier states are important to remember when investigating and controlling foodborne illness. It is not only individuals with symptoms who are capable of transmission to others, but also those who are in the incubation or convalescent phases of illness and those who are asymptomatic. For example, when determining the close contacts who need prophylatic immune globulin (IG) in a hepatitis A outbreak, it is necessary to identify the onset date of symptoms in the patient and then identify those individuals who may have had close contact with the patient for as long as two weeks prior to that date. See Appendix A, Section 5, for detailed information on hepatitis A control measures.

Conclusion

The next chapter (Chapter 3) discusses the pathogenesis of foodborne illness. It expands further on issues addressed in this chapter. These issues focus on the development of disease among people who eat the same contaminated food. Why do some people get sick when others do not? Why is the severity of symptoms different among those who get ill? Why do some people develop chronic medical conditions when others do not? What quantity of bacteria, virus or parasite (infective or toxic dose) does it take to cause illness?

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NOTES

Chapter 3

PATHOGENESIS

1) The Digestive Tract

2) The Body's Defense System

3) High-Risk Populations

4) Infective or Toxic Dose

PATHOGENESIS

Introduction
Ingested pathogens, transmitted from contaminated foods, enter the body by way of the gastrointestinal (GI) tract. The body has defenses to fight these pathogens, but an overwhelming dose of pathogens or weakened resistance can lead to illness. Certain populations, such as the very young, the elderly, and some immunocompromised persons, are at higher risk for foodborne disease and for serious complications of foodborne disease. The severity of illness may be different among people eating the same contaminated food. The variability in illness severity is due to several factors including: the virulence of the pathogen, the health status of the host, and the concentration of the pathogen. The minimum infective dose necessary to cause illness varies from organism to organism and host to host.

1) The Digestive Tract

Food digestion begins in the mouth, where the food is mixed with enzyme-containing saliva, and then continues in the stomach, where other acid and enzymes in the gastric juice are added. The large molecules of proteins, fats, and carbohydrates cannot be used until they move to the small intestine where they are digested into smaller molecules by enzymes. Normal intestinal bacteria are present in large quantities and aid in digestion.

The surface layer of the small intestine consists of a lining called the epithelium that mediates exchanges between the partially digested food and the deeper tissue layers containing blood, lymph vessels, glands and nerves. The smaller molecules are absorbed across this lining into the blood and the lymph. Hence, the molecules gain entry into the body and are used for energy and other bodily requirements. The large intestine has comparatively little digestive function. It mainly absorbs water and electrolytes from the digested food. It then expels the resulting waste products as feces, which contain undigested material (fiber).

The digestive tract is under frequent attack, and serves as the main line of defense against the actions of potential foodborne pathogenic microorganisms. Illness results when the number of microorganisms or the concentration of their toxins overwhelms the body's defenses. Most foodborne exposures are mild, the body successfully fights off the microorganisms, and the person never experiences any symptoms of illness. Or, a person may experience mild abdominal symptoms, or perhaps more severe symptoms, without realizing that the cause was foodborne.

The threshold point for illness differs from person to person and is affected by various factors described in the following sections. For pathogens that cause infections, the threshold point is termed the **infective dose**; for pathogens that cause intoxications, it is termed the **toxic dose**. The frequency and severity of illness usually increases as the dose consumed exceeds this threshold. This is termed a dose-response relationship. (See Table 3.3 at the end of this chapter for the infective and toxic dose of various microorganisms.)

2) The Body's Defense System

The human body possesses a wide variety of defense mechanisms for counteracting foodborne pathogens. The components of the GI defense system include:

- stomach acid pH,
- GI tract immune system,
- intestinal flora, and
- bile acids and digestive enzymes.

A. Stomach pH

The gastric fluid present in the stomach is quite acidic, with a pH of about 2. Many bacteria that enter the stomach are killed in such an environment. The pH indicates the degree of acidity or alkalinity of a substance. A neutral substance, such as water, has a pH of 7. Acids have a pH less than 7 and bases have a pH ranging from 7 to 14.

The acidity of the stomach can reduce or eliminate pathogenic microorganisms or toxins before they can reach the small intestine, where most absorption occurs. Anything decreasing stomach acidity (resulting in increased pH) can potentially protect many pathogens and toxins and increase their chance of reaching the small intestine rendering the person more susceptible to illness. Such factors include:

- the buffering capacity of food (e.g., the components of milk decrease acidity),
- the consumption of antacids (these are buffering agents and decrease acidity),
- the use of certain acid-blocking drugs (e.g., cimetidine and ranitidine for treatment of ulcers inhibit the secretion of stomach acids),
- partial or total gastrectomies (these are associated with decreased acidity).

Salmonella is a good example of a bacterium that benefits from the buffering capacity of foods. Relatively large numbers of *Salmonella* bacteria are normally required to cause illness in healthy adults. However, infection can occur with lower doses from foods that protect *Salmonellae* from the acidity of the stomach (e.g., milk). The same applies to *Campylobacter* species if the organism is consumed with milk or other foods that neutralize stomach acidity.

Clostridium botulinum has an effective way to cause illness while being protected against the acidity of the stomach. When growing in contaminated foods, it makes a toxin consisting of two parts (toxic and nontoxic). The toxic part induces the illness but is easily altered by stomach acidity. The nontoxic portion serves to protect the toxic part during passage through the stomach. The toxin is released by intestinal enzymes after passage to the small intestine, thus causing illness.

B. The GI Tract Immune System

The GI tract has its own immune system. It is related to, but distinct from, the overall immune system. The GI tract immune system helps to keep the body healthy by reducing absorption of some large molecules or reducing colonization or invasion of the epithelium by pathogens. It does all of this without affecting normal bacterial flora.

Large particles, such as toxins, are immobilized within the epithelium. Certain enzymes can then attack the immobilized form. Another way in which the intestines minimize entry of particles into the body is by breaking down particles that attach to the bowel wall. The intestinal wall also contains lymphocytes and antibody producing cells that fight infection. Generally only organisms that can attach to the intestinal lining cause problems. Otherwise organisms are swept out by the motility of the GI tract.

Although the intestinal immune system is well designed to handle many invading molecules and pathogens, certain ones are difficult to control. Some pathogenic microorganisms can change their outside surfaces so that they are not recognized or are considered harmless. They are therefore not attacked or eliminated by the host and can then cause illness.

Persons who have been exposed to certain pathogens or toxins may develop partial or total immunity to later exposures to the same pathogen/toxin. The immunity results from a specific immune reaction and greatly increases the infective or toxic dose required to cause subsequent illness. For example, hepatitis A antibodies appear early in the course of infection, remain detectable for the person's lifetime and indicate lifelong immunity. Subsequent exposure to hepatitis A will not result in illness.

C. The Intestinal Flora

More than 400 species of bacteria (also called normal flora) live in the adult human GI tract. This flora can provide resistance to colonization by some pathogenic microorganisms. Animal studies indicate that colonization resistance exerted by the normal flora increases throughout adulthood. In the healthy individual, host tissues and the normal GI flora operate in harmony.

Most foodborne pathogens are not normal inhabitants of the intestines. Exceptions include certain strains of *Clostridium perfringens* and *Escherichia coli*, which are normal inhabitants of the intestinal tract but are not virulent strains causing disease in the healthy individual.

To cause illness, foodborne pathogens must be able to compete successfully against the normal flora. They must be able to either colonize the epithelial surface or hide from the GI immune system. Some pathogens produce attachment factors which enable them to colonize the intestinal walls. Others produce enzymes, toxins, or other compounds altering permeability or damaging epithelial cells allowing pathogens to invade. A few examples to help illustrate this are described below.

Shigella are localized in the intestinal cells where they remain attached to, or multiply within these cells. They cause a severe local inflammatory response which results in a bloody, mucopurulent diarrhea. Unlike S*higella*, *Vibrio cholerae* do not penetrate the epithelial layer, but remain adhered to it. The pathogen produces severe diarrhea, resulting from the secretion of a toxin that affects the underlying cells.

Manifestations of some foodborne diseases are not restricted to the GI tract. For example, *Salmonella typhi* (*S. typhi*) can move through the intestinal wall penetrating the epithelial cells. Following inflammation in the small intestine, the organisms may invade the regional lymph nodes. From the lymphatic system, they may enter the blood and infect various organs and tissues, including the liver, kidneys, spleen, bone marrow, gall bladder and even the heart. Symptoms of *S. typhi* infection include headache, loss of appetite, rash, abdominal pain, weakness and a continued fever. Hepatitis A is an example of a virus that moves beyond the GI tract into the liver. Other microorganisms that play an etiologic role in illness beyond the GI tract include: *E. coli* O157:H7 (hemolytic uremic syndrome), *Campylobacter jejuni* (Guillain-Barré syndrome) and *Listeria monocytogenes* (fetal morbidity and meningitis).

D. Bile Acids and Digestive Enzymes

Bile acids are produced in the liver and assist in the digestion and absorption of fat. They inhibit the growth of many pathogenic microorganisms. They are thought to be partly responsible for preventing *Clostridium botulinum* from producing toxin in the intestinal tract of adults. However, other enteric microorganisms such as *Escherichia*, *Salmonella*, and *Shigella* are not affected by bile acids.

Digestive enzymes are active throughout the GI tract. As mentioned in the preceding sections of this chapter, many may inhibit or inactivate a variety of microorganisms. For example, lysozyme in saliva kills and digests microbes. In some cases, however, as with botulinum toxin, GI enzymes actually play a role in activating a toxin.

E. Treatment

While antibiotic therapy is sometimes useful in treating foodborne illness, it can sometimes be ineffective or actually make the condition worse. Antibiotics can prevent the growth of normal flora. In the absence of normal flora, pathogenic bacteria may become established. Normally, such organisms do not flourish in the intestines because they cannot compete with the normal flora. But with the normal flora eliminated from antibiotic use, they can take over.

Furthermore, oral antibiotics can facilitate intestinal colonization of certain foodborne pathogens and prolong carriage. For example, antibiotic therapy is usually not indicated for those patients with uncomplicated gastroenteritis caused by non-typhi *Salmonella* species. Antibiotic therapy can prolong the excretion of *Salmonella* organisms into feces. Treatment is indicated however for those patients with invasive disease or an increased risk of invasive disease, such as infants younger than 3 months of age and immunocompromised individuals.

There does not appear to be a role of antibiotic treatment for patients with *E. coli* O157:H7. Some studies have demonstrated that antibiotics (such as trimethoprim sulfamethoxazole) have no effect on the progression of symptoms, fecal pathogen excretion or progression to HUS. Other analyses have demonstrated that trimethoprim sulfamethoxazole can increase the chances of progression to HUS. The data are insufficient to provide an answer at this time, and further studies need to be done. Overall, antibiotic therapy should be used with care, especially if the pathogen is resistant to a number of antibiotics and the normal flora is sensitive to the antibiotic.

3) High-Risk Populations

Certain populations of people are predisposed to prolonged, more frequent, and often more severe illness. As the population of the U.S. ages, an increasing percentage of the population is becoming more susceptible to foodborne pathogens (see Table 3.1). Elderly individuals undergo a decrease in immune function and are more susceptible to microbial infections and to the complications of diarrheal disease (e.g., dehydration). Those older than 65 years account for approximately 10% of the U.S. population, and this number is growing by about 1 million per year.

TABLE 3.1 Populations Sensitive to Foodborne Disease in the United States

Population Category	Individuals	Year
Pregnant women	6,484,000	1992
Children under 5 years	19,286,000	1996
Elderly (over 65)	33,200,000	1994
Cancer patients	1,208,000	1994
Organ transplant procedures	17,331	1994
AIDS patients	66,816	1996

Source: U.S. Department of Commerce, 1996; U.S. Department of Health and Human Services, 1996.

Individuals immunocompromised as a result of transplant operations, chemotherapy, or AIDS are also potentially at higher risk for certain foodborne illnesses. Immunocompromised individuals may also be infected by lower infective or toxic doses of pathogenic microorganisms than healthy individuals.

Listeria and *Salmonella* are much more pathogenic in immunocompromised individuals. The risk of infection with *Listeria* is estimated to be 100 to 300 times higher in patients with AIDS. For these individuals, the illness carries a mortality rate of 23 percent. The

risk of infection with *Salmonella* is 20 times higher for these same individuals, with septicemia six times more likely to develop as a complication of infection. The number of U.S. transplant patients requiring continued immunosuppressive therapy is increasing each year; with the number of heart, kidney, liver, and pancreas transplants increasing by as much as 50% annually. Immunosuppressive therapy can reduce the ability of the body's immune system to fight off infection from pathogens.

Other factors may also increase an individual's risk for foodborne illness. Pregnancy puts a woman's fetus at risk for infections with *Listeria monocytogenes* or *Toxoplasma gondii*. Each of these organisms may cause abortion, stillbirth or fetal abnormality. Patients with sickle cell disease are at high risk of invasive *Salmonella* infection. Additionally, hospitalized persons are at increased risk for microbial infection. Nearly one-third of all hospitalized patients are treated with antibiotics. As mentioned in Section 2 of this chapter, antibiotic treatment alters the normal flora leaving one more vulnerable to foodborne illness.

In total, more than 30 million individuals in the United States are likely to be at high risk for foodborne illness. These and other factors discussed in this chapter are presented in Table 3.2 at the end of the chapter.

4) Infective or Toxic Dose

The minimum infective or toxic dose of microorganisms needed to cause illness for an individual is difficult to determine because of all the variables described. Not everyone exposed to a contaminated food will become clinically ill. Doses necessary to cause illness can range from one to hundreds to millions of microorganisms. (Table 3.3)

Predictions have been made to determine the number of pathogens needed to cause illness. These predictions were developed from human feeding studies and are based on probability models. One study by Rose and Sobsey (1993) estimates that individuals consuming 60 grams of raw shellfish from approved waters in the United States may have on average a 1 in 100 chance of becoming infected with an enteric virus. When the rotavirus probability model is used, which represents a more infectious virus, the risk increases to 5 in 10. These predictions can help explain why outbreaks continue to occur.

These studies should be interpreted with caution because of the limitations of sampling and laboratory methodology. The feeding trials are usually done with healthy young men who may report mild or no illness, whereas in an actual outbreak, lower levels of pathogens may cause illness due to the variations of people involved. Also, the food may have a significant effect on infectivity; for example, certain foods may be especially efficient vehicles for transmission of infectious or toxic agents in that they enhance the probability of infection or illness (e.g., milk).

Additionally, pathogens that cause illness differ greatly among types, genera, species and strains. Not all microorganisms sharing the same genus and species name (e.g., *Escherichia* is the genus and *coli* is the species) are identical, and they may differ greatly in their infectiousness. In fact, some may not be capable of causing human illness, while others are quite hazardous. Additionally, smaller numbers of pathogens can more easily cause illness in a person who is at higher risk than in one who is not.

The probability of infection and subsequent illness is a function of:

- **the vulnerability of the host (e.g., age, immune resistance),**
- **the number of units of the infectious agent ingested with food (e.g., viral particles, bacterial cells, parasitic cysts), and**
- **the virulence or pathogenicity of the agent.**

Table 3.3 at the end of the chapter presents what is currently known of the infectivity/toxigenicity of the more common agents. This information has been drawn from human feeding studies as well as from foodborne illness outbreaks.

Conclusion

Chapters 4-9 of this reference manual cover the sequential events in the investigation of foodborne illness. While chapters 1-3 consist of background or textual information, the following chapters contain more of the "how to" or "hands on" material. Each chapter provides information on a specific part of an investigation. Keep in mind that these events do not necessarily happen in the order that the material is printed. Many events happen simultaneously; note the various references to other chapters and sections as you go along.

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TABLE 3.2 Factors Increasing the Risk or Severity of Foodborne Illness

FACTORS	REASONS
Microbial Factors:	
Type and strain of pathogen ingested	Some pathogens and strains more virulent than others
Quantity of pathogens ingested	Higher numbers ingested may increase severity of illness and/or shorten onset time
Host Factors:	
Age less than 5 years	Lack of developed immune systems, smaller infective dose-by-weight required
Age greater than 50 or 60 years (depending on pathogen)	Immune system failing, weakened by chronic ailments, occurring as early as 50 to 60 years of age
Pregnancy	Altered immunity during pregnancy
Hospitalized persons	Immune systems weakened by other diseases or at risk of exposure to antibiotic-resistant strains
Concomitant infections	Overloaded or damaged immune systems
Consumption of antibiotics	Alteration of normal intestinal microflora
Excessive iron in blood	Iron in blood serving as nutrient for some organisms
Reduced liver/kidney function (alcoholism)	Reduced digestion capabilities, altered blood-iron concentrations
Possession of certain human antigenic determinants duplicated or easily mimicked by microorganisms	Predisposition to chronic illness (sequelae)
Surgical removal of portions of stomach or intestines	Reduction in normal defense systems against infection
Immunocompromised individuals including those on chemotherapy or radiation therapy; recipients of organ transplants taking immunocompromising drugs; persons with leukemia, AIDS, or other illnesses	Immune system inadequate to prevent infection
Stress	Body metabolism changes allowing easier establishment of pathogens, or lower dose of toxin required for illness
Poor hygiene	Increased likelihood of ingestion of pathogens
Diet related factors:	
Nutritional deficiencies either through poor absorption of food (mostly ill or elderly persons) or unavailability of adequate food supply (starving persons)	Inadequate strength to build up resistance and/or consumption of poor-quality food ingredients, which may contain pathogens
Consumption of antacids	Increased pH of stomach
Consumption of large volume of liquids including water	Dilution of acids in the stomach and rapid transit through the stomach
Ingestion of fatty foods (such as chocolate, cheese, hamburger) containing pathogens	Protection of pathogens by the fat against stomach acids
Other factors:	
Geographic location	Likelihood of exposure to endemic virulent strains, limited food and water supply, varied distribution of organisms in water and soil

TABLE 3.3 - Infectivity or Toxigenicity of Various Microorganisms

h=high number organisms required for infection
l=low number organisms required for infection

AGENT	INFECTIVITY/TOXIGENICITY
Bacillus cereus **(h)**	Symptoms arise after ingestion of food containing large numbers of toxigenic bacteria (> 10^5/g), or preformed toxin.
Campylobacter jejuni **(l)**	As few as 100 organisms can cause illness if consumed with milk or other foods that may neutralize gastric acidity.
Clostridium botulinum **(l)**	The toxin is potentially lethal at very low doses.
Clostridium perfringens **(h)**	Usually >10^6 microorganisms are required to cause illness.
Cryptosporidium species **(l)**	High infectivity, approximately 100-150 organisms can cause illness.
E. coli O157:H7 **(l)**	Relatively high toxigenicity as <1000 bacteria can cause illness.
Giardia lamblia **(l)**	As few as 25-100 cysts can cause illness.
Hepatitis A **(l)**	High infectivity, as approximately 10-100 particles of virus can cause illness.
*Listeria monocytogenes**	Not highly pathogenic for healthy adults outside high-risk groups.
Salmonella species **(h)** (excluding *S. typhi* and *S. paratyphi*)	Normally, relatively large numbers of bacteria (10^5) required to cause illness in healthy adults, but vulnerable groups can be infected by lower numbers. Infection can occur from relatively low doses, particularly in foods that protect salmonellae from the acidity of the stomach.
Salmonella typhi **(h/l)** *Salmonella paratyphi*	Variable infectivity. 10^5-10^9 bacteria may be required to cause illness, depending on the strain and host susceptibility. As few as 10 to 100 *S. typhi* have caused illness.
Shigella species **(l)**	Small numbers of bacteria (10-100) have caused illness in volunteers.
*Staphylococcus aureus***(h)**	Illness can occur in the absence of live cells; toxin may have been produced, and the organisms may die out. Sufficient toxin to cause illness may be produced if bacterial numbers reach 10^5 to 10^6.
Vibrio cholerae serotype 01 and non 01 strains **(h/l)**	10^6 organisms cause illness. If given with alkali to neutralize stomach acidity as few as 100-1000 can cause disease.
Vibrio parahaemolyticus **(h)**	Relatively low infectivity - at least 10^5 to 10^7 organisms of virulent strain may be required to cause illness.
Viruses **(l)**	Relatively high infectivity. For example, infectious dose of rotavirus in a child can be as few as 10 viral particles.
Yersinia enterolcolitica **(h)**	Relatively low infectivity. Larger numbers bacteria required to cause illness.

NOTES

Chapter 4

FOODBORNE ILLNESS SURVEILLANCE

1) Purpose of Surveillance
2) Historical Development of Surveillance
3) Information You Need to Collect
4) How to Collect Information
5) Reporting Issues: Timeliness, Priorities and Confidentiality
6) Using the Information Collected
7) Limitations of Data

FOODBORNE ILLNESS SURVEILLANCE

Introduction
Surveillance of foodborne illness serves as the framework from which public health officials can act to control and prevent diseases, which can be acquired through food. Surveillance is necessary to determine any significant changes in frequency or distribution of cases. These observations are a continuous process to determine the extent of disease, risk of transmission, and to develop an approach for the prevention and control of illness.

The purpose of this chapter is to outline the information necessary to collect when conducting foodborne illness surveillance, to explain the methods by which this information is collected, and to give several examples about how this information can be used. In addition, a historical perspective on disease surveillance is offered, along with discussions about the limitations of data, timely disease reporting, and confidentiality issues surrounding such reporting.

1) Purpose of Surveillance

Simply stated, surveillance is the regular collection, summarization and analysis of data.

The key to recognizing foodborne illness outbreaks lies in routine surveillance. How, after all, does one know what is **unusual** if one does not keep track of what happens every day? This point illustrates the importance of timely and thorough reporting. Thus, the purpose of foodborne illness surveillance is to interrupt the transmission of disease to susceptible persons by:

- seeking rapid notification of illness through timely and thorough reporting,
- identifying outbreaks, investigating outbreaks, and
- interpreting surveillance and investigative data and disseminating findings.

2) Reporting Regulations

In Georgia, reporting of communicable diseases is required under the **Uniform Code of Georgia: 31-12-2**.

(a) The department is empowered to declare certain diseases and injuries to be diseases requiring notice and to require the reporting thereof to the county board of health and the department in a manner and at such times as may be prescribed. The department shall require that such data be supplied as are deemed necessary and appropriate for the prevention of certain diseases and accidents as are determined by the department. All such reports and data shall be deemed confidential and shall not be open to inspection by the public; provided, however, the department may release such reports and data in statistical form or for valid research purposes.

(b) Any person, including but not limited to practitioners of the healing arts, submitting in good faith reports or data to the department or county boards of health in compliance with the provisions of this Code section shall not be liable for any civil damages therefor.

In Georgia, district and local health staff or their designees are authorized to accept, investigate and submit reportable disease case information to the Georgia Division of Public Health, Epidemiology Branch, Notifiable Disease Epidemiology Section. Summary information on nationally notifiable diseases is submitted to the CDC on a weekly basis (without personal identifiers). This information is used to track national and regional disease trends.

3) Information You Need to Collect

Two main categories of information should be collected as part of a foodborne illness surveillance system: **Descriptive Information** and **Investigational Findings**.

A. Descriptive Information.

First, information is needed regarding the time(s), place(s), and person(s) connected with a particular complaint or notifiable disease. Descriptive data is the first and most essential information necessary for surveillance. When notified about a potential or confirmed foodborne illness, the following data should ideally be gathered:

- **WHO** became ill and what are the characteristics of this person(s) (age, sex, race, occupation)?

- **WHEN** did the person(s) become ill?

- **WHAT** foods, beverages, or meals are suspect? (See "Guidelines For Determining Suspect Foods" below, Table 4.1) **WHAT** pathogen or symptoms did the person(s) have?

- **WHERE** did the ill person(s) eat or purchase these foods and **when** did they consume them?

These data and other information could be collected using a standardized *Foodborne Illness Complaint Worksheet*. A detailed explanation of the worksheet is provided in Section 4 of this chapter, and a copy of the worksheet may be found in Appendix E.

Table 4.1 - Guidelines For Determining Suspect Foods

I. Only **one person** is reported ill.
  a) If cause (organism) is NOT KNOWN**:** record all foods/beverages/meals consumed for **at least 72 hours prior to the onset of illness.**
  b) If cause (organism) is KNOWN**:** record all foods/beverages/meals which were consumed during the appropriate incubation period prior to the onset of illness (for appropriate incubation periods, please refer to Chapter 2, Table 2.3 ,Table 2.5, or appendix H).

II. **Two or more persons** are reported ill and EXPOSURE IS KNOWN OR RELATED TO A COMMON EVENT.
  a) If cause (organism) is NOT KNOWN**:** record all foods/beverages/meals COMMON to all persons for **at least 72 hours prior to the onset of illness** or consumed at the common event**.**
  b) If cause (organism) is KNOWN**:** record all foods/beverages/meals COMMON to all persons or consumed at the event which were consumed during the appropriate incubation period prior to the onset of illness (for appropriate incubation periods, please refer to Chapter 2, Table 2.3,Table 2.5, or appendix H).

III. **Two or more persons** are reported ill with NO known exposure or common event.
  a) If cause (organism) is NOT KNOWN: for each person, record all foods/beverages meals which were consumed **for at least 72 hours prior to the onset of illness**.
  b) If cause (organism) is KNOWN: for each person, record all foods/beverages/meals which were consumed during the appropriate incubation period prior to the onset of illness (for appropriate incubation periods, please refer to Chapter 2, Table 2.3, Table 2.5, or appendix H).

B. Investigational Findings

Based on the information from above, a foodborne illness investigation may be initiated. More information will be collected as an investigation proceeds. These investigational findings are a crucial component of a foodborne illness surveillance system because such

findings enable public health officials to more clearly understand the causes of foodborne illness and potentially prevent further illness. Findings may include the answers to some or all of the following questions:

- **What** specific food item(s) or ingredient(s) was linked to the illness?
- **What** type of contaminant (bacterium, virus, parasite, toxin or chemical) caused the illness?
- **What** were the factors leading to the contamination, survival, or growth of a particular contaminant in an implicated food item? (Was the item improperly cooked or stored? Did a sick food handler prepare food?)

4) How to Collect Information

The quickest way to respond to a suspect foodborne illness is to complete a *Foodborne Illness Complaint Worksheet* when a complaint is received.

The Georgia Division of Public Health strongly encourages using the *Foodborne Illness Complaint Worksheet*. It will help ensure that the pertinent information is gathered during the initial interview.

When a notifiable foodborne disease is reported, the basic information on the *notifiable disease/condition form* must be reported to GDPH through SENDSS. Several of the notifiable illnesses can be acquired through foods, such as laboratory-confirmed *Salmonella*, *Campylobacter*, and *E. coli* O157 infections. While food and other exposure information should ideally be collected on all notifiable diseases, GDPH only requires additional follow-up forms for *Cyclospora*, *E. coli* O157, *Listeria*, shiga toxin positive *E. coli*, *Vibrio*, *Yersinia,* and a selection of *Salmonella* infections. Follow-up forms for all notifiable foodborne diseases can be obtained from the Notifiable Disease Section, GDPH. The proper way to collect information on suspect foodborne and notifiable foodborne diseases are discussed below.

A. The *Foodborne Illness Complaint Worksheet*

Any cluster of illness, regardless of whether or not it is a reportable illness, **must be reported** to district or local health department by all health care providers, hospitals, laboratories, schools, daycares, detention centers, nursing homes, or other facilities. Complaints of possible foodborne illness are also reported by consumers, neighboring health officials, and restaurant owners.

Regardless of who reports a potential foodborne illness, the *Foodborne Illness Complaint Worksheet* should be used to record all information for all foodborne illnesses that are not notifiable and should be filed as a permanent record of the complaint. Remember, if the illness has been confirmed to be due to a notifiable diasease, the notifiable disease information should be entered into SENDSS and, if necessary, an official disease-specific *case report form* must be completed **in addition to** the *Foodborne Illness Complaint Worksheet*.

When completing the *Foodborne Illness Complaint Worksheet* (a copy of which is located in Appendix E), please keep the following factors in mind:

1) Always try to **collect as much information as possible** from the complainant the first time contact is made. It might be difficult to contact this individual again. If the complainant cannot provide critical pieces of information, try to find out who may be able to and contact that person. By collecting enough information in the initial stages, you will be able to determine the validity of the complaint more easily (see Chapter 5, Section 3), and possibly avoid conducting an unnecessary investigation.

2) **A laboratory diagnosis is not required for a foodborne illness complaint to be legitimate**. The complainant may have been infected through food, but may have not received medical care. Also, remember that many foodborne illnesses (for example, those caused by viruses) are not reportable and are difficult to diagnose in the laboratory.

3**) Remember that many illnesses that can be acquired through foods may also be acquired through other means, such as water, person-to-person contact, and animal-to-person contact.** In addition, a complainant may be "sure" about the source of the illness and report only one suspect food or food establishment. Do not be deterred from obtaining an appropriate food consumption history and information on other potential exposures. (See Table 4.1 - Guidelines For Determining Suspect Foods in Section 3 of this chapter.)

4) Be sure to **accurately record dates and times** of the onset of illness and food consumption. Most people who have experienced a recent illness should be able to provide you with these answers. If they cannot, try to find out why.

5) The completed worksheets should be filed at the local and/or district health department for easy retrieval. This will facilitate the identification of specific complaints or possibly related complaints during certain time periods.

6) Foodborne Illness Complaint Worksheets should be recorded on paper or electronic logs sheets at the local or district health departments. This allows for easier identification of complaints from the same establishments from different persons or on different days.

NOTE: Any foodborne illness complaint that is initially received at the state level will be forwarded to the appropriate local health department via phone and/or fax.

B. Georgia Notifiable Disease Surveillance

Reporting is the activity whereby a surveillance system receives a timely and regular flow of information on cases of illness. As mentioned earlier, certain notifiable diseases in Georgia can be acquired through food. Most of these are gastrointestinal illnesses, for example salmonellosis, and **once confirmed must be reported by district and local health departments to GDPH through SENDSS, (State Electronic Notifiable Disease Surveillance System) (http://sendss.state.ga.us).**

When a report of a notifiable disease is received from a health care provider, laboratory, or other source, the case should be reported as soon as possible to the GDPH through SENDSS. Many of the enteric cases may be confirmed at the Georgia Public Health Laboratory (GPHL) or a reference lab, and thus the state may first notify the local health department of a case.

In either situation, the local health official will then begin the task of collecting information requested on the *notifiable disease/condition form* or, **for some diseases**, on the appropriate GDPH disease-specific *form for case follow-up*. Since initial case reports (from providers, labs, etc.) usually contain minimal information on the case, the completion of a *notifiable disease/condition form* and/or of a *form for case follow-up* is often critical for linking similar cases and determining how the case may have become infected (e.g., a summer cook-out or consumption of homemade ice cream). To begin to complete these forms, it may be necessary to contact the laboratory or provider for the required information to contact the case (address, telephone numbers, etc.). If the *notifiable disease/condition form* information is not completed within 1 month, state staff may attempt to gather the appropriate information directly from healthcare providers.

Please consider the following points when completing a disease-specific *Form for Case Follow-up*:

1) Be sure to collect all appropriate demographic and clinical information for the patient.

2) Be sure to **accurately record dates and times of the onset of illness and symptom information.**

3) Please **ask about the correct incubation period range** for the etiologic agent reported (for example, the incubation period range for *Salmonella* is 12-36 hours). The incubation time is listed on the appropriate form for follow-up.

4) Obtain as much detailed information about exposure history as possible:
   a) Questions about travel history and outdoor activities are asked in order to identify where the patient may have been infected.
   b) Questions about animal contact are asked because **certain animals can carry and transmit enteric diseases to humans.** (For example, reptiles can shed *Salmonella* in their feces which can then be transmitted to humans through poor hygiene or food contamination.)
   c) Information about food consumption and water usage is collected because many agents that cause gastrointestinal illness can be transmitted through food and water.
   d) Information is collected about contact with other people since some diseases are transmitted easily from person to person.
   e) Information about occupation and daycare attendance is necessary to make sure that a patient is not employed in a sensitive position (food handler or healthcare worker) or attending daycare.

5) Remember that patients may need to be restricted from attending work or daycare dependent on their type of illness. Please keep in mind that food handling not only can refer to restaurant employees, but also **to medical care providers, dental office employees, food processing factory workers, and others** (see the food handler definition in Appendix A, Section 2).

6) **Promptly fax completed disease-specific *form for case follow-up* to the Notifiable Disease Section at 404-657-7517 or 404-657-2608.**

NOTE: Individuals collecting case information, either completing *the notifiable dieases/condtion form* or disease-specific *forms for case follow-up* must ensure that they use the most recent forms available from the GDPH, Notifiable Disease Section. If questions arise about the most recent forms or in completing the forms, investigators should contact the Notifiable Disease Section at (404) 657-2588.

5) Reporting Issues: Timeliness, Priorities, and Confidentiality

A. Timeliness

Report as soon as possible. As presented in Section 4-B of this chapter, all cases of notifiable disease must be reported using a *notifiable disease/condition form* or by entering the data into SENDSS. Because the process of obtaining information for a *notifiable disease/condition form* can take time, all immediately notifiable disease reports **(includes any cluster of disease)** and disease requiring follow-up should be phoned in,

faxed, or emailed to the District Health Office or to the Georgia Notifiable Disease Section within 24 hours. Later, the *notifiable disease/condition form* can be mailed in or entered into SENDSS.

The GDPH Epidemiology Branch always has an epidemiologist on duty daily to answer your questions. An epidemiologist is also available via beeper during non-work hours for **emergency situations** (e.g., if you receive several complaints and are concerned about a potential foodborne illness outbreak). All calls are returned promptly.

The importance of timely reporting cannot be overemphasized. If data are reported or collected sporadically, it will be difficult, if not impossible, to actually mount a reasonable and timely public health response. For example, if a local health authority saves up all its reports of *Salmonella* and only submits them once every three years, the data could be interpreted incorrectly. One might think that there had been no *Salmonella* for several years, and that there was suddenly an outbreak situation. Likewise, potential outbreaks among neighboring towns might be missed because no data were received from the local health authority in this particular town until it was too late.

B. Priorities

The most important investigations to do immediately are those that are a severe threat to an individual's health or where a timely control response is critical. There are times when cases of foodborne illness may be of a lower priority than other cases. Top priorities would include:

- Clusters of illness potentially connected with a specific individual or facility.
- Foodborne illness in a food handler or a household contact of a food handler.
- Indications of adulterated food presenting an imminent danger.
- Botulism case.
- Hepatitis A in a food handler.
- Typhoid (*Salmonella* Typhi) case.
- *E. coli* O157 or shiga toxin positive case.
- Hemolytic Uremic Syndrome case.
- *Vibrio* (especially cholera) case.

If you are unsure about which investigations to do first, or need technical assistance, feel free to contact the GDPH on-call Epidemiologist at (404) 657-2588. Again, submit initial information to the state health department via phone, fax, or email and then follow-up with a complete *notifiable disease/condition form* or *form for case follow-up* as quickly as possible.

C. Confidentiality

Confidentiality is a legal requirement. The information that public health practitioners collect is often of an extremely personal nature. Success and cooperation lies in protecting the privacy rights of the individuals.

It is important to realize that it is not just the investigator who needs to be concerned about confidentiality. Clerical staff, administrative staff, interns and elected officials who may be aware of personal information on a case should all be familiar with and mindful of the basic tenets of maintaining an individual's confidentiality. Only individuals who have a **"need to know"** should have access to sensitive records. At your agency, evaluate who these individuals are and be certain that the concept and practice of confidentiality is well understood.

If you are unsure about whether it is appropriate to release information: ***do not release it*!** Check with a supervisor, the state attorney or legal advisor, or contact the Notifiable Diseases Epidemiology Section at (404) 657-2588 for advice. Make sure information is released only to people who are authorized to receive it. Do not be pressured into a hasty decision. One should not confirm that an individual is even in your records unless one is certain it is appropriate to release that information. If unsure about who the requesting individual is, request better confirmation of identity before releasing information (i.e., a signed consent form with documented identification such as a driver's license; for guardians: documentation of guardianship).

It is, of course, important to realize that information must often be shared between local and district health departments, with providers, and with the state health department during the course of public health investigations and control activities. However, even in these instances the **"need to know"** rule described above applies. Information on individual cases is available only from the GDPH, Notifiable Disease Section only to the responsible representative of a local health authority involved in an investigation of the case, or to the case, a legal guardian, or designee (if the information is requested with written informed consent).

Always consider what type of information is **"personally-identifying"** and what is not. When releasing information on a small number of cases (e.g., during an investigation), demographic information such as age, race, sex, or county could be used to identify individuals.

Local and state public health authorities have investigated cases of infectious disease and collected sensitive information over years. These efforts would not be so successful if all personnel did not uphold the public's trust by maintaining strict confidentiality.

D. HIPAA

The Health Insurance Portability and Accountability Act (HIPAA) privacy rule should not impede public health investigations, including outbreak investigations.

HIPAA Does Not Preempt State Reporting Laws

The Privacy Rule specifically states that it does not preempt contrary state public health laws, including state procedures established under such laws, that provide for the reporting of disease or injury, child abuse, birth or death, or for the conduct of public health surveillance, investigation, or intervention. [45 CFR 160.203 (a)(1)(iv)&(c)]

NOTE: Important Points Regarding Confidentiality

- **Sharing of confidential information should be kept to a minimum.**
- **Confidential information should be shared only with those who "need to know." If unsure about one's identity, request better confirmation (e.g., a copy of driver's license).**
- **Confidential information that is being reported to the local health department or to the GDPH should be sent in a way which guards confidentiality (telephone probably best option, email and fax are secondary options for security reasons).**

6) Using the Information Collected

In order to use surveillance information to its full potential, it must be collected accurately and consistently. As described in Section 3, there are two principal methods by which information about possible foodborne illness is collected: 1) completing the *Foodborne Illness Complaint Worksheet*, and 2) completing *notifiable disease/condition form* or disease-specific *forms for case follow-up*. Sections 6-A and 6-B (below) explain some of the ways that foodborne illness surveillance information obtained from each method can be used. Section 6-C provides information on computerized entry of the *Foodborne Illness Complaint Worksheet*.

A. Using the *Foodborne Illness Complaint Worksheet*

Perhaps the most important reason for using the *Foodborne Illness Complaint Worksheet* is that it will allow local and state public health officials to "speak the same language" regarding foodborne illness. Such standardized data that are shared between agencies will be more easily interpreted, thus providing the opportunity for more rapid responses.

When a complaint is received, descriptive information is requested first from the complainant(s). Later, any investigational findings can be added to the worksheet. **By consistent and accurate recording of these data, the public health official is maintaining a foodborne illness surveillance system!** Data can be reviewed or analyzed for different purposes, including answering the following questions:

1) How many complaints about possible foodborne illness were received during defined time periods? How many persons were ill during those periods?

2) Do the number and/or nature of the complaints appear to be changing over time?

3) Have certain food establishments or food items been associated with an increase in complaints?

4) Can you identify links among complaints (using the descriptive information discussed in Section 3 of this chapter), possibly indicating a more widespread cluster of foodborne illness?

5) Of the complaints received during a defined time period, how many were investigated?

6) How many complaints were deemed valid but could not be investigated because of the lack of personnel or training?

7) Do certain investigational findings (for instance, certain contributing factors) appear to be related to particular types of establishments or foods?

By routinely examining your data, the answer to these and other questions regarding foodborne illness in your community will emerge. Such answers will help guide you in making policy and directing resources towards commonly identified problem areas.

NOTE: Utilizing Log Sheets or computerized databases of the *Foodborne Illness Complaint Worksheet* will make it easier for you to identify foodborne illness in your community.

B. Using the Georgia Notifiable Disease Surveillance System

As part of the case follow-up for diseases caused by potential foodborne pathogens (such as *Vibrio* related illness), an appropriate individual will be completing a *form for case follow-up* which will then be sent to the GDPH. The case's answers to exposure history questions may reveal that food was a possible or probable source of the infection. If so, an appropriate follow-up should occur as with any other foodborne illness complaint (e.g., the local food establishment inspector should be notified, if appropriate). If probable sources are identified, specific interventions may be necessary; advice is available from the Notifiable Disease Section.

Also, *notifiable disease/condition forms* are entered into SENDSS locally or at the State level. Notifiable diseases should be routinely analyzed for trends. Occasionally, an increase in certain diseases occurs. In this situation, attempts are made to determine similarities among the cases in question to determine if an outbreak is occurring. **Reportable disease follow-up performed at the local level is critical for identifying widespread clusters of foodborne or other illness.**

C. Computerized Entry of the *Foodborne Illness Complaint Worksheet*

As mentioned at the end of Section 4-A, a computer database to log complaints of suspect foodborne illness could be an effective way to look at the data collected using the *Foodborne Illness Complaint Worksheet*. Local county and district health offices which routinely use computers and which employ one or more individuals with some database management experience may consider adopting this system. It is simple to use, allows greater accessibility to data, facilitates review of data and/or answering of questions regarding foodborne illness in the community, and may be used to manage other data. When compared to the time-consuming method of searching through records in a file cabinet, the advantages of such a database can be appreciated.

NOTE: If requested, the GDPH could help developing an e-log file, which can be used in conjunction with the *Foodborne Illness Complaint Worksheet*. For more information, call the Notifiable Disease Section at (404) 657-2588.

It is hoped that at the state, district, and local levels, computerized management of foodborne illness complaints will result in more timely and improved identification of clusters, more meaningful analyses of trends in occurrence and cause of foodborne illness, and information-based policies resulting in the enhanced prevention of foodborne illness.

7) Limitations of Data

Several problems inherent in data obtained through surveillance must be recognized if the data are to be interpreted correctly.

A. Under-Reporting and Incomplete Data

Because most surveillance systems are based on diseases reported by health care providers, under-reporting is inevitable. For example, foodborne illness is often underreported by ill individuals because they do not visit a health care provider. Often health care providers diagnose ill patients with "gastrointestinal illness" and do not perform any diagnostic tests that might confirm a particular infecting organism. The lack of testing is becoming more prevalent with the growth of managed care. Yet, even with incomplete information, it is often possible to detect key trends and/or sources of infection. For diseases that occur less frequently, the need for complete investigation becomes more important. Each individual case must be treated as a "key" event.

B. Lack of Representativeness of Reported Cases

Another limitation is that health conditions are not reported randomly. For example, illnesses in a health facility are reported more frequently than those diagnosed by private providers. Also, a health problem that results in hospitalization is more likely to be reported than health problems dealt with on an outpatient basis. A provider is more likely to report a case of hepatitis A if the patient is severely ill than if the patient has few or no symptoms. A case of typhoid is more likely to be reported than is a case of *Shigella*. Thus, reporting biases can distort interpretation of reported disease data.

C. Changing Case Definitions

Different practitioners frequently use different case definitions for health problems. The more complex the disease syndrome, the greater the difficulty in reaching consensus on a case definition. Moreover, with newly emerging diseases, as understanding progresses, case definitions are frequently adjusted to allow greater accuracy of diagnosis. Also, case definitions change to incorporate newly developed diagnostic tests. Persons who interpret surveillance data must be aware of any changes in case definitions and must adjust interpretations correctly. Attachment 4.1 at the end of this chapter contains the CDC's most recent listing of case definitions or laboratory criteria for the enteric diseases which are notifiable in Georgia. These case definitions establish uniform criteria for disease reporting and should not be used as the sole criteria for public health action. Use of additional clinical, epidemiologic, and laboratory data may enable a physician to diagnose a disease even though the formal surveillance case definition may not be met.

Conclusion

The real art of conducting surveillance lies in collecting accurate and timely data and in carefully and correctly interpreting the data. The interpretation should focus on elements that might lead to control of the condition. Investigators can use surveillance as a basis for appropriate public health action. Through proper surveillance, outbreaks can be recognized, preventive strategies applied, and the effects of such actions can be assessed.

References

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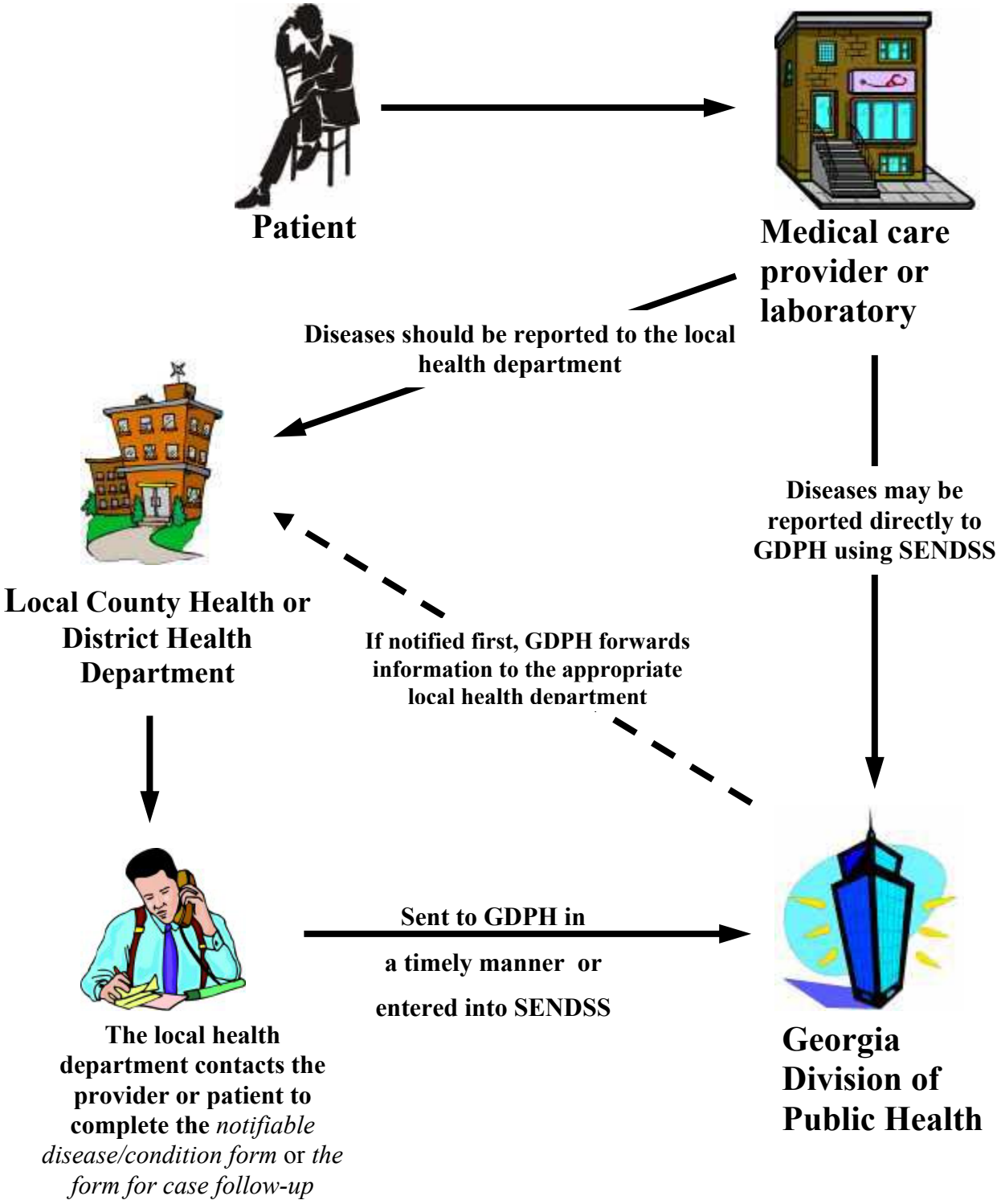
Figure 4.1 Georgia Reportable Disease Surveillance System



ATTACHMENT 4.1

Case Definitions for Infectious Conditions Under Public Health Surveillance

Laboratory criteria for diagnosis:

Botulism, Foodborne or Infant
- Detection of botulinum toxin in serum, stool, or patient's food OR
- Isolation of *Clostridium botulinum* from stool

Campylobacteriosis
- Isolation of *Campylobacter* from any clinical specimen

Cryptosporidiosis
- Demonstration of Cryptosporidium oocysts in stool, intestinal fluid, or small-bowel biopsy, OR
- Demonstration of Cryptosporidium antigen in stool by specific immunodiagnostic test (e.g., EIA, ELISA) or PCR

Cyclosporiasis
- Demonstration of *Cyclospora* oocysts in stool, intestinal fluid, or small-bowel biopsy, OR
- Demonstration of *Cyclospora* antigen in stool by specific immunodiagnostic test (e.g., EIA, ELISA) or PCR

Escherichia coli O157:H7
- Isolation of *E. coli* O157 from any clinical specimen OR
- IgM or IgG titer for E. coli O157 greater than 1:320 (please note in SENDSS that test was serology

Giardiasis
- Demonstration of *G. lamblia* cysts or trophozoites in stool, duodenal fluid, or small-bowel biopsy OR
- Demonstration of *G. lamblia* antigen in stool by a specific immunodiagnostic test (e.g., ELISA, EIA) or PCR.

Hepatitis A
- Hepatitis A immunoglobulin M (IgM) antibody to hepatitis a virus (anti-HAV) positive

Listeriosis
- Isolation of *L. monocytogenes* from any clinical specimen

Salmonellosis
- Isolation of *Salmonella* species from any clinical specimen

Shiga toxin positives
- Identification of shiga toxin (a.k.a. verotoxin or shiga-like toxin) from any clinical specimen.

Shigellosis
- Isolation of *Shigella* species from any clinical specimen

Typhoid Fever
- Isolation of *S. typhi* from blood, stool or other clinical specimen

Vibrio infection
- Isolation of *Vibrio* from any clinical specimen.

Yersiniosis
- Isolation of *Yersinia* from any clinical specimen

Source: CDC. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR*. May 2, 1997; Vol. 46, No. RR-10.

NOTES

Chapter 5

FOODBORNE ILLNESS COMPLAINT ACTIONS

1) Preparation

2) Receiving and Monitoring Foodborne Illness Complaints

3) Criteria to Determine If a Complaint Is Valid

4) Expanding the Investigation

5) Notifying the Georgia Division of Public Health

6) Restricting an Infected Food Worker

7) Collecting Leftover Food Samples

FOODBORNE ILLNESS COMPLAINT ACTIONS

Introduction
Local county health departments are the primary agencies responsible for investigating foodborne illness complaints implicating foods prepared or sold in food service establishments within their jurisdiction. Also among their responsibilities are the investigations of confirmed **or suspected** reports of sick food workers. Foodborne illness complaints should be promptly investigated, preferably within 24-48 hours of being received, to evaluate the need for collecting food samples, to identify and correct poor food handling procedures and to request clinical specimens from food handlers. Certain situations may require an immediate investigation. This chapter addresses how to evaluate and respond to reports of foodborne illnesses and infected food workers and also gives a list of sequential steps to ensure a thorough, efficient investigation.

1) Preparation

Importance of Investigation
The public relies on health and food regulatory officials, as well as the food industry, for protection from foodborne illness. **The single most important reason to investigate a foodborne illness complaint is to identify contaminated food and remove it from the marketplace to prevent the occurrence of further illness.** Prompt investigations and actions by the county health department can lead to disease prevention in the community.

Receiving and investigating foodborne illness complaints is a critical program component in determining the nature of the illness and whether an implicated food might be a causal factor. Failure or inability to investigate valid foodborne illness reports endangers the public health. Every county health department should have an established policy on how foodborne illness complaints are handled and by whom.

Trained Personnel
Depending on the nature of the incident, foodborne illness complaints will warrant various degrees of response. A public health professional trained in the investigation of foodborne disease; such as an environmental health specialist, epidemiologist, or public health nurse, should be responsible for *evaluating the validity* of the complaint based on their knowledge of the etiology of foodborne disease, food microbiology and contributing

environmental factors relating to food preparation. If the complaint is deemed valid, a follow-up investigation should be initiated in a coordinated fashion. In an outbreak situation, it is important to designate a local health department contact person to interact with other investigating agencies, the media and the general public.

Supplies
To conduct a foodborne illness investigation, be prepared with the appropriate supplies. Keep a supply of the following:

- Appropriate paperwork such as a Foodborne Illness Complaint Worksheets or a logbook and *Notifiable Disease Report Forms*.
- Stool specimen collection kits. These are available from the Georgia Division of Public Health, Epidemiology Branch and/or District Health Departments.
- Food sample containers and inspection equipment such as thermometers, forms, and sanitizer test strips (outbreak investigation kit). Information on inspection equipment and supplies can be found in Chapter 8.

Communication
Coordination and communication with other members of the foodborne illness complaint response team (e.g., environmental health specialists, laboratory, epidemiology) is imperative. Additionally, be sure to keep others not directly involved in an outbreak informed (e.g., other board of health members or health department staff).

2) Receiving and Monitoring Foodborne Illness Complaints

Use a standardized *Foodborne Illness Complaint Worksheet* to record complaint information. This form is explained in Chapter 4, Section 4-A and Section 6-A, and a copy of the form is provided in Appendix E. When possible, speak directly with ill complainants to obtain complete and accurate information. Listen carefully to the complainant. Often you will obtain additional information and details during the re-telling of the complaint.

Obtain a *72-hour or longer* food history to ensure that the suspected food item is the most appropriate to be investigated, based on the diagnosis or symptoms, implicated food vehicle, and onset time. (See Box 4.1, *Guidelines For Determining Suspect Foods* in Chapter 4, Section 3.) A longer food history is necessary when organisms such as hepatitis A, campylobacter and parasites that have incubation periods longer than 72 hours are suspected (see Table 2.3 and Table 2.4 in Chapter 2 for incubation periods). Often, complainants will associate the illness with the last food or meal consumed in a commercial establishment. Although foods prepared in commercial food establishments are often implicated in reported outbreaks, foods prepared at home are most often responsible for single cases of foodborne illness and should not be ignored.

Record all single case complaints since the single case may be the first of an outbreak. Record all anonymous complaints that appear to be valid. Complainants often request anonymity for fear of retribution. Some county health departments have different policies on whether or not they will accept anonymous complaints. The GDPH encourages local health departments at county and district level to accept anonymous complaints since, as stated earlier; the single case may be the first of an outbreak. Immediately record foodborne illness complaints in one logbook or electronic database to help identify a potential outbreak.

NOTE: The importance of documenting single complaints cannot be overstated. An outbreak may not always manifest as an obvious group of ill people. Sporadic cases of diseases may occur when a contaminated food is widely distributed (e.g., chicken with *Salmonella*). This situation can lead to a low attack rate distributed over a large geographic area, so that no one may realize that an outbreak is occurring.

3) Criteria to Determine If a Complaint is Valid

Single case complaints should be investigated if there is a possibility that the confirmed diagnosis and/or clinical symptoms are consistent with the foods eaten and the onset time of illness. For example, one person reports having bloody diarrhea three days after eating ground beef which may indicate potential *E. coli* infection. Other factors such as the possibility of sick food handlers and poor food handling/physical facility violations observed by the complainant should also be considered when determining if an investigation is warranted. Failure to respond to a valid single case complaint may result in additional persons becoming ill if corrective actions are not initiated. If the complaint appears valid, it is the responsibility of the county health department to investigate and make a presumptive determination if the implicated food is the causal factor.

If two or more persons implicate a food, meal or establishment that does not seem to be a likely source but there is **no other shared food history or evident source of exposure**, the county health department should; 1) notify their District Environmental Health Director and District Epidemiologist, and 2) conduct an environmental investigation. (See Section 4 of this chapter and all of Chapter 7 for more information on environmental investigations.)

In some situations, a follow-up investigation may not be warranted or minimal follow-up may be sufficient if:

1) It is obvious that the symptoms or diagnosis are clearly unrelated to the food which the complainant believes to be causal, and
2) No other information is available (e.g., incomplete food history).

For example:

- An individual with salmonellosis believes the illness was contracted from eggs consumed one-half hour prior to the onset of their symptoms. (The average incubation period for salmonella infection is 12-36 hours.)

- Three family members believe they became ill with cramps and diarrhea from commercially canned cranberry sauce eaten with their home baked stuffed turkey and rice. (Baked stuffed turkey and even rice are potentially hazardous foods which are more likely to be contaminated during home preparation.)

- A complaintant with *Campylobacter* (incubation period is 2-5 days) gives only last meal and is unable to provide complete food history.

Before acting on a suspect foodborne illness complaint**, always obtain a complete 72-hour or longer food history to determine if other food may have been the causal factor.** Note that there are pathogens that have incubation periods longer than 72 hours. In such circumstances, longer food histories will be necessary. Use the *Guidelines For Determining Suspect Foods* (Chapter 4, Box 4.1) when determining the time length of the food history.

Consumers often focus on foods prepared or eaten at commercial food establishments rather than home-prepared meals. It may be necessary to explain to the complainant the possibility of other exposures, such as home-prepared foods, daycare centers and pet reptiles. It is appropriate, as well as good public health practice, to evaluate and review procedures used in preparing suspect home-cooked food.

If it is determined that an environmental investigation is not warranted, notify (preferably in person) the food establishment that has been implicated in a suspected foodborne illness complaint. Establish through an interview with the manager, if food handlers have been ill and if the establishment has received any other similar complaints.

Another situation in which a follow-up investigation may not be necessary is when the same individual(s) makes repeated complaints and prior investigation revealed no significant findings. Disgruntled employees, competitors, unfriendly neighbors and dissatisfied customers, may generate invalid complaints. Whatever the situation, always briefly summarize for the file your reasons why an investigation was not conducted.

NOTE: If uncertain of whether or not to proceed with an investigation, contact the Georgia Division of Public Health, Environmental Health Section; Food Service, Tourist Accommodation, and Swimming Pool Director (404) 657-6534 or the Epidemiology Branch, Notifiable Disease Section (404) 657-2588

4) Expanding the Investigation

If the complaint appears valid, an environmental and/or epidemiological investigation should be initiated within 24-48 hours. The local health department should have coverage for weekends and holidays in emergency situations.

The Environmental Investigation **This is not a routine inspection but a foodborne illness investigation.** The environmental health specialist gathers and assimilates facts to find the cause and contributing factors to illness.

Environmental health specialists play a key role in proving that a food is responsible for illness by making observations and measurements that relate to contamination, survival and growth of the etiologic agent. **The environmental investigation should focus on the preparation and service of the implicated food to determine the risk of contamination and temperature abuse.** Foods found to be at risk for contamination because of an infected food handler, poor food handling practices or procedures, or an unapproved source (i.e., clams illegally harvested from contaminated beds) should be embargoed. When contamination is blatant, foods should be discarded. An emergency closure or suspension order may be issued by the county health department when an imminent health hazard exists, such as several infected food handlers or the lack of adequate refrigeration. See Chapter 7 for detailed information on environmental investigations.

The Epidemiologic Investigation Epidemiologic investigations are usually conducted in outbreak situations. The purpose of the investigation is to identify a problem, collect data, formulate and test hypotheses. It involves the collection and analysis of more facts or data to determine the cause of illness and to implement control measures to prevent additional illness. A questionnaire is often solicited to assist the investigator in developing better hypotheses about the etiologic agent's identity, source and transmission. The investigators interview ill and well persons, and calculate and compare incidence rates of both groups. They make time, place, and person associations and calculate the probability that a food was the responsible vehicle.

The investigator incorporates results from epidemiological associations and the environmental and laboratory investigations, and uses these data in forming and testing hypotheses. **Careful development of epidemiologic inferences coupled with persuasive clinical and laboratory evidence will almost always provide convincing evidence of the source and mode of spread of a disease**. In situations where food and stool testing are negative, epidemiological association implicates the cause of an outbreak. See Chapter 6 for detailed information on the steps in an epidemiologic investigation.

Foodborne Illness in Private Homes Suspect foods prepared in private homes are sometimes the causative factor in reported illnesses. While it is not within the county health department's authority to conduct an on-site inspection of private homes, the local

environmental health specialist should try to conduct a HACCP risk assessment based on an interview with the food preparer to identify possible sources of contamination. Often, friends and family are hesitant to participate in an interview or epidemiology questionnaire studies. Encourage participation in an investigation and offer assistance with food and stool specimen testing. Offer advice or educational materials on safe food handling practices and advocate the prevention of further illnesses by ensuring that sick individuals seek medical attention. Additionally, inform affected persons of work restrictions associated with certain diseases transmissible through food.

If it appears that a commercially processed food prepared in the home may have been contaminated when the consumer purchased it, obtain product information (e.g., manufacturer name and address, package size and type, code or lot number, expiration dates) and immediately notify the Georgia Department of Agriculture, Consumer Protection Division (404) 656-3627. Try to obtain the suspect food itself, if there are leftovers (see Section 7 of this chapter for more information on collecting leftover food samples).

Results of an investigation, however small or large, should always be documented. Reports may vary in length from one paragraph in a single case incident to several pages for a large outbreak. Examples of summary reports are provided in Chapter 8, Section 4.

NOTE: With certain foodborne illnesses, such as botulism or a chemical poisoning, even one case requires an in-depth epidemiological and environmental investigation.

5) Notifying the Georgia Division of Public Health and District Health Office

Immediately report suspected foodborne illness outbreaks and one case of botulism or chemical poisoning to the:

- Georgia District Health Office that has jurisdiction. This may include more than one District Health Office if cases are reported in different areas of the state or if suspect foods are widely distributed.

- Georgia Division of Public Health, Environmental Health Section, Food Service, Tourist Accommodation, and Swimming Pool Director. (404) 657-6534.

- Georgia Division of Public Health, Epidemiology Branch, Notifiable Disease Section (404) 657-2588.

The notification should be **within 24 hours.** Any cluster of illnesses is reportable by law to the Notifiable Disease Section.

NOTE: A suspected foodborne disease outbreak is usually defined as: two or more persons experiencing a similar illness, usually gastrointestinal, after ingestion of a common food OR different foods in a common place. An outbreak may also be defined as a situation when the observed number of cases unaccountably exceeds the expected number.

Notifying Others. Maintain a list of people on your local health department and in the local community to contact in an outbreak, including hospitals and emergency rooms. Notifying area health care providers may aid in the identification of related cases.

6) Restricting an Infected Food Worker

Infected food handlers represent a significant contributing factor in foodborne illness outbreaks. Fecal-oral transmission by food handlers is possible since certain pathogens can be shed during and after illness. For example, food workers have been found to be shedding enteric viruses and bacteria weeks after symptoms have ended. Food handlers with infected skin lesions may also be reservoirs of pathogens, such as *Staphylococcus aureus*, which can be transmitted to food when there is direct contact. Refer to Appendix A - Infected Food Handler Policy for detailed information on restrictions.

7) Collecting Leftover Food Samples

Leftover food specimens may hold the clue to the cause of a foodborne illness outbreak. Leftover food samples should be collected in outbreaks and in a timely manner to prevent important evidence from being discarded. However, leftover foods that have been discarded in the garbage or have been out of refrigeration normally should not be collected since the integrity of the food has not been maintained.

Procedures for collecting food samples are outlined in Chapter 8. Always notify the Georgia Division of Public Health, Epidemiology Branch, Notifiable Disease Section (404) 657-2588 prior to collecting and delivering samples at the Georgia Public Health Laboratory (GPHL) in order to review methodology and determine what tests will be conducted on the food. Also notify the GDPH Environmental Health Section at (404) 657-6534 whenever samples from a suspected or confirmed food borne illness outbreak are submitted to the GPHL.

The general policy of the Georgia Public Health Laboratory is only to test food samples epidemiologically implicated in suspected outbreaks. However, suspected foods may be stored in a refrigerator for later submission to the lab.

In **all botulism-suspect cases**, it is appropriate to test the suspected food items. Additionally, a single, confirmed case with leftover food consumed within the incubation period, may be considered for testing.

Further information on collecting leftover food samples can be found in Chapter 7, Section 1 and in Chapter 8.

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NOTES

Chapter 6

CONDUCTING AN EPIDEMIOLOGIC INVESTIGATION

1) What is Epidemiology?

2) Reasons for Conducting an Epidemiologic Investigation

3) Determining When to Conduct an Epidemiologic Investigation

4) Steps in an Epidemiologic Investigation

CONDUCTING AN EPIDEMIOLOGIC INVESTIGATION

Introduction
Epidemiologic investigation is an important part of the complete foodborne illness investigation that also includes environmental (see Chapter 7) and laboratory investigations (see Chapter 8). Each part of the investigation compliments the other and team-work and open communication are of utmost importance.

The purpose of the epidemiologic investigation is to identify a problem, collect data, and formulate and test hypotheses. It involves the collection and analysis of facts or data to determine the cause of illness and to implement control measures to prevent additional illness.

This chapter addresses epidemiology and the steps involved in an epidemiologic investigation.

1) What is Epidemiology?

A text-book definition of epidemiology is the study of the **distribution** and **determinants** of disease **frequency** in human populations. It is the collection and analysis of data to determine whether an association exists between one or more exposures and the occurrence of disease. Epidemiologists often use statistics and probability to determine who gets sick or injured and why.

2) Reasons for Conducting an Epidemiologic Investigation

Epidemiologic investigations are usually conducted in outbreak situations. The main reasons to conduct an epidemiologic investigation are:

- to determine the cause of an outbreak, and
- to implement control measures to prevent additional illness.
- to gain insight into the roots of foodborne diseases.

A questionnaire is often used by the investigator to develop hypotheses about the etiologic agent, source and transmission. Investigators interview ill and well persons, and calculate and compare rates of illness in both groups. They make time, place, and person associations and calculate the probability that a specific food was the responsible vehicle.

The investigator incorporates results from epidemiological associations and the environmental and laboratory investigations, and uses these data to form and test hypotheses. Careful development of epidemiologic inferences coupled with persuasive clinical and laboratory evidence often provide convincing evidence of the source and mode of spread of a disease. In situations where food and stool testing are negative, the cause of an outbreak may still be determined by epidemiological association.

In addition to the above, epidemiologic investigations serve as a teaching tool. By carrying out the appropriate steps investigators gain an understanding of the systematic, logical approach an epidemiologist or "disease detective" follows in an investigation.

3) Determining When to Conduct an Epidemiologic Investigation

It is often unclear when to conduct a full epidemiologic investigation. When a large number of people who attended an event become ill, there is usually no question as to the importance of conducting an epidemiologic investigation. However, uncertainty arises when sporadic complaints are reported. It is important to consider whether the reports indicate that the affected cases are all suffering from the same illness and whether there is any evidence of an association between them. This underscores the need to follow-up on every complaint received. **In many cases, single complaints are actually related to an outbreak.**

- Refer to Chapter 4, Sections 3 and 4 for details on what information to collect and how to collect it.

- Refer to Chapter 5, Sections 2 and 3 for details on handling single complaints.

The following are some of the factors to consider when determining whether a full investigation is warranted:

1. The number of people affected – When a large number of people are affected by an outbreak, a full investigation into the cause of the outbreak should be conducted, even if the illness is mild.

2. Severity of illness among those affected – In outbreaks where the illness is very severe (long duration of symptoms, hospitalization and/or deaths among those

affected) a full investigation should be conducted, even if the number of affected people is small. With some very severe diseases, such as botulism, one case of illness warrants a full outbreak investigation. In addition, outbreaks of unusual diseases or syndromes should also be fully investigated.

3. The public and/or media's perception of the importance of the outbreak – In some situations it is necessary to conduct a full investigation in order to allay fears, even if it seems that the investigation is unwarranted.

4. Outbreak setting – Outbreaks occurring in **schools, hospitals, prisons, or other institutions** should usually be fully investigated.

5. Type of population affected – Outbreaks affecting vulnerable populations such as children, pregnant woman, hospitalized persons, the elderly, etc… should usually be fully investigated.

6. Ongoing transmission – If there is evidence of ongoing transmission, immediate action must be taken to identify the exposure and eliminate it.

7. Other factors (bioterrorism) – If there is any evidence that the outbreak was due to an intentional act, the appropriate authorities should be notified immediately and a very thorough and well-documented investigation should be conducted. Please refer to Chapter 10 for additional information.

When an incident is reported in which illness has resolved and no new cases have been identified, the decision to conduct an epidemiologic investigation should be based on an assessment of what will be gained from the investigation. As stated above, an investigation always serves as a learning tool. But, if the resources (time, personnel, etc) are not available, it may not be warranted to conduct a full investigation. However, at a minimum, it is important to ensure that appropriate control measures have been implemented to prevent future outbreaks. In addition, **all outbreaks**, regardless of whether they are investigated, must be reported to the Georgia Division of Public Health, Notifiable Diseases Section.

4) Steps in an Epidemiologic Investigation

The following are the steps in an epidemiologic investigation. It is important to note that while the list of steps is in a particular order, they do not necessarily have to be carried out in that order. In fact, several steps may be put into action simultaneously. However, confirming the diagnosis and the establishment of the existence of an outbreak always deserve early attention.

1. Confirm the existence of an outbreak.
2. Confirm the diagnosis.
3. Determine the number of cases.
4. Orient the data in terms of time, person and place.
5. Develop a hypothesis.
6. Compare the hypothesis with the established facts.
7. Execute control and preventive measures.
8. Write a report.

Step 1. Confirm the existence of an outbreak. An outbreak of foodborne illness is loosely defined as two or more persons experiencing a similar illness after ingestion of a common food OR different food in a common place. An outbreak may also be defined as a situation when the observed number of cases unaccountably exceeds the expected number. However, with certain foodborne illnesses such as botulism or chemical poisoning, a single case merits an in-depth epidemiological and environmental investigation.

An outbreak may not always manifest itself in an obvious manner. Outbreaks dispersed over a broad geographic area, with few cases in any one jurisdiction, are difficult to detect locally. This underscores the importance of establishing and maintaining a surveillance system as discussed in Chapter 4. Maintaining a surveillance system and reporting diseases to the GDPH in a timely manner, facilitates the likelihood that an outbreak spread over a broad geographic area will be recognized.

When confirming the existence of an outbreak, it is important to rule out other causes for increases in numbers of cases. For example, media attention about a specific disease tends to heighten public awareness and can lead to an increased number of cases being reported. Are there truly more cases, or is it just that more cases are being reported?

Once the existence of an outbreak has been confirmed, the Georgia Division of Public Health, Notifiable Diseases Section, should be contacted immediately.

Step 2. Confirm the diagnosis. This is done by obtaining appropriate specimens for laboratory study and obtaining clinical histories.

In most foodborne outbreaks, obtaining appropriate specimens from ill persons (usually stool) should be considered a priority. Stool specimens should be collected as soon as possible after onset of illness. Collecting stool within 72 hours of illness onset and while the patient is still symptomatic greatly increases the chance of a positive result. However, even if several days have passed since illness onset, or the patient no longer has symptoms, the specimen should still be collected. If the patient has already provided a stool specimen at a hospital or physicians office, the lab where the specimen was tested should be contacted. It is important to find out not only the results of the testing, but what testing was done. In some cases it may be necessary to collect an additional

specimen. If a bacterial pathogen was isolated from the stool at a private laboratory, ask that the isolate be sent to the Georgia Public Health Laboratory (GPHL) for confirmation and subtyping. Information on submitting clinical specimens to the GPHL is discussed in Chapter 8.

Be wary of verbal reports of cases of disease. Whenever possible, copies of laboratory results should be obtained. However, other evidence to support the diagnosis (e.g., a lab-confirmed contact to a case) can sometimes be used in lieu of laboratory results. In some instances, there will be outbreaks of unknown etiology, and there will be no laboratory results to confirm the diagnosis. Cases or outbreaks of diseases of unknown etiology are just as valid as those with known etiologies.

Laboratory identification of a pathogen validates the hypothesis and allows easier implementation of control and preventive measures. **Therefore, time is critical when requesting and collecting clinical and food specimens.**

- Refer to Chapter 8 for information on submission of clinical specimens.
- Refer to Chapter 7, Section 1 and Appendix B for more information on submission of food specimens.
- When possible, it is usually preferable to have laboratory testing done at the Georgia Public Health Laboratory.

Regardless of whether the etiology is known, the investigator should characterize the illness by interviewing ill persons, family members or physicians. This can be done through phone calls, informal interviews, or a more formal survey that will be discussed further in Step 3 - "Determine the number of cases." Remember, this information is confidential and should be shared with only those individuals involved in the investigation. (See Chapter 4, Section 5 for more information on confidentiality.)

Step 3. Determine the number of cases (ill people). This is important in order to understand the magnitude of the problem. Determination of case numbers is based on creating a **case definition**. A case definition is a set of criteria for deciding whether an individual should be classified as a case. The case definition places boundaries on who is considered a case, so the investigation does not include those with illnesses unrelated to the outbreak.

The common elements of a case definition include information on symptoms, laboratory results, time, place and person. A **probable** case is an illness in a person who attended a specific event, and later experienced gastrointestinal symptoms within a specified time after the event. A **confirmed** case is an illness in a person who attended a specific event, and later experienced gastrointestinal symptoms within a specified time after the event *with a confirmed laboratory result of the pathogen*.

a) Symptoms: People with the same illness do not always have the same symptoms, but they will experience similar ones. It is important to remember that the symptoms

of some foodborne illnesses can mimic other foodborne diseases. The following list of symptoms can be used as a "general rule of thumb" for determining the incubation period and possible etiologic agent:

- chemical poisoning symptoms, (e.g., vomiting) usually start within 1 hour of ingestion;
- nausea and vomiting usually start within 6 hours of ingestion;
- cramps and diarrhea usually start between 6-20 hours after ingestion;
- diarrhea, chills, fever usually start between 12-72 hours after ingestion.

b) Laboratory results: Having a laboratory confirmed diagnosis makes the task of defining a case much easier. It is often useful to notify laboratories in the area that an outbreak exists and ask them to notify you of additional cases of the illness under investigation. **Note: during an outbreak of foodborne illness, efforts should be made to send all specimens and/or isolates to the GPHL for further identification, confirmation and to assure coordination of the investigation.** (See Chapter 8 for more information on what testing is done at the GPHL.)

c) Time: If there appears to be a common meal involved, then the time between consumption of that meal and the onset of symptoms provides an indication of the incubation period. The incubation period and symptoms are helpful in determining which illnesses should be considered as possible causes of the outbreak and thus may facilitate decision-making regarding what types of laboratory tests should be run. As with symptoms, incubation periods can vary among individuals; therefore, be sure to offer a range of time when considering an incubation period. For example, if you are investigating a salmonella outbreak, you may want to include, as cases, those persons who experienced symptoms consistent with the case definition from 6 - 72 hours after the suspected exposure.

d) Place: When there is a common meal involved, you already know the place. But sometimes the only information available may be that cases are occurring in several different locations over the same time period. It is only after more information becomes available that the case definition will become more specific as to the location of the outbreak.

e) Person: The outbreak may or may not take place within a particular group of people. Therefore, characteristics such as age, sex, occupation, ethnic group, social affiliations or function attendance greatly assist in qualifying the case definition.

The initial case definition should be general so that potential cases are not left out. Later, when more information is available, the case definition can be refined to "weed out" extraneous cases. Once the case definition is in place, attempts should be made to find additional cases. This can be done by contacting local physicians, hospitals, and/or laboratories. If the outbreak was related to an event, such as a wedding, as many of the attendees as possible should be contacted. In some cases, it may be worthwhile to enlist the help of the media to make the public aware of the outbreak.

To organize the data, a good starting point is the creation of a "line listing" table. Case names and ID numbers are listed down the left hand column, and the heading row at the top of the table should contain pertinent information such as the case's age, sex, onset time, and symptoms. This type of organization permits a simple means for comparison of many characteristics at one time for possible patterns, similarities, or associations.

Example of a Line Listing Table

#	Name	Age	Sex	Onset Date	Onset Time	Symptoms
1	Mary	32	F	5/4/97	1:00 PM	Diarrhea, abdominal cramps
2	Bob	25	M	5/4/97	1:30 PM	Diarrhea
3	Carol	26	F	5/4/97	10:15 AM	Diarrhea, nausea
4	Mark	18	N	5/4/97	11:30 PM	Diarrhea, abdominal cramps

The Questionnaire/Survey

A common method of finding cases, organizing and analyzing data is to conduct a questionnaire or survey among the population believed to be at risk, (e.g., attendees of a wedding). A questionnaire with specific questions about foods eaten and symptoms experienced is a valuable epidemiologic tool. The questionnaire should be given to as many people as possible who are associated with the incident, both ill and well. This will assist the investigator to develop hypotheses about the etiologic agent's identity and source, including the means and time of transmission.

NOTE: It is extremely important to interview well individuals when investigating foodborne outbreaks.

Key questions to consider when developing a questionnaire

- What are the demographic characteristics of the individual? (name, age, sex, occupation, home and work addresses, phone numbers)
- Was the individual exposed to the suspected source and when?
- What are the symptoms, date and time of onset, their order of occurrence and duration?
- What medical treatment was sought and received?
- Is there a diagnosis or laboratory results?
- Who else has been exposed to a case during his or her infectious period? (secondary contacts)
- What foods were consumed in the last 72 hours or other appropriate time frame, before the time of onset? **It is also important to interview and obtain food histories from those who ate the same suspect food and did not get sick**.

These questions are intended as a guide. They will require modification to fit the particular circumstances surrounding the investigation. Questionnaires can be designed for personal or telephone interviews by the investigator (epidemiologist, nurse, sanitarian, health agent, etc.). A self-administered survey can also be conducted through the mail, but the response rate will usually be lower, and responses may take a long time.

NOTE: **An example of a foodborne illness questionnaire/survey** can be found at the end of this chapter **(Attachment 6.1).**

CDC has developed a computer software program called EPI INFO, which can be used to develop questionnaires and analyze data. The software is free. Copies may be obtained by contacting the GDPH at (404) 657-2588 or via the Internet at: www.cdc.gov. For more information about developing questionnaires or about EPI INFO, contact GDPH.

Step 4. Orient the data in terms of TIME, PLACE, and PERSON. The purpose of data orientation or epidemiological characterizations is to arrange all incoming data so that it means something. The investigator is searching for common associations based on TIME, PLACE, and PERSON to strengthen or amend current hypotheses. A common method of data orientation is plotting, on a graph, the cases by time of symptom onset to obtain an **epidemic curve**.

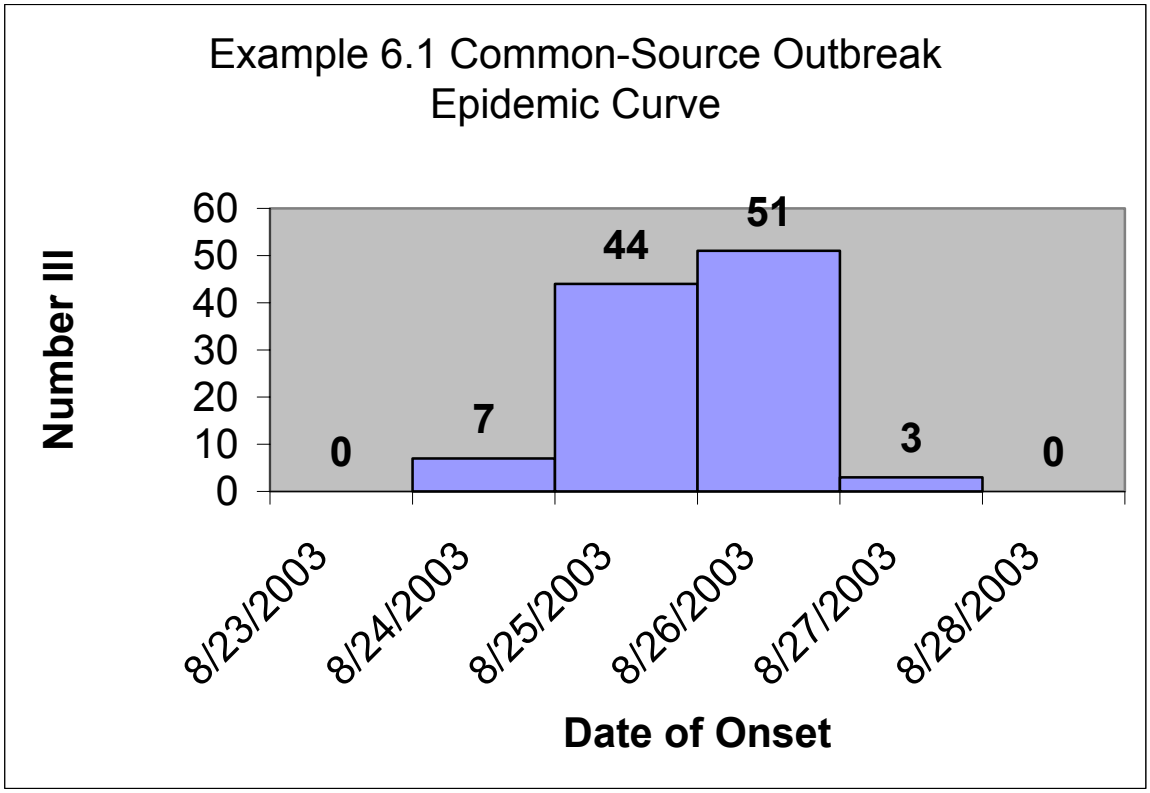
An **epidemic curve** is a graph that depicts the association of the time of illness onset of all cases that are associated with the outbreak. It helps to determine whether the outbreak originated from a common source or person to person. Time is plotted on the horizontal axis and the number of cases plotted on the vertical axis.

The line listing and/or survey described above (Steps 2 and 3), will provide information on the characteristics of the ill persons (age, sex, occupation, exposures to specific foods or other items). Very often, simply by knowing these descriptive aspects, the diagnosis and then plotting an **epidemic curve**, the source, mode of transmission and who is at risk can be determined. Once the population at risk has been determined, appropriate control measures can be implemented.

The shape of the epidemic curve may suggest what type of outbreak is occurring. A *common-source* or *point-source outbreak* looks different than a *propagated-source* or *person-to-person outbreak* and a *continual source outbreak*. Definitions of these kinds of outbreaks, and an example of each epidemic curve are found below. Epidemic curves are also useful when communicating to lay persons (consumers, restaurant operators, etc.) the nature and magnitude of the outbreak spread.

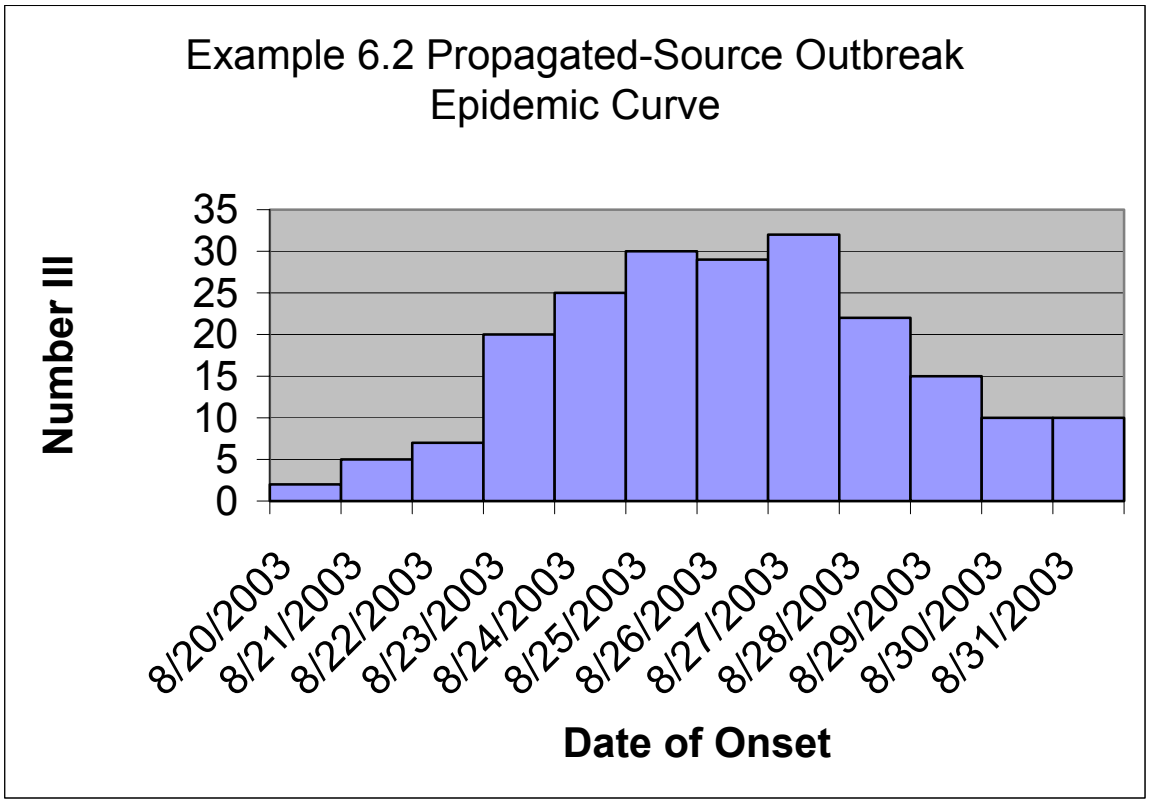
Common-Source or Point-Source Outbreak. An outbreak of disease or illness in which susceptible individuals are exposed simultaneously to one source of infection. For example: guests at a wedding reception. The epidemic curve for this type of outbreak is characterized by a sharp rise to a peak followed by a decline usually less abrupt than the rise. See Example 6.1 below.

Example 6.1



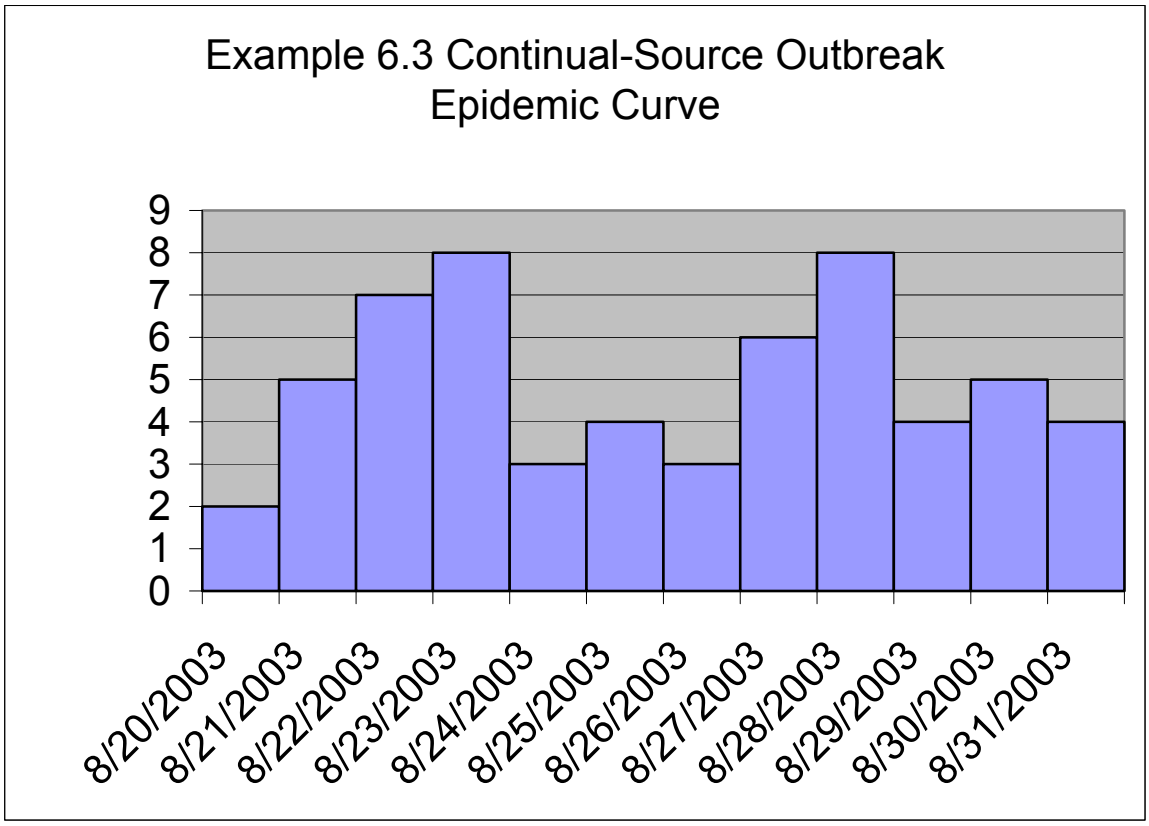
Propagated-Source Outbreak or Person-to-Person Outbreak. An outbreak of disease or illness that is spread from one person to another rather than from a single source. For example: a community-wide outbreak of shigellosis. The epidemic curve for this type of outbreak is characterized by a relatively slow, progressive rise. The curve will continue for the duration of several incubation periods of the disease. See Example 6.2 below.

Example 6.2



Continual-Source Outbreak. An extended outbreak of disease or illness caused by a source that continues to be contaminated. For example: an outbreak where food is continuously contaminated by an infected food handler. The epidemic curve for this type of outbreak is characterized by continual peaks over time (e.g., weeks, months). The peaks may not be as dramatic as a common-source epidemic curve, and the outbreak may not be as obvious. See Example 6.3 below.

Example 6.3



Step 5. Develop a hypothesis that explains the specific exposure(s) that may have caused the disease (and test this by appropriate statistical methods). Using the information gathered from the previous steps, consider the possible source(s) from which the disease may have been contracted. One example of a simple hypothesis is: the cases became ill after sharing a common meal.

As stated in Step 4, very often, simply by knowing the descriptive aspects, the diagnosis and then plotting an **epidemic curve**, the source, mode of transmission and who is at risk can be determined. Once the population at risk has been determined, appropriate control measures can be targeted. This descriptive aspect of the epidemiological investigation is what is most often carried out at the local level.

Analytic techniques, such as statistical testing, are used to test or prove a hypothesis. Odds ratios, relative risks, and p-values are some of the statistics that are used when testing a hypothesis. Many statistical tests can be automatically calculated by computer programs like EPI INFO. They can also be done by hand.

Often in a foodborne illness outbreak, food-specific attack rates (AR) are calculated. Attack rates are used to determine if one or more food items were responsible for causing the illness. The food that caused the problem shows a higher attack rate in persons who ate the food than in those who did not. The AR is usually expressed in percent. It represents the proportion of ill persons among the total number exposed.

NOTE: Refer to Example 8.3 - Outbreak Report in Chapter 8 for an example of an investigation where more advanced analytical techniques were employed. (See various tables and graphs at the end of the report.)

Step 6. Compare the hypothesis with the established facts and draw conclusions. For example, based on evidence gathered, an investigator develops a hypothesis that the salad was the vehicle of transmission in a hepatitis A outbreak. The investigator then needs to determine how the salad became contaminated with hepatitis A and whether this can be verified with the results of the environmental investigation. In other words, are the epidemiologic results plausible and consistent with other investigational findings? For instance, vegetables can become contaminated with hepatitis A virus when infected food handlers prepare raw vegetables without adequate hand washing or use of gloves. Compare the hypothesis to the results of the environmental investigation. Did the inspector note how the salad was made and served? Was it possible for this scenario to have happened? Some of the questions that need to be addressed to ensure that the hypothesis is not only statistically sound, but makes sense in the real world are:

- Could the hypothesized events actually have happened?
- Is the hypothesis consistent with the environmental aspects of the investigation? (See Chapter 7 for more information on environmental investigations.)
- Is it likely the vehicle of transmission identified became contaminated with the organism that has been identified?

Step 7. Execute control and preventive measures. Before initiating any control measures, consider the effectiveness, timeliness, costs, available resources, personnel requirements and possible ramifications of proposed actions. Are the recommendations realistic for the establishment involved? For example, will the restaurant be able to install the new dishwasher or the 3-bay sink that was recommended? If not, what are the alternatives?

NOTE: **Some control measures should be implemented very early in an outbreak investigation.** For example, removal of ill food handlers or the embargo, recall or destruction of contaminated food items should be implemented immediately, if necessary.

In addition, all corrective actions must be verified by the local health department to ensure that steps to reduce or eliminate the hazards have actually occurred. See Chapter 7, Section 3-Steps 4 and 5 for additional information on control and preventive measures.

Step 8. Write a report. After analysis of epidemiologic and environmental data, conclusions should be summarized in a report. This is one of the most important steps in the outbreak investigation. Not only does the report detail your agency's efforts, but identifies a potential source(s) of the outbreak and suggests control measures to prevent future illness. The lead investigator should also ensure that the appropriate outbreak forms are completed. (See Appendix E.)

- See Chapter 9 for detailed information on writing a report. Sample reports are also included in Chapter 9.

Depending on staffing, resources and time, you may not be able to cover all the steps or cover them thoroughly. As stated previously, the GDPH is available for guidance and assistance at (404) 657-2588.

Investigation of an outbreak of foodborne illness is a team effort where each member has an essential role to perform. In some instances the team may include a number of individuals at the local level (epidemiologist, public health nurse, environmentalist, laboratory staff) as well as health professionals at the state level. In addition, other agencies such as the Georgia Department of Agriculture, the Centers for Disease Control and Prevention, the Food and Drug Administration, and the United States Department of Agriculture may be involved. **Whatever the circumstances, it is important to remember that the GDPH, Epidemiology Branch is available for guidance and assistance throughout each step of the investigation.** GDPH can be contacted at (404) 657-2588.

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ATTACHMENT 6.1 - STANDARD FOODBORNE DISEASE OUTBREAK QUESTIONNAIRE

Hello. My name is _____. The Georgia Division of Public Health in conjunction with the XXXXX health department is investigating an outbreak of gastrointestinal illness, which occurred among the attendees of a business conference held at Establishment A on mm/dd/yyyy. We understand that you are one of the people who attended the conference. I would like to ask you some questions that will assist us in our efforts to identify the source of this illness, so we can prevent additional illness in our community. **All information that you provide will be kept strictly confidential and used solely for the purposes of this investigation.** This will take about ____ minutes. Shall we continue?

If no: Is there a convenient time I can call you back? Day _____
Time ___:___ am pm
Telephone: _____

Who answered the phone? □ Patient □ Other person_____
(Describe the relationship with patient)

Part I. Demographics/Introduction:

Patient name: _____ D.O.B.: ____ / ____ / ____

Age: _____ (days/months/years) Sex: _____

Race: _____ Hispanic: Y N

Address: _____

City: _____ County: _____

Zip: _____

Home phone: _____

Work Phone: _____

Parent's Name (if child) _____

Occupation: _____

Name and Address of Employer, daycare, school:

_____

Part II. Clinical information

Were you sick? □Yes □ No *(If No, go to **Part III**)*

Which did you (*the patient*) experience first: □ vomit □ diarrhea

Date of onset of vomit or diarrhea (whichever occurred first): ____ / ____ / ____

Onset time: *Circle closest hour. For onset times after midnight, double-check the onset day/date!*

1 am	7 am	13-1 pm	19-7 pm
2	8	14-2	20-8
3	9	15-3	21-9
4	10	16-4	22-10
5	11	17-5	23-11
6 am	12 noon	18-6 pm	24-12 midnight

Are you (*the patient*) still experiencing vomit or diarrhea? □Yes □No □ DK

Date of last day of illness with vomit or diarrhea: ____ / ____ / ____
Time of last episode of vomit or diarrhea: ____:____ AM PM

Would you (*the patient*) be willing to provide a stool specimen? □Yes □No □ DK

Read questions exactly as written below. Circle Y for "yes," N for "no" and DK for "don't know, can't remember, not sure" etc.

Did you (*the patient*) have:

Nausea	Y	N	DK
Vomiting	Y	N	DK
Diarrhea	Y	N	DK
If yes:			
Maximum number of stools in a 24-hour period: _____			
Bloody diarrhea	Y	N	DK
Abdominal cramps	Y	N	DK
Fever	Y	N	DK
If yes, _____ °F			
Chills	Y	N	DK
Headache	Y	N	DK
Body aches	Y	N	DK
Fatigue	Y	N	DK
Constipation	Y	N	DK
Other:	Y	N	DK
If yes:_____			

Did you (*the patient*) see a healthcare professional, such as a doctor or a nurse?
□Yes □No □ DK If yes, when? ____ /____/ ____

Were you (*the patient*) hospitalized overnight? □Yes □No □ DK
Where? _____
From: ____ /____/ ____ To: ____ /____/ ____

Was a stool culture done? □Yes □No □ DK
Results: _____

Did you (*the patient*) take any prescription medications for this illness? □Yes □No □ DK
If yes, what medications? _____

Did anyone in your (*in the patient's*) household have a similar illness? □Yes □No □ DK
If yes, who? _____

Do you (*the patient*) know of anyone else with a diarrheal illness during the past week?
□Yes □No □ DK
If yes, who? _____
Telephone: When? ____ / ____ / ____

Part III. General information

(*Add any additional general exposure questions here).*

Part IV. Specific food questions
(Add menu from the suspected meal)

When did you eat at _____ Restaurant?
Date: _____ Approximate Time: _____

Please indicate whether you ate any of the following food items:

	Yes	No	Maybe	Don't Know
Beverages				
Sweet tea/Iced Tea				
Soft Drinks Specify _____				
Milk				
Juice Specify _____				
Ice				
Coffee				
Other: _____				

NOTES

Chapter 7

CONDUCTING AN ENVIRONMENTAL INVESTIGATION

1) What Does the Environmental Investigation Entail?

2) Background to a Hazard Analysis Critical Control Point (HACCP) Risk Assessment

3) Application of HACCP Principles in a Foodborne Illness Investigation

CONDUCTING AN ENVIRONMENTAL INVESTIGATION

Introduction

The county health department is the public health agency responsible for conducting an environmental investigation in response to a suspect foodborne illness complaint. **The objective of the environmental investigation is to:**

- Identify the reason for, or source of contamination, and
- Initiate corrective actions, if necessary, to eliminate contaminated foods or poor food handling practices that may result in contaminated foods.

Further illnesses may be avoided if potentially contaminated foods are promptly identified and removed from sale or service to the public, and poor food-handling practices are corrected.

Other reasons for initiating an environmental investigation include government responsibility, consumer expectation, and vindication of innocent establishments. Investigative findings are important information: they are a public record and may be subpoenaed for legal proceedings.

1) What Does the Environmental Investigation Entail?

The primary objective of the environmental investigation is to determine what specific factors may have contributed to the illness or outbreak and, if discovered, assure that they are corrected. Unlike routine inspections, a quality environmental investigation of a foodborne disease outbreak may take several hours. The investigation involves the evaluation of all suspected processes but starts with a review of the previous routine inspection reports of the implicated food establishment. One must be acquainted with the inspection equipment and forms necessary to conduct a complete investigation. **An environmental investigation should be initiated within 24-48 hours of the receipt of a complaint.**

Steps in an Environmental Investigation
The following steps need to be taken in all environmental investigations (not necessarily in this order):

1. Inspecting the food establishment
2. Collecting food samples
3. Facilitating enteric collections
4. Conducting a HACCP risk assessment on implicated foods
5. Initiating corrective or enforcement actions
6. Writing a report or summary

A. Collecting Food Samples

To avoid important evidence from being inadvertently discarded during your investigation, always identify and collect leftovers of the suspect food(s) immediately.

See Table 4.1 - *Guidelines For Determining Suspect Foods* in Chapter 4, Section 3-A. Food collection should be completed prior to initiating the HACCP risk assessment of the suspect food. Review how to aseptically collect food samples and transport them for analysis. Bring the proper food sample containers and investigation forms with you. Guidelines for how to collect food samples are provided in Chapter 8, Section 6.

B. Facilitating Enteric Collections

As with food samples, stool samples must be collected as soon as possible in order to confirm a clinical diagnosis. Bring an adequate supply of enteric kits and instructions for collection. Determine who is responsible for distributing enteric stool kits to food handlers and infected persons. Determine who is responsible for instructing food workers and infected persons on how stool specimens should be collected. Further information on obtaining enteric stool kits and instructions on collection can be found in Chapter 8.

C. Inspecting the Food Establishment

The environmental health specialist should be trained in the provisions outlined in OCGA 290-5-14 Rules *of Department of Human Resources, Public Health, Food Service.* Bring the most current version of OCGA 290-5-14, which can be found at the GDPH website http://health.state.ga.us/pdfs/environmental/290-5-14.pdf Bring the necessary equipment to conduct an inspection. An inspector's equipment checklist is provided in Chapter 8, Section 6. A list of food sampling equipment and the food report form can also be found in Chapter 8, Section 6.

D. Conducting A HAACP Risk Assessment on Implicated Foods

Hazard Analysis Critical Control Point (HACCP) is a science-based method of evaluating food-handling procedures to identify or prevent hazards that contribute to foodborne disease. The environmental health specialist investigating an outbreak should be trained in conducting a HACCP Risk Assessment. See Section 2 and 3 of this chapter for more information on a HACCP risk assessment.

E. Initiating Corrective or Enforcement Actions

Have an environmental health specialist trained in enforcement (e.g., embargo, voluntary disposal, emergency closure, food worker restrictions) procedures outlined in OCGA 290-5-14**.**

Persons conducting the environmental investigation should be knowledgeable in the following areas:

- Food microbiology;
- Etiology of foodborne disease;
- High-risk factors in foodborne illness outbreaks;
- The application of HACCP principles;
- Food preparation review and food establishment investigation procedures;
- Regulatory provisions; and
- Enforcement procedures outlined in OCGA 290-5-14.

Good communication skills are also required to conduct a thorough investigation. When identifying yourself to the person-in-charge (PIC), explain the purpose of the "foodborne illness" investigation and be prepared for a variety of reactions. Food establishment operators are often nervous, defensive, angry, and, sometimes, in complete denial at the prospect of being responsible for a customer's illness. Stay calm, respectful and professional. Encourage cooperation by explaining the county health department's responsibility, as well as the food establishment's responsibility to ensure that practices and procedures are adequate to prevent foodborne diseases. If necessary, remind the PIC that failure to cooperate in the investigation may result in the suspension or revocation of the food permit. In any situation, maintain an unbiased attitude and assure the PIC that other plausible causes will be addressed.

The designated local health department spokespersons - at the county or the district level - responsible for talking to the media and affected groups in high-profile investigations (e.g., larger outbreaks) should also be knowledgeable in risk management issues and have a medical or public health background.

GDPH Environmental Health Section 404-657-6534	For policy and technical assistance with the environmental investigation such as conducting a HACCP risk assessment, initiating enforcement actions and collecting food samples. On-site investigation assistance is often available for larger outbreaks.
GDPH Notifiable Disease Section 404-657-2588	For technical assistance with the epidemiologic investigation such as obtaining medical histories, coordinating stool specimen submissions and developing questionnaires. On-site investigation assistance is often available for larger outbreaks.
GDPH Public Health Laboratory 404-327-7900	For technical assistance with the collection protocol for food and clinical specimens.

2) Background to a Hazard Analysis Critical Control Point (HACCP) Risk Assessment

A. What is HACCP?

HACCP provides a systematic, science-based approach to food safety. A HACCP-based investigation focuses on the suspect food or meal implicated, rather than on a routine inspection of the physical and sanitary facilities of the food establishment. The production of the implicated food item is evaluated for hazards that can contribute to the occurrence of foodborne disease. This is done at each step of handling from receipt to sale or service to the consumer.

The ideal steps in conducting a HACCP risk assessment of the implicated food include actual observation of the suspect food being prepared, taking temperatures and identifying potentially faulty food handling practices. Since this may not be feasible if the food establishment is not producing the implicated food or meal at the time of the investigation, it will be necessary to interview the PIC of food production on how the food was handled from receipt to sale or service. General food handling practices should be evaluated by observing food workers and by measuring various potentially hazardous food temperatures.

To effectively conduct a HACCP risk assessment, an environmental health specialist must have a general understanding of applied food microbiology, high-risk factors in food preparation and the application of HACCP principles.

B. Applied Food Microbiology

An understanding of how pathogens (disease-causing microorganisms) can contaminate food, survive and/or multiply (and in some cases produce toxins) is essential to evaluate risk. Pathogens may be present in raw foods as well as in infected food workers.

Pathogens in food, present either naturally or by contamination, can survive if the food requires no further cooking or is undercooked. It is important to note that while bacteria may survive and multiply in potentially hazardous food, viruses and parasites may survive but cannot multiply without a living host. Pathogens in infected food workers may be shed in feces, infected lesions and respiratory secretions and thus can be transmitted to food. A list of primary sources of common foodborne pathogens is provided at the end of the chapter (see Attachment 7.1). Use this list when trying to determine the source of contamination.

Potentially hazardous foods (PHFs) are those high-risk foods in which bacteria can survive, multiply and with certain bacteria, produce toxin. Foods with a pH of 4.6 or above and a water activity of 0.85 Aw or greater are regarded as PHFs. PHFs are also defined as any food or ingredient, natural or synthetic, in a form capable of supporting the rapid and progressive growth of infectious or toxigenic microorganisms or the slower growth of *Clostridium botulinum*. The pH and Aw for several categories of food are provided at the end of the chapter (see Attachment 7.2).

TABLE 7.1 - EXAMPLES OF PHF

Examples of PHFs include:

- Beef
- Poultry
- Pork
- Finfish
- Shellfish
- Dairy Products
- Eggs
- Vegetables (cooked vegetables, raw bean sprouts, and cabbage)

The optimum growth temperature range for the majority of pathogens is between 60° and 120° F. Some pathogens such as *Listeria* and *Yersinia* grow best under refrigeration temperature ranges. Under optimum growth temperatures, bacteria, in their vegetative state, can double in number every 15-20 minutes. At temperatures below freezing, foodborne pathogens may survive but cannot grow**. Most pathogens are destroyed at 165° F**.

While PHFs may provide the optimum environment for the growth of pathogens, other non-PHFs may be the causal factor in a foodborne illness outbreak by simply acting as the food vehicle in which bacteria, parasites or viruses can survive until ingested.

The foods listed below, not normally defined as PHFs, have been implicated in foodborne outbreaks.

TABLE 7.2 - EXAMPLES OF NON-PHF

Non-PHFs Implicated in Foodborne Illness Outbreaks:

Food	Outbreak
Orange juice	*Salmonella*
Apple cider	*E. coli* O157:H7
Lettuce	*E. coli* O157:H7
Raspberries	*Cyclospora*
Cantaloupe	*Salmonella*
Water/ice	Viruses
Mushrooms	*Staphylococcus aureus*
Garlic in oil	Botulism

Many pathogens that are naturally found in soil-grown vegetables, grains and spices have a dormant spore state that can be heat shocked into a vegetative state after cooking. With the exception of infant botulism, bacterial spores do not cause foodborne disease. However, if a pathogen's spore (e.g., *Bacillus cereus* in rice) is heat shocked into its vegetative state after cooking, the *Bacillus cereus* bacteria can then multiply rapidly if left at optimum growth temperatures (60° - 120° F).

Some pathogens such as *Bacillus cereus* and *Staphylococcus aureus* are **toxin-producing pathogens**. If a food is contaminated and stored at optimum growth temperatures, these organisms can produce heat-stable toxins (i.e., **toxins which are not destroyed by heating**), which can remain toxic even after reheating (see Chapter 2, Section 1-B).

C. High-Risk Factors in Food Preparation

Significant factors in foodborne illness outbreaks have been documented in several foodborne disease investigation surveillance studies. Significant factors associated with the occurrence of foodborne disease are listed below and can be divided into three hazard categories: **contamination, survival, and growth**.

Contamination:

- *infected person*
- *contaminated ingredients*
- *hand contact/implicated food*
- *unclean equipment*

- *toxic container*
- *cross-contamination*
- *added poisonous chemicals*
- *unapproved source*
- *natural toxicant*
- *consumption of raw or lightly cooked food of animal origin*

Survival:

- *inadequate cooking*
- *inadequate reheating*

Growth:

- *inadequate refrigeration*
- *preparation several hours before serving*
- *inadequate hot-holding*
- *improper cooling*
- *anaerobic packaging*

Such factors will vary in significance depending on the significant ingredient and how it is prepared. Definitions of these contributing factors and questions you may need to address are outlined in Section 3-Step 3. Further information on contributing factors associated with the implicated pathogen, significant ingredient and method of preparation can found in Appendix B - HACCP Foodborne Disease Data.

3) Application of HACCP Principles in a Foodborne Illness Investigation

Table 7.3 lists the steps in a HACCP risk assessment. A *HACCP Risk Assessment Form* can be used to facilitate risk assessment of the suspect food and, if used, must be attached to the inspection report. The county health department can use the *HACCP Risk Assessment Form* to identify the procedures used by the establishment in preparing the suspect food as well as to identify corrective actions initiated as a result of the investigation. **Correction of faulty food handling practices is essential to ensure prevention of further illness.**

A HACCP risk assessment must be conducted for each suspect food item prepared. If baked chicken and gravy is the suspect food, one should evaluate separately how each was prepared.

TABLE 7.3 - STEPS IN A HACCP RISK ASSESSMENT

STEPS IN A HACCP RISK ASSESSMENT
1. Identify ingredients, weight/volume, and steps involved in the preparation of suspect food(s).
2. Identify food-handling procedures at each step in the preparation of suspect food(s).
3. Based on observation or interview, identify potential hazards and critical control points (CCP).
4. Identify violations and initiate corrective actions.
5. Verify corrective actions undertaken by the food establishment.

STEP 1. Identify ingredients, weight/volume, and steps involved in the preparation of suspect food(s).

Ingredients in the suspect food

Obtain recipes for all suspect food items. List all ingredients for each suspect food item. Ingredients must be from an approved source, especially high-risk ingredients such as raw shellfish or canned low-acid foods. It is usually not necessary to obtain exact measurements of each ingredient unless there is a question on the pH of the food. Note new changes in recipes or ingredient substitutions. **NOTE:** Recipes are proprietary information and must be treated with strict confidentiality.

The suspect food is contaminated at the source (farm/ocean) or at the manufacturing level

Contaminated produce, eggs, seafood and commercially processed foods have been implicated in many foodborne illness outbreaks. When such products, contaminated at the source, are implicated, it is crucial to obtain as much information as possible from the food establishment or consumer to identify the exact source and/or manufacturer/distributor. Product lot numbers, expiration dates and sales records are necessary when conducting a trace back to identify an implicated source. When investigating such products, be sure to obtain the following product information.

TABLE 7.4 - PRODUCT INFORMATION

Manufactured Product Identification	
- Brand Name	- Package Type
- Product Name	- Date of Purchase
- Code/Lot Number	- Manufacturer Name and Address
- Expiration/Sell by/Use by Date	- Distributor Name and Address
- Size/Weight	- Retail Food Establishment Where Purchased

Shellfish identification tags should always be obtained for clams, oysters, quahogs and other molluscan shellfish associated with a foodborne illness. For information on conducting food trace backs, see article (Attachment 7.3) at the end of this chapter.

Volume of the suspect food prepared by the food establishment
List the weight/volume of the suspect food prepared. Large volumes may indicate problems with cooling or food handling procedures, especially if the food was prepared a day or more before service. If the volume was greater than what is normally prepared, different procedures may have been used.

Suspect food preparation schedule
Dates and the length of time are important information needed to determine potential time/temperature abuse. It is important to document **date and time prepared**, when applicable, to determine if there was ample time for temperature abuse which may have resulted in the growth of pathogens or the production of toxin.

Identify steps in preparing the suspect food
Each step (e.g., store, thaw, cook, cool, serve) in the preparation of a food item is regarded as a **"control point."** (More information on control points can be found in Step 3. List each step or control point on the *HACCP Risk Assessment Form*. Listing the steps as a flow chart permits the visualization of each preparation step.

STEP 2. Identify food-handling procedures at each step in the preparation of suspect food(s).

Clearly document **how the food was handled** at each step. The method used to identify food-handling procedures at each step is to observe the actual process. Since this may not be feasible in some situations, it is essential to interview the manager-in-charge of food production and then walk-through the preparation steps in the kitchen afterwards. Identify how suspect foods were thawed, cooked, cooled, reheated, served and transported. Identify how food workers determined final cooking temperatures. Indicated what equipment was used in the preparation of the suspect food. Specify if food workers use disposable gloves or utensils to handle cooked and read-to-eat foods. Indicate hand-washing practices observed.

Clearly document **who prepared the food**. It is recommended that the initials of the **employee responsible for handling food** be documented. An infected food worker with poor hygiene may be the source of contamination. The initials (versus “line cook” or “waitress”) are helpful when comparing the positive or symptomatic food workers to their job functions to determine if there is a relationship. Inquire if the food worker had been recently ill. Ask if the worker is a new employee or new to the particular operation because a new or different food worker unaware of the proper procedure may have been responsible for preparing the suspect food. Review the food establishment's sick or infected food worker policies. See Appendix A for the GDPH Infected Food Handler Policy.

Focus on the significant factors in foodborne illness outbreaks. When conducting a HACCP Risk Assessment, focus on poor food handling practices that can contribute to food borne disease. Definitions for each significant factor are listed in Step 3 in addition to questions that may need to be addressed during your assessment.

STEP 3. Based on observation or interview, identify potential hazards and critical control points (CCP).

The level of risk for a suspect food depends on the probability of occurrence of a hazard or the sequential occurrences of several hazards identified in the preparation procedure.

As mentioned earlier in this chapter, the three main microbiological hazards are:

a) Contamination (C)
b) Survival (S)
c) Growth/Toxin Production (G/T)

a) Contamination

Determine if there are risks at each step in the food preparation for microbial CONTAMINATION (C) from either the food worker, food, or improperly cleaned and sanitized equipment /utensils. (Food could be raw animal foods already contaminated or foods that were contaminated at the point of harvesting and intended to be consumed raw such as lettuce, raspberries and unpasteurized apple cider.)

Epidemiological data indicates that microbiological hazards pose the highest risks to the greatest number of persons. Physical and chemical hazards usually affect individuals rather than groups. Microbiological contamination such as bacteria, viruses and parasites are present in infected food workers and raw foods of animal origin. Indirect or cross-contamination from raw foods of animal origin to ready-to-eat foods that will receive no further heating can also result in microbiological contamination.

Contributing Factors Associated With Contamination:

***Contaminated Ingredients*:** The suspect food or a component of the food contained the pathogenic agent when it arrived at the point of preparation.

- Determine if the suspect food harbors contaminants normally found in soil, fertilizers or raw animal foods (e.g., raw meat, poultry, seafood, root vegetables etc.).
- Check to determine if the water/ice supply was possibly contaminated.
- Check to determine if back-flow prevention devices were present on plumbing cross-connections.
- Check to determine if the suspect food was from an approved source.
- Check to determine if the source may have contributed to the suspect food's contamination (e.g., shellfish from a contaminated growing bed).

***Unapproved Source*:** The suspect food was obtained from a source that does not comply with appropriate regulatory standards (e.g., shellfish harvested from closed growing beds).

- Determine if all foods (including water/ice) were obtained from an approved source.
- Check identification tags on shellfish and if they are retained for 90 days.

***Infected Person*:** A food worker involved in the preparation of the suspect food was infected or was suspected as being infected at the time the food was prepared. This individual was identified as the probable source of the agent in the outbreak.

- Identify the persons responsible for preparing the suspect foods.
- Determine if any of the food workers were ill before or during the time that the suspect food was being prepared.
- Check if any of the food workers were observed with infected cuts or wounds on their fingers or hands.

***Consumption of Raw or Lightly Cooked Food of Animal Origin*:** The suspect food was eaten raw or after a heat treatment that would not have reduced the level of agent contamination to below an infectious dose.

- Determine if the suspect food of animal origin was served raw or undercooked.
- If required by law, check if consumer advisories were properly posted.

***Cross-Contamination*:** The pathogen was transferred to the suspect food during preparation by contact with contaminated worker hands, equipment, utensils, drippage, or spillage. If worker hands were the mode of contamination, the worker was not necessarily infected with or a carrier of the organism.

- Determine if raw foods were stored separately from cooked and ready-to-eat foods.
- Check if food workers were properly washing their hands and using a physical safety barrier such as disposable gloves, deli papers and utensils in-between handling raw and cooked or ready-to-eat foods.
- Check equipment, utensils and food contact surfaces for proper cleaning and sanitizing between use

***Unclean Equipment*:** The suspect food was prepared with or stored in equipment that was contaminated with the agent.

- Check if the equipment and utensils used to prepare the suspect food were properly cleaned and sanitized.

***Hand Contact with Implicated Food*:** A food worker who was identified as the source of the agent prepared the vehicle with his/her bare hands.

- Check if infected workers used their bare hands to handle or to prepare cooked and ready-to-eat foods.

- Determine if food workers are trained to use physical safety barriers such as disposable gloves, deli papers and utensils in-between handling raw and cooked or ready-to-eat foods.

***Added Poisonous Chemicals*:** The chemical agent was deliberately or inadvertently added to the suspect food. In former cases, this addition typically occurred at the time of preparation or packaging of the vehicle.

- Determine if any toxic substances were improperly stored or used around the suspect food.
- Check if there was any recent situation involving a disgruntled employee possibly seeking revenge.
- Investigate where any toxic substance in the immediate vicinity of the suspect food may have been mislabeled.

***Natural Toxicant*:** A chemical agent of biologic origin that occurs naturally in the suspect food or bioaccumulates in the suspect food prior to or soon after harvest.

- Investigate whether a suspect food is known to harbor natural toxicants (e.g., histamine in scombroid fish, aflatoxins in grain, toxins in poisonous mushrooms, dinoflagellate toxins in shellfish).

Toxic Container: A chemical agent originated in the material from which the food container was made. The agent migrated from the container into the suspect food.

- Determine if the suspect food was in direct contact with lead, copper, aluminum, tin, cadmium or other heavy metals.
- Is the suspect food acidic (pH < 7)? The more acidic the product, the greater potential for the metals to leach into foods. Check to see that food is stored in the proper containers.

b) Survival

Determine if pathogens SURVIVED (S) the cooking process. The survival of pathogens is determined by the "thermalization" or cooking procedure used. Adequate cooking or reheating easily destroys pathogens. The consumption of undercooked or raw foods of animal origin is a significant factor in foodborne disease outbreaks

Contributing Factors Associated With Survival:

***Inadequate Cooking*:** The suspect food was not heated to a temperature and for a time adequate to destroy the agent or to reduce the level of contamination to below an infectious dose.

- Were the raw animal origin foods cooked to proper time/temperatures?
- Check if the establishment has a food stem thermometer and whether it is used to test final cooking temperatures.
- If required, are cooking temperature logs maintained?

***Inadequate Reheating*:** The suspect food, which had been previously cooked and cooled, was not heated to a temperature sufficient to destroy the agent or to reduce the level of contamination to below an infectious dose.

- Determine how the suspect food was reheated.
- Check to determine if the suspect food was properly reheated.
- Determine if a thermometer was used to test the final reheat temperature of the suspect food.

c) Growth/Toxin Production

Determine if the pathogens had ample time to GROW (G) AND/OR PRODUCE TOXIN (T). The growth of pathogens and the production of toxins can occur in PHFs that achieve temperatures between 41° and 140° F for several hours. Time/temperature abuse can result from inadequate cooling procedures, holding at room temperature and inadequate hot and cold holding units. While reheating contaminated food may destroy pathogens, it may not deactivate heat-stable toxins produced by pathogens such as S*taphylococcus aureus*. It is recommended that potentially hazardous foods be cooled from 140° F to 70° F within two hours and then to 41° F or less within four hours.

Contributing Factors Associated With Growth and Production of Toxins:
Improper Cooling: The suspect food was cooled from a cooking or ambient air temperature to a refrigeration temperature by a means that allowed the growth of a pathogen to an infectious dose or the production of toxin.

- Determine if implicated PHFs were cooled to 41° F within 4 hours by pre-chilling ingredients, using shallow containers, ice baths or reducing the size of the product.

Inadequate Refrigeration: The suspect food was not held at a temperature of 41° F or less either due to improperly functioning refrigeration equipment or because it was being held outside of refrigeration. The period of time held at an improper temperature was sufficient to permit the growth of a pathogen to an infectious dose or the production of toxin.

- Determine if there were an adequate number of refrigeration units to maintain the suspect PHF at or below 41° F.
- Determine if refrigeration units were properly operating at or below 41° F.

***Inadequate Hot Holding*:** The suspect food (PHF) was not held at or above 140° F due to improperly functioning hot holding equipment or was not being held in hot holding equipment. The period of time the food was held was sufficient to permit the multiplication and growth of the pathogen to an infectious dose.

- Determine if the suspect food was left out for storage or display at ambient air temperature.
- Determine how long the suspect food (PHF) was below 140° F.
- Determine if temperatures of suspect foods in hot holding units were at or above 140° F.

- Determine if the food workers have and use thermometers to measure temperatures of the suspect PHFs in hot holding units.
- If required, check temperature logs for hot holding units.

***Preparation Several Hours Before Service*:** The suspect food was prepared long before service, and this practice permitted a time/temperature abuse of the food.

- Determine the length of time between preparation and service of the suspect food.
- Determine how long the suspect food was stored between preparation and service.

***Anaerobic Packaging*:** The suspect food was stored in a container that provided an anaerobic environment. This environment permitted the multiplication and growth of the agent.

- Check to determine whether the suspect food was stored in an anaerobic package or container (e.g., vacuum packaging, container filled to capacity and tightly covered, hermetically sealed containers and garlic in oil products).
- If the suspect food was in a vacuum package or container, investigate at what temperature it was stored.
- Determine if the suspect food was prepared in a cook-chill or sous-vide operation.
- If the suspect food was in a vacuum package or container, review the label storage instructions.

Critical control points

A **critical control point (CCP)** is a preparation step in which a hazard, if present, can result in a foodborne disease. For example, any step in the production of a ready-to-eat food (e.g., tuna salad), where contamination is likely to occur, may be considered a CCP since pathogens introduced during storage or preparation may survive until ingested. Thus, each step where contamination occurs in a ready-to-eat food is "critical." However, if a food worker handles raw chicken with bare hands, this step would not be critical, since the chicken would be cooked in the next step destroying all pathogens introduced into the food. In this procedure, cooking would be a "critical control point" because adequate cooking is necessary to destroy all pathogens naturally present or introduced during preparation. Failure to cook the chicken properly would allow the survival of pathogens, which could result in a food borne illness.

STEP 4. Identify violations and initiate corrective actions.

Document Violations. This step in the investigation is critical especially if further enforcement action is necessary. Violations may be referenced on the *HACCP Risk Assessment Form* in the "Item No." column and then attach the *HACCP Risk Assessment Form* to the food establishment inspection report form. If a *HACCP Risk Assessment Form* is not completed at the time of the investigation, the violations must be documented

on the narrative section of the inspection report form. Failure to properly document violations may result in the county health department being legally challenged for actions.

- *Modifying faulty food handling practices*

Initiating corrective actions is the most critical aspect of the environmental investigation if unsafe food handling practices are discovered. Ensuring that faulty food handling practices, which can result in foodborne disease, are corrected, is one of the primary objectives of the investigation. **Emphasize critical control point's correction.** Discuss with the food manager monitoring procedures that can be implemented by the food establishment to ensure that steps designated as *critical* are properly carried out by employees.

Correction plans can include recommendations to improve food safety. For example, the use of raw eggs in a Caesar salad dressing is not in violation of the regulations. However, recommending that the establishment use a pasteurized product is reasonable since the use of a pasteurized product can reduce the risk of disease transmission.

- *Education*

Efforts to educate the operator on the risks posed by identified poor food handling practices should be made by the environmental health specialist. In some situations, it may be necessary for the operator to hire a consultant to assist in making changes or training their staff. Food operators may also be required to participate in a food safety management program if not already certified in food safety.

- *Removal of contaminated food from sale or distribution*

If it is determined that food prepared on the premises is possibly contaminated and may cause a foodborne illness, the county health department may initiate the voluntary disposal of the food or an embargo until the food can be tested in a laboratory. Such action should be taken only with clear evidence of contamination or time/temperature abuse.

Most of the focus should be placed on foods that will not receive further cooking or reheating, since it is these foods in which bacteria and toxins, if present, may survive until ingested. However, some food poisonings, such as scombroid poisonings can occur even after food is cooked. Remember that corrective actions may not always require disposal.

When there is strong evidence that the establishment has distributed contaminated food, it may be necessary to issue a press release warning consumers not to eat the food. A food recall may also be initiated by the implicated food manufacturer, distributor or by federal and state food regulatory agencies.

- *Restriction of infected food workers*

If a sick food handler is noted at any time during the environmental investigation, take steps to restrict the food handler from working with food.

- *Emergency closure or suspension of operations*

In certain situations, it may be necessary to close an establishment or suspend a particular operation if imminent health hazards exist that cannot be corrected immediately. Failure to immediately correct violations that may result in a food borne disease (normally associated with critical control points) should invoke an emergency closure or suspension of operation(s).

For example, if it is discovered that a mechanical salad bar refrigeration unit is not maintaining PHF temperatures at or below 41°F, and there is no ice source, the salad bar operation should be closed until the unit is repaired. Another example that may warrant an emergency closure is in an outbreak situation when it is determined that the majority of the food workers must be restricted from working with food, and there are no replacement workers. A food establishment may desire to voluntarily close to avoid negative publicity. Remember, closures and suspensions are a serious matter to all involved and should be well planned before implemented.

If a closure or suspension is initiated, the permit holder and the person-in-charge must be notified of the order in writing. The order is effective upon posting on the premises.

STEP 5. Verify corrective actions undertaken by the establishment.

All corrective actions must be verified by the county health department to ensure that steps to reduce or eliminate the hazards have actually occurred. Failure to correct critical violations or to comply with other necessary measures (e.g., food worker specimen submission or work restrictions) should result in the county health department taking further enforcement actions such as suspension or emergency closure. Verification may be completed during the investigation by actually observing the corrective actions or by re-inspection.

Conclusion

A HACCP risk assessment may require more than one contact with the food operator during site visits or telephone calls in order to obtain all the information necessary to assess the procedures. Elements in the investigation may change and can require shifts of focus in suspect procedures. Try to stay open-minded and patient. When investigating suspect foods that may have been contaminated prior to being received at the retail food establishment, it is important to obtain as much product information as possible to identify the exact source, and remove contaminated products from distribution.

Conducting a HACCP risk assessment of the implicated food is necessary in order to effectively identify potential hazards or points of contamination and time/temperature abuse. A report that reflects a HACCP-based investigation provides specific information to the reviewer (food establishment operator, complainant, board of health members, lawyers, etc.) on how the food was handled by the establishment.

Findings may demonstrate how a food establishment is employing safe food handling procedures in preparing the suspect food. Findings may also reveal critical control points in the preparation of the suspect food that were not being safely performed or monitored. In this case, a HACCP risk assessment will clearly identify faulty food handling practices as well as the recommendations to initiate corrective actions. Poor food handling practices can be replaced with safe practices and procedures, thereby averting future occurrences of food borne disease.

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ATTACHMENT 7.1

Primary Sources of Common Foodborne Pathogens

Human beings:

Salmonella typhi - intestinal tract, feces, urine
nontyphi Salmonella - intestinal tract, feces
Shigella - intestinal tract, feces
Escherichia coli (enteroinvasive, enterotoxigenic, enteropathogenic strains) - intestinal tract (*E. coli* normal flora), feces
Staphylococcus aureus - nasal passages (normal flora), skin (normal flora), lesions containing pus
Streptococcus pyogenes - skin and throat infections
Clostridium perfringens - intestinal tract (normal flora), feces
Norovirus - feces and respiratory tract
Hepatitis A virus - feces
Giardia lamblia - intestinal tract, feces

Fowl and mammals (meat and poultry products):

nontyphi Salmonella - intestinal tract, feces, skin/feather contamination
Campylobacter jejuni/coli - intestinal tract (normal flora), feces, skin/feather contamination
Escherichia coli (Enterohemorrhagic strains) - intestinal tract (*E. coli* normal flora), feces
Clostridium perfringens - intestinal tract, (normal flora), feces
Yersinia enterocolitica - intestinal tract, feces, tongues of swine
Staphylococcus aureus - cows udder and teat canal, feathers, bruised tissue of fowl, nasal passages (normal flora), skin (normal flora), hair, and lesions containing pus

Raw milk:

nontyphi Salmonella - intestinal tract, feces, skin/hair contamination, hands of milker
Campylobacter jejuni/coli - intestinal tract (normal flora), skin/hair contamination
Escherichia coli - intestinal tract (*E. coli* normal flora), feces
Clostridium perfringens - intestinal tract (normal flora), feces
Yersinia enterocolitica - intestinal tract, feces
Staphylococcus aureus - cows udder and teat canal, nasal passages (normal flora), skin (normal flora), hair, lesions containing pus, hands of milker
Brucella spp. - systemic infection, milk
Mycobacterium bovis - systemic infection, milk
Coxiella burnetii - infection, milk

Finfish, shellfish, marine crustacea:

Vibrio parahaemolyticus - sea water natural habitat, fish surfaces, shellfish
Vibrio cholerae non-O1 - sea water natural habitat, fish surfaces, shellfish
Vibrio cholerae O1 - sewage pollution of water habitat, fish surfaces, shellfish
Vibrio vulnificus - sea water natural habitat, shellfish, fish surfaces
Noroviruses - sewage pollution of water habitat
Hepatitis A virus - sewage pollution of water habitat
Paralytic shellfish poison - toxic marine plankton
Ciguatoxin - toxic marine plankton and certain fish in region
Scombroid toxin - finfish containing high levels of histidine and improper cooling of fish after catching that allows growth of certain bacteria that break down histidine to histamine compounds

Soil and soil-grown vegetables, cereals, spices:

Listeria monocytogenes - soil natural habitat, moisture on floors
Clostridium botulinum - soil natural habitat
Clostridium perfringens - soil natural habitat, and fecal droppings
Bacillus cereus - soil natural habitat
All enteric pathogens listed above if night soil or sewage fertilization

Water:

Aeromonas hydrophila
Pseudomonas aeruginosa
Yersinia enterocolitica - stream water contaminated by animals
Giardia lamblia
All enteric pathogens listed above if sewage pollution occurs

Source: Used with permission from Frank Bryan, Ph.D., MPH, Food Safety Consultation and Training, 8233 Pleasant Hill Road, Lithonia, GA 30058, (770-760-1569), 1996.

ATTACHMENT 7.2

Effects of pH

The pH of a food can be used to either encourage or discourage the growth of microorganisms. In general, bacteria multiply most rapidly when the pH is near neutrality. Few pathogenic foodborne organisms can grow at a pH as low as 4.5 and none, except the toxigenic fungi, when the ph drops below 4.0. The pH of a food has a strong bearing on the time/temperature equation necessary to destroy food borne pathogens. In general, for any given temperature, the lower the pH of the food product, the more rapidly the pathogens will be killed.

pH of Selected Foods

Food	ph
Limes	2.0
Lemons	2.2
Vinegar, plums	2.9
Prunes, apples, grapefruit (3.0-3.3)	3.1
Rhubarb, dill pickles	3.2
Strawberries, lowest acidity for jelly	3.4
Peaches	3.5
Raspberries, sauerkraut	3.6
Sweet cherries	3.8
Pears	3.9
Acid fondant, acidophilus milk	4.0
Tomatoes (4.0-4.6)	4.2
Lowest acidity for processing at 1000	4.4
Buttermilk	4.5
Bananas, egg albumin, figs, isoelectric point for casein	4.6
Pumpkins, carrots	5.0
Turnips, cabbage, squash	5.2
Sweet potatoes, bread	5.4
Asparagus, cauliflower	5.6
Meat, ripened	5.8
Tuna	6.0
Potatoes	6.1
Corn, oysters, dates	6.3
Egg yolk	6.4
Milk (6.5-6.7)	6.6
Shrimp	6.9
Meat, unripened	7.0
Egg white	8.0

Source: George, Harvey. Inspecting The Food Service Establishment: Microbiological Considerations, *MDPH, Food and Drugs Reporter*, July 1987, Vol. 5, Issue 87-3.

Effects of Water

Effective growth of microorganisms in food products requires the presence of minimum water content. This minimal water content or water availability is referred to as the *water activity* of the food or Aw. The maximum theoretical value for Aw is 1.0, which is that of pure water. As a solution becomes more concentrated or a food becomes drier, its vapor pressure decreases and hence its Aw decreases. Most food borne pathogens have a very narrow Aw range, with rapid growth taking place in a Aw range from 0.98 to 0.999, and growth ceasing when the Aw drops below 0.94 to 0.96. Many organisms have the ability to remain viable for long periods in dried foods with a low Aw, but die rapidly in heavily salted foods that have a low Aw.

Approximate Aw values of Selected Foods

Aw	Foods
1.00 - 0.95	Fresh meat, fruit, vegetables, canned fruit in syrup, canned vegetables in brine, frankfurters, liver sausage, margarine, butter, low-salt bacon
0.95 - 0.90	Processed cheese, bakery goods, high-moisture prunes, raw ham, dry sausage, high-salt bacon, orange juice concentrate
0.90 - 0.80	Aged cheddar cheese, sweetened condensed milk, Hungarian salami, jams, candied peel
0.80 - 0.70	Molasses, soft dried figs, heavily salted fish
0.70 - 0.60	Parmesan cheese, dried fruit, corn syrup, licorice
0.60 - 0.50	Chocolate, confectionery, honey, noodles
0.40	Dried egg, cocoa
0.30	Dried potato flakes, potato crisps, crackers, cake mixes, pecan halves
0.20	Dried milk, dried vegetables, chopped walnuts

Source: George, Harvey. Inspecting The Food Service Establishment: Microbiological Considerations. *MDPH, Food and Drugs Reporter*. July 1987, Vol. 5, Issue 87-3.

ATTACHMENT 7.3

Trace back Methodology - *Cyclospora Cayetanensis* Outbreak Example

Trace back information is essential in many foodborne illness outbreaks. Trace backs are necessary to identify possible sources of contamination and to quickly identify and correct an undesirable situation. Many individual case reports of foodborne illness have been linked to a common source of contamination through the process of a trace back investigation. Specific codes assigned to a particular food product, as well as specific invoice information relative to each and every distributor should be included in the tracing back of a particular food item. Every step of a trace back investigation needs to be properly identified and properly documented. A conventional trace back usually begins with the information available at the time of purchase of a specific food item by a consumer and extends back to the very beginning of its production. Trace back has been especially beneficial in those outbreaks that have been the result of contamination caused by both S*almonella* and *E. coli* O157:H7.

An outbreak of cyclospora infection that occurred in 1997 in Massachusetts was associated with similar outbreaks occurring in fourteen other states and Canada. Multiple epidemiologic analyses strongly implied that the consumption of contaminated fruit, specifically raspberries, was responsible for causing illness. Onset times and symptomatology of illness was similar in most reported cases. Trace back information was used to help identify the source and site of product contamination. Information relevant to each and every step was considered in the process of tracing back this specific food item. All of the steps from harvesting to consumption were considered in the trace back of the implicated fruit. The Centers for Disease Control and Prevention (CDC) coordinated the trace back investigation of all the states associated with this outbreak and provided a database that was useful in tabulating and summarizing pertinent information relative to the investigation.

Local health departments may also be asked for participation in trace backs. They will generally work in conjunction with the State Health Department in obtaining information relevant to the origin of a specific food product.

Tracing back a product to its point of origin requires obtaining certain basic and essential information, which should include the following:

- Code numbers
- Lot numbers
- Sell by dates
- Expiration dates
- Wholesalers
- Distributors
- Dates received

The complete product name as well as the identity and the location of each distributor needs to be included in the trace back. The size of a package or container and type of packaging should be recorded. Invoices from each distributor should be provided. Invoice information should include the identity of a product as well as the exact origin of the product. The quantity of product purchased and the date of purchase should also be included as relevant information. Trace back should start with the purchase of the product by the consumer. The validity of a trace back is strongly dependent upon proper documentation. Receipts and labels are essential in a meaningful trace back. If a label or statement of purchase is not available, then every attempt should be made to seek accurate information relative to date and location of the purchase of the food item in question. Trace back should include all of the locations that a particular product was purchased by the consumer. For example, in many cases, the same consumer for the same event purchased raspberries from several different locations. All of these establishments were in fact included in the trace back of raspberries.

Surveillance data indicated that the illness caused by the protozoal parasite *Cyclospora cayetanensis* was due to the ingestion of contaminated raspberries. Trace back information indicated that the contaminated raspberries originated in Guatemala. The Massachusetts trace back investigation also implicated Guatemalan raspberries. Several different distributors were involved with the handling of raspberries. Most of the distributors were housed in one central location. Since the shelf life of this fruit was approximately five days, the time of distribution was rather limited. Invoices from all distributors were collected and examined.

Trace back data indicated that Guatemala was responsible for producing the contaminated raspberries. A cooperative system of farming and the intermingling of produce at one point of collection in Guatemala have made the identification of the exact source and site of contamination difficult. Even though contaminated raspberries from Guatemala have been strongly implicated as the reason for illness occurring, product testing as well as environmental sample testing has not identified the exact cause of contamination. Trace back investigation was in fact very helpful in identifying Guatemala as the source of contaminated raspberries and did rule out the possibility of other countries providing contaminated fruit.

Source: Leonard J. Letendre D.V.M., M.S., R.S., Massachusetts Department of Public Health, Division of Food and Drugs. 1997.

NOTES

Chapter 8

LABORATORY INVESTIGATION

Submission of Clinical Specimens to the Georgia Public Health Laboratory

1) Specimens Accepted for Testing

2) Tests Performed on Fecal Specimens

3) Turnaround Times on Specimens Submitted Directly to GPHL

4) Procedures for Stool Sample Collection and Submission

5) Other Tips

6) How to Obtain Enteric Collection Kits

7) Food Sample Collection

LABORATORY INVESTIGATION

Submission of Clinical Specimens to the Georgia Public Health Laboratory

In a foodborne outbreak investigation, laboratory identification of a pathogen can validate the hypothesis and perhaps allow easier implementation of control and preventive measures. Increased certainty results if statistical association is combined with isolation of a pathogen from the ill person and the implicated food. This evidence is almost certain to be irrefutable. **Therefore, time is of the essence when requesting and collecting clinical and food specimens.**

1) Specimens Accepted for Testing

Feces and Food
The two specimens considered most appropriate for foodborne illness-related testing are **feces** and **food.** Food specimen submission is addressed at the end of this chapter.

Other Specimens
Urine is not a usual specimen for culture although the Bacteriology Lab does receive isolates (usually from hospital labs) from urine specimens of *Salmonella*, *Shigella* and *E. coli* O157:H7 for identification or serotyping. If the local health department receives notification from the Bacteriology Lab of a positive pathogen from a urine specimen, follow-up should include a stool specimen. If the case is a food handler, the employee still must submit at least one negative stool specimen for clearance to return to work (with the exception of *S. typhi* which is three negative stool specimens).

Urine should be collected in cases when chemical poisoning is suspected. However, urine must be collected as soon after onset as possible in order to be useful. The GPHL does not test outbreak specimens for chemicals. Contact the Notifiable Diseases Section for information on collecting and submitting specimens for chemical testing.

Blood is an acceptable specimen when typhoid or botulism is suspected (see Section 4-F on more information on botulism testing), or the clinician requests blood testing for another reason. Blood tests for hepatitis A are usually performed through the individual's private medical provider, but may be performed with prior notification at the Georgia Public Health Laboratory.

2) Tests Performed on Fecal Specimens

The GPHL can analyze stool specimens related to foodborne outbreaks for the following pathogens:

Bacteriology: All enteric specimens submitted for bacteriology are routinely tested for:

- *Salmonella*
- *Shigella*
- *Campylobacter*
- *Aeromonas*
- enterohemorrhagic *E. coli* (EHEC) – including *E. coli* O157:H7

Additional agents must be specifically requested. These include:

- *Yersinia*
- *Vibrio*
- *Staphylococcus aureus* (including toxin)
- *Bacillus cereus*
- *Clostridium perfringens* (including toxin)

Parasitology: All enteric specimens submitted for parasitology are routinely tested for:

- *Cyclospora cayetanensis*
- *Giardia lambia*
- *Cryptosporidium parvum*
- *Entamoeba histolytica*

PCR testing can also be performed by request

Virology: All enteric specimens submitted for virology are routinely tested for:

- Norovirus (EM & PCR)

The GPHL tests stool specimens by electron microscopy (EM) and PCR for viruses. In addition, these stool specimens are also sent (when appropriate) to the Centers for Disease Control and Prevention (CDC) in Atlanta for viral confirmation and sequencing.

3) Turnaround Times on Specimens Submitted Directly to GPHL

The following table details the minimum time to complete enteric testing from receipt of sample to test result. (This does not include weekend days.)

Table 8.1 - Stool Testing Turnaround Times

Species	Positive (minimum)	Negative (minimum)
Campylobacter	5 days	72 hours
Salmonella	72 hours	72 hours
Yersinia	96 hours	48 hours
Shigella	48 hours	48 hours
Vibrio	6 days	48 hours
E. coli O157:H7	5 days	48 hours
C. perfringens	72 hours	48 hours
Bacillus cereus	6 days	48 hours
S. aureus	72 hours	48 hours

4) Procedures for Stool Sample Collection and Submission

1. When to collect clinical specimens
   - Collect freshly passed stool as soon as possible after symptoms begin. While it is best to collect stool within 24 hours of onset, it may be possible to identify pathogens in stool up to a week after onset of symptoms (in some cases even longer), even if the patient is no longer symptomatic.
   - Stool specimens should be collected prior to antibiotic treatment (bacterial testing only). A repeat sample may need to be submitted if the patient was on antibiotics when the initial culture was taken. This often happens if the patient is a food handler and needs clearance to return to work. If the patient started antibiotics prior to collecting the specimen, this should be clearly indicated on the specimen submission form (along with the date and time antibiotic therapy was initiated).

   If you have any questions about the usefulness of collecting stool specimens when the reporting of an outbreak is delayed, or the patient has been on antibiotics, please contact the Notifiable Diseases Section.

2. Rectal swabs
   Swabs are not usually recommended for testing because the sample size is too small. If a rectal swab is the only available sample, care should be taken to insert the swab past the anal sphincter muscle to obtain a representative fecal specimen. Transfer the swab to the appropriate transport container, rotate the swab in the medium, press the swab vigorously against the side of the container, break or cut off the handle and include swab with container.

3. Number of specimens to collect
   Collect as many stool specimens from symptomatic persons as possible (up to 10). It is not necessary to collect "control" stool specimens from persons who have not been ill.

4. Stool kit instructions
   (A sample stool collection instruction sheet for patients is included in Appendix F.)

   - Bacterial Kit (for all bacterial pathogens, except *B. cereus* and *C. perfringens*): Take the container (orange top container with red liquid) out of the bag. With the scoop inside the lid, fill the container with stool until the liquid inside comes up to the red line. Complete the information requested on the outside of the tube. The patient name and date of collection must be written on the container. Close the lid tightly and shake the container to mix the sample with the liquid thoroughly. Place the container inside the plastic biohazard bag. Complete **form #3416** provided with the outfit. Be sure the name on the specimen matches the name on the form. Place the form in the **pocket** of the plastic biohazard bag. Do **not** put the form inside the bag with

the specimen container. **Store the specimen at room temperature** until it can be sent to the lab. Refrigerating the specimen may reduce the likelihood of detecting certain organisms, particularly *shigella.* Please see exceptions for this temperature rule below under "fresh stool."

- Parasitology Kit: Each parasitology kit contains 2 tubes for collecting stool, one with a white top (5% Formalin) and one with a blue top (LV-PVA). Ideally, patients should be given 3 sets of tubes. Collect three consecutive-day specimens that the patient has a BM. For these, take the two containers (1 set) out of the bag. Write the patient name and date collected on the outside of both specimen containers and place them in a biohazard bag. With the scoop that is inside the lid of each container, fill each container with stool until the liquid inside comes up to the red line. Close each lid tightly and shake each container to thoroughly mix the sample with the liquid. Complete **form #3414** provided with the outfit. Be sure the name on each specimen matches the name on the form. There should be a total of six containers, three white tops and three blue tops. There should be six forms completed, one for each tube. Place the form in the **pocket** of the biohazard bag. Do **not** put the form inside the bag with the specimen container. **Store at room temperature** until the specimen can be sent the lab.

  Note: It may not always be feasible to collect 3 sets of specimens on 3 consecutive days. When this is not possible, it is acceptable to send in only one or two sets. However, because parasites may be shed intermittently, collecting 3 sets of specimens greatly increases the chance of detecting parasites.

  PCR testing for certain parasites can be performed by special request. This requires a special collection kit. Contact the Georgia Public Health Laboratory, Parasitology Unit at 404-327-7961/63 for the outfit and instructions on how to submit specimens.

- Fresh Stool (for **Norovirus**, ***B. cereus*** and ***C. perfringens***): Using a clean utensil (plastic spoon, tongue depressor, etc…) collect approximately 25 to 35 ml of fresh stool in a clean, dry container with a secure lid (conical tubes or urine specimen cups are available to districts from the GPHL for this use). Tightly close the container and write the patient's name and date of collection on the outside of the container. Place the container into a biohazard bag and **store the bagged container in the refrigerator** until it can be sent to the lab. Complete **form #3595R** for viral pathogens and/or **form #3416** for *B. cereus* and *C. perfringens*). Be sure the name on the specimen matches the name on the form. If requesting testing on fresh stool for viruses *and* bacteria please be sure to give the patient **two empty containers**. Each container should be put in a separate biohazard bag with the appropriate form (#3595R and #3416) completed and placed in the **pocket** of the bag. Do **not** put the form inside the bag with the specimen container.

NOTE: All enteric culture kits provided by the GPHL have clearly labeled "expiration dates" on them. If the kits have expired and no other kits are available, they may still be used as long as the transport medium (liquid solution inside) is still red and there is no visible sediment in the container. If the solution has changed color, or sediment is visible, *DO NOT USE* the container. Please notify the Notifiable Diseases Section if you collect stool in an expired kit. Then we can contact the lab to ensure that the kit is not discarded when it is received at the lab. If the results of testing performed on a specimen from an expired kit are negative, the laboratory will report a disclaimer with the results.

5. Submission Forms

Please fill in the submission form as completely as possible. The following information should be included. Items with an asterisk are required.

- Unique patient identifier (name or number)*
- Date of specimen collection*
- Agent suspected, if applicable (see above)*
- Submitter's name and address*
- Whether or not the specimen is outbreak related and the name of the outbreak
- Symptoms
- Specimen number (first or repeat)
- Date of onset
- Whether collected before antibiotic treatment
- Name(s) of other patient(s) with known enteric pathogens with whom this patient has been in contact
- Patient demographics (race, sex, age, and address)

Each specimen must have its own form, even if there are multiple specimens from the same person.

GPHL submission forms may be found in Appendix E.

Specimens received without submission forms or without a patient identifier on the collection container may be discarded. Please take the time to make sure all paperwork is in order before submitting specimens to the lab.

6. Packaging

- To prevent leakage, tighten cover of transport bottle completely.
- Place container inside provided plastic bag (biohazard bag).
- Place appropriate form in the outside pocket of the specimen bag.
- Para-pak containers may be mailed to the lab using the canisters provided by the lab.
- Specimens which need to be kept cool should be hand-delivered or mailed in an insulated container with an ice pack.

7. Transporting Specimens to the GPHL

Specimens may be delivered directly to lab by the submitter or sent by courier, mail or common carrier. Fresh stool specimens should be sent to the lab on ice to keep them cool. The Georgia Public Health Laboratory does not accept deliveries on Saturday, Sunday or holidays. Specimens that must be kept cool should not be sent to the lab on these days. Please contact the department of epidemiology before submitting outbreak-related specimens to the lab. This will help ensure that the specimens are handled properly and tested for the appropriate organisms.

Deliver Specimens to:

Georgia Public Health Laboratory
1749 Clairmont Road
Decatur, GA 30033-4050

5) Other Tips

- When providing specimen containers to patients, include health department contact information including telephone number, clinic hours, and address if you expect the patient to return the specimen to you. Give the patient mailing instructions if you want them to mail specimens directly to the lab.

- Give the patient explicit instructions on collecting and handling the stool specimen. Be sure to specify whether the specimen should be refrigerated and if it must be transported on ice. Leave written instructions with the patient.

- Provide the patient with all materials needed to collect the specimen. This might include latex gloves, a garbage bag, stool collection container(s), utensil for scooping stool (such as a tongue depressor) and a plastic biohazard bag to put the specimen container in. Ask the patient to complete all of the information requested on the outside of the collection container after the specimen is collected. Be sure to give the patient the appropriate number of containers for the pathogens suspected.

- Always notify the Georgia Division of Public Health, Notifiable Diseases Section, before submitting outbreak specimens to the GPHL so that we may assist with making sure the right outfits are used and that the appropriate tests are performed.

6) How to Obtain Enteric Collection Kits

You may obtain enteric collection kits from the Outbreak Coordinator. Please call 404-657-2588 with requests.

7) Food Sample Collection

- Inspection Equipment Checklist
- Food Sample Collection Procedures

Inspection Equipment Checklist

Table 8.2 - Inspection Equipment Checklists

TYPE OF EQUIPMENT	***USE/TIPS***
Picture I.D.	Always identify yourself
Business cards	Assists in access to you and your department
Inspection forms	Documentation, documentation!!!
Regulations	For reference
Educational materials	For distribution and reinforcement
Clipboard	To hold forms and paper
Pens, pencils, and markers	Report writing and marking sample bags
Flashlight	To inspect poorly lit areas
Thermometers	To monitor food and equipment temperatures
Alcohol swabs	To disinfect food thermometer
Sanitizer test kits	Don't store these in a hot car
Ruler and tape measure	To take measurements
Hair restraint	Use during inspection/sets a good example!
Disposable gloves	For handling food
HAVE ACCESS TO	***USE/TIPS***
Sterile bags and vials	For sampling
Embargo tags and notices	To embargo food
Cooler and ice packs	For transporting & storing samples
Camera and film	Evidence
Black light	To detect rodent urine

FOOD SAMPLE COLLECTION PROCEDURES

All food sample submissions require pre-approval before delivery to the State Laboratory. If you have foods that need to be submitted for analysis, please contact the GDPH, Epidemiology Branch, Notifiable Diseases Section at (404) 657-2588. Food samples will not be accepted without a properly completed sample submission form. Since these forms are routinely updated, make sure that you are using the most updated version.

1. SAMPLES TO BE COLLECTED ASEPTICALLY: TEMPERATURE RANGE (32°-45° F)

a) Use sterile containers.
b) Make sure caps are tight, to prevent leakage.
c) Do not handle or touch the inside of the container.
d) Use sterile utensils, tongs, spoons, etc.
e) Use polypropylene containers. Try not to use Whirlpack bags for liquids, which can leak and spill easily. Whirlpack bags may be used for solid foods, such as dry milk, meat, etc.
f) Collect adequate amount of sample - at least 100-150 grams or milliliters, (4-6 oz.).
g) Fill containers no more than ¾ full, to allow for proper mixing of the sample. This applies to liquid samples, milk, water, etc.
h) When collecting water from spigots, let the water run for 2 minutes first.

2. TRANSPORTATION:

a) Use dry ice for ice cream or frozen food samples.
b) Use plenty of ice cubes or crushed ice in a well-insulated ice chest (for PHFs or perishable foods).
c) Place container in chest so that cover or lid is just above ice level.
d) If possible, wrap sample in a plastic bag and place in chest. This will help prevent leakage into the container.
e) Pre-frozen ice packs may be used for food samples.

3. LABELS:

a) Write clearly with waterproof marker (or use waterproof labels with a ball-point pen).
b) Tags may be used - especially on glass bottles (use wire tags).
c) Be careful to number each container, watch sequence, and be careful not to skip numbers.
d) Clearly state contents of container, i.e., raw milk, pasteurized, bulk, cultured, etc.

SAMPLING EQUIPMENT

A sampling kit, including the following, should be kept stocked at all times:

1. **Sterile Sample Containers**
   - Plastic bags (disposable or Whirl-Pak) 2oz., 18 oz., 24 oz.
   - Wide mouth plastic and glass jars (6oz. - 1 qt) with screw caps

2. **Sterile and Wrapped Sample Collection Implements**
   - Spoons, scoops, tongue-depressor blades, spatula, swabs

3. **Supporting Equipment**
   - Fine-point felt-tip marking pen, role of adhesive or masking tape, waterproof labels/tags, sample forms

4. **Sterilizing and Sanitizing Agents**
   - 95 % ethyl alcohol, propane torch, sodium or calcium hypochlorite, test papers and alcohol swabs

5. **Refrigerants**
   - Ice packs (refrigerant in heavy plastic bags, rubber or plastic bags which can be filled with water and frozen, heavy-duty plastic bags

NOTES

Chapter 9

SUMMARIZING THE INVESTIGATION

1) The Report
2) Purpose of The Report
3) Outbreak Report Format
4) Examples of Reports

SUMMARIZING THE INVESTIGATION

Introduction
When an investigation is complete, the final responsibility is to provide written documentation of events. This is necessary not only for large outbreaks involving many people but also for single complaints of possible foodborne illness. This chapter explains the importance of the report and its possible uses. Also included is a detailed explanation of a workable format for writing a report, what should be included in the report and who should receive it. Finally, samples of outbreak reports of differing complexity are included as a guide.

While this chapter focuses on a report written for a more complex outbreak, even single complaints should be documented as completely as possible. The single complaint must always be regarded as the possible first indication of a larger problem.

1) The Report

The report documents what happened in a foodborne illness investigation. **It is public record and must be objective, accurate, clear, and timely.**

Detail in the document should reflect the complexity of the incident under investigation. A single complaint might result in a "complaint form" (e.g., the *Foodborne Illness Complaint Worksheet)* being completed with a list of action steps and any follow-up. (See Chapter 4, Section 4-A for more information on the *Foodborne Illness Complaint Worksheet*.)

A more complicated occurrence (i.e., a large outbreak) might involve people outside your local jurisdiction and require a more comprehensive report. It may be necessary to enlist all involved parties when writing a final report. It is the responsibility of the local health department at county and/or district level, however, to recruit state agency personnel or others to assist in completion of the report.

2) Purpose of the Report

Whether the report is being written in response to an outbreak or a single complaint, complete documentation is important for the following reasons:

A document for action

In some cases, control and prevention measures will only be instituted in response to a written report. Until an outbreak is documented and summarized in a formal "outbreak report," it is easy for the implicated establishment operator to shift responsibility. The document contains the "official" findings. It should be used in refuting rumors and speculation.

A record of performance

A well-written report documents the magnitude of health problems and justifies program activities. A report clearly states events that occurred and the process that was followed. It should include all steps undertaken by everyone involved. The person writing the report will need to gather that information. The comprehensiveness of the outbreak report should reflect the complexity of the investigation. This accurately documents events and also clearly illustrates staffing resources required to undertake the investigations.

A document for potential legal issues

An investigative report written by health professionals must be written objectively, honestly and fairly. Information in these investigations is frequently used in legal actions. Thus, it is very important that a record exists that accurately documents events in a timely manner to aid in any legal investigations that might ensue.

An enhancement of the quality of the investigation

The process of writing a report and viewing the data in written form may result in new insights. It could precipitate new questions to be answered before a conclusion is reached. The more investigations and outbreaks one writes up, the better the understanding of process and results.

An instrument to present control and preventive measures

The primary reason to undertake an investigation is to control and prevent disease. The written report is an official medium to present control and preventive measures, and perform needs assessments. One may identify new trends, introduce new regulations or policies, identify training needs and reinforce existing regulations. When the report is presented to the owners and managers, encourage them to use it as a catalyst for change. This document is an educational tool and may help to prevent the same problems from reoccurring. (For example, operators who have been educated about the availability and safety of a pasteurized egg product will probably choose that over pooled whole, shell eggs.)

3) Outbreak Report Format

There are a variety of ways to compile the information obtained during an investigation into a professional, understandable and usable document. Below is the standard outline used by the Georgia Division of Public Health (GDPH) to write an outbreak report. The GDPH staff usually follow this format because it logically describes the events that occur during an investigation. This format can be modified to reflect the complexity of the outbreak. Three fictitious outbreak report examples (9.1, 9.2, and 9.3) are provided at the end of this chapter. Please note the varying complexity of each report.

Even if you do not get the opportunity to compile a complex "outbreak report," you might be the recipient of one if a large outbreak occurs in your jurisdiction. It would be helpful for you to be familiar with the following format and understand what information is contained in each section. It will then be easier for you to adopt any or all of the sections for use when responding to and documenting smaller scale incidents.

A foodborne illness outbreak report should include the following sections:

I. Summary
II. Introduction
III. Background
IV. Methods
- **A) Epidemiologic**
- **B) Environmental**
- **C) Laboratory and Clinical**

V. Results
- **A) Epidemiologic**
- **B) Environmental**
- **C) Laboratory and Clinical**

VI. Discussion
VII. Recommendations
VIII. Acknowledgments
IX. Supporting Documentation

I. Summary
The summary should consist of a paragraph or two that provide the reader with an overview of the investigation (i.e., the WHO, WHAT, WHERE and WHEN of the outbreak). It should describe what caused the outbreak or the causal hypothesis based on the evidence.

II. Introduction
Include the specific events that led to the investigation. Include:
1) How the outbreak was first reported;
2) Steps undertaken to confirm its existence; and
3) All who assisted in the investigation.

III. Background

Background information is important. This section identifies the type of establishment involved in the outbreak (e.g., take-out restaurant, banquet facility, caterer, fast food establishment, retail store). Also include whether the establishment is part of a national chain, a commissary, a dormitory or a buffet where attendees are likely to eat multiple foods. In this section discuss the capacity of the food service operation, which may help to determine the possible extent of the outbreak.

IV. Methods

A. Epidemiologic

Explain how cases were defined. For example, even if you are investigating an outbreak of salmonella you are probably not confining yourself to only laboratory confirmed cases. Does a case have to experience diarrhea or is abdominal cramping sufficient? The issues should be determined and explained in detail. Also describe how cases became known, questions you asked, and how asked. Include descriptions of interview techniques and copies of questionnaires or surveys if used.

B. Environmental

Clearly outline the number and kinds of environmental investigations that occurred and who conducted them. Was a HACCP risk assessment conducted of suspect foods as well as physical facility inspections? Were there any tracebacks of food products?

C. Laboratory and Clinical

Discuss any analyses performed. It is important to note what kinds of and how many specimens were submitted for laboratory analysis. Was food available for testing? Did cases submit stool specimens or other clinical specimens for analysis? Were food handlers required to submit stool samples for testing? Note where the specimens were sent, what kinds of analyses were performed and who completed the testing. This could involve private, state or federal laboratories.

V. Results

In the previous section you outlined what steps you took to investigate the outbreak. This section is where you tell your readers what you discovered. These results can be presented in tables, graphic figures and/or text:

A. Epidemiologic

- number of questionnaires mailed and returned
- number of people fitting the case definition
- symptoms experienced by cases
- duration of symptoms
- incubation period
- food or meal-specific attack rates
- statistical significance of foods eaten
- epidemic curve of the outbreak
- relationships among cases (if any)

B. Environmental

- results of any HACCP risk assessments conducted
- the results of the physical facilities inspection (e.g., violations noted)
- the results of any food tracebacks

C. Laboratory and Clinical

- culture or other laboratory results on food handlers, patrons, or other individuals connected to the outbreak
- results on foods tested

VI. Discussion

This section is where all aspects of the investigation are brought together and a conclusion is drawn.

NOTE: Not all outbreaks have a resolution. In fact, it is rare when everything comes together and a cause can be definitively determined. Do not be discouraged. In most cases, there will be enough evidence to present a plausible hypothesis (see Chapter 6, Section 3). Be clear and present a detailed explanation on what has contributed to the conclusion.

VII. Recommendations

This is the opportunity to educate. Be detailed because these recommendations hopefully will be read by many people in the establishment that was investigated. The establishment has a vested interest in following the suggestions. If the outbreak has been large and disruptive, the establishment will not want it to reoccur. In addition to listing general recommendations on good food handling procedures, include specific recommendations that address what might have been overlooked in the particular outbreak (e.g., attempting to transport food long distances at inadequate temperatures).

VIII. Acknowledgments

In the spirit of cooperation, it is proper to thank those who assisted in the investigation. This might include health care personnel, the food handlers and/or management of the establishment or other local or state officials.

IX. Supporting Documentation

When compiling the report, attach copies of all items that are relevant. These would include the following:

- inspection reports
- blank samples of the surveys or questionnaires
- letters to management
- menus
- copies of posted notices
- food testing results
- foodborne illness worksheet(s) (without names or other personal identifiers)

When compiling material, be aware of confidentiality issues (see Chapter 4, Section 5). **Information that can lead to the identification of individual cases (e.g., test results that include personal identifiers), should not be included in the outbreak report.** The name of the establishment under question is part of the public record and can be disclosed. Data that *cannot* be used to identify individuals can be presented. People cooperate in investigations on the basis of protected confidentiality, and this should be respected.

Distributing the Report
Copies of the report should be made available to all parties involved in the investigation. This would include, but not be limited to, **the owner and/or managers** of the establishment, the **GDPH,** and any **other local or state agencies** affected by or involved in the outbreak or the investigation.

4) Examples of Reports

Three examples of outbreak reports are provided at the end of this chapter (Examples 9.1, 9.2 and 9.3).

Example 9.1 - This sample report summarizes a situation that occurred in which two different types of salmonella were reported in patrons who ate at a specific establishment. This report is not as comprehensive as Example 9.3. The association of illness with this establishment was subtle. The response in this case was abbreviated. However, it is still necessary to document the events that took place during the course of the investigation.

Example 9.2 - This sample report summarizes an event-associated outbreak of salmonellosis that occurred in a private home. This report is also not as comprehensive as Example 9.3. The investigation consisted of a HACCP risk assessment along with food and stool sample submission. The stool and food samples (lasagna and chicken) both tested positive for *atypical Salmonella enteritidis*. The findings of the HACCP risk assessment suggest contamination of lasagna and possibly chicken. The findings of this investigation illustrate that outbreaks of *Salmonella enteritidis* are a public health problem in homes as well as food-service establishments. It is important to encourage participation in investigations of home outbreaks and document events that took place.

Example 9.3 - This sample is a report summarizing the investigation of a large point-source outbreak of an unidentified gastrointestinal illness that occurred at a wedding. This investigation included the use of questionnaires and data analysis to identify a suspect food item. In an outbreak of this magnitude, it is important to be as complete as possible because years later one could be asked to provide information on the investigation.

Foodborne Illness Complaint Worksheet. Another type of report would be a completed *Foodborne Illness Complaint Worksheet.* In some situations, a follow-up investigation of a complaint may not be warranted or minimal follow-up may be sufficient (e.g., complaints involving one person or for complaints where it is obvious that the symptoms or diagnosis are clearly unrelated to the food which the complainant believes to be causal and no other information is available). Documentation can consist of a completed *Foodborne Illness Complaint Worksheet* with an inspection report attached, if applicable. This form comprises the entire "report." If no violations were noted during the environmental inspection and no other complaints about the establishment were received, close the investigation. (More information on the *Foodborne Illness Complaint Worksheet* can be found in Chapter 4, Section 4-A and in Appendix E.)

References

Bryan, F. *Guide for Investigating Foodborne Disease Outbreaks and Surveillance Data,* U.S. Department of Health and Human Services, CDC. Atlanta, Georgia, 1981.

Holland, W. et al. *Oxford Textbook of Public Health*, Oxford University Press, 1985; 3: 284-289.

NOTES

EXAMPLE 9.1
OUTBREAK REPORT

MEMORANDUM

To: The File

From: [Writer of the Report]

Date: January 2, 1996

Re: Outbreak of *Salmonella tyvar-copenhagen* and *atypical Salmonella enteritidis* among patrons of Restaurant X during the month of September, 1995

I. Summary

On November 16, 1995, the Georgia Division of Public Health (GDPH), Epidemiology Branch, was notified by a resident of Town Y who had been confirmed with *Salmonella tyvar copenhagen* that she and a friend had eaten at Restaurant X on September 9, 1995 and had become sick on September 10th and 11th respectively Upon further investigation of *Salmonella tyvar copenhagen* cases reported to the bacteriology lab of the Georgia Public Health Laboratory (GPHL) during September and October, 1995, nine other cases were reported in the vicinity of Town Y, including four from a nearby town of only 3,000 people. Eight of these cases were eventually contacted, and all reported eating at Restaurant X previous to their illness with six reporting eating there in the two to three days before their illness. An additional case was identified from a complaint received from a resident of a distant town who had eaten at the restaurant in September and was later diagnosed with *S. tyvar-copenhagen*. Illness onset dates ranged from September 6 to September 25. A secondary case had an onset date of October 5. The cases ate a variety of food items including chicken, French toast, soup, salad, and a cheese steak sandwich. Seventeen food handlers submitted stool samples during December. All tested negative, but it was almost three months after the outbreak. There were, however, anecdotal reports of two food handlers being ill during the month of September.

IV and V Methods and Results

A. Epidemiologic

Attempts were made to contact all *S. tyvar-copenhagen* cases reported to the GDPH during September and October 1995. Eleven cases were reported in the vicinity of Town Y, two of which had been the original complainants. Eight of the remaining

nine cases had reported eating at Restaurant X previous to their illness. They had eaten a variety of foods on different days. The ninth case was unable to be contacted but an additional case was identified from a complaint received from a resident of a geographically distant town who was later diagnosed with *S. tyvar-copenhagen*. The Town Y health agent reported that there had been another separate complaint against the restaurant in September which involved a father and daughter, both of whom were ill, although only the daughter was confirmed with *atypical Salmonella enteritidis.* There were no other atypical *Salmonella enteritidis* cases reported to the SLI in the area of Town Y involving Restaurant X.

B. Environmental

The environmental health specialist at the county health department inspected the restaurant on November 20, 1995. The following deficiencies were noted: no hand washing sink with soap and paper towels in the kitchen, poor lighting in walk-ins, chowder cooling in four gallon pails, and no light shields in side preparation area. The environmental health specialist reviewed various aspects of food temperatures, handling, storage, preparation, hygiene, and sanitizing. The environmental health specialist did not observe any food preparation since the inspection occurred between meal times.

C. Laboratory

No food items were available for testing. Seventeen food handlers submitted negative stool samples during December.

VI Discussion

There appeared to be eleven cases of *S. tyvar-copenhagen* associated with Restaurant X during the month of September, 1995. These cases did not eat a common food item and did not eat on a common day. This supports the theory that contamination occurred in the restaurant. This contamination could have occurred as a result of poor food handling among *Salmonella*-infected food handlers or contamination of environmental surfaces by *Salmonella*-infected food items. The inspection report mentions no hand washing sink in the kitchen. The food handlers who submitted stool specimens tested negative, but this was two to three months after the outbreak, ample time for the *Salmonella* bacteria to be completely cleared from the stool of a previously infected person.

VII. Recommendations

1) To prevent outbreaks, efforts should be directed at optimizing conditions for sanitation, preventing contamination of foods or water, and cleaning environmental surfaces that may be at risk for contamination.

2) Any food handler who experiences any type of gastrointestinal illness must report it to a supervisor and must refrain from participating in foodhandling activities. Food handlers

should be aware of the importance of good hygiene in preventing the spread of foodborne illness. Handwashing should be done frequently, especially after toilet use.

3) All foods to be served to the public should be stored and prepared in a facility specifically for that purpose.

4) Potentially hazardous foods which contain poultry and/or poultry products shall be cooked to an internal temperature of at least 165^0F.

5) Potentially hazardous foods should be transported and held at suitable temperatures, if hot, at > 140^0F, if cold, at < 45^0F.

6) Potentially hazardous foods should be prepared as close to service time as possible. Advance preparation should be discouraged.

7) Food that will not be cooked before serving should be handled using a utensil or wearing gloves.

EXAMPLE 9.2
OUTBREAK REPORT

MEMORANDUM

To: The File

From: [Writer of the Report]

Date: February 6, 1996

Re: Outbreak of *atypical Salmonella Enteritidis* at a Private Home in XXXXX, GA on December 24, 1995.

Introduction:

On December 26, 1995, the Georgia Division of Public Health (GDPH), Epidemiology Branch, was notified by the XXXXX county health department that 11 out of 25 people who attended a private family holiday dinner in Town X during the late afternoon of December 24 had become ill with nausea, diarrhea, abdominal cramps, and fever the next day. All of the ill people were reported to have eaten lasagna at the dinner party. Other food items at the dinner included eggplant parmesan, chicken, and antipasto. The lasagna had been prepared at home by a resident of Town Y who initially contacted the county health department.

Food Preparation:

The environmental health specialist at XXX county health department reviewed the preparation process (HACCP risk assessment) for the lasagna with the resident. Eight shelled eggs were mixed with ricotta cheese during the preparation process. The lasagna was refrigerated overnight at the resident's house. It was transported to Town X in an unrefrigerated car for 20 minutes and then left out on a porch, unrefrigerated, for approximately two hours. The lasagna was then put in a preheated oven at 350^0F for approximately 30 minutes. Finally, the cooked lasagna was left out on a table at room temperature for more than two hours.

Laboratory Results:

Eleven ill guests of the holiday dinner submitted stool specimens which tested positive for *atypical Salmonella enteritidis*. The guests of the party were never queried as to their food history at the party, but anecdotal reports indicated that all the ill people ate the lasagna. A sample of the lasagna and chicken from the party were transported to the Georgia Public Health Laboratory (GPHL) for analysis. Both food items had violated

standard plate count levels (2,500,000 for the lasagna and 190,000 for the cooked chicken) and tested positive for *atypical Salmonella enteritidis*.

Conclusions:

Lasagna appears to be the food item which caused this Salmonella outbreak based on the information that all ill people apparently ate the lasagna, both the lasagna and ill people tested positive for *atypical Salmonella enteritidis,* and the lasagna, which was prepared with raw eggs, did not appear to have been cooked long enough to sufficiently kill the Salmonella bacteria. The chicken also tested positive for Salmonella, but both the leftover chicken and the leftover lasagna had been submitted in the same container where cross contamination could have occurred. Since no specific food histories were obtained from the guests at the party, no food item could be statistically implicated in this outbreak.

EXAMPLE 9.3
OUTBREAK REPORT

MEMORANDUM

To: The File

From: [Report Writer]

Date: January 27, 1996

Re: Outbreak of Gastrointestinal illness at a wedding reception at Restaurant X, Town Y, GA on October 14, 1995.

I. Summary

An outbreak of gastrointestinal illness began October 15, 1995 among attendees of a wedding reception held at Restaurant X in Town Y, GA. Approximately 140 people attended the reception. Of 76 attendees who responded to a questionnaire, 41 (54%) fit the case definition. Epidemiologic analysis of the questionnaires indicated that illness was primarily associated with the consumption of gravy and stuffed turkey. An evaluation of procedures used to prepare reception foods identified improper cooling, storage, and reheating techniques which could have resulted in time-temperature abuse of both gravy and stuffing, and cross-contamination of turkey. Neither food nor clinical specimens were available for testing. Clinical, epidemiologic, and environmental evidence suggests that this outbreak occurred as a result of consumption of gravy and/or stuffed turkey contaminated with *Clostridium perfringens* or *Bacillus cereus*.

II. Introduction

On November 2, 1995, the Environmental Health Office of the Georgia Department of Public Health (GDPH) was notified by the Town Y county health department of sixty-six of approximately 140 attendees of a wedding reception who became ill with abdominal cramps and diarrhea. The reception was held at Restaurant X in Town Y, GA on 10/14/95. The majority of ill attendees reported an onset of symptoms during the morning of 10/15/95. The reception consisted of appetizers (chicken fingers, cheese and crackers, bacon squares, deviled eggs, and stuffed celery) and a sit-down dinner including stuffed turkey, gravy, mashed potatoes, corn, cranberry sauce, rolls, salad, and cake. Beverages included home made hard apple cider. In response to the initial report, the County and District Health Department initiated an investigation in cooperation with the Epidemiology Branch, GDPH.

III. Background

Restaurant X, located in Town Y, GA, is a large restaurant including a banquet and conference room. Up to 225 patrons can be accommodated in a banquet setting.

IV. Methods

A. Epidemiologic

A case was preliminarily defined as any person who attended the wedding reception on October 14 (or ate leftovers from the reception) and who had onset of abdominal cramps, diarrhea, nausea, or vomiting during the next seven days. This definition was subsequently narrowed to only include those who had onset of symptoms within three days of the reception.

One hundred thirty-eight questionnaires regarding symptomatology, medical care, and food item consumption history were sent to a list of reception attendees obtained from the county health department. Completed questionnaires were entered into a database analysis system (EPI INFO, Version 6.02). Descriptive case statistics were calculated and a retrospective cohort analysis was performed.

B. Environmental

An on-site investigation was conducted by the local environmental health specialist at Restaurant X on November 2, 1995, in which procedures used in the preparation of foods served at the function were reviewed. The groom was interviewed by the district epidemiologist from the XXX District Health Department regarding procedures he used to manufacture hard cider served at the reception.

V. Results

A. Epidemiologic

Of 138 questionnaires sent out, 78 (57%) were received. Seventy-six of the 78 were completed and used in data analysis. Forty-one of the 76 respondents fit the case definition.

Descriptive analyses of the cases revealed that 21 (51%) were female and that ages ranged from 20 to 77 with a median age of 41 years. The incubation period between food consumption and illness ranged from two to fifty-eight hours with a median time of 12 hours (Table 1). Major case symptoms included diarrhea (93%), abdominal cramping (73%), nausea (37%), and fatigue (24%). Fever and vomiting were very infrequent and no bloody stools were reported by the cases (Table 2). Medical care was sought by one case. The reported duration of illness

ranged from 2 hours to 10 days, with a median of 24 hours and most frequently reported duration of 48 hours (24%) (Table 1).

The epidemic curve shown in Figure 1 suggests that this outbreak occurred after the reception attendees were exposed to a common source. A retrospective cohort analysis of completed questionnaires indicates that the consumption of each of five items, including turkey, stuffing, gravy, corn, and ranch dressing, was statistically associated with illness (Table 3). All cases consumed turkey (estimated risk ratio [RR] = 10.83, 95% confidence [CI] = Undefined, p-value = 0.001), stuffing ([RR] = 8.18, [CI] = Undefined, p-value = 0.007), and gravy ([RR] = 10.83, [CI] = Undefined, p-value = 0.001). The observed association with illness for both corn and ranch dressing consumption is likely confounded by stuffed turkey or gravy consumption. Due to low cell counts, however, stratification did not reveal further meaningful statistics.

Food and beverage consumption dose data was obtained for most items listed on the questionnaire. Results from a chi square analysis for trend indicated that the reported quantity of turkey, stuffing, and gravy consumed was linearly associated with illness (Table 4).

B. Environmental

The following high risk factors were revealed during the environmental investigation of Restaurant X by the county health department combined with subsequent follow-up by the District Health Department staff: 1) Stuffing made with sautéed onions, celery, butter, bread crumbs, and seasoning may have been prepared the day before service. Hot stuffing prepared ahead of time was placed in five-gallon plastic containers, covered with saran wrap, and placed in the walk-in refrigerator overnight. This may have resulted in improper cooling; 2) Seven gallons of gravy consisting of chicken stock, flour, and butter was prepared at noon the day before service, covered, and stored overnight in two five gallon plastic buckets, possibly delaying cooling and allowing the growth of vegetative bacterial cells. The gravy was then reheated in a double boiler prior to service. Lower cooking temperatures and/or shorter cooking time in the double boiler may have been insufficient to destroy vegetative cells present. Thermometers were not used by the establishment to monitor cooking and cooling temperatures; 3) Raw beef was stored over cooked food products which may have resulted in cross-contamination. No other significant findings were noted relative to the preparation of foods or to employee health and hygiene.

A Hazard Analysis Critical Control Point (HACCP) evaluation of the hard cider preparation was conducted by the Division of Food and Drugs, but no high risk factors were revealed. The hard cider was a fermented alcoholic beverage made with fresh cider from an approved source, yeast, sugar, and maple syrup. The cider was fermented with carbon dioxide and aged for approximately two and one-half years.

VI. Discussion

The gastrointestinal illness observed in this outbreak was characterized primarily by diarrhea, abdominal cramps, and nausea, with very little vomiting or fever reported. The median incubation and duration periods were calculated as 12 and 24 hours respectively. These clinical features closely resemble those of both *Clostridium perfringens* and long incubation *Bacillus cereus* infections, although a viral or other bacterial etiology remains possible.

Epidemiologic analysis of food consumption histories obtained from questionnaires suggests that the consumption of gravy and/or stuffed turkey was most significantly associated with illness. These findings are supported by environmental evidence indicating that improper cooling procedures for both stuffing and gravy could have resulted in the growth of bacterial organisms. In addition, the subsequent reheating of gravy may not have destroyed any bacteria present, following cooling. Corn and ranch dressing consumption, shown to have a weaker association with illness, are more likely associated with the consumption of stuffed turkey or gravy. No violative procedures were noted regarding the preparation of corn or ranch dressing.

Homemade hard cider was a suspect item along with the foods and beverages prepared by Restaurant X. No epidemiologic association was found between hard cider consumption and illness. While there have been cases of mycotoxin contamination of apple juice, hard cider has not been identified as a common vehicle in foodborne illness outbreaks.

Gravy prepared from meat stock in cafeteria, restaurant, or institutional settings (large volume) is one of the most frequently implicated foods in *Clostridium perfringens* outbreaks. Heat-resistant spores may survive initial cooking. During slow cooling processes, spores can germinate and multiply to levels high enough to cause illness. Inadequate reheating (at temperatures less than 165^0F) can result in failure to kill the bacteria present.

VII. Recommendations

1. Prepare potentially hazardous foods as close to service time as possible.

2. Rapidly cool hazardous foods to 41^0F within 2 hours. Use shallow containers or icebaths to facilitate rapid cooling. Stainless steel containers rather than plastic are recommended for cooling. Loosely wrap the containers while cooling to allow for air circulation and refrigerate foods to be cooled immediately. Use food stem-type thermometers to monitor temperatures while cooling.

3. Reheat foods to 165^0F within two hours. Use a thermometer to measure temperature after reheating.

VIII. Acknowledgments

The GDPH Notifiable Diseases Section thanks the Town Y Board of Health for their participation and assistance in this investigation. In addition, Restaurant X and the wedding reception organizers are thanked for their cooperation.

TABLE 1.
INCUBATION PERIOD AND DURATION OF ILLNESS
GI Outbreak, Town Y, GA - October 1995

INCUBATION PERIOD (HOURS)
n = 41

RANGE	2-58
MEAN	12.9
MEDIAN	12
SD	8.4

DURATION OF ILLNESS (HOURS)
n =41

RANGE	2-240
MEAN	34.8
MEDIAN	24
MODE	48
SD	39.7

TABLE 2.
SYMPTOMS OF CASES (n = 41)
GI Outbreak, Town Y, GA - October 1995

SYMPTOM	NUMBER (PERCENT)
Diarrhea	38 (92.7%)
Bloody	0 (0%)
Abdominal Cramps	30 (73.2%)
Nausea	15 (36.6%)
Fatigue	10 (24.4%)
Loss of Appetite	7 (17.1%)
Headache	6 (14.6%)
Muscle Aches	4 (9.8%)
Vomiting	3 (7.3%)
Chills	3 (7.3%)
Dizziness	2 (4.9%)
Fever	1 (2.4%)

TABLE 3.
ATTACK RATE BY FOOD CONSUMED
GI Illness, Town Y, GA - October 1995

		Attack Rates				
		Exposed	Unexposed			
Food Item	**Total Exposed**			**Risk Ratio**	**95% C.I.**	**p-value ***
Turkey	68	60%	0%	10.83 ***	Undef	0.001 **
Stuffing	70	59%	0%	8.18 ***	Undef	0.007 **
Gravy	68	60%	0%	10.83 ***	Undef	0.001 **
Mashed Potatoes	69	57%	29%	1.98	0.60, 6.5	0.238 **
Corn	62	61%	21%	2.86	1.03, 7.95	0.016
Cranberry Sauce	47	57%	48%	1.19	0.76, 1.87	0.588
Rolls	47	57%	48%	1.19	0.76, 1.87	0.588
Butter	53	57%	48%	1.18	0.73, 1.93	0.649
Salad	60	55%	50%	1.1	0.64, 1.89	0.941
Italian Dressing	28	43%	60%	0.71	0.44, 1.15	0.214
Ranch Dressing	32	69%	43%	1.59	1.05, 2.40	0.048
Chicken Fingers	3	67%	53%	1.25	0.55, 2.86	1.000 **
Bacon Squares	14	43%	57%	0.76	0.40, 1.44	0.532
Deviled Eggs	19	63%	51%	1.24	0.81, 1.90	0.506
Stuffed Celery	27	44%	59%	0.75	0.46, 1.22	0.321
Crackers	40	55%	53%	1.04	0.69, 1.58	0.971
Cheese	37	51%	56%	0.91	0.60, 1.38	0.832
Water	52	52%	58%	0.89	0.58, 1.36	0.784
Ice	46	54%	53%	1.02	0.66, 1.56	0.882
Hard Cider	25	60%	51%	1.18	0.77, 1.79	0.62
Beer	25	48%	57%	0.84	0.53, 1.35	0.629
Wine	14	71%	50%	1.43	0.94, 2.16	0.248
Coffee	41	46%	63%	0.74	0.49, 1.12	0.227
Cake	38	61%	47%	1.28	0.84, 1.95	0.357

* Yates Corrected unless otherwise noted
** Fisher's Exact (2-sided)
*** Risk Ratio Estimate (0.5 added to each cell)

TABLE 4.
CHI SQUARE ANALYSIS FOR TREND
(Turkey, Stuffing, and Gravy Consumption)
GI Outbreak, Town Y, GA - October 1995

Turkey Consumption

Amount consumed	Attack rate	p-value
None	0%	0.00007 *
Some	31.6%	
All	71.4%	

Stuffing Consumption

Amount consumed	Attack rate	p-value
None	0%	0.007 *
Some	30%	
All	70%	

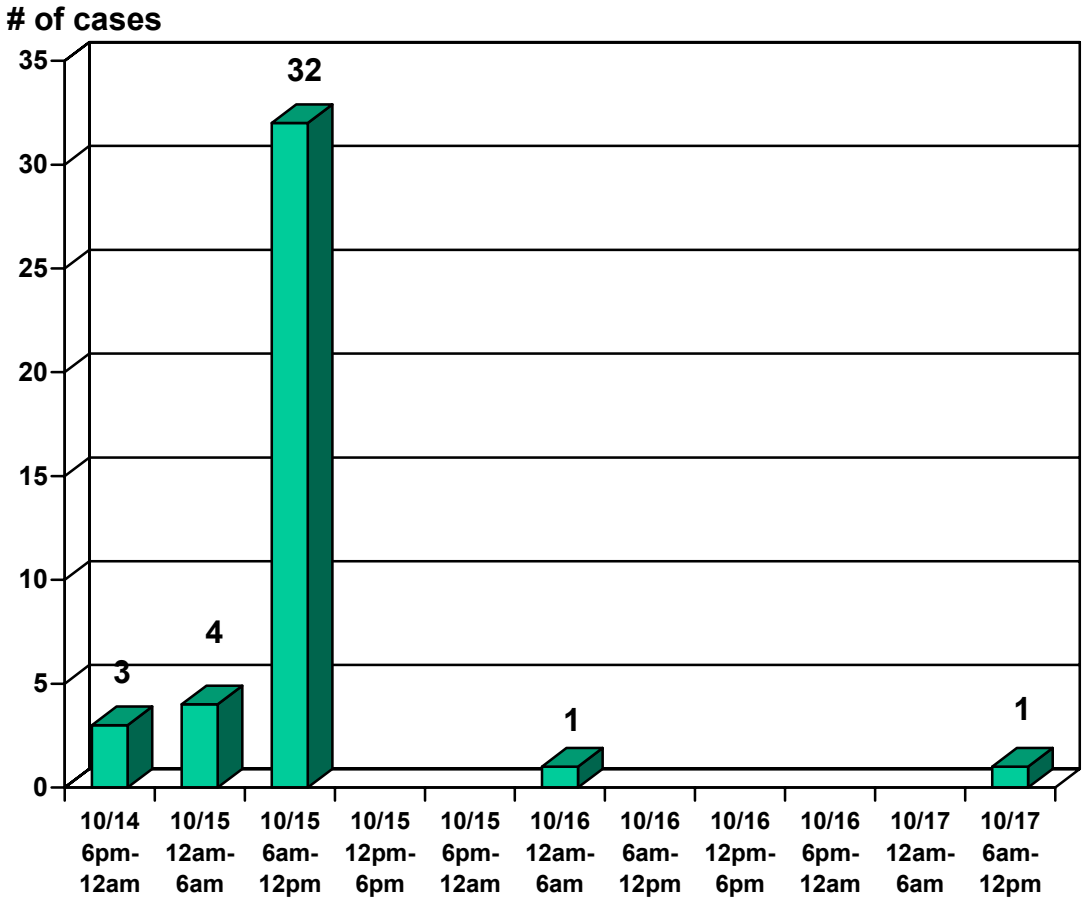
Gravy Consumption

Amount consumed	Attack rate	p-value
None	0%	0.00006 *
Some	33.3%	
All	72.3%	

*Mantel Extension

Figure 1 - Epidemic Curve

Onset of Illness by Quarter Day
Wedding Reception, Town Y – GA, April 199



NOTES

Chapter 10

FOOD BIOTERRORISM

1) Background on Intentional Contamination of Food

2) Distinguishing an Intentional Attack from a Naturally Occurring Outbreak

3) Factors that Increase the US Food Supply to an Intentional Attack

4) Potential Agents for an Intentional Attack

5) What We Can Do

FOOD BIOTERRORISM

1) Background on Intentional Contamination of Food

Food is an element of daily life, but, in our complex culture, we often overlook the role of food in basic survival. It is not only a need for basic survival, but it also represents security, comfort, and the ability to provide basic needs. The threat of a bioterrorist attack on our food supply is an issue that we need to evaluate and analyze at every level of preparedness planning. Deliberate food and water contamination remains the easiest way to distribute biological or chemical agents for the purpose of terrorism, despite the national focus on dissemination of these agents as small particle aerosols or volatile liquids. Terrorists may target the civilian population to create panic and threaten civil order. A review of the preparedness of federal food safety regulatory agencies by the US General Accounting Office found that "although few actual incidents or threats of deliberate food contamination with a biological agent have occurred to date, there is little assurance that this track record will continue".

In 1906, Upton Sinclair's graphic literary masterpiece, *The Jungle*, described the shockingly grotesque conditions found in American pork and beef packing plants. That powerful novel triggered the United States government's century long quest to protect and preserve the safety of our national food supply. Nearly 100 years later, the U.S. food supply is the largest and safest in the world, and it is safe to say our government has succeeded in protecting and ensuring its quality. Times have changed since 1906, however, and today's food supply faces more dangers than the rats and disease described in Sinclair's work. New bacteria and germs continually emerge, causing both illness and death. In addition to these natural threats, the U.S. food supply has found itself in danger of intentional biological contamination. In the time since the September 11th attacks, the nation's leading food safety and homeland security authorities have openly acknowledged the very real threat of intentional food supply contamination. As the U.S. continues to globalize its food supply, the threat of biological warfare and the consequential threat to the security of the food supply greatly increases.

Deliberate contamination of food has already occurred in the past. One of the earlier documented episodes occurred in Japan with the introduction of Typhoid in Japan. In this situation, research microbiologists contaminated food and beverages over a 2-year period, resulting in over 100 cases and four deaths. The purpose of the sabotage may have been to obtain clinical samples for a doctoral thesis. Another example is an outbreak of hepatitis due to food contamination on a military base in 1961. The outbreak was traced to the ingestion of potato salad served over a two-day period in the Officer's Quarters. One food worker was identified as the preparer of the salad, and it was discovered that this worker had a history of mental illness. Although it was never proven, it is thought that this worker had a mild illness and urinated on the potato salad.

One of the most well-known and documented examples of this is the deliberate introduction by a religious cult, of *Salmonella typhimurium* into salad bars of restaurants in The Dalles, OR in 1984. In this case, the cult members intentionally introduced *S. typhimurium* obtained from a laboratory supply company in order to disrupt the local elections. It is interesting to note that investigators initially ruled out intentional contamination and it was not until a former cult member informed law enforcement officials of the plot that the criminal investigation was reopened. In 1996, an outbreak of *Shigella dysenteriae* occurred in a group of laboratory workers in Texas. Epidemiologic investigation revealed a 100% attack rate for persons who ate pastries left anonymously in the secure break room. This raised suspicions of an intentional contamination. There were no other cases linked to the pastries outside of this one laboratory. The strain of *S. dysenteriae* was found to be identical the laboratory's own stock culture. In this case, a disgruntled employee plead guilty to a personal act of food-borne terrorism.

Bacterial agents are not the only types of contamination that have been used in the past to contaminate food. In 1970, four male students ingested a festive meal maliciously contaminated with ova of *Ascaris suum,* the pig roundworm. The students developed clinical syndromes of massive pulmonary infiltrates, asthma, and eosinophilia, and required hospitalization. A recent example of using a non-bacterial agent occurred in Michigan this past May. A supermarket employee pleaded guilty to lacing ground beef with an insecticide containing nicotine. This lead to illness in 111 people, including 40 children. Rat poison has been used as well to contaminate food. This was the case in China in 2002 where an owner of a fast food outlet contaminated the breakfast food of a competitor's restaurant. There were nearly 40 deaths and over 200 people were hospitalized. In an attempt to disrupt Israel's economy, citrus exports were contaminated with mercury, resulting in illness and hospitalization of dozens of children in Holland and West Germany.

One of the most lethal terrorist attacks on food occurred when several thousand SS soldiers interned in a US prisoner-of-war camp were poisoned with arsenic. Nakam, a group seeking vengeance, infiltrated the bakery that supplied bread to the camp, and this act resulted in hundreds of deaths and thousands of illnesses. Historically, targeted political assassinations or murders too numerous to count have been reported for centuries. Multiple hoaxes of threatened contamination of the food supply have also been investigated by security agencies worldwide. There are many more examples of unintentional contamination of food and resultant illness in the literature. Although these examples are not acts of terrorism, they may serve as a guide to a potential terrorist as to what to use and how to do it.

2) Distinguishing an Intentional Attack from a Naturally Occurring Outbreak

Food may be compromised in a deliberate attack in two main ways, either as the primary agent or as a secondary agent. To be a primary agent, food would need to be contaminated with an infectious or noninfectious agent or chemical. Examples include botulism toxin, *Salmonella* species, *E. coli* 0157:H7 or *Shigella* species. To be a secondary agent, a terrorist may attack our ability to feed individuals by limiting access to food and water by disrupting the flow of energy (cooking fuels), or by causing significant casualties, leading to social disruption.

The National Academy of Sciences report "Making the Nation Safer: The Role of Science and Technology in Countering Terrorism" points out that food and water supply networks have a ready-made distribution system for the rapid and widespread introduction of chemical weapons. The systems put in place for quality control in food production and distribution centers are not designed to deter and detect intentional contamination. Our current system for food safety has two strengths that may help minimize the spread of an introduced contaminant. This includes consumer education materials on safe food handling practices and a heightened awareness of safe food handling practices. The existing system of Hazard Analysis Critical Control Point (HACCP) at every step of food production from the farm to the consumer for highly perishable foods will also help to prevent or minimize effects of intentional contamination.

Assessing if there has been an intentional attack on our food and water supplies would be difficult, to say the least. We could hope that a threat of an overt attack be made by a terrorist group, or a group that would claim responsibility for an attack. But more than likely we would have to rely on an epidemiological investigation of an outbreak. Early recognition is key, not only to remove the contaminated product and treat any afflicted people, but also to promptly direct the criminal investigation by law-enforcement authorities and bring into play the full array of federal resources available to counter a bioterrorist attack**.** It is therefore important to improve and maintain the public health infrastructure for detection and response to outbreaks. This includes robust surveillance, improved laboratory diagnostic capability, increased training of staff for rapid epidemiological investigations, and enhancement of effective communications between involved agencies and the public. If bioterrorism is suspected, local hospitals and clinics should contact local law enforcement officers/FBI for referring the specimens to GPHL**.**

Important epidemiologic clues to alert investigators of the possibility of a deliberate attack include different foods being contaminated at different locations and nearly simultaneous involvement of many locations despite the lack of common food sources. We would also see a surge in demand for testing of foods for pathogens at local and state public health laboratories. Additionally, risk in naturally occurring disease, once understood, generally remains constant or has a predictable seasonality. However, in an intentional contamination, risk may be altered by the perpetrators(s). This could be accomplished by

using genetically modified strains of bacteria that are more virulent or are resistant to multiple antibiotics. Also, multiple agents could be combined when used for intentional contamination, or agents not normally considered food borne pathogens might be used. There may also be unusual food vehicles identified as the source of an outbreak.

A global increase in food and water safety initiatives combined with enhanced disease surveillance and response activities are the best hope to prevent and respond quickly to food and waterborne bioterrorism.

3) Factors that Increase the US Food Supply to an Intentional Attack

The modern global food supply is a wonder of mass production and efficiency, but in its size and sophistication lie its vulnerabilities. Farms and livestock companies are enormous enterprises here and abroad owned by international firms and serving a multitude of retail supermarkets, discount stores, and fast food outlets. Contamination, whether unintentional or deliberate, at any point in the production, processing, or distribution of food spreads quickly across states and even beyond national borders.

To further complicate matters, 12 separate federal entities administer more than 35 different food safety laws. Therefore, even though the FDA and USDA-FSIS are the principle food safety agencies, no agency feels empowered to take action to protect the food supply.

4) Potential Agents for an Intentional Attack

Table 10-1: Potential Agents of Contamination*

Bacteria	Viruses	Protozoa	Parasites	Inorganics	Toxins
Salmonella spp.	Hepatitis A	*Giardia lambia*	*Trichinella spiralis*	Lead	Botulinum toxin (*Clostridium botulinum*)
Shigella spp.	Caliciviruses (Including Noroviruses)	*Cryptosporidium parvum*	Tapeworms	Arsenic	Staphylococcal enterotoxin B
Shiga toxin producing *E.coli*	Rotavirus	Balantidium coli	Misc. parasites of human and animal origin	Mercury	Ricin
Vibrio cholerae		*Entamoeba histolytica*		Various pesticides	Anthrax spores
Campylobacter spp.		Cyclospora spp		Dioxins	Aflatoxin
Yersinia enterocolitica				PCBs	Seafood intoxications
Clostridia spp. (other than *C. botulinum)*					T-2 mycotoxins
Listeria monocytogenes					
Bacillus cereus					

*Refer to Chapter 2 or Appendix G for additional details about many of these agents

5) What We Can Do

We need to strengthen systems of active surveillance such as The Foodborne Diseases Active Surveillance Network (FoodNet) and PulseNet. PulseNet is a computer network of public health and regulatory laboratories that tracts molecular typing and sub-typing of certain foodborne pathogens including *E. coli* 0157, non-typhoidal *Salmonella* spp, *Listeria monocytogenes*, and *Shigella* spp. Currently, all 50 state public health laboratories in the US, as well as public health laboratories in Canada, participate in PulseNet. FoodNet was established jointly by the CDC, FDA, and USDA Emerging Infections Program to ascertain the burden of foodborne illness. FoodNet sites do population-based active surveillance for laboratory-diagnosed cases of ten enteric bacterial and parasitic infections as well as for hemolytic uremic syndrome (HUS). Other pathogens and syndromes will be added as needed in the future. As of today, FoodNet does not cover all 50 states, and such implementation would greatly expand our nation's surveillance capabilities. Surveillance activities must be coupled with robust response activities that are triggered by real-time monitoring of surveillance indicators and contacts with the medical community.

The USDA-FSIS and FDA-Center for Food Safety and Applied Nutrition (CFSAN), our food safety agencies, have issued guidelines, and the USA Patriot Act includes a Bioterrorism Preparedness Act. At least our awareness of the danger is high. The FDA has asked for increased funds to be directed towards its food surveillance, including 210 additional import inspectors, 100 additional inspectors at critical survey points for product safety in domestic food production, and 100 additional technical analysts to multiply the number of food samples tested for possible contamination.

President Bush signed into law the Bioterrorism Preparedness and Response Act of 2002 (the Act). This act governs the efforts of the FDA and other agencies in protecting this country from food borne threats. One of the main features is the required registration with the FDA of domestic or foreign facilities that manufacture, process, pack, distribute, receive, or hold food for consumption in the US. This was accomplished by December 12, 2003. Proper record maintenance must also be done to allow access to a facility when there is a reasonable belief that an article of food is adulterated and presents a threat of a health consequence. These records are to include information to identify the immediate previous sources and the immediate subsequent recipients of food. Administrative detention of food will be allowed if the FDA has credible evidence that the food presents a serious threat to health. Another key feature of the Act is the requirement of advance notice of each shipment of food into the US. This notice must include a description of all articles, each article's manufacturer and shipper, grower (if known), originating country, country from which the article is shipped, and anticipated port of entry. This requirement went into effect on December 12, 2003.

The Act also includes several provisions for which FDA is currently considering guidance. The first is the debarment of persons from importing food who have been convicted of a felony relating to the importation of any adulterated food or who have engaged in a pattern of importing adulterated food that presents a threat to health. The next is the marking or labeling of foods refused admission into the US at the owner's expense. The Act also allows for grants to states, territories and Indian tribes to assist them with the costs of taking appropriate action after receiving notification, as well as authorizing the Secretary to commission other Federal employees to conduct examinations and inspections. Thus, the Act has firmly placed food safety as a legitimate concern within homeland security, national defense and related programs.

Some steps individuals can take to safeguard themselves are:

- Accept only food from reputable vendors
- Check for intact packaging
- Wash cans before opening to keep debris from falling into foods
- Be alert to abnormal odor, taste or appearance of food item
- Proper handling and cooking of foods

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NOTES

Appendix A

INFECTED FOOD WORKER POLICY

1) County Health Department Responsibility

2) Definition of a Food Worker

3) What To Do If You Discover a Sick Food Worker

4) Specific Disease Control Measures

5) Hepatitis A Control Measures

INFECTED FOOD WORKER POLICY

1) County Health Department Responsibility

Infected food handlers are a significant contributing factor in foodborne illness outbreaks. Fecal-oral transmission by food workers with gastrointestinal symptoms such as nausea, cramps, vomiting and diarrhea is possible since they shed the pathogen during illness as well as after symptoms disappear. Infected skin lesions on food handlers may also be reservoirs of pathogens, such as *Staphylococcus aureus*, which can be transmitted to food when there is direct contact between the food and the infected lesion.

When a local health department receives a report of a food worker who may be a carrier of a communicable disease that can be spread through food, it should be investigated immediately. The key to effective intervention is timeliness. Precautionary actions, specific to the disease agent involved, must be taken, and in some cases, rapid public notification must also be implemented.

2) Definition of a Food Worker

A food worker is any person directly preparing or handling food. This could include the owner, individual having supervisory or management duties, other person on the payroll, family member, volunteer, person performing work under contract, or any other person working in a food handling facility. In health care facilities, this includes those who set up trays for patients to eat, feed or assist patients in eating, give oral medications or give mouth/denture care. In day care facilities, schools, and community residential programs, this includes those who prepare food for clients to eat, feed or assist clients in eating, or give oral medications.

3) What To Do If You Discover A Sick Food Worker

a. Confirmation of Illness

Whenever a food worker is reported to have a disease capable of being spread through food, the diagnosis should be confirmed immediately.

If the initial report is received from a health care provider, confirmatory laboratory tests from an approved laboratory should be requested. If the initial report is received from a

qualified laboratory, health care provider confirmation is not necessary to proceed with the implementation of public health measures (see steps below).

b. Worker Exclusion

Restriction or exclusion actions that should be taken are outlined in OCGA 290-5-14-.04, and OCGA 290-5-14-.11. An excluded food worker may return to work when the local health officer determines that no further public health threat is posed by that individual working as a food handler.

c. Identification and Disposition of Food Contaminated by Infected Food Worker

Collect specific information about the food worker's duties and responsibilities at the food service establishment. Determine if food on the premises prepared or served by the sick food handler should be discarded based on: hygienic practices observed (poor hygiene increases the risk for disease transmission through food), foods handled, and method of preparation. Be specific as to food handled and dates on which it was handled for the entire time the food handler was symptomatic while working. (Exception: With a hepatitis A case, the person is considered to be infectious with HAV two weeks prior to onset of symptoms and up to one week after onset.

Questions to keep in mind are:

- What dates did the employee work while he/she was symptomatic?
- What specific foods were touched by the employee's bare hands and were not subsequently cooked prior to service?
- Describe the food worker's hygienic practices.
  - Does the food worker wash his/her hands after using the bathroom?
  - Does the food handler wash his/her hands as necessary during the day?
  - Does the food handler use disposable gloves? If so, are they used properly?

Foods that may have become contaminated by an infected food handler should be embargoed or disposed of in accordance with OCGA 290-5-14-.11

d. Interviewing and Education of Other Food Workers

Other food handlers in the food establishment should be interviewed about their health status and, if symptomatic, excluded and possibly referred to their health care provider. The food establishment employees should also be educated about the disease (i.e., symptoms, mode of transmission, prevention). Provide the employees with fact sheets.

- Stress the importance of thorough hand washing.
- Stress the importance of employees not working if they are ill.
- If the establishment is using gloves, educate about the proper use of gloves.

Proper hand washing procedures

1) Wet hands with warm water and apply enough soap to attain a good lather.
2) Wash the palms and backs of your hands, wrists, between the fingers, and under the fingernails. Washing for at least 20 seconds is necessary.
3) Rinse thoroughly under running water.
4) A second hand washing should be done on entering the kitchen before beginning work, and after using restroom. This "double handwash" will require placing soap on a nailbrush, and scrubbing the ends of the finger tips and washing the hands as described above. Then hands are washed a second time as described above.
5) Dry hands with a paper towel. Use the paper towel to shut off the water.

e. Testing Food Workers in Outbreak Situations

In an outbreak situation, especially when multiple foods are implicated, it may be useful to collect stool specimens from food workers to ensure the removal of a food worker who is a continuous source of contamination or to help to determine if infected food workers contributed to or were the source of an outbreak. Food handlers should provide a stool specimen within 48 hours. Further information on how to submit stool specimens is found in Chapter 6, Section 4.

f. If Applicable, Public Notification

When a public notice is anticipated, such as in a hepatitis A exposure, facilities and the medical community must be notified first in order to be prepared to respond. (A sample public notice is provided in Appendix D.) All public inquiries should be directed to the local health department.

4) Specific Disease Control Measures

Disease control measures for some of the more common diseases are listed below.

Campylobacteriosis, Salmonellosis, Giardiasis: An infected food handler / daycare attendee may return to work/daycare once diarrhea has resolved.

Hepatitis A: See next section, Section 5, for detailed information on hepatitis A.

Typhoid Fever: An infected food handler/daycare attendee may return to work/school only after producing *three negative* stool specimens, each taken at least 24 hours apart greater than a month after onset. If the food handler has been treated with an antimicrobial, the first stool specimen shall not be submitted until at least 48 hours after cessation of therapy. Certain types of *S.* Paratyphi can cause a similar illness called

Paratyphoid Fever. Please contact the Notifiable Disease Section for guidance on foodhandlers infected with *S*. Paratyphi.

Shigellosis: An infected food handler may return to work once diarrhea has resolved *and* two negative stool specimens have been produced at least 24 hours apart. If the food handler has been treated with an antimicrobial, the stool specimens shall not be submitted until at least 48 hours after cessation of therapy.

***E. coli* O157:H7**: An infected food handler may return to work once diarrhea has resolved *and* two negative stool specimen have been produced at least 24 hours apart. If the food handler has been treated with an antimicrobial, the stool specimen shall not be submitted until at least 48 hours after cessation of therapy.

Skin Infections: An infected food handler may return to work after the risk of transmitting bacteria has been eliminated. Any lesions must be completely healed or properly covered with an impermeable bandage and a single use glove must be worn over the bandage.

Undiagnosed Diarrhea and Vomiting: Employees with diarrhea and/or vomiting may only return to work after clinical symptoms have resolved or until a noninfectious cause has been determined.

5) Hepatitis A Control Measures

Reports of hepatitis A cases should be acted upon immediately. A confirmed case of hepatitis A in a food handler is a serious event and requires that risk for both co-workers and the public be assessed as quickly as possible.

Since the incubation period for hepatitis A can be as long as 50 days, a prevention measure is available for those who might have been exposed. Immune globulin (IG), if administered within 2 weeks of exposure, is 80-90% effective in preventing the illness completely or making the symptoms less severe. This is particularly important when trying to prevent further cases among co-workers of a positive food handler. The sooner IG is given the more effective it is in preventing infection. Food handlers who have previously received two doses of hepatitis A vaccine can be considered immune. These food handlers will not need to receive IG nor be restricted.

The infectious period, hygiene, work habits, foods prepared, methods of food preparation and symptoms can help to determine the likelihood that consumers were exposed to contaminated food. If the risk is considered high, based on established criteria, efforts must be made to find those consumers and advise them to be evaluated for preventive treatment (i.e., IG).

Follow the recommendations below when you receive a call regarding a suspect case of hepatitis A in a food handler.

a. Confirm the Case

The confirmation of hepatitis A requires serologic testing to detect antibodies against HAV (anti-HAV). The antibody response to HAV (Hepatitis A Virus) consists initially of the IgM class antibody that usually becomes detectable at the time of illness (approximately 30 days post-exposure.) Therefore, the presence of IgM is associated with active or recent HAV infection. **In order to have a confirmed case of hepatitis A, the patient must be IgM anti-HAV positive**. The appearance of the IgG class of anti-HAV follows the IgM response by several weeks. IgG antibody to HAV persists for life in most cases.

Typically, HAV serology is performed by first testing the serum for the presence of total antibody against HAV (i.e., IgM and IgG combined). If this test is negative, no further tests need to be done on that sample. If it is positive for total HAV antibody, the serum should then be tested for IgM specifically.

Thus, three results are possible when testing for antibody against HAV:

1) Total antibody negative = No evidence of HAV infection = susceptible

2) Total antibody positive and IgM negative = Prior infection with HAV (possibly years ago) or immunized, currently immune, not an active case, not infectious

3) Total antibody positive and IgM positive = A case of active hepatitis A, recent infection and possibly infectious, follow-up is necessary

Occasionally, a laboratory will report a HAV serology as "IgM and IgG positive." Although this wording can be confusing, typically, this means the specimen was total antibody positive. One should always confirm that a specific test for IgM anti-HAV was performed and that it was positive.

NOTE: Remember, if a suspect case of hepatitis A in a food handler becomes confirmed, a GDPH Notifiable Disease Report Form must be completed and sent to the GDPH, Notifiable Disease Section. (404) 657-2588

b. Determine the Period of Infectivity

Fecal shedding of the virus peaks during the week prior to onset of symptoms. For purposes of public health intervention, a patient should be considered to be infectious for 14 days prior to the onset of symptoms to 7 days after onset of symptoms. If symptom onset is unclear, use the date when jaundice was first noticed. If no symptoms were noted, the date the blood was drawn is considered the date of onset.

c. Report to the GDPH

Notify the GDPH, Notifiable Disease Section (404) 657-2588 as soon as you hear of a suspect/confirmed hepatitis A case in a food handler.

d. Exclude the Food Worker

No case shall engage in the handling of any food until one week after onset of symptoms, providing all symptoms have subsided.

e. Inspect the Food Establishment

The food establishment inspection should involve the following:

- Focus on hand washing practices and rest room facilities, the types of foods and beverages that are served, and how these foods and beverages are handled.
- Obtain a very **careful history** of which days and shifts the infected person worked; exact duties, types of food handled, any use of disposable gloves, as well as an assessment of the employee's hygiene. Inquire about tasks performed by the infected employee during his/her infectious period that may have differed from normal job duties. Ascertain if food prepared on one shift is carried over to the next shift or to the next day. Determine if other employees eat food prepared by the index case. Ask the case whether she/he worked while symptomatic with diarrhea; if so, note the dates on which this occurred**. Ask the case if he/she is a food handler at other establishments.**
- Institute rigid hand washing and minimize bare hand contact with high-risk foods. High-risk foods are items which are served raw or which are handled after being cooked. Examples of high risk foods include but are not limited to:
  - Lettuce, tomatoes, etc. on sandwiches that receives no further heating
  - Salads, vegetables, and fruits at salad bars
  - Sliced cooked foods which may be contaminated during boning or slicing procedures
  - Cold cuts
  - Cake icing
  - Ice that is scooped by hand or with a contaminated scoop
  - Condiments for drinks (olives, lime wedge, etc.)
- Ensure that the food handler is excluded from work until no longer infectious, i.e., one week after symptom onset.
- Obtain a list of all employees. Survey other employees for symptoms consistent with hepatitis A. I f other employees are symptomatic, they should also be excluded from work and tested for hepatitis A.

f. Immunize Contacts with IG

Hepatitis A can be transmitted by food contaminated with feces from an infected food worker. When a food worker has a confirmed case of hepatitis A, **other food handling facility employees that worked with the infected person or had contact with the food he/she prepared, must receive immune globulin (IG).** IG provides temporary protection (three months) and is 80-90% effective in preventing hepatitis A if administered within 14 days after exposure to HAV. IG given more than 14 days after exposure is unlikely to prevent secondary cases of hepatitis A.

The county health department must ensure that other employees receive IG. If an employee elects not to receive IG, the employee must be excluded from working for 28

days. The exception to this exclusion is if documentation of HAV vaccination can be produced or serologic immunity to HAV demonstrated. Receipt of IG will not interfere with subsequent serologic tests for HAV.

g. Assess the Likelihood of Transmission to the Patrons of the Food Establishment

A determination should be made whether or not there is a sufficient risk of HAV transmission to the public to warrant notification of the establishment's patrons. IG administration to patrons is usually not recommended, but should be considered if the following conditions exist:

- The infected person is directly involved in handling, without gloves, foods that will not be cooked before eaten, and
- The infected person is assessed to have less than adequate personal hygiene OR worked while symptomatic with diarrhea, and
- Patrons can be identified and provided IG within 2 weeks of exposure.

In settings where repeated exposures to HAV may have occurred (e.g., institutional settings), stronger consideration of IG use may be warranted.

h. If Applicable, Notify the Public

If it is determined that patrons would benefit from IG administration (see f above), the local health department will be involved in posting public notices, issuing press releases and/or holding press conferences to identify and inform patrons at risk.

i. Maintain Surveillance

The manager of the establishment should monitor employees daily for the presence of signs and symptoms of hepatitis A (nausea, vomiting, diarrhea, abdominal pain, fever and jaundice). If symptoms appear in other employees, they should be referred to their health care provider for testing and excluded from work until they test negative and symptoms have subsided. This monitoring should continue for 50 days (one incubation period) past the last day the food handler worked while infectious. The local health department should also visit the establishment during this time to confirm compliance with all recommended control measures.

j. Take Steps for Prevention

As stated in Section 3 of this appendix, the food establishment employees should be educated about the disease, its signs and symptoms and the importance of not working while ill. The education should also include the importance of good hygiene (i.e., frequent hand washing) and no bare-hand contact with ready to eat foods.

Hepatitis A Vaccine. Hepatitis A vaccination provides pre-exposure protection against HAV infection, and is recommended for persons who are at increased risk for infection and for any person wishing to attain immunity. The populations at increased risk for HAV infection or the adverse consequences of infection are:

- Persons traveling to or working in countries that have high or intermediate endemicity of infection,

- Children in communities that have high rates of hepatitis A and periodic hepatitis A outbreaks;
- Men who have sex with men;
- Illegal-drug users;
- Persons who have occupational risk for infection;
- Persons who have chronic liver disease;
- Persons who have clotting-factor disorders; and
- Other groups (consideration is now being given to food handlers).

More information on each of these populations is provided in "Prevention of Hepatitis A Through Active or Passive Immunization" (*MMWR*, Vol. 45, No. RR-15, December 27, 1996).

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Appendix B

HACCP FOODBORNE DISEASE DATA

Confirmed, Suspected & Unknown Etiology Foodborne Disease Outbreaks by Method of Preparation, Significant Ingredient, Agent and Contributing Factor (Cumulative: 01/01/80 through 12/31/95)

NOTE: For assistance in interpreting the data below, call the GDPH Environmental Health Office at (404) 657-6534.

1) COOK/SERVE FOODS*

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	Gastrointestinal Virus (GI)	(1)+	Inadequate Refrigeration	(23)#
	Salmonella	(26)	Inadequate Hot-Holding	(4)
			Food Prep Several Hours Before Serving	(7)
			Inadequate Cooking	(20)
			Inadequate Reheating	(5)
			Contaminated Ingredients	(22)
			Cross-Contamination	(2)
			Hand Contact with Implicated Food	(2)
			Consumption: Raw/Lightly Heated (Animal Origin)	(3)
Beef	*Escherichia coli* O157:H7	(5)	Inadequate Refrigeration	(3)
	Campylobacter	(2)	Inadequate Cooking	(9)
	Clostridium perfringens	(2)	Contaminated Ingredients	(3)
	Salmonella	(5)	Cross-Contamination	(3)
	Other Chemical	(1)	Unknown	(10)
	Unknown	(6)		
Pork	*Salmonella*	(2)	Inadequate Refrigeration	(2)
	Staphylococcus aureus	(2)	Inadequate Hot-Holding	(1)
	Trichinella spiralis	(4)	Inadequate Cooking	(5)
	Yersinia enterolytica	(2)	Unapproved Source	(1)
			Contaminated Ingredients	(3)
			Cross-Contamination	(2)
			Unclean Equipment	(1)
			Unknown	(2)
Poultry	*Campylobacter*	(1)	Inadequate Refrigeration	(5)
	Clostridium perfringens	(1)	Inadequate Hot-Holding	(2)
	Salmonella	(6)	Food Prep Several Hours Before Serving	(1)
	Staphylococcus aureus	(2)	Inadequate Cooking	(7)
	Unknown	(10)	Contaminated Ingredients	(1)
			Infected Person	(1)
			Cross-Contamination	(4)
			Unclean Equipment	(3)
			Improper Cooling	(1)
			Hand Contact with Implicated Food	(1)
			Unknown	(9)
Fin Fish	Scombrotoxin	(1)	Natural Toxicant	(1)
	Other Chemical	(1)	Unknown	(3)
	Unknown	(2)		
Shellfish	Gastrointestinal Virus	(1)	Unknown	(1)
Other Seafood	Gastrointestinal Virus	(1)	Inadequate Refrigeration	(1)
	Plesiomonas shigelloides	(1)	Unknown	(10)
	Salmonella	(2)		
	Staphylococcus aureus	(1)		
	Other Chemical	(1)		
	Unknown	(5)		

Starchy Foods	*Bacillus cereus*	(1)	Inadequate Refrigeration	(1)
	Staphylococcus aureus	(1)	Inadequate Hot-Holding	(1)
			Unclean Equipment	(1)
			Improper Cooling	(1)
			Other	(1)
Dairy	Gastrointestinal Virus (GI)	(1)	Unknown	(1)
Infected Worker	*Salmonella*	(2)	Infected Person	(3)
	Shigella	(1)		
No Specific Ingredient	*Clostridium perfringens*	(2)	Inadequate Refrigeration	(3)
	Gastrointestinal Virus (GI)	(2)	Inadequate Hot-Holding	(4)
	MSG	(1)	Inadequate Cooking	(2)
	Salmonella	(2)	Inadequate Reheating	(1)
	Staphylococcus aureus	(5)	Unclean Equipment	(1)
	Other Chemical	(2)	Added Poisonous Chemicals	(1)
	Unknown	(22)	Improper Cooling	(1)
			Unknown	(28)

2) ROASTED MEAT/POULTRY

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Beef	*Clostridium perfringens*	(15)	Inadequate Refrigeration	(4)
	Gastrointestinal Virus (GI)	(4)	Inadequate Hot-Holding	(11)
	Salmonella	(3)	Food Prep Several Hours Before Serving	(7)
	Staphylococcus aureus	(1)	Inadequate Cooking	(5)
	Unknown	(12)	Inadequate Reheating	(9)
			Cross-Contamination	(2)
			Unclean Equipment	(2)
			Improper Cooling	(5)
			Unknown	(13)
Pork	*Campylobacter*	(1)	Inadequate Refrigeration	(2)
	Clostridium perfringens	(3)	Inadequate Hot-Holding	(3)
	Salmonella	(2)	Food Prep Several Hours Before Serving	(1)
	Staphylococcus aureus	(3)	Inadequate Cooking	(4)
	Trichinella spiralis	(2)	Inadequate Reheating	(2)
	Unknown	(2)	Contaminated Ingredients	(1)
			Infected Person	(1)
			Cross-Contamination	(2)
			Unclean Equipment	(1)
			Improper Cooling	(5)
			Hand Contact with Implicated Food	(1)
			Unknown	(1)
Poultry	*Bacillus cereus*	(1)	Inadequate Refrigeration	(8)
	Bacillus subtilis	(1)	Inadequate Hot-Holding	(7)
	Campylobacter	(4)	Food Prep Several Hours Before Serving	(7)
	Clostridium perfringens	(7)	Inadequate Cooking	(14)
	Salmonella	(18)	Inadequate Reheating	(5)
	Staphylococcus aureus	(1)	Contaminated Ingredients	(2)
	Unknown	(5)	Infected Person	(1)
			Cross-Contamination	(2)
			Unclean Equipment	(1)
			Improper Cooling	(9)
			Hand Contact with Implicated Food	(2)
			Unknown	(10)
Infected Worker	*Salmonella*	(1)	Inadequate Hot-Holding	(1)
	Unknown	(1)	Infected Person	(1)
			Cross-Contamination	(1)

3) SOLID MASSES OF POTENTIALLY HAZARDOUS FOODS

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(20)	Inadequate Refrigeration	(15)
			Inadequate Hot-Holding	(3)
			Food Prep Several Hours Before Serving	(1)
			Inadequate Cooking	(20)
			Inadequate Reheating	(6)
			Contaminated Ingredients	(14)
			Cross-Contamination	(2)
			Unclean Equipment	(2)
			Improper Cooling	(5)
			Hand Contact with Implicated Food	(1)
Beef	Fecal Streptococcus	(1)	Inadequate Refrigeration	(5)
	Bacillus cereus	(1)	Inadequate Hot-Holding	(7)
	Clostridium perfringens	(14)	Food Prep Several Hours Before Serving	(1)
	Salmonella	(2)	Inadequate Cooking	(2)
	Unknown	(2)	Inadequate Reheating	(7)
			Infected Person	(1)
			Cross Contamination	(1)
			Unclean Equipment	(3)
			Improper Cooling	(10)
			Hand Contact with Implicated Food	(2)
			Unknown	(2)
Pork	*Bacillus cereus*	(1)	Unapproved Source	(1)
	Trichinella spiralis	(1)	Contaminated Ingredients	(1)
			Consumption: Raw/Lightly Heated (Animal Origin)	(1)
			Unknown	(1)
Poultry	*Clostridium perfringens*	(6)	Inadequate Refrigeration	(3)
	Salmonella	(3)	Inadequate Hot-Holding	(2)
	Shigella	(1)	Food Prep Several Hours Before Serving	(4)
	Unknown	(1)	Inadequate Cooking	(1)
			Inadequate Reheating	(4)
			Contaminated Ingredients	(1)
			Infected Person	(1)
			Cross-Contamination	(1)
			Improper Cooling	(5)
			Unknown	(2)
Other Seafood	*Salmonella*	(1)	Inadequate Refrigeration	(1)
	Other Chemical	(1)	Cross-Contamination	(1)
			Hand Contact with Implicated Food	(1)
			Unknown	(1)
Starchy Foods	*Bacillus cereus*	(34)	Inadequate Refrigeration	(9)
	Campylobacter	(1)	Inadequate Hot-Holding	(19)
	Clostridium perfringens	(1)	Food Prep Several Hours Before Serving	(6)
	Staphylococcus aureus	(1)	Inadequate Reheating	(1)
	Unknown	(8)	Cross-Contamination	(1)
			Unclean Equipment	(2)
			Improper Cooling	(11)
			Unknown	(11)
Other Vegetables	*Clostridium perfringens*	(2)	Inadequate Refrigeration	(3)
	Staphylococcus aureus	(1)	Inadequate Hot-Holding	(1)
	Unknown	(1)	Food Prep Several Hours Before Serving	(2)
			Inadequate Cooking	(1)
			Inadequate Reheating	(2)
			Cross-Contamination	(1)
Infected Worker	Gastrointestinal Virus (GI)	(1)	Inadequate Refrigeration	(1)
	Salmonella	(2)	Inadequate Hot-Holding	(1)
	Unknown	(1)	Inadequate Cooking	(1)
	Rotavirus	(1)	Infected Person	(5)

No Specific Ingredient	*Bacillus cereus*	(6)	Inadequate Refrigeration	(10)
	Clostridium perfringens	(15)	Inadequate Hot-Holding	(23)
	Gastrointestinal Virus (GI)	(4)	Food Prep Several Hours Before Serving	(9)
	Hepatitis A	(1)	Inadequate Cooking	(5)
	MSG	(1)	Inadequate Reheating	(10)
	Salmonella	(9)	Unapproved Source	(1)
	Shigella	(1)	Infected Person	(3)
	Staphylococcus aureus	(7)	Cross-Contamination	(5)
	Unknown	(35)	Unclean Equipment	(3)
			Improper Cooling	(9)
			Hand Contact with Implicated Food	(4)
			Unknown	(41)

4) LIQUID/SEMI-SOLID MIXTURES POTENTIALLY HAZARDOUS FOODS

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(4)	Inadequate Refrigeration	(4)
			Inadequate Hot-Holding	(2)
			Inadequate Cooking	(1)
			Contaminated Ingredients	(4)
			Consumption: Raw/Lightly Heated (Animal Origin)	(3)
Beef	*Clostridium perfringens*	(5)	Inadequate Refrigeration	(3)
	Salmonella	(1)	Inadequate Hot-Holding	(1)
	Staphylococcus aureus	(2)	Food Prep Several Hours Before Serving	(2)
	Unknown	(1)	Inadequate Cooking	(1)
			Inadequate Reheating	(2)
			Cross-Contamination	(1)
			Unclean Equipment	(1)
			Improper Cooling	(5)
			Unknown	(2)
Poultry	*Campylobacter*	(1)	Inadequate Refrigeration	(3)
	Clostridium perfringens	(7)	Inadequate Hot-Holding	(3)
	Salmonella	(4)	Food Prep Several Hours Before Serving	(3)
			Inadequate Cooking	(4)
			Inadequate Reheating	(5)
			Cross-Contamination	(1)
			Improper Cooling	(6)
			Unknown	(1)
Other Seafood	*Bacillus cereus*	(1)	Inadequate Hot-Holding	(1)
	Clostridium perfringens	(1)	Inadequate Cooking	(1)
	Unknown	(1)	Inadequate Reheating	(1)
			Improper Cooling	(2)
Dairy	*Staphylococcus aureus*	(1)	Inadequate Hot-Holding	(1)
			Infected Person	(1)
			Hand Contact with Implicated Food	(1)
Other Vegetables	*Clostridium botulinum*	(2)	Inadequate Refrigeration	(2)
	Clostridium perfringens	(1)	Anaerobic Packaging	(2)
			Inadequate Cooking	(2)
			Inadequate Reheating	(1)
			Improper Cooling	(1)
Other Vehicle	*Clostridium perfringens*	(1)	Inadequate Hot-Holding	(1)
	Salmonella	(1)	Food Prep Several Hours Before Serving	(1)
			Inadequate Cooking	(1)
			Inadequate Reheating	(2)
Infected Worker	Gastrointestinal Virus (GI)	(1)	Infected Person	(2)
	Norwalk	(1)		

No Specific Ingredient	Fecal Streptococcus	(1)	Inadequate Refrigeration	(4)
	Bacillus cereus	(1)	Inadequate Hot-Holding	(9)
	Campylobacter	(1)	Food Prep Several Hours Before Serving	(8)
	Clostridium perfringens	(10)	Inadequate Cooking	(1)
	Salmonella	(2)	Inadequate Reheating	(5)
	Staphylococcus aureus	(2)	Infected Person	(1)
	Unknown	(15)	Cross-Contamination	(3)
			Unclean Equipment	(1)
			Improper Cooling	(12)
			Unknown	(11)

5) SALADS PREPARED WITH ONE OR MORE COOKED INGREDIENTS

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(4)	Inadequate Refrigeration	(4)
	Unknown	(1)	Food Prep Several Hours Before Serving	(1)
			Inadequate Cooking	(2)
			Contaminated Ingredients	(3)
			Cross-Contamination	(1)
			Unclean Equipment	(1)
			Improper Cooling	(1)
			Unknown	(1)
Poultry	*Clostridium perfringens*	(1)	Inadequate Refrigeration	(5)
	Gastrointestinal Virus (GI)	(1)	Inadequate Hot-Holding	(1)
	Salmonella	(4)	Food Prep Several Hours Before Serving	(2)
	Staphylococcus aureus	(3)	Inadequate Cooking	(1)
	Unknown	(2)	Cross-Contamination	(4)
			Unclean Equipment	(1)
			Improper Cooling	(1)
			Unknown	(3)
Fin Fish	*Campylobacter*	(1)	Unknown	(1)
Other Seafood	Unknown	(3)	Infected Person	(1)
	Vibrio cholera	(1)	Unknown	(3)
Dairy	Gastrointestinal Virus (GI)	(1)	Unknown	(1)
Green Leafy Vegetables	Gastrointestinal Virus (GI)	(1)	Unknown	(1)
Infected Worker	Gastrointestinal Virus (GI)	(2)	Inadequate Refrigeration	(3)
	Salmonella	(3)	Infected Person	(7)
	Shigella	(1)	Cross-Contamination	(1)
	Unknown	(1)	Improper Cooling	(2)
			Hand Contact with Implicated Food	(3)
No Specific Ingredient	*Escherichia coli* O157:H7	(1)	Inadequate Refrigeration	(8)
	Bacillus cereus	(1)	Inadequate Hot-Holding	(3)
	Clostridium perfringens	(1)	Food Prep Several Hours Before Serving	(5)
	Gastrointestinal Virus (GI)	(8)	Inadequate Reheating	(1)
	Salmonella	(10)	Infected Person	(3)
	Shigella	(1)	Cross-Contamination	(7)
	Staphylococcus aureus	(8)	Unclean Equipment	(6)
	Unknown	(15)	Added Poisonous Chemicals	(2)
			Improper Cooling	(2)
			Hand Contact with Implicated Food	(3)
			Unknown	(23)
			Other	(1)

6) SALADS WITH RAW INGREDIENTS

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(1)	Inadequate Refrigeration	(1)
			Contaminated Ingredients	(1)
			Consumption: Raw/Lightly Heated (Animal Origin)	(1)
Fruits	Gastrointestinal Virus (GI)	(3)	Unknown	(3)
Green Leafy Vegetable	Gastrointestinal Virus (GI)	(7)	Infected Person	(2)
	Unknown	(3)	Cross-Contamination	(1)
	Rotavirus	(1)	Hand Contact with Implicated Food	(4)
			Unknown	(6)
			Other	(1)
Other Vegetables	Gastrointestinal Virus (GI)	(1)	Unknown	(2)
	Unknown	(1)		
Other Vehicle	Gastrointestinal Virus (GI)	(1)	Infected Person	(1)
Infected Worker	Gastrointestinal Virus (GI)	(8)	Infected Person	(12)
	Hepatitis A	(1)	Cross-Contamination	(1)
	Unknown	(1)	Hand Contact with Implicated Food	(5)
	Norwalk	(2)		
No Specific Ingredient	Gastrointestinal Virus (GI)	(4)	Infected Person	(1)
	Salmonella	(1)	Cross-Contamination	(1)
	Unknown	(7)	Improper Cooling	(1)
			Hand Contact with Implicated Food	(1)
			Unknown	(10)

7) SANDWICHES

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(2)	Inadequate Refrigeration	(2)
			Contaminated Ingredients	(2)
			Cross-Contamination	(2)
			Unclean Equipment	(2)
Beef	*Escherichia coli* O157:H7	(1)	Inadequate Cooking	(1)
	Staphylococcus aureus	(1)	Infected Person	(1)
Pork	*Staphylococcus aureus*	(1)	Inadequate Refrigeration	(1)
			Food Prep Several Hours Before Serving	(1)
Poultry	Gastrointestinal Virus (GI)	(1)	Inadequate Refrigeration	(2)
	Staphylococcus aureus	(1)	Food Prep Several Hours Before Serving	(1)
	Unknown	(2)	Infected Person	(1)
			Hand Contact with Implicated Food	(1)
			Unknown	(1)
			Other	(1)
Green Leafy Vegetables	Gastrointestinal Virus (GI)	(1)	Cross-Contamination	(1)
	Salmonella	(1)	Unknown	(1)
Other Vehicle	*Staphylococcus aureus*	(1)	Inadequate Refrigeration	(1)

Infected Worker	Gastrointestinal Virus (GI)	(5)	Inadequate Refrigeration	(2)
	Hepatitis A	(1)	Food Prep Several Hours Before Serving	(1)
	Salmonella	(1)	Infected Person	(6)
	Staphylococcus aureus	(1)	Cross-Contamination	(2)
			Hand Contact with Infected Food	(2)
No Specific Ingredient	*E. coli* - No Verotoxin: ? type	(1)	Inadequate Refrigeration	(2)
	Gastrointestinal Virus (GI)	(5)	Food Prep Several Hours Before Serving	(1)
	Hepatitis A	(1)	Infected Person	(5)
	Salmonella	(4)	Cross-Contamination	(1)
	Shigella	(2)	Unclean Equipment	(1)
	Staphylococcus aureus	(2)	Improper Cooling	(1)
	Unknown	(6)	Hand Contact with Implicated Food	(5)
			Unknown	(11)
Unknown	Gastrointestinal Virus (GI)	(1)	Unknown	(1)

8) BAKED GOODS

SIGNIFICANT INGREDIENTS	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(12)	Inadequate Refrigeration	(12)
			Inadequate Cooking	(10)
			Contaminated Ingredients	(12)
			Cross-Contamination	(2)
			Consumption: Raw/Lightly Heated (Animal Origin)	(2)
Dairy	*Bacillus cereus*	(1)	Unknown	(2)
	Unknown	(1)		
Other Vehicle	Other Chemical	(1)	Added Poisonous Chemicals	(1)
Infected Worker	Gastrointestinal Virus (GI)	(1)	Infected Person	(4)
	Hepatitis A	(1)	Hand Contact WITH Implicated Food	(2)
	Unknown	(1)	Unknown	(1)
	Rotavirus	(1)		
	Norwalk	(1)		
No Specific Ingredient(s)	*Bacillus cereus*	(1)	Inadequate Refrigeration	(7)
	Gastrointestinal Virus (GI)	(4)	Food Prep Several Hours Before Serving	(1)
	Hepatitis A	(1)	Inadequate Cooking	(2)
	Salmonella	(7)	Contaminated Ingredients	(2)
	Staphylococcus aureus	(5)	Infected Person	(2)
	Giardia lamblia	(1)	Cross-Contamination	(2)
	Other Chemical	(5)	Added Poisonous Chemicals	(2)
	Unknown	(13)	Improper Cooling	(1)
			Unknown	(22)

9) FOODS EATEN RAW OR LIGHTLY COOKED

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(4)	Inadequate Refrigeration	(3)
			Inadequate Cooking	(2)
			Contaminated Ingredients	(3)
			Cross-Contamination	(1)
			Consumption: Raw/Lightly Heated (Animal Origin)	(2)
Beef	*Trichinella spiralis*	(1)	Unclean Equipment	(1)
			Consumption: Raw/Lightly Heated (Animal Origin)	(1)
			Other	(1)

Pork	*Trichinella spiralis*	(2)	Contaminated Ingredients	(2)
			Consumption: Raw/Lightly Heated (Animal Origin)	(2)
Fin Fish	*Clostridium botulinum*	(1)	Inadequate Refrigeration	(1)
	Salmonella	(1)	Food Prep Several Hours Before Serving	(1)
	Other Chemical	(1)	Improper Cooling	(1)
	Unknown	(2)	Consumption: Raw/Lightly Heated (Animal Origin)	(2)
			Unknown	(2)
			Other	(1)
Shellfish	Gastrointestinal Virus (GI)	(127)	Inadequate Cooking	(1)
	Hepatitis A	(5)	Unapproved Source	(198)
	Unknown	(11)	Contaminated Ingredients	(200)
	Norwalk	(63)	Cross-Contamination	(1)
	Vibrio parahaemolyticus	(1)	Consumption: Raw/Lightly Htd (Animal Origin)	(202)
	Snow Mountain Agent	(4)	Unknown	(11)
	Vibrio vulnificus	(4)		
	Other Chemical	(1)		
Other Seafood	Unknown	(1)	Unknown	(1)
Dairy	*Staphylococcus aureus*	(1)	Inadequate Refrigeration	(1)
			Unapproved Source	(1)
			Consumption: Raw/Lightly Heated (Animal Origin)	(1)
No Specific Ingredient	Gastrointestinal Virus (GI)	(1)	Unknown	(1)

10) COMMERCIALLY PROCESSED FOODS

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(1)	Inadequate Cooking	(1)
Beef	Gastrointestinal Virus (GI)	(1)	Inadequate Hot-Holding	(1)
	Salmonella	(5)	Inadequate Cooking	(3)
	Staphylococcus aureus	(1)	Contaminated Ingredients	(2)
	Unknown	(1)	Infected Person	(1)
			Unknown	(1)
Pork	Unknown	(1)	Unknown	(1)
Beverage	Other Chemical	(1)	Added Poisonous Chemicals	(1)
	Unknown	(1)	Unknown	(1)
Poultry	Gastrointestinal Virus (GI)	(2)	Inadequate Hot-Holding	(1)
	Unknown	(1)	Unknown	(2)
Fin Fish	*Clostridium botulinum*	(1)	Inadequate Refrigeration	(1)
	Staphylococcus aureus	(1)	Inadequate Hot-Holding	(1)
	Other Chemical	(1)	Anerobic Packaging	(1)
	Unknown	(1)	Inadequate Cooking	(1)
			Contaminated Ingredients	(1)
			Improper Cooling	(1)
			Other	(2)
Starchy Foods	*Salmonella*	(1)	Natural Toxicant	(1)
	Unknown	(1)	Unknown	(1)

Dairy	Gastrointestinal Virus (GI)	(2)	Inadequate Cooking	(1)
	Salmonella	(1)	Unknown	(3)
	Staphylococcus aureus	(1)		
Other Vegetables	*Clostridium botulium*	(1)	Inadequate Refrigeration	(1)
			Contaminated Ingredients	(1)
Mushrooms	*Staphylococcus aureus*	(1)	Contaminated Ingredients	(1)
Other Vehicle	*Clostridium botulinum*	(1)	Contaminated Ingredients	(1)
	Other Chemical	(3)	Unknown	(3)
Infected Worker	*Staphylococcus aureus*	(2)	Unapproved Source	(2)
			Contaminated Ingredients	(2)
No Specific Ingredients	*Beta Hemolytic Streptococcus*	(1)	Inadequate Refrigeration	(1)
	Salmonella	(1)	Hand Contact with Implicated Food	(1)
	Staphylococcus aureus	(1)	Unknown	(4)
	Unknown	(3)		

11) NATURAL TOXICANT

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Beverage	Other Chemical	(1)	Contaminated Ingredients	(1)
			Natural Toxicant	(1)
Fin Fish	Ciguatera Toxin	(1)	Inadequate Refrigeration	(2)
	Scombrotoxin	(95)	Natural Toxicant	(3)
			Unknown	(92)
Shellfish	Other Chemical	(1)	Unknown	(1)
Other Seafood	Other Chemical	(1)	Natural Toxicant	(1)
Diary	Scombrotoxin	(1)	Unknown	(1)
Other Vegetables	Other Chemical	(1)	Inadequate Cooking	(1)
			Natural Toxicant	(1)
Mushrooms	Mushrooms	(15)	Unapproved Source	(5)
			Natural Toxicant	(8)
			Unknown	(2)
			Other	(1)

12) MULTIPLE FOODS

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(5)	Inadequate Refrigeration	(4)
			Inadequate Cooking	(4)
			Contaminated Ingredients	(2)
			Cross-Contamination	(4)
			Unclean Equipment	(2)
			Improper Cooling	(1)
Beef	Gastrointestinal Virus (GI)	(1)	Other	(1)

Poultry	*Salmonella*	(1)	Inadequate Refrigeration	(1)
			Inadequate Cooking	(1)
			Inadequate Reheating	(1)
Fin Fish	Scombrotoxin	(1)	Unknown	(1)
Shellfish	Unknown	(2)	Inadequate Refrigeration	(1)
	Norwalk	(2)	Inadequate Cooking	(1)
			Unapproved Source	(3)
			Contaminated Ingredients	(2)
			Unclean Equipment	(1)
			Consumption: Raw/Lightly Heated (Animal Origin)	(2)
			Unknown	(1)
			Other	(1)
Other Vehicle	Hepatitis A	(1)	Infected Person	(1)
	Unknown	(1)	Other	(1)
Infected Worker	*Campylobacter*	(1)	Food Prep Several Hours Before Serving	(1)
	Gastrointestinal Virus (GI)	(13)	Infected Person	(23)
	Hepatitis A	(2)	Cross-Contamination	(2)
	Salmonella	(6)	Hand Contact with Implicated Food	(5)
	Staphylococcus aureus	(1)	Unknown	(2)
	Shigella	(1)	Unknown	(1)
No Specific Ingredients	*Bacillus cereus*	(4)	Inadequate Refrigeration	(9)
	Pesticide	(1)	Inadequate Hot-Holding	(16)
	Campylobacter	(1)	Food Prep Several Hours Before Serving	(6)
	Clostridium perfringens	(3)	Inadequate Cooking	(7)
	Gastrointestinal Virus (GI)	(25)	Inadequate Reheating	(7)
	Hepatitis A	(1)	Unapproved Source	(1)
	Heavy Metal	(1)	Infected Person	(21)
	MSG	(1)	Cross-Contamination	(7)
	Salmonella	(16)	Unclean Equipment	(3)
	Shigella	(1)	Added Poisonous Chemicals	(2)
	Staphylococcus aureus	(6)	Improper Cooling	(3)
	Unknown	(61)	Hand Contact with Implicated Food	(11)
	Rotavirus	(5)	Consumption: Raw/Lightly Heated (Animal Origin)	(2)
	Yersinia enterolytica	(1)	Unknown	(69)
			Other	(2)
Unknown	Hepatitis A	(1)	Infected Person	(1)

13) BEVERAGES

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(3)	Inadequate Refrigeration	(1)
			Contaminated Ingredients	(3)
			Consumption: Raw/Lightly Heated (Animal Origin)	(3)
Beverage	Pesticide	(1)	Unapproved Source	(2)
	Gastrointestinal Virus (GI)	(4)	Contaminated Ingredients	(2)
	Heavy Metal	(1)	Infected Person	(1)
	Other Chemical	(3)	Added Poisonous Chemicals	(3)
	Unknown	(2)	Hand Contact with Implicated Food	(1)
			Unknown	(2)
			Other	(2)
Dairy	*Campylobacter*	(3)	Unapproved Source	(4)
	Gastrointestinal Virus (GI)	(2)	Contaminated Ingredients	(1)
	Salmonella	(1)	Hand Contact with Implicated Food	(1)
	Unknown	(3)	Consumption: Raw/Lightly Heated (Animal Origin)	(3)
			Unknown	(4)

Infected Worker	Gastrointestinal Virus (GI)	(3)	Infected Person	(6)
	Salmonella	(1)	Improper Cooling	(1)
	Unknown	(3)	Hand Contact with Implicated Food	(2)
			Unknown	(1)
No Specific Ingredient	Pesticide	(1)	Unknown	(3)
	Other Chemical	(1)		
	Unknown	(1)		
Unknown	*Salmonella*	(1)	Unknown	(1)

14) UNKNOWN

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(1)	Unknown	(1)
Beef	*Salmonella*	(1)	Inadequate Hot-Holding	(1)
			Food Prep Several Hours Before Serving	(1)
			Inadequate Cooking	(1)
			Unapproved Source	(1)
Poultry	Gastrointestinal Virus (GI)	(1)	Unknown	(5)
	Unknown	(4)		
No Specific Ingredient	*Clostridium perfringens*	(1)	Infected Person	(1)
	Gastrointestinal Virus (GI)	(1)	Unclean Equipment	(1)
	Unknown	(3)	Hand Contact with Implicated Food	(1)
			Unknown	(3)
Unknown	*Beta Hemolytic Streptococcus*	(3)	Inadequate Refrigeration	(15)
	Escherichia coli O157:H7	(3)	Inadequate Hot-Holding	(14)
	Bacillus cereus	(5)	Food Prep Several Hours Before Serving	(4)
	Clostridium botulinum	(2)	Inadequate Cooking	(8)
	Campylobacter	(14)	Inadequate Reheating	(5)
	Clostridium perfringens	(13)	Infected Person	(52)
	Gastrointestinal Virus (GI)	(89)	Cross-Contamination	(9)
	Hepatitis A	(7)	Unclean Equipment	(13)
	MSG	(1)	Added Poisonous Chemicals	(2)
	Pseudomonas aeruginosa	(1)	Improper Cooling	(5)
	Salmonella	(85)	Hand Contact with Implicated Food	(5)
	Shigella	(5)	Unknown	(445)
	Staphylococcus aureus	(4)	Other	(4)
	Giardia lamblia	(2)		
	Other Chemical	(4)		
	Parasite	(1)		
	Unknown	(283)		
	Rotavirus	(5)		
	Norwalk	(9)		

15) CHEMICAL CONTAMINATION

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Beef	Other Chemical	(1)	Added Poisonous Chemicals	(1)
Beverage	Heavy Metal	(10)	Toxic Container	(4)
	Other Chemical	(8)	Added Poisonous Chemicals	(7)
			Unknown	(6)
			Other	(3)
Other Seafood	Other Chemical	(1)	Unknown	(1)

Starchy Foods	Pesticide MSG Other Chemical	(1) (1) (4)	Added Poisonous Chemicals Unknown Other	(2) (3) (1)
Dairy	Pesticide Other Chemical	(1) (4)	Toxic Container Added Poisonous Chemicals Unknown	(1) (1) (3)
Green Leafy Vegetable	Other Chemical	(3)	Added Poisonous Chemicals Unknown	(1) (2)
Other Vegetables	Pesticide	(1)	Natural Toxicant	(1)
Other Vehicle	Heavy Metal Other Chemical	(1) (1)	Toxic Container Added Poisonous Chemicals	(1) (1)
No Specific Ingredients	MSG Other Chemical	(1) (18)	Added Poisonous Chemicals Unknown Other	(12) (6) (1)

16) OTHER

SIGNIFICANT INGREDIENT	AGENTS		CONTRIBUTING FACTORS	
Eggs	*Salmonella*	(1)	Inadequate Refrigeration Inadequate Cooking Contaminated Ingredients Cross-Contamination	(1) (1) (1) (1)
Dairy	Gastrointestinal Virus (GI)	(1)	Unknown	(1)
Other Vegetables	*Clostridium botulinum*	(1)	Food Prep Several Hours Before Serving	(1)
Other Vehicle	*Salmonella*	(1)	Inadequate Refrigeration	(1)
Infected Worker	*Shigella* Unknown	(1) (1)	Infected Person	(2)
No Specific Ingredient	*Campylobacter* Gastrointestinal Virus (GI)	(1) (2)	Cross-Contamination Unclean Equipment Unknown	(1) (1) (2)

* Each Method of Preparation category is defined on the last page of this appendix.

\+ Number of reported outbreaks for specific agent in above category.

\# Number of outbreaks where specific contributing factor was reported with above category. Any outbreak may report none or more than one contributing factor.

Source: New York State Department of Health, Bureau of Community Sanitation and Food Protection, II University Place, Room 404, Albany, New York 12203. July 1997. Used with permission.

Method of Preparation Categories*

Cook/Serve Foods: Preparation steps limited to cook/serve or cook/hot hold/serve; cooking is likely to destroy vegetative microbial pathogens; a potentially hazardous food (as per FDA Food Code) is often an ingredient; the foods are completely cooked within 30 min. and usually served within 1 hour, e.g., fish fillets, lobster, eggs prepared individually, steaks, chops, sausage, chicken pieces and pizza.

Roasted Meat/Poultry: Roasted, baked, etc., solid pieces of meat/poultry and/or formed masses of ground or chipped meat or poultry that are greater than 3 in. thick. Usually cooked longer than 30 min., e.g., roast beef, whole turkey, broiler chickens, baked ham, gyro, stuffed chicken breasts, meat loaf and turkey roll.

Solid Masses of Potentially Hazardous Foods: Food preparation steps sometimes involve combining of several ingredients prior to cooking the food followed by hot-holding and service. This category also includes solid masses of single potentially hazardous foods, such as rice and refried beans, e.g., casseroles, lasagna, baked ziti, meatballs and crab meat stuffing.

Liquid or Semi-Solid Mixture of Potentially Hazardous Foods: Food preparation steps usually involve combining of several ingredients prior to or during cooking followed by hot holding and service of cooling, reheating, hot-holding and service, e.g., sauce, soup, gravy, chili, stew and chowder.

Salads Prepared with One or More Cooked Ingredients: One or more ingredients are cooked prior to combining with raw ingredients and then served cold. These salads usually include one or more potentially hazardous ingredients, e.g., egg, chicken, turkey, ham, tuna, potato, antipasto, macaroni and pasta salad.

Salads with Raw Ingredients: Ingredients are generally not cooked and are served cold. These salads do not usually contain a potentially hazardous ingredient except possibly the dressing, e.g., green salads, fresh tomatoes, fruit salad, relish tray, cole slaw and raw vegetables.

Sandwiches: Ingredients are assembled and served between two slices of bread or other baked goods and served hot or cold. This category is selected when the investigation determines that the preparation error that led to the outbreak occurred at the time of assembly or serving of the food, e.g., hamburger, hot dog, bacon-lettuce-tomato (BLT), toasted cheese sandwich, club sandwich and Monte Cristo sandwich.

Baked Goods: Baking, cooking, icing or filling and cold and/or hot-holding are preparation steps. Some ingredients may be potentially hazardous e.g., meat-filled pastries, such as calzones, croissants and other pastries, such as cakes, pies, cookies, breads, rolls, icing, non-diary whipped toppings, and eclairs.

Foods Eaten Raw or Lightly Cooked: These are served uncooked or after a heating that would not destroy vegetative pathogens. Preparation steps involve cold storage, cleaning, opening, steaming or other light cooking and service. This category does not include commercially canned foods, e.g., hard-shell clams, oysters, mussels - consumed whole raw or steamed, steak tartar, Caesar salad with raw egg, lightly cooked eggs and hollandaise sauce.

Commercially Processed Foods: A food that has been processed in another facility prior to the locations where it was served e.g., pasteurized milk, precooked roast beef, precooked poultry, surimi (processed and formed fish), canned fruits and vegetables and ice cream.

Natural Toxicant: A toxin of biologic origin that either develops or bioaccumulates in the food prior to final preparation and service, e.g., poisonous mushrooms, shellfish containing toxins capable of causing paralytic shellfish poisoning, neurotoxic shellfish poisoning, diarrhetic shellfish poisoning and amnesic shellfish poisoning, reef fish containing ciguatoxin, scombrotoxin (histamine), mycotoxins and plant toxins.

Multiple Foods: More than one food statistically implicated; does not fit any single category; foods from more than one category implicated, e.g., salad bar, smorgasbord and buffet.

Beverages: Preparation steps include reconstitution, mixing, dispensing and serving. Foods in liquid from served with or without ice. Contamination and/or multiplication occurs at the point of service, e.g., carbonated and non-carbonated beverages, alcohol, milk, ice, juices and hand-dipped ice cream.

Unknown: An implicated vehicle was not identified and contributing factors were not determined.

Chemical Contamination: A substance of non-biologic origin that is introduced at toxic levels during harvest, processing or service, e.g., heavy metals, pesticides, food additives (niacin).

Other: Food implicated, but does not fit any of the above categories.

* Foods are assigned to the category that best describes the step or process where contributing factors that lead to the outbreak occurred.
Source: Weingold, S. et al, Use of Foodborne Disease Data for HACCP Risk Assessment, *Journal of Food Protection*, Vol. 57, Sept., 1994.

Appendix C

DISEASE FACT SHEETS

Campylobacteriosis

Etiologic Agent	*Campylobacter*, a gram-negative, microaerophilic bacterium. Virtually all human illness is caused by one species, *Campylobacter jejuni*, but 1% are caused by other species.
Clinical Symptoms	Fever, abdominal cramps, malaise, nausea, vomiting and diarrhea (often bloody).
Mode of Transmission	Ingestion of undercooked poultry, contaminated food and water or raw milk. Contact with infected pets, farm animals or infected persons
Incubation Period	Usually 2-5 days, but ranges from 1-10 days.
Period of Communicability	Throughout the course of the infection. An untreated person may excrete Campylobacter spp. For up to 7 weeks.
Treatment	Usually no treatment is indicated. Rehydration therapy maybe required for people with diarrhea. Antibiotics such as tetracyclines or quinolones can be used early in the illness when Campylobacter has been identified OR to eliminate the carrier state.
Lab Criteria for Diagnosis	Campylobacter from any clinical specimen
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Culture Referral • Specimen needed: Pure culture • Outfit: Cary-Blair medium (available from testing lab) • **Form: 3410** • Lab test Performed: Campylobacter identification Culture • Specimen needed: Feces • Outfit: Stool culture; Para-Pak, C&S • **Form: 3416** • Lab test performed: Campylobacter culture. Culture in outbreak situations • Specimen: At least one portion serving of suspected food, if available. Immediately obtain and refrigerate food specimens. **Broad testing of all foods is discouraged**. Coordinate with Epi branch regarding foods to be tested. • Outfit: Sterile plastic bags, label and instructions. • **Form: 3450** • Lab test performed: Campylobacter Culture
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed.
Outbreak Investigation	Outbreaks should be investigated to determine the possible source of infection and to prevent additional cases. Questionnaires should place emphasis on foods (especially poultry, raw foods and milk), non-chlorinated water, exposure to pets, food handling procedures, possible cross-contamination during cooking, cooking times and temperatures and food handler health and hygiene.
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a GA Notifiable Disease Report From.

	Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.
Restrictions	Infected persons should be EXCLUDED from food handling and the care of children until symptoms have resolved.

Reported Cases of Campylobacter in Georgia, 1999-2002

Year	Number of Cases
1999	729
2000	609
2001	640
2002	665
2003	622

References and Further Reading

- Centers for Disease Control and Prevention. Outbreak of *Campylobacter* Enteritis Associated with Cross-Contamination of Food – Oklahoma, 1996. *MMWR* 1998; 47(07): 129-131.
- Chin J. ed. *Campylobacter* Enteritis. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association, 2000:79-81.
- Centers for Disease Control and Prevention. Case Definitions for Infectious Conditions under Public Health Surveillance. *MMWR* 1997; 46(RR10): 1-55.
- U.S. Food and Drug Administration, Center for Food Safety & Applied Nutrition. *Campylobacter jejuni*. In: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook.

Links:

- Centers for Disease Control and Prevention Campylobacter Fact Sheet - http://www.cdc.gov/ncidod/dbmd/diseaseinfo/campylobacter_g.htm
- FDA Bad Bug Book – http://vm.cfsan.fda.gov/~mow/chap4.html

Cryptosporidiosis

Etiologic Agent	*Cryptosporidium parvum* is a coccidian parasite that is 4-6 microns in diameter.
Clinical Symptoms	Watery diarrhea, low-grade fever, abdominal cramps, nausea, vomiting
Mode of Transmission	Person to person, animal to person, waterborne and foodborne.
Incubation Period	The average is 6-7 days, with a range of approximately 1-14 days.
Period of Communicability	A person is infectious as long as oocysts are shed in the stool. Excretion begins at the beginning of symptoms and may continue for several weeks after symptoms resolve.
Treatment	Provide fluids and electrolytes if dehydration occurs. There is no known effective drug for treatment. It is self-limiting in most healthy persons.
Lab Criteria for Diagnosis	Demonstration of *Cryptosporidium* oocysts or antigen in stool, OR demonstration of *Cryptosporidium* in intestinal fluids or small-bowel biopsy specimens.
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Culture • Specimen needed: Feces • Outfit: IP & PVA outfit • **Form: 3414** Lab test performed: Identification for *Cryptosporidium* **Comment**: It MUST be specified on the lab request that testing for Cryptosporidium is desired, as routine examination for O&P is a poor test for this organism.
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed.
Outbreak Investigation	Investigate clustered cases to determine the source and mode of transmission. Search for a common vehicle such as recreational water, drinking water, unpasteurized milk or contaminated food or milk.
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a GA Notifiable Disease Report Form. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.
Restrictions	Infected persons should be EXCLUDED from food handling and the care of children until symptoms have resolved.

Reported Cases of Cryptosporidiosis in Georgia, 1999-2002

Year	Number of Confirmed Cases
1999	166
2000	190
2001	162
2002	124
2003	125

References and Further Reading:

- Centers for Disease Control and Prevention. Case Definitions for Infectious Conditions under Public Health Surveillance. *MMWR* 1997; 46(RR10): 1-55.
- Centers for Disease Control and Prevention. Epidemiologic Notes and Reports. Swimming-Associated Cryptosporidiosis- Los Angeles County. *MMWR* 1990; 39(20): 343-345.
- Centers for Disease Control and Prevention. Foodborne Outbreak of Diarrheal Illness Associated with Cryptosporidium parvum- Minnesota, 1995. *MMWR* 1996; 45(36): 783-784.
- Centers for Disease Control and Prevention. Foodborne Outbreak of Cryptosporidiosis – Spokane, Washington, 1997. *MMWR* 1998; 47(27): 565-567.
- Centers for Disease Control and Prevention. Outbreak of Cryptosporidiosis at a Day Camp – Florida, July-August 1995. *MMWR* 1996; 45(21): 442-444.
- Centers for Disease Control and Prevention. Outbreaks of Escherichia coli O157:H7 Infection and Cryptosporidiosis Associated with Drinking Unpasteurized Apple Cider – Connecticut and New York, October 1996. *MMWR* 1997; 46(1):4-8.
- Chin j, ed. Cryptosporidiosis. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association, 2000: pp. 134-137.
- MacKenzie WR, Hoxie NJ, Proctor ME, et al. A massive outbreak in Milwaukee of Cryptosporidium infection transmitted through the public water supply. New England Journal of Medicine 1994; 331:161-7.

Links:

- Centers for Disease Control and Prevention Fact Sheet: http://www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_cryptosporidiosis.htm
- FDA Bad Bug Book: http://www.cfsan.fda.gov/~mow/chap24.html

Cyclosporiasis

Etiologic Agent	*Cyclospora cayetanensis* is a coccidian parasite.
Clinical Symptoms	Watery diarrhea, low-grade fever, abdominal cramps, nausea, loss of appetite, substantial weight loss, bloating, fatigue and vomiting.
Mode of Transmission	Ingestion of contaminated food or water. Direct person-to-person transmission is highly unlikely.
Incubation Period	Median is about 1 week.
Period of Communicability	Although Cyclospora is transmitted by the fecal-oral route, direct person-to-person transmission is unlikely because Cyclospora oocysts are not infectious at the time of excretion.
Treatment	Trimethoprim/sulfamethoxazole (TMP/SMX) (brand names Bactrim, Septra, or Cotrim) is effective. Patients with immunosuppression may require higher doses and long-term maintenance treatment. No alternative treatment regimen has been identified for patients who do not respond to or are intolerant of TMP/SMX.
Lab Criteria for Diagnosis	Cyclospora oocysts can be identified in stool by examination of wet mounts under phase microscopy, use of modified acid-fast stains, or demonstration of autoflouorescence with ultraviolet epifluorescence microscopy. GPHL can confirm the diagnosis using a modified Kinyoun acid-fast stain and epifluorescence. Polymerase Chain Reaction (PCR) may also be used if other methods cannot confirm the presence of the parasite. For intestinal parasite testing, three consecutive day's samples are needed due to the shedding pattern of the organism.
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Culture • Specimen needed: Feces • Outfit: IP & PVA outfit • **Form: 3414** Lab test performed: Identification for *Cyclospora* **Comment**: It MUST be specified on the lab request that testing for *Cyclospora* is desired. Identification of this parasite in stool requires special laboratory tests that are not done routinely. Three or more stool specimens may be required for testing, as a single negative stool does NOT rule out the diagnosis.
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed.
Outbreak Investigation	For outbreaks associated with an event (involving a confirmed case), a probable case may be defined as onset of illness from 1 to 14 days after the event and: a. A stool specimen with Cyclospora oocysts and at least one gastrointestinal symptom (i.e., loose or watery stools, nausea, vomiting, stomach cramps, gas/bloating) or constitutional symptom (i.e., fever, chills, muscle aches, joint aches, headaches, fatigue) **OR** b. Three or more loose stools in a 24-hour period and at least one other GI symptom or constitutional symptom. c. A total of 4 or more GI symptoms.

Investigation and Follow-up	• Ensure that all ill persons are aware of the Cyclospora diagnosis as soon as it is confirmed, so that their physicians can provide appropriate treatment. • Notify Centers for Disease Control and Prevention when an outbreak is suspected, as it is possible that related outbreaks may be occurring in other states. • Investigate to determine possible sources of infection. • Take note of seasonal produce origination from a domestic or international location. • Initiate trace back on implicated food vehicle(s) through the Food and Drug Administration.
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a GA Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.
Restrictions	Infected persons should be EXCLUDED from food handling and the care of children until symptoms have resolved.

Reported Cases of Cyclospora in Georgia, 1999-2002

Year	Number of Confirmed Cases
1999	10
2000	11
2001	29
2002	22
2003	8

References and Further Reading:

- Centers for Disease Control and Prevention. Case Definitions for Infectious Conditions under Public Health Surveillance. *MMWR* 1997; 46(No. RR-10):1-55.
- Centers for Disease Control and Prevention. Outbreak of Cyclosporiasis- Northern Virginia-Washington, DC-Baltimore, Maryland, Metropolitan Area, 1997. *MMWR* 1997;46(30):689-691
- Centers for Disease Control and Prevention. Outbreaks of Pseudo-Infection with Cyclospora and Cryptosporidium – Florida and New York City, 1995. *MMWR* 1997;46(16):354-358.
- Chin J, ed. Cyclosporiasis. In: Control of Communicable Diseases Manual. 17ed. Washington, DC.: American Public Health Assiociation, 2000:137-138.
- Herwaldt BL. Cyclospora cayetanensis: A Review, Focusing on the Outbreaks of Cyclosporiasis in the 1990s. Clinical Infectious Diseases 2000; 31(4):1040-1057.

Links:

- Centers for Disease Contro and Prevention Cyclospora Fact Sheet: http://www.cdc.gov/ncidod/dpd/parasites/cyclospora/factsht_cyclospora.htm
- FDA Bad Bug Book: http://www.cfsan.fda.gov/~mow/cyclosp.html

Escherichia coli O157:H7 and Shiga Toxin Producing *E. coli* (STEC)

Etiologic Agent	*Escherichia coli* serotype O 157:H7 or other E. coli serotypes producing Shiga toxins.
Clinical Symptoms	Bloody diarrhea with little or no fever, abdominal cramps.
Mode of Transmission	Ingestion of contaminated food (most often undercooked ground beef) but also unpasteurized milk and fruit or vegetables contaminated with feces. Direct person-to-person and waterborne transmission may also occur.
Incubation Period	Ranges from 2 to 8 days with a median of 3 to 4 days.
Period of Communicability	Adults usually excrete the pathogen for one week or less. Children may excrete the pathogen for up to 3 weeks.
Treatment	Fluid and electrolyte replacement if dehydration occurs.
Lab Criteria for Diagnosis	**E.coli *O157:H7*** • Isolation of Escherichia coli O157:H7 from a specimen or • Isolation of Shiga toxin producing E. coli O157:NM from a clinical specimen* (*Strains of E.coli O157:H7 that have lost the flagellar "H" antigen become nonmotile and are designated "NM.") **Shiga Toxin Producing *E.coli*** • Positive Shiga toxin test (e.g. EIA)
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Culture – Specimen: Feces – Outfit: Stool culture – **Form: 3416** – Lab Test Performed: Bacterial isolation and identification. Tests for Shiga toxin I and II. PFGE Antigen Typing – Specimen: Pure culture – Outfit: Culture referral – **Form: 3410** – Lab Test Performed: Flagella antigen typing
Case Classification	*Suspected:* A case of post-diarrheal HUS or TTP (see HUS case definition in the HUS fact sheet). *Probable***:** • A case with isolation of E. coli O157 from a clinical specimen, pending confirmation of H7 or Shiga toxin **OR** • A clinically compatible case that is epidemiologically linked to a confirmed or probable case. *Confirmed*: A case that is laboratory confirmed.
Investigation	The potential severity of the disease calls for early involvement of local health authorities to identify the source and apply appropriate specific preventive measures. It is important to interview the cases quickly so that they will recall exposures accurately to prevent secondary cases. The patient's isolate should be forwarded to the Georgia Public Health lab subtyping and further testing. Some clinical

	laboratories only perform Shiga toxin tests and do not attempt to isolate the organisms that produce Shiga toxin. For public health purposes, it is important to have the organism, so you would need to send the stool from the clinical lab or a fresh stool from the patient to the GPHL for culture. Advise family members of the need for frequent hand washings with soap and water, especially after using the toilet and diaper changes. **Prophylactic use is NOT recommended.**
Reporting	Report all cases **IMMEDIATELY** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a GA Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.
Restrictions	Infected persons should be EXCLUDED from food handling and the care of children until symptoms have resolved. **Infected persons should NOT be employed to handle food or to provide child or patient care until TWO successive negative fecal samples or rectal swabs are obtained.**

Reported Cases of E. coli O157:H7 in Georgia, 1999-2002

Year	Number of C Cases
1999	42
2000	45
2001	45
2002	47
2003	35

References and Further Reading:

- Centers for Disease Control and Prevention. Outbreak of Escherichia coli O157:H7 and Campylobacter Among Attendees of the Washington County Fair – New York, 1999. *MMWR* 1999; 48(36):803.
- Centers for Disease Control and Prevention. Case Definitions for Infectious Condition under Public Health Surveillance. *MMWR* 1997; 46(RR10): 1-55.
- Centers for Disease Control and Prevention. Enhanced Detection of Sporadic Escherichia coli O157:H7 Infections – New Jersey, July 1994. *MMWR* 1995; 44(22): 417-418.
- Centers for Disease Control and Prevention. Escherichia coli O157:H7 Outbreak at a Summer Camp – Virginia, 1994. *MMWR* 1995; 44(22):419-421.
- Centers for disease Control and Prevention. Outbreaks of Escherichia coli O157:H7 Infection and Cryptosporidiosis Associated with Drinking Unpasteurized Apple Cider – Connecticut and New York, October 1996. *MMWR* 1997; 46(1):4-8.
- Chin J, ed. Diarrhea caused by Escherichia coli. Diarrhea caused by Enterohemorrhagic Strains. In: Control of Communicable Disease Manual. 17th ed. Washington, DC: American Public Health Association, 2000: 155-158.

Links:

- USDA Food Safety and Inspection Service – http://www.fsis.usda.gov
- USDA Cooking Ground Beef Safely – http://www.fsis.usda.gov/OA/topic/gb.htm
- Centers for Disease Control and Prevention Escherichia coli O157":H7 fact sheet - http://www.cdc.gov/ncidod/dbmd/diseaseinfo/escherichiacoli_g.htm
- Centers for Disease Control and Prevention Pulsenet – http://www.cdc.gov/ncidod/dbmd/pulsenet/pulsenet.htm
- Centers for Disease Control and Prevention FoodNet- http://www.cdc.gov/ncidod/dbmd/foodnet

Giardiasis

Etiologic Agent	*Giardia intestinalis,* a protozoan parasite.
Clinical Symptoms	Chronic symptoms including: diarrhea, abdominal cramping, bloating, fatigue, weight loss, malabsorption (greasy, foul smelling stools.)
Mode of Transmission	Ingestion of cysts in fecally contaminated water and less often from fecally contaminated, uncooked food. Person-to-person transmission occurs by hand to mouth transfer of cysts from the feces of an infected individual.
Incubation Period	Usually 7-10 days, but ranges from 3- 25 days
Period of Communicability	Throughout the course of the infection.
Treatment	• Metronidazole is presently the drug of choice in the U.S. • Albendazole and quinacrine (requires special ordering) are alternatives. • Furazolidone is available in pediatric suspension for young children and infants but is difficult to administer due to its terrible taste. • Paromomycin can be used during pregnancy.
Lab Criteria for Diagnosis	• Demonstration of Giardia intestinalis cysts in stool OR • Demonstration of Giardia intestinalis trophozoites in stool, duodenal fluid or small bowel biopsy OR • Demonstration of Giardia intestinalis antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunoabsorbent assay.)
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	**Feces** – Specimen: Feces – Outfits: IP & PVA (intestinal parasite & polyvinyl alcohol) outfit, order #0520. – **Form: 3414** – Laboratory Test Performed: Identification of cysts and trophozoites of the organism. **Water** Generally not tested directly for the presence of Giardia, but can be screened using a test for fecal coliforms. A positive test for fecal coliforms indicates that water is contaminated by fecal materials. Fecal coliform testing is performed by the Water Laboratory, Georgia Department of Natural Resources, through coordination of the Epidemiology Branch. ALL specimens must be submitted with GPHL. In the event of an outbreak, specific testing for Giardia can be accomplished in coordination with the Epidemiology Branch
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed
Investigation and Follow-up	Outbreaks should be investigated immediately to determine the possible source of the infection. Consider food contamination by infected food handlers. Of particular interest are children attending day care centers and common sources such as municipal water systems. Institute appropriate prevention and control measures in coordination with the

	Epidemiology Branch. Advise patients and food handlers about proper hand washing after using the toilet, after handling contaminated clothing or linens and before cooking.
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a GA Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.
Restrictions	Infected persons should be EXCLUDED from food handling and the care of children until symptoms have resolved.

Reported Cases of Giardia in Georgia, 1999-2002

Year	Number of Cases
1999	1357
2000	1201
2001	961
2002	927
2003	855

References and Further Reading:

- Centers for Disease Control and Prevention. Case Definition for Infectious Conditions under Public Health Surveillance. *MMWR* Vol. 46(RR10), 1997: 1-55.
- Centers for Disease Control and Prevention. Giardiasis Surveillance- Untied States, 1992-1997. *MMWR* Vol. 49(SS07), 2000:1-13.
- Chin J. ed. Giardiasis. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association, 2000: 220-222.
- U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition. Giardia Lamblia. In: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook.

Links:

- Centers for Disease Control and Prevention Giardiasis Fact Sheet – http://www.cdc.gov/ncidod/dpd/parasites/giardiasis/factsht_giardia.htm
- FDA Bad Bug Book – http://vm.cfsan.fda.gov/~mow/chap22.html

Hepatitis A

Etiologic Agent	Hepatitis A (HAV)
Clinical Symptoms	Fever, fatigue, malaise, loss of appetite, nausea, abdominal pain, dark urine and yellowing of the skin and eyeballs (jaundice).
Mode(s) of Transmission	• Primarily by the fecal-oral route. This includes ingestion of fecally contaminated water or ice; raw or undercooked shellfish; fruits, vegetables, and other foods eating uncooked that may have become contaminated during handling. • Waterborne transmission is common in places with inadequate sewage disposal and water treatment, such as those found in developing nations. • Sexual contact can also be a method of transmitting the virus. • Bloodborne transmission is rare.
Incubation Period	Average time is 28-30 days; Range is 15-50 days
Period of Communicability	Virus is present in the highest quantity in stool during the latter half of the incubation period (7-14 days prior to onset of illness) and continues at lower levels for 7-14 more days after onset of jaundice. Most cases are noninfective after the first week of jaundice.
Vaccine Recommendations	• Persons traveling to countries that have high or intermediate rates of Hepatitis A • Persons with chronic liver disease or clotting factor disorders, • Men who have sex with men, • Persons who work with HAV infected primates or with HAV in laboratory settings, and • Children living in communities that have elevated rates of HAV.
Treatment	Symptomatically only. Hepatitis A IS self-limiting.
Post-exposure Prophylaxis of Contacts	Immune globulin (IG) should be offered after exposure to hepatitis A if it can be given within 14 days of last exposure to the case as indicated below: • Persons who live in the same household or who are intimate and/or sex partners of a diagnosed case • Daycare center associated cases • Children who attend the same room as a diagnosed case • Workers who change diapers in a day care center having a diagnosed case • Inmates in the same cell in a detention center • Food handlers who work with the acute case. **Note**: When a food worker has acute infection, consideration may be given to prophylaxis of patrons IF prophylaxis can be given within 14 days of last exposure and the case worked while having diarrhea and/or having questionable hygienic practices, combined with having contact with ready-to-eat foods.
Lab Criteria for Diagnosis	Immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV) positive. Note: A person may remain IgM positive for up to 6 months after infection. This makes it difficult to determine the timing of infection in a person who has been asymptomatic.

Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Serology • Specimen: Serum/blood • Outfits: Other serology • **Form: 3595** • Laboratory Test Performed: Anti-HAV IgM
Case Classification	***Suspected****:* Meets the clinical case definition of having an acute illness with a) discrete onset of symptoms and b) jaundice or elevated serum aminotransferase levels >2.5 times normal. ***Probable****:* Meets the clinical case definition and occurs in a person who has an epidemiologic link with a person who has laboratory-confirmed hepatitis A (i.e., household or sexual contact with an infected person **during the 15-50 days before the onset of symptoms.)** ***Confirmed:*** Laboratory confirmed (HAV (IgM positive))
Outbreak Investigation	1. Complete the Centers for Disease Control and Prevention Form 51.3, "Hepatitis Case Record" 2. Conduct an assessment of the patient for high-risk activities (food handler, day care attendee/provider, health care provider) and hygienic practices such as hand washing. 3. Determine whether the case worked while having diarrhea. 4. Assess the need for Immune Globulin (IG) as indicated above for contacts regarding the patient. 5. Educate case contacts regarding HAV transmission. Advise international travelers, men who have sex with men, and others who will be at increased risk of exposure to hepatitis A in the future, to obtain the hepatitis A vaccine.
Reporting	Report acute, laboratory confirmed cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after regular business hours, it is very important to report cases to the Epidemiology Branch answering service. After a verbal report has been made, please transmit the case information electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a GA Notifiable Disease Report From. Districts should complete the Centers for Disease Control and Prevention Form 51/3, "Viral Hepatitis Case Record" and forward by fax to the Epidemiology branch at 404-657-2608 as soon as possible.

Reported Cases of Acute Hepatitis A in Georgia, 1999-2002

Year	Number of Cases
1999	482
2000	376
2001	930
2002	511

References:

- Centers for Disease Control and Prevention of Hepatitis A through Active or Passive Immunization: Recommendations of the Advisory Committee on Immunization Practices (ACIP). *MMWR* 1999;48(rr12): 1-37
- Chin J, ed. Hepatitis, Viral. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC; American Public Health Association, 2000: 238-243.
- Centers for Disease Control and Prevention. Case Definitions for Infectious Conditions Under Public Health Surveillance. *MMWR* Vol. 46(RR10):1-55.

Links:

- Centers for Disease Control and Prevention Hepatitis A Fact Sheet: http://www.cdc.gov/ncidod/diseases/hepatitis/a/fact.htm
- FDA Bad Bug Book: http://www.cfsan.fda.gov/~mow/chap31.html

Listeriosis

Etiologic Agent	*Listeria monocytogenes*, a gram-positive rod-shaped bacterium.
Clinical Symptoms	Fever, nausea, muscle aches, diarrhea, headache, stiff neck and confusion. Pregnant women may experience mild, flu-like illness, and fetal loss may occur.
Mode(s) of Transmission	Ingestion of foods contaminated with Listeria such as raw milk, ready-to-eat meats and deli salads, soft unpasteurized cheeses and contaminated vegetables, also mother to fetus before or during delivery.
Incubation Period	Varies; Ranges from 3-70 days. Median is 3 weeks.
Period of Communicability	• Mothers of infected newborn infants may shed Listeria in vaginal discharges and urine for 7-10 days after delivery. • Infected individuals may shed Listeria in stool for several months.
Treatment	First line therapy is Ampicillin in combination with an aminoglycoside. Second line is trimethoprim-sulfamethoxazole.
Lab Criteria for Diagnosis	Isolation of Listeria from CSF, blood, amniotic fluid, fetal tissue
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Serology – Specimen: CSF, blood, placenta, amniotic fluid, fetal tissue – **Form: 3410** – Lab test performed: Isolation of Listeria from a normally sterile site. Culture – Specimen: Pure culture – **Form: 3140** – Lab test performed Confirmation of identification of Listeria monocytogenes Feces – Specimen: Stool – **Form 3416** – Lab test performed: Isolation of organism, same serotype/ subtype
Case Classification	***Confirmed***: Clinically compatible case that is laboratory confirmed *Listeria monocytogenes*
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a GA Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.

Reported Cases of Listeriosis in Georgia, 1999-2002

Year	Number of Cases
1999	30
2000	20
2001	16
2002	15
2003	31

References and Further Reading:

- Chin J, ed. Listeriosis. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC; American Public Health Association, 2000: 296-299
- Centers For Disease Control and Prevention. Outbreak of Listeriosis Associated With Homemade Mexican-Style Cheese—North Carolina, October 2000- January 2001. *MMWR* 2001; 50(26):560-562.
- Centers for Disease Control and Prevention. Outbreak of Listeriosis –Northeastern United States, 2002. *MMWR* 2002; 51(42): 950-951.

Links:

- Centers for Disease Control and Prevention Listeriosis Fact sheet- http://www.cdc.gov/ncidod/dbmd/diseaseinfo/listeriosis_g.htm
- FDA Bad Bug Book: http://www.cfsan.fda.gov/~mow/chap6.html

Norovirus

Etiologic Agent	Single-stranded RNA, non-enveloped virus
Clinical Symptoms	Low-grade fever, vomiting, non-bloody diarrhea, dehydration, abdominal pain, myalgia, headache; Symptoms usually last 24 to 60 hours.
Mode of Transmission	• Fecal-orally by consumption of contaminated food or water • Direct person-to-person spread • Environmental and fomite contamination may also act as a source of infection
Incubation Period	Between 24 and 48 hours (median in outbreaks 33 to 36 hours), but cases can occur within 12 hours of exposure.
Period of Communicability	During the acute phase of the disease and up to 72 hours after diarrhea stops.
Treatment	Fluid and electrolyte replacement may be required in severe cases
Lab Criteria for Diagnosis	Identification of small-round-structured virus (SRSV) in stool by direct or immune EM, by RIA or by reverse transcription polymerase chain reaction (RT-PCR). Because norovirus may be commonly found in stool, norovirus must be detected in the stool of $\geq$ 2 persons in order to establish norovirus as the etiology of an outbreak.
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	**Feces** • Specimen: fresh stool • Outfit: Sterile container • **Form: 3595R** Lab tests performed: Electron Microscopy, RT-PCR
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed.
Outbreak Investigation	Outbreaks should be investigated immediately to determine the possible source of the infection. Consider food contamination as well as person-to-person transmission. Institute appropriate prevention and control measures in coordination with the Epidemiology Branch. Advise patients and food handlers about frequent hand washing with soap and water for at least 20 seconds as an effective means of prevention.
Reporting	Individual cases of norovirus infection are not reportable. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.
Restrictions	Infected persons should be EXCLUDED from food handling and the care of children until at least 3 days AFTER symptoms have resolved. Food handlers should practice STRICT personal hygiene at all times.

Reported Cases of Norovirus Cases in Georgia, 1999-2002
** This information is unavailable **

References and Further Reading:

- Centers for Disease Control and Prevention. "Norwalk-like Viruses" Public Health Consequences and Outbreak Manangement. *MMWR* 2001; 50(RR-9): 1-24.
- Centers for Disease Control and Prevention. "Outbreaks of Gastroenteritis Associated with Noroviruses on Cruise Ships- United States, 2002." *MMWR* 2002; 51(49):1112-1115.
- Centers for Disease Control and Prevention. "Norwalk-Like Viral Gastroenteritis in U.S. Army Trainees -- Texas, 1998." *MMWR* 1999; 48(11): 225-227.
- Centers for Disease Control and Prevention. "Epidemiologic Notes and Reports Multistate Outbreak of Viral Gastroenteritis Associated with Consumption of Oysters -- Apalachicola Bay, Florida, December 1994- January 1995." *MMWR* 1995; 44(02): 37-39.
- Chin J ed. Acute Viral Gastroenteropathy. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association 2000: 218-220.

Links:

- Centers for Disease Control and Prevention Fact Sheet: http://www.cdc.gov/ncidod/dvrd/revb/gastro/norovirus-factsheet.htm
- FDA Bad Bug Book: http://www.cfsan.fda.gov/~mow/chap34.html

Salmonellosis

Etiologic Agent	Salmonella spp.
Clinical Symptoms	Diarrhea, vomiting, nausea, fever, headache, abdominal pain
Mode of Transmission	Ingestion of contaminated foods from infected animals or food contaminated by feces of an infected animal or person. Fecal-oral transmission is extremely important when diarrhea is present.
Incubation Period	Usually about 24-36 hours with a range of 6 hours to seven days. If the dose of Salmonella ingested is smaller, the incubation period tends to be longer.
Period of Communicability	Throughout the course of infection. An infected person may excrete Salmonella from several days to several weeks. A temporary carrier state occasionally continues for months, especially in infants.
Treatment	No treatment is usually indicated. Rehydration may be necessary for persons with diarrhea. Antibiotics are usually not necessary unless the patient is at risk of extraintestinal infection such as infants <3 months or those who are immuno-compromised.
Lab Criteria for Diagnosis	Isolation of Salmonella from a clinical specimen
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Culture – Specimen: Feces – Outfit- 0555 – Stool culture – **Form: 3416** Feces Culture for Bacterial Enteric Pathogens – Lab Test Performed – Salmonella culture Serotyping – Specimen: Pure culture – Outfit: 0505 – Culture Referral – **Form: 3410** – Lab Test Performed: Salmonella Serotyping Culture (Outbreaks Only) – Specimen: At least one serving portion of suspected food, if available. Immediately obtain and refrigerate food specimens. If frozen, keep frozen. If not frozen, ship with freezer packs. Coordinate with Epidemiology Branch regarding which foods should be tested. – Outfit: Sterile plastic bags, label and instructions – Laboratory Form: Food Report **Form 3450** – Lab Test Performed: Salmonella culture
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed.
Investigation	Outbreaks should be investigated to determine the possible source of infection. Questionnaires should place emphasis on animal contact, food handling procedures, possible cross-contamination during cooking, cooking times and temperatures and food handler health and hygiene. The District or local Environmentalist should collect samples of food(s) and forward selected samples of food(s) to the State Public Health laboratory in coordination with the Epidemiology Branch (404-656-2588). For *Salmonella Enteritidis* outbreaks in which dishes

	containing eggs are implicated, initiate trace back to the egg sources and notify the Department of Agriculture. Complete "Investigation of a Foodborne Outbreak" and send a copy to the Epidemiology Branch as soon as the investigation is complete.
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a Georgia Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.
Restrictions	**Infected food handlers should be excluded from handling food until they have three consecutive negative stools obtained at least 48 hours apart. Ciprofloxacin has been effective in clearing chronic infection in adults.**

Reported Cases of Salmonella in Georgia, 1999-2002

Years	Number of Cases
1999	1975
2000	1688
2001	1722
2002	1958
2003	2062

References and Further Reading:

- Centers for Disease Control and Prevention. Case Definitions for Infectious Conditions under Public Health Surveillance. *MMWR* 1997; 46(RR10): 1-55
- Centers for Disease Control and Prevention. Salmonellosis Associated with Chicks and Ducklings- Michigan and Missouri, Spring 1999. *MMWR* 20000; 49(14):297-9.
- Chin J ed. Salmonellosis. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association 2000: 440-444.
- U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition. Salmonella spp. In: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook.

Links:

- Centers for Disease Control and Prevention Salmonellosis Fact Sheet: http://www.cdc.gov/ncidod/dbmd/diseaseinfo/salmonellosis_t.htm
- FDA Bad Bug Book: http://vm.cfsan.fda.gov/~mow/chap1.html.

Shigellosis

Etiologic Agent	Shigella spp. (sonnei, flexneri, boydii and dysenteriae)
Clinical Symptoms	Watery or bloody diarrhea, abdominal pain, fever, and malaise.
Mode of Transmission	Person to person spread can easily occur by the fecal-oral route and occurs more commonly than transmission by food and water.
Incubation Period	Usually 1 to 3 days, but ranges from 12 hours to 4 days (up to one week for *Shigella dysenteriae 1*, which is a rare serotype in the U.S.)
Period of Communicability	During acute infection and until the infectious agent is no longer present in the feces, usually within 4 weeks after illness. Rarely, the asymptomatic carrier may persist for months or longer.
Treatment	Provide fluid and electrolytes if dehydration occurs. Antibacterials should be used in individual cases if warranted by the severity of the illness. Depending upon sensitivities, treatment for adults may include trimethoprim-sulfamethoxazole (TMP-SMX), ciprofloxacin or ofloxacin. Treatment for children may include TMP-SMX, ampicillin or nalidixic acid.
Lab Criteria for Diagnosis	Isolation of Shigella from a clinical specimen.
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Culture • Specimen: Feces • Outfit: Stool culture outfit, order #0555 • **Form: 3416** • Laboratory test performed: Shigella culture. Serotyping • Specimen: Pure culture • Outfit: Culture referral outfit, order #0505 • **Form: 3410** • Laboratory test performed: Shigella typing Culture of Food (Outbreaks only) • Specimen: At least one serving portion of suspected food, if available. Immediately obtain and refrigerate food specimens. If frozen, keep frozen. If not frozen, ship with freezer packs. Coordinate with Epidemiology Branch regarding which foods should be tested. • Outfit: Sterile plastic bags, label and instructions • Laboratory Form: Food Report **Form 3450** • Laboratory test performed: Shigella culture
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed.
Investigation and Follow-up	Common source outbreaks require prompt investigation and intervention. Cultures of contacts should generally be confined to food handlers, attendants, and children in hospitals or daycare centers, and other situations where the spread of infection is likely. An organized effort to promote careful hand washing with soap and water is the single most important control measure in most settings. Institutional outbreaks may require special measures, including separate housing for cases and new admissions or cohorting of convalescent and well children within daycare centers.

Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a Georgia Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.
Restrictions	**Infected persons should be excluded from food handling and the care of children or patients until they have two consecutive negative stool specimens obtained at least 24 hours apart.**

Reported Cases of Shigellosis in Georgia, 1999-2002

Years	Number of Cases
1999	284
2000	339
2001	752
2002	1842
2003	1171

References and Further Reading:

- Centers for Disease Control and Prevention. Shigella sonnei Outbreak Associated with Contaminated Drinking Water – Island Park, Idaho, August 1995. *MMWR* 1996; 45(11): 229-231
- Centers for Disease Control and Prevention Case Definitions for Infectious Conditions under Public Health Surveillance. *MMWR* 119; 46(RR10):1-5
- Centers for Disease Control and Prevention. Public Health Dispatch: Outbreak of Shigella sonnei Infections Associated with Eating a Nationally Distributed Dip- California, Oregon and Washington, January 2000. *MMWR* 2000; 49(03):60-1.
- Chin J, ed. Shigellosis. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association, 2000: pp. 451-455.
- U.S. Food and Drug Administration, Center for Food Safety and Applied Nutrition. Shigella spp. In: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook.

Links:

- Centers for Disease Control and Prevention Shigellosis Fact Sheet - http://www.cdc.gov/ncidod/dbmd/diseaseinfo/shigellosis_g.htm
- FDA Bad Bug Book – http://vm.cfsan.fda.gov/~mow/chap19.html

Vibrio Parahaemolyticus

Etiologic Agent	*Vibrio Parahaemolyticus*, a halophilic vibrio
Clinical Symptoms	Watery diarrhea, abdominal cramping, nausea, vomiting, fever and headache are the usual symptoms
Mode of Transmission	Ingestion of raw or undercooked seafood or any food contaminated by the handling of raw seafood or by rinsing with contaminated water.
Incubation Period	Usually 12 to 24 hours, but can range from 4 to 30 hours
Period of Communicability	Not considered to be transmitted from person to person contact.
Treatment	Treatment is usually not necessary. Rehydration therapy may be needed to replace fluids lost from diarrhea.
Lab Criteria for Diagnosis	Isolation of Vibrio Parahaemolyticus
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Feces • Specimen: Stool • Outfit: Para-Pak #0555 • **Form: 3416** • Laboratory test performed: Isolation of toxigenic organism from 2 or more people
Case Classification	***Probable*: A clinically compatible case that has been epidemiologically linked to a confirmed case.** ***Confirmed***: A case that is laboratory confirmed.
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a Georgia Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.

Reported Cases of Vibrio Parahaemolyticus in Georgia, 1999-2002
** This information is currently unavailable**

References

- Chin J ed. Vibrio Parahaemolyticus Enteritis. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association 2000: 110-111.
- Daniels NA, MacKinnon L, Bishop R, Altekruse S, Ray B, Hammond RM, Thompson S, Wilson S, Bean NH, Griffin PM, Slutsker L. *Vibrio parahaemolyticus* Infections in the United States, 1973-1998. Journal of Infectious Diseases 2000; 181: 1661-1666.
- Centers for Disease Control and Prevention. Outbreak of *Vibrio parahaemolyticus* infection associated with eating raw oysters and clams harvested from Long Island Sound - Connecticut, New Jersey, and New York, 1998. *MMWR* 1999; 48(03):48-51.

Links:

- Centers for Disease Control and Prevention V. Parahaemolyticus Fact Sheet: http://www.cdc.gov/ncidod/dbmd/diseaseinfo/vibrioparahaemolyticus_g.htm
- FDA Bad Bug Book - http://vm.cfsan.fda.gov/~mow/chap9.html

Vibrio Vulnificus

Etiologic Agent	*Vibrio vulnificus*, a halophilic (salt-requiring) gram-negative bacterium naturally and commonly found in marine and estuarine environments.
Clinical Symptoms	In persons with underlying medical conditions, especially liver disease, can cause bloodstream infections characterized by fever, chills, decreased blood pressure, blistering skin lesions, and often, death. In otherwise healthy persons, causes diarrhea, vomiting, and abdominal pain.
Mode of Transmission	Ingestion of raw or undercooked seafood. Naturally occurring in warm, marine waters.
Incubation Period	Usually 12 to 72 hours after eating raw or undercooked seafood.
Period of Communicability	Not considered to be transmitted from person to person contact directly or via contamination of food with the exception of raw and/or undercooked seafood.
Treatment	Treatment is with antibiotics. Doxycycline or a third-generation cephalosporin (e.g., ceftazidime) is appropriate.
Lab Criteria for Diagnosis	Isolation of Vibrio Vulinificus
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Feces • Specimen: Stool • Outfit: Para-Pak #0555 • **Form: 3416** • Laboratory test performed: Isolation of toxigenic organism from 2 or more people Blood • Specimen: Blood • Outfit: • Form: • Laboratory Test performed: Isolation of Vibrio species
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed.
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a Georgia Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.

Reported Cases of Vibrio Vulnificus in Georgia, 1999-2002

Year	Number of Cases
1999	3
2000	2
2001	7
2002	7

References

- Centers for Disease Control and Prevention. Vibrio Vulnificus Infections Associated with Raw Oyster Consumption- Florida, 1981-1992. *MMWR* 1993; 42(21): 405-407.
- Vibrio Vulnificus Infections Asscociated with Eating Raw Oysters—Los Angeles. *MMWR* 1996; 45(29): 621-624.
- Chin J ed. Infection with Vibrio Vulnificus. In: Control of Communicable Diseases Manual. 17th ed. Washington, DC: American Public Health Association 2000: 111-113.

Links:

- Centers for Disease Control and Prevention V. Vulnificus Fact Sheet: http://www.cdc.gov/ncidod/dbmd/diseaseinfo/vibriovulnificus_g.htm
- FDA Bad Bug Book: http://www.cfsan.fda.gov/~mow/chap10.html

Yersinia Enterocolitica

Etiologic Agent	Y. Enterocolitica, a rod-shaped bacteria.
Clinical Symptoms	Abdominal pain, diarrhea, fever
Mode of Transmission	Fecal-oral transmission takes place by eating and drinking contaminated food and water or by contact with infected persons or animals.
Incubation Period	Usually 3-7 days but is generally less than 10 days.
Period of Communicability	Secondary transmission appears to be rare. Fecal shedding can last 2-3 weeks or at least as long as symptoms exist. Untreated cases may excrete the organism for 2-3 months.
Treatment	Uncomplicated cases usually resolve without treatment. Complicated cases sometimes require antibiotics such as aminoglycosides or fluoroquinolones.
Lab Criteria for Diagnosis	Isolation of Yersinia Enterolitica
Diagnostic Testing (all tests performed by the Georgia Public Health Laboratory in Decatur, GA)	Culture • Specimen: Feces • Outfit:Para-Pak #0555 • **Form: 3416** Laboratory test performed: Isolation of Yersinia Enterocolitica.
Case Classification	***Probable*:** A clinically compatible case that has been epidemiologically linked to a confirmed case. ***Confirmed***: A case that is laboratory confirmed.
Reporting	Report all cases **WITHIN 7 DAYS** electronically through the State Electronic Notifiable Disease Surveillance System (SENDSS) at ***http://sendss.state.ga.us*** OR complete and mail a Georgia Notifiable Disease Report From. Report any **cluster** of cases **IMMEDIATELY** by phone to the local health department, District Health Office or the Epidemiology Branch at 404-657-2588. If calling after hours, it is important to report cases to the Epidemiology Branch answering service.

Reported Cases of Yersinia in Georgia, 1999-2002

Year	Number of Cases
1999	2
2000	2
2001	49
2002	46
2003	51

References and Further Reading:

- Chin J ed. Yersinia Enterocolitica. In: Control of Communicable Diseases Manual. 17th edition. Washington, DC: American Public Health Association 2000: 558-561.
- Centers for Disease Control and Prevention. Topics in Minority Health Yersinia enterocolitica Infections during the Holidays in Black Families – Georgia. *MMWR* 1990; 39(45): 819-820.
- Centers for Disease Control and Prevention. *Yersinia enterocolitica* Gastroenteritis Among Infants Exposed to Chitterlings --- Chicago, Illinois, 2002. *MMWR* 2003; 52(40): 956-958.
- Centers for Disease Control and Prevention. Epidemiologic Notes and Reports Outbreak of Yersinia enterocolitica -- Washington State. *MMWR* 1982; 31(41): 562-564.

Links:

- Centers for Disease Control and Prevention Fact Sheet: http://www.cdc.gov/ncidod/dbmd/diseaseinfo/yersinia_g.htm
- FDA Bad Bug Book: http://www.cfsan.fda.gov/~mow/chap5.html

Appendix D

SAMPLE LETTERS

1) **Sample Letters to Use for Contacting Cases**
2) **Sample Press Release**
3) **Sample Public Notice**

Sample Letter for Contacting Vibrio Cases by Mail

Date

Dear [NAME],

My name is _____and I am an epidemiologist for the State Health Department. Your physician recently notified us that you had a *Vibrio* infection. This is a rare infection, and we are interested in asking you some questions about how you might have become infected with this type of infection to help prevent future illness in others.

Please fill out the Vibrio interview form and mail it back to us. I have enclosed a self-addressed stamped envelope for your convenience in mailing the interview form. I have also enclosed some information regarding the type of infection you had. These materials were acquired from the CDC website and are to keep for your own use.

Please feel free to call me if you have any questions or concerns. You can reach me at 404-_____.

Thank you for your assistance,

_____
Epidemiologist
Georgia Department of Human Resources
Notifiable Disease Section
2 Peachtree St, NW
Suite 14-___
Atlanta, GA 30303
Phone: _____

***MAKE SURE THE QUESTIONS YOU STILL NEED ANSWERED ARE INCLUDED ON THE VIBRIO INTERVIEW FORM (STARTING ON THE NEXT PAGE) - IF THEY ARE NOT THEN YOU HAVE TO TYPE THEM IN SO THAT THEY ARE ANSWERED BY THE CASE*

Vibrio Interview Form

Name:

Phone:

Date of birth:

Race:

Ethnicity:

Occupation:

What was the date your symptoms began?

How long did the symptoms last?

What were your symptoms?

Were you hospitalized with this infection? If yes, dates of hospitalization?

Were you given an antibiotic? If yes, type and duration of dose?

Did you travel outside of your home state in the 7 days before your illness began?

If yes, where_____ and dates of travel? _____
_____

Please specify which of the following seafoods were eaten in the 7 days before illness began (if multiple times, then the most recent meal):

TYPE OF SEAFOOD	DATE EATEN	ANY EATEN RAW
Clams		
Crab		
Lobster		
Mussels		
Oysters		
Shrimp		
Crawfish		
Other Shellfish-specify		
Fish-specify		

If any of the above were consumed please list any details as to where the seafood was obtained, name and address of restaurant, grocery store, etc: _____
_____
_____
_____
_____
_____
_____
_____
_____
_____

In the 7 days before illness began was your skin exposed to any of the following?

1. Fresh or salt water? _____

   Please specify location and date: _____

   Was a wound sustained during this exposure? _____

   Did you have a pre-existing wound and went swimming? _____

2. Drippings from raw or live seafood? _____

   Please specify type and date: _____

3. Other contact with marine or freshwater? _____

   Please specify how and date: _____
   _____
   _____

Vibrio parahaemolyticus

What is Vibrio parahaemolyticus?

Vibrio parahaemolyticus is a bacterium in the same family as those that cause cholera. It lives in brackish saltwater and causes gastrointestinal illness in humans. V. parahaemolyticus naturally inhabits coastal waters in the United States and Canada and is present in higher concentrations during summer; it is a halophilic, or salt-requiring organism.

What type of illness is caused by V. parahaemolyticus?

When ingested, V. parahaemolyticus causes watery diarrhea often with abdominal cramping, nausea, vomiting fever and chills. Usually these symptoms occur within 24 hours of ingestion. Illness is usually self-limited and lasts 3 days. Severe disease is rare and occurs more commonly in persons with weakened immune systems. V. parahaemolyticus can also cause an infection of the skin when an open wound is exposed to warm seawater.

How does infection with V. parahaemolyticus occur?

Most people become infected by eating raw or undercooked shellfish, particularly oysters. Less commonly, this organism can cause an infection in the skin when an open wound is exposed to warm seawater.

How common is infection with V. parahaemolyticus?

In Asia, V. parahaemolyticus is a common cause of foodborne disease. In the United States, it is less commonly recognized as a cause of illness, partly because clinical laboratories rarely use the selective medium that is necessary to identify this organism. Not all states require that V. parahaemolyticus infections be reported to the state health department, but CDC collaborates with the Gulf Coast states of Alabama, Florida, Louisiana, and Texas to monitor the number of cases of Vibrio infection in this region. From those states, about 30-40 cases of V. parahaemolyticus infections are reported each year. The Foodborne Diseases Active Surveillance Network, Food Net, also tracks V. parahaemolyticus in regions outside the Gulf Coast. In 1997, the incidence of diagnosed V. parahaemolyticus infection in Food Net sites was .25/100,000.

How is V. parahaemolyticus infection diagnosed?

Vibrio organisms can be isolated from cultures of stool, wound, or blood. For isolation from stool, use of a selective medium that has thiosulfate, citrate, bile salts, and sucrose (TCBS agar) is recommended. If there is clinical suspicion for infection with this organism, the microbiology laboratory should be notified so that they will perform cultures using this medium. A physician should suspect V. parahaemolyticus infection if a patient has watery diarrhea and has eaten raw or undercooked seafood, especially oysters, or when a wound infection occurs after exposure to seawater.

How is V. parahaemolyticus treated?

Treatment is not necessary in most cases of V. parahaemolyticus infection. There is no evidence that antibiotic treatment decreases the severity or the length of the illness. Patients should drink plenty of liquids to replace fluids lost through diarrhea. In severe or prolonged illnesses, antibiotics such as tetracycline, ampicillin or ciprofloxicin can be used. The choice of antibiotics should be based on antimicrobial susceptibilities of the organism.

How do oysters get contaminated with V. parahaemolyticus?

Vibrio is a naturally occurring organism commonly found in waters where oysters are cultivated. When the appropriate conditions occur with regard to salt content and temperature, V. parahaemolyticus thrives.

How is V. parahaemolyticus infection prevented?

Most infections caused by V. parahaemolyticus in the United States can be prevented by thoroughly cooking seafood, especially oysters. Wound infections can be prevented by avoiding exposure of open wounds to warm seawater. When an outbreak is traced to an oyster bed, health officials recommend closing the oyster bed until conditions are less favorable for V. parahaemolyticus.

How can I learn more about Vibrio parahaemolyticus?

You can discuss your medical concerns with your doctor or other health care provider. Your local health department can provide information about this and other public health problems. Information about problems associated with raw seafood consumption can be obtained from the FDA's Center for Food Safety and Applied Nutrition (telephone 1-800-332-4010). At this number recorded information is available on many subjects including seafood consumption and handling. A public affairs specialist is available 12:00 p.m.-4:00 p.m. Eastern Standard Time. Seafood safety information is also available on the world wide web at http://vm.cfsan.fda.gov, http://seafood.ucdavis.edu. There is more information about other Vibrio infections, such as Vibrio vulnificus at http://www.cdc.gov/ncidod/diseases/foodborn/vibrio.htm.

Sample Letter for Contacting Yersinia Cases by Mail

Date

Dear [NAME]:

On February 4, 2003, the Georgia State Health Department was notified that [Case's name] tested positive for an organism known as Yersinia Enterocolitica. This "bug" causes diarrhea and vomiting, among other symptoms, in children as well as adults. Through various phone calls, we have attempted to contact you to find out more information pertaining to [case's name] infection. However, we have been unable to reach you by phone. We are sending you this letter in hopes that you will provide us with more information pertaining to [Case's name} infection. The information needed is highlighted in yellow on the "Yersiniosis Form for Case Interview." A self-addressed stamped envelope is enclosed to assist you in returning the requested information to us. We have also included information on Yersinia. The information can also be obtained from the Centers for Disease Control and Prevention website. We hope that you will assist us in obtainining more information on Yersinia by completing the form and returning it to us in the self-addressed stamped envelope provided. Thank you in advance for your assistance.

Respectfully,

Epidemiologist
Georgia Department of Human Resources
Address

Yersinia enterocolitica

What is yersiniosis?

Yersiniosis is an infectious disease caused by a bacterium of the genus Yersinia. In the United States, most human illness is caused by one species, Y. enterocolitica. Infection with Y. enterocolitica can cause a variety of symptoms depending on the age of the person infected. Infection with Y. enterocolitica occurs most often in young children. Common symptoms in children are fever, abdominal pain, and diarrhea, which is often bloody. Symptoms typically develop 4 to 7 days after exposure and may last 1 to 3 weeks or longer. In older children and adults, right-sided abdominal pain and fever may be the predominant symptoms, and may be confused with appendicitis. In a small proportion of cases, complications such as skin rash, joint pains, or spread of bacteria to the bloodstream can occur.

What sort of germ is Y. enterocolitica?

Y. enterocolitica belongs to a family of rod-shaped bacteria. Other species of bacteria in this family include Y. pseudotuberculosis, which causes an illness similar to Y. enterocolitica, and Y. pestis, which causes plague. Only a few strains of Y. enterocolitica cause illness in humans. The major animal reservoir for Y. enterocolitica strains that cause human illness is pigs, but other strains are also found in many other animals including rodents, rabbits, sheep, cattle, horses, dogs, and cats. In pigs, the bacteria are most likely to be found on the tonsils.

How do people get infected with Y. enterocolitica?

Infection is most often acquired by eating contaminated food, especially raw or undercooked pork products. The preparation of raw pork intestines (chitterlings) may be particularly risky. Infants can be infected if their caretakers handle raw chitterlings and then do not adequately clean their hands before handling the infant or the infant's toys, bottles, or pacifiers. Drinking contaminated unpasteurized milk or untreated water can also transmit the infection. Occasionally Y. enterocolitica infection occurs after contact with infected animals. On rare occasions, it can be transmitted as a result of the bacterium passing from the stools or soiled fingers of one person to the mouth of another person. This may happen when basic hygiene and handwashing habits are inadequate. Rarely, the organism is transmitted through contaminated blood during a transfusion.

How common is infection with Y. enterocolitica?

Y. enterocolitica is a relatively infrequent cause of diarrhea and abdominal pain. Based on data from the Foodborne Diseases Active Surveillance Network (FoodNet), which measures the burden and sources of specific diseases over time, approximately one culture-confirmed Y. enterocolitica infection per 100,000 persons occurs each year. Children are infected more often than adults, and the infection is more common in the winter.

How can Y. enterocolitica infections be diagnosed?

Y. enterocolitica infections are generally diagnosed by detecting the organism in the stools. Many laboratories do not routinely test for Y. enterocolitica,so it is important to notify laboratory personnel when infection with this bacterium is suspected so that special tests can be done. The organism can also be recovered from other sites, including the throat, lymph nodes, joint fluid, urine, bile, and blood.

How can Y. enterocolitica infections be treated?

Uncomplicated cases of diarrhea due to Y. enterocolitica usually resolve on their own without antibiotic treatment. However, in more severe or complicated infections, antibiotics such as aminoglycosides, doxycycline, trimethoprim-sulfamethoxazole, or fluoroquinolones may be useful. .

Are there long-term consequences of Y. enterocolitica infections?

Most infections are uncomplicated and resolve completely. Occasionally, some persons develop joint pain, most commonly in the knees, ankles or wrists. These joint pains usually develop about 1 month after the initial episode of diarrhea and generally resolve after 1 to 6 months. A skin rash, called "erythema nodosum," may also appear on the legs and trunk; this is more common in women. In most cases, erythema nodosum resolves spontaneously within a month.

What can be done to prevent the infection?

- Avoid eating raw or undercooked pork.
- Consume only pasteurized milk or milk products.
- Wash hands with soap and water before eating and preparing food, after contact with animals, and after handling raw meat.
- After handling raw chitterlings, clean hands and fingernails scrupulously with soap and water before touching infants or their toys, bottles, or pacifiers. Someone other than the foodhandler should care for children while chitterlings are being prepared.
- Prevent cross-contamination in the kitchen: -Use separate cutting boards for meat and other foods. -Carefully clean all cutting boards, counter-tops, and utensils with soap and hot water after preparing raw meat.
- Dispose of animal feces in a sanitary manner.

What are public health agencies doing to prevent or control yersiniosis?

The Centers for Disease Control and Prevention (CDC) monitors the frequency of Y. enterocolitica infections through the foodborne disease active surveillance network (FoodNet). In addition, CDC conducts investigations of outbreaks of yersiniosis to control them and to learn more about how to prevent these infections. CDC has collaborated in an educational campaign to increase public awareness about prevention of Y. enterocolitica

infections. The U.S. Food and Drug Administration inspects imported foods and milk pasteurization plants and promotes better food preparation techniques in restaurants and food processing plants. The U.S. Department of Agriculture monitors the health of food animals and is responsible for the quality of slaughtered and processed meat. The U.S. Environmental Protection Agency regulates and monitors the safety of our drinking water supplies.

SAMPLE PRESS RELEASE

[Use DHR letterhead]

Hepatitis A Case Detected in Georgia

[**Insert appropriate town and date**]: Today Georgia Division of Public Health and Local Public Health Authorities announced that a case of hepatitis A occurred in a food worker at the **[insert appropriate facility name]**, located in **[insert appropriate town].**

Health officials warn that people who ate cold or uncooked foods at this restaurant between the dates of **[insert appropriate dates]** may be at risk for developing hepatitis A. Cold or uncooked foods include salads and salad items, rolls, breads, hamburger and hot dog buns, fruit or vegetable garnishes, cold desserts, hamburger or sandwich condiments such as pickles and onions, chips, and ice or beverages containing ice. Immune globulin (IG) provides immediate protection lasting for as long as 3-5 months when given within two weeks after a person has been exposed. Therefore, people who ate cold or uncooked foods or are unsure of what they ate from this restaurant between **[insert appropriate dates]** should contact their health care provider and receive IG as soon as possible. Health care providers may obtain IG from **[insert appropriate locations].**

The early signs and symptoms of hepatitis A are fever, fatigue, loss of appetite, nausea, vomiting, diarrhea, dark urine and jaundice (yellowing of eyes or skin). The illness varies in severity, with mild cases lasting two weeks or less and more severe cases lasting 4-6 weeks or longer. Some individuals, especially children, may not develop jaundice, and may have an illness so mild that it can go unnoticed. However, even mildly ill persons can still be highly infectious. Persons with illness suggestive of hepatitis should consult a physician even if symptoms are mild.

Hepatitis A virus is spread as a result of fecal contamination (fecal-oral route) and may be spread from person to person through close contact or through food handling. The virus can be spread by contaminated food and beverages.

Persons who ate cold or uncooked foods from **[insert appropriate restaurant]** between **[insert appropriate dates]** are urged to be particularly thorough in handwashing after toileting and prior to food preparation to avoid any potential further spread of disease. Handwashing should include vigorous soaping of the hands. All surfaces should be washed including the back of the hands, wrists, between fingers and under fingernails. Hands should be thoroughly rinsed with running water.

Further information can be obtained from local health departments, health care providers or the Georgia Division of Public Health, Epidemiology Branch at (404) 657-2588.

SAMPLE PUBLIC NOTICE

DEAR GUEST:

An employee of this restaurant was recently diagnosed as having hepatitis A. As a precautionary measure, all of the restaurant employees have received immune globulin (IG). Please be assured that we will continue to take every precautionary step to ensure the health and safety of our employees and guests.

As a result of this, we have been asked by state and local health officials to post the following information:

Exposure: It is of the opinion of state and local health departments that patrons who ate uncooked or cold food served from this restaurant anytime between [**insert appropriate dates**] and [**insert appropriate dates**] have potentially been exposed to hepatitis A.

Cold or uncooked foods include salads and salad items, rolls, breads, hamburger and hot dog buns, fruit or vegetable garnishes, cold desserts, hamburger or sandwich condiments such as pickles and onions, chips, and ice or beverages containing ice.

Prevention: Persons who ate cooked or uncooked foods at the restaurant from [**insert appropriate dates**] to [**insert appropriate dates**] should contact a health care provider and receive IG as soon as possible but no later than [**insert appropriate dates**]. IG provides protection when given as late as two weeks after a person has been exposed to hepatitis A. Health care providers can obtain IG from **[insert appropriate locations**].

Symptoms of hepatitis A: Symptoms of hepatitis A are age-related, with adults and adolescents more likely to develop the "classic" symptoms of fever, fatigue, loss of appetite, nausea and jaundice (dark brown urine and yellow skin and whites of eyes). In children, hepatitis A infections usually have minimal flu-like symptoms or upset stomach symptoms or no symptoms at all, and children usually do not develop jaundice. When symptoms do occur they generally last one to two weeks, although on rare occasions adults can feel sick for as long as several months.

Where to obtain information about hepatitis A?

Health care provider

Local health department (County and District level)

Georgia Division of Public Health
Epidemiology Branch, Notifiable Diseases Epidemiology Section (404) 657-2588

Appendix E

FORMS

1) Foodborne Illness Complaint Work Sheet
2) Laboratory Submission Forms
3) Specific Disease Investigation Forms
4) Investigation of a Foodborne Outbreak (CDC Fork&Spoon Form)
5) FoodNet Outbreak Supplemental Form

FOODBORNE ILLNESS COMPLAINT WORKSHEET

Date: ____/____/____
Case# _____

Questions? Call:
GDPH Environmental Health Office (404) 657-6534 or Notifiable Disease Epidemiology (404) 657-2588

PERSON COMPLETING INFORMATION

Last Name, First Name: _____ ☎: ( ) _____ - _____

Affiliation: ☐ County Health Department: _____ ☐ District: _____ ☐ State DPH: _____
☐ Other:_____

REPORTER / COMPLAINANT

Last Name, First Name: _____ ☎: ( ) _____ - _____

Affiliation: ☐ Consumer
☐ Laboratory
☐ Local BOH
☐ Medical Provider
☐ Other

Street Address: _____

City, State, ZipCode: _____

County: _____

ILLNESS INFORMATION

 # Persons ill: ☐

Symptoms: *(mark if reported **for anyone**):*

☐ Diarrhea ☐ Vomiting ☐ Nausea ☐ Abdominal cramps
☐ Fever ☐ Bloody stool ☐ Headache ☐ Muscle aches
☐ Chills ☐ Loss of appetite ☐ Fatigue ☐ Dizziness
☐ Burning in mouth ☐ Other symptoms:

Onset: →
Earliest Date: ____ /____ /____ Time: ____ : ____ ☐AM ☐PM
Latest **(if > 2 ill)** Date: ____ /____ /____ Time: ____ : ____ ☐AM ☐PM

Duration of illness: ☐ Less than 24 Hours ☐ 24-48 Hours ☐ More than 48 Hours ☐ Ongoing ☐ Unknown

Ill Persons:

	Name	Address/Town	☎	Age	Occupation	Med. Provider/ ☎
	☐ same as reporter (above)					

Medical attention received ***(by anyone)***? ☐ Yes ☐ No ☐ Unknown → ***If Yes, specify above:*** ↑

Stool specimens submitted ***(by anyone)***? ☐ Yes ☐ No ☐ Unknown → **To GPHL?** ☐ Yes ☐ No ☐ Unknown

Medical (or Lab) diagnosis reported**?** ☐ Yes ☐ No ☐ Unknown → ***If Yes, specify*** _____

Incubation Periods for Selected Organisms

	Min	Max		Min	Max		Min	Max
B. cereus (short)	1 hr	6 hrs	*E. coli* O157:H7	3 days	8 days	*Staph. Aureus*	30 min	8 hrs
B. cereus (long)	6 hrs	24 hrs	Hepatitis A	15 days	50 days	*Shigella*	12 hrs	96 hrs
Campylobacter	1 day	10 days	*Salmonella* (non-typhi)	6 hrs	72 hrs	*Vibrio cholerae*	few hrs	5 days
Cyclospora	1 day	14 days	*Salmonella typhi*	1 wk	3 wks	Viral GI	12 hrs	48 hrs
C. perfringens	6 hrs	24 hrs	Shellfish poisoning	minutes	few hrs	*Yersinia*	3 days	7 days

FOOD HISTORY→ Obtain history **at least <u>72 hours</u>** before symptoms.

Date & Time (hr:min AM/PM)	**Food(s) consumed**	**Location where purchased/acquired** (Type, name, city, state)	**Place consumed**
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:
☐ B ☐ L ☐ D		☐ Rest. ☐ Catered ☐ Store	☐ Same *(as left)* ☐ Home ☐ Other *(specify)*:

Incubation Periods for Selected Organisms

	Min	*Max*		*Min*	*Max*		*Min*	*Max*
B. cereus (short)	1 hr	6 hrs	*E. coli* O157:H7	3 days	8 days	*Staph. Aureus*	30 min	8 hrs
B. cereus (long)	6 hrs	24 hrs	Hepatitis A	15 days	50 days	*Shigella*	12 hrs	96 hrs
Campylobacter	1 day	10 days	*Salmonella* (non-typhi)	6 hrs	72 hrs	*Vibrio cholerae*	few hrs	5 days
Cyclospora	1 day	14 days	*Salmonella typhi*	1 wk	3 wks	Viral GI	12 hrs	48 hrs
C. perfringens	6 hrs	24 hrs	Shellfish poisoning	minutes	few hrs	*Yersinia*	3 days	7 days

NOTES

FOOD TESTING

Food(s) available for testing? ☐ Yes ☐ No ☐ Unknown → **Sent to GPHL[1]?** ☐ Yes ☐ No ☐ Unknown

→ ***If Yes, specify*** *food(s) & sources*:

Product and Manufacturer Information for Commercially-Processed Food(s)

Product name: _____

Code/lot # _____

Expiration date: ____ /____ /____ **Package size/type:** _____

Manufacturer: _____ ☎: ( ) _____ - _____

Address: _____

_____

Incubation Periods for Selected Organisms

	Min	*Max*		*Min*	*Max*		*Min*	*Max*
B. cereus (short)	1 hr	6 hrs	*E. coli* O157:H7	3 days	8 days	*Staph. Aureus*	30 min	8 hrs
B. cereus (long)	6 hrs	24 hrs	Hepatitis A	15 days	50 days	*Shigella*	12 hrs	96 hrs
Campylobacter	1 day	10 days	*Salmonella* (non-typhi)	6 hrs	72 hrs	*Vibrio cholerae*	few hrs	5 days
Cyclospora	1 day	14 days	*Salmonella typhi*	1 wk	3 wks	Viral GI	12 hrs	48 hrs
C. perfringens	6 hrs	24 hrs	Shellfish poisoning	minutes	few hrs	*Yersinia*	3 days	7 days

Georgia Department of Human Resources
Public Health Laboratory
Bacteriology (Feces Specimen) Submission Form

SUBMITTER INFORMATION

SUBMITTER CODE: ☐☐☐ – ☐☐☐

NAME: _____

STREET: _____

_____

_____

CITY: _____

ZIP CODE: _____ + _____

COUNTY: _____

PHONE NO: ( ) _____
Area Code

CONTACT PERSON: _____

PATIENT INFORMATION

PATIENT # _____

NAME: _____
Last First Middle Initial

STREET: _____ CITY _____

ZIP CODE: _____+_____ COUNTY: _____ STATE: _____

DATE OF BIRTH: ____/____/_____ DATE OF ONSET: ____/____/_____

RACE
- ☐ White
- ☐ Black/African American
- ☐ Am. Indian/Alaska Native
- ☐ Asian
- ☐ Native Hawaiian/Pacific Islander
- ☐ Multi-racial
- ☐ Unknown

ETHNICITY
- ☐ Hispanic
- ☐ Non-Hispanic
- ☐ Unknown

SEX
- ☐ Male
- ☐ Female
- ☐ Unknown

Travel: _____

SYMPTOMS: (Check all that apply)

☐ Diarrhea ☐ Vomiting ☐ Blood/mucus ☐ Not Ill

☐ Cramping ☐ Fever ____° ☐ Other _____

CLOSE CONTACTS: _____

OUTBREAK RELATED: ☐ Yes ☐ No

If Yes, Name of Outbreak _____

SPECIMEN INFORMATION

SPECIMEN: ☐ 1st ☐ Repeat DATE COLLECTED: ____/____/_____ Collected Before Antibiotic Rx: ☐ Yes ☐ No

TEST REQUESTED

Preserved Stool (Para-Pak C&S*, Room Temperature) for:

☐ Routine (Salmonella, Shigella, Campylobacter, Aeromonas, E. coli O157, Yersinia)

Single Agents: ☐ Salmonella ☐ Campylobacter ☐ E. coli O157 ☐ Vibrio ☐ Yersinia
☐ Shigella ☐ Aeromonas ☐ Staphylococcus aureus** (Submit w/in 24 hours after onset)
☐ Other: _____

Fresh Stool (Refrigerated) for:

☐ Bacillus cereus** (Submit w/in 48hr after onset)

☐ Clostridium perfringens** (Submit w/in 48hr after onset)

☐ Clostridium botulinum**

*NOT USED FOR PARASITE PRESERVATION

**SPECIAL ARRANGEMENT REQUIRED - Call 404-327-7990

LABORATORY COPY

Form 3416 (Rev. 09-03)

Georgia Department of Human Resources
Public Health Laboratory
Bacteriology Food Work Submission Form

SUBMITTER INFORMATION

SUBMITTER CODE: ☐☐☐ – ☐☐☐

NAME: _____

STREET: _____

_____

_____

CITY: _____

ZIP CODE: _____ + _____

COUNTY: _____

PHONE NO: ( ) _____
Area Code

CONTACT PERSON: _____

PATIENT INFORMATION

PATIENT NAME: _____
Last First Middle Initial

COUNTY: _____ ZIP CODE: _____+_____

Date of Onset: _____/_____/_____ Incubation Period: _____ hours

Duration of Illness: _____

SYMPTOMS: (Check all that apply)

☐ Diarrhea ☐ Vomiting ☐ Blood/mucus
☐ Cramping ☐ Fever ____° ☐ Other _____

OUTBREAK RELATED: ☐ Yes ☐ No

If Yes, Name of Outbreak: _____

SPECIMEN INFORMATION

SOURCE OF FOOD: ☐ Restaurant ☐ Fast Food ☐ Other: _____

FOOD ESTABLISHMENT/PREPARER: _____ PHONE #: _____

ADDRESS: _____ COUNTY: _____

TYPE OF FOOD: _____ MANUFACTURER'S CODE: _____

DATE COLLECTED: _____/_____/_____ SHIPPED: ☐ Refrigerated ☐ Frozen ☐ Room Temperature

TEST REQUESTED: ☐ *Staphylococcus aureus* ☐ *Clostridium perfringens* ☐ *Salmonella* ☐ *E. coli* O157:H7 ☐ *Vibrio*
☐ *S. aureus* Enterotoxin ☐ *Listeria monocytogenes* ☐ *Shigella* ☐ *Bacillus cereus* ☐ Other: _____

LABORATORY COPY

Form 3450 (Rev. 09/03)

Georgia Department of Human Resources
Public Health Laboratory
Molecular Biology Submission Form

SUBMITTER INFORMATION

SUBMITTER CODE: ☐☐☐ - ☐☐☐
NAME _____
STREET_____
CITY_____
ZIP CODE_____
COUNTY_____
PHONE NUMBER: ( )
CONTACT PERSON:

ENVIRONMENTAL SPECIMENS

Specimen Type: _____
Suspicious Organism: _____
Source: _____

CLINICAL SPECIMENS

PATIENT INFORMATION

PLEASE PRINT ALL INFORMATION LEGIBLY

PATIENT #

NAME: _____
Last First Middle Initial
STREET:
CITY: _____ZIP Code: _____ +
COUNTY: _____ STATE:
DATE OF BIRTH: _____/_____/
OCCUPATION:_____
RACE:_____ SEX: □ Male □ Female □ Unknown

CLINICAL SYMPTOMS: □Headache; □Fever; □Chills; □Nausea; □Vomiting; □Backache; □Myalgia; □Difficulty in swallowing; □Blurred vision; □Disordered speech; □Swollen lymph nodes; □Hemorrhage; □Necrosis; □Chest pain; □Sore throat; □Fatigue; □Cough; □Weight loss; □Constipation; □Joint pain; □Rash

BRIEF HISTORY:_____
_____
_____

SPECIMEN INFORMATION

DATE COLLECTED: _____/_____/_____
TIME COLLECTED: _____
DATE RECEIVED: _____
TEST REQUESTED: _____

Type of Specimen
□ Clinical
□ Culture for identification
□ Other (Specify)_____

RESULTS

Agent Identified:

Genetic Pattern Analysis:

Date Reported: _____

Form 3409 (Rev.6-03)

Georgia Department of Human Resources
Public Health Laboratory
Parasitology Submission Form

SUBMITTER INFORMATION

SUBMITTER CODE: ☐☐☐-☐☐☐

NAME: _____

STREET: _____

_____

CITY: _____

ZIPCODE: _____+_____

COUNTY: _____

PHONE NUMBER: ( ) _____

CONTACT PERSON: _____

PATIENT INFORMATION

PATIENT ID # _____

NAME: _____
Last First Middle Initial

STREET: _____ CITY: _____

ZIP CODE: _____+_____ COUNTY: _____ STATE: _____

DATE OF BIRTH: _____/ _____/ _____ AGE:_____

RACE	ETHNICITY	SEX	FOREIGN TRAVEL
☐ White	☐ American	☐ Male	☐ No
☐ Black/African American	☐ African	☐ Female	☐ Yes, where _____
☐ Am Indian/Alaska Native	☐ Russia	☐ Undetermined	_____
☐ Asian	☐ Viet./Laos./Thai		
☐ Native Hawaiian	☐ Hispanic/Latino		Has **Rx** been given:
☐ Pacific Islander	☐ Non-Hispanic		☐ Yes, DATE : _____
☐ _____	☐ Undetermined		☐ No

SYMPTOMS: ☐Abdominal pain ☐Headache ☐Chills ☐ Fever ___° ☐ Nausea ☐ Vomiting ☐ Watery diarrhea ☐ Eosinophilia ☐ Increased gas ☐ Other_____

SPECIMEN INFORMATION

SOURCES: ☐ Feces ☐ Pinworm slide ☐ Urine ☐ Blood ☐ Tissue ☐ Arthropod ☐ Other _____

TESTS REQUESTED: ☐ Formalin-Feces ☐ PVA–Feces ☐ Pinworm slide ☐ Urine for Schistosoma haematobium
☐ Whole Blood/Blood smear for parasites ☐ Tissue/Tissue smear for parasites
☐ Miscellaneous Identification _____ DATE COLLECTED: _____/_____/_____

PURPOSE OF EXAM: ☐ Diagnosis ☐ Confirmation ☐ Test of Cure ☐ Reference ☐ Outbreak TIME COLLECTED: _____AM _____PM

CONCERNS/COMMENTS/Name of Outbreak: _____ DATE RECEIVED: _____/_____/_____

Form 3414 (Rev. 9/03)

Georgia Department of Human Resources
Public Health Laboratory
Viral Culture Submission Form

SUBMITTER INFORMATION

SUBMITTER CODE: ☐☐☐ – ☐☐☐

NAME: _____

STREET: _____

_____

_____

CITY: _____

ZIP CODE: _____ + _____

COUNTY: _____

PHONE NO: ( ) _____
Area Code

CONTACT PERSON: _____

PATIENT INFORMATION

PATIENT # _____

NAME: _____
Last First Middle Initial

STREET: _____ CITY _____

ZIP CODE: _____+_____ COUNTY: _____ STATE: _____

DATE OF BIRTH: _____/ _____/ _____

RACE
- ☐ White
- ☐ Black/African American
- ☐ Am. Indian/Alaska Native
- ☐ Asian
- ☐ Native Hawaiian/Pacific Islander
- ☐ Multi-racial
- ☐ Unknown

ETHNICITY
- ☐ Hispanic
- ☐ Non-Hispanic
- ☐ Unknown

SEX
- ☐ Male
- ☐ Female
- ☐ Unknown

Date of Onset: ____/____/_____

Travel: _____

SYMPTOMS: (Check all that apply)

☐fever _____ ° ☐chills ☐cough ☐meningitis ☐conjunctivitis ☐rash ☐diarrhea

☐vomiting ☐other: _____

OUTBREAK RELATED: ☐ Yes ☐ No

If Yes, Name of Outbreak: _____

SPECIMEN INFORMATION

DATE COLLECTED: _____/ _____/ _____

SOURCE/TYPE: ☐ Lesion/Genital Swab ☐Urine ☐Throat Swab ☐Whole Blood ☐ Nasopharyngeal Aspirate

☐ Lesion/General Swab ☐ Stool ☐Rectal Swab ☐ Serum ☐ CSF ☐ Other: _____

TEST REQUESTED: ☐ Herpes Culture ☐ Influenza Culture ☐ Enterovirus Culture ☐ Respiratory Panel ☐ Rotavirus identification

☐ Norwalk identification on EM ☐ Viral culture/identification (misc.): _____

REASON FOR TESTING: ☐ Diagnosis ☐ Routine Screening ☐ Other: _____

LABORATORY COPY

Form 3595 (Rev. 9-03)

Campylobacter Form for Case Follow-up

For State Use **ID #** __ __ __ __ -CA- __ __ __ __

I. CASE IDENTIFICATION
(fill out contact information for the patient)

Name: _____ (Last, First) **County**: _____

Address: _____ (Street) **Occupation/Grade**: _____

_____ (City) _____-_____ (Zip Code) **Work/Daycare/School**: _____

Home Phone: ( ) _____ **Work Phone**: ( ) _____

II. CASE DEMOGRAPHICS
(check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Race: ☐ White ☐ Multiracial ☐ Black ☐ American Indian/Alaska Native ☐ Asian ☐ Hawaiian/Pacific Islander ☐ Other → Please specify _____

Ethnicity: ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

Date of Birth: ____ / ____ / _____

Age: _____ years / mos / days

III. CLINICAL DATA (check all appropriate boxes)

Symptomatic: ☐ YES ☐ NO ☐ Unknown

If yes, **Date of onset**: _____ / _____ / _____

Date of Diarrhea onset: _____ / _____ / _____

Symptoms

Diarrhea: ☐ YES ☐ NO ☐ Unknown
Vomiting: ☐ YES ☐ NO ☐ Unknown
Fever: ☐ YES ☐ NO ☐ Unknown
Nausea: ☐ YES ☐ NO ☐ Unknown
Abd Cramping: ☐ YES ☐ NO ☐ Unknown
Other: ☐ YES ☐ NO ☐ Unknown
Specify: _____

Outcome: ☐ **Survived** ☐ **Died** ☐ **Unknown**

Date of death: ___ / ___ / _____

Date Received First Report: ____ / ____ / _____

Physician Name: _____

Physician Phone: ( ) _____

Hospitalized: ☐ YES ☐ NO ☐ Unknown
(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____
Date of admission: ___ / ___ / _____
Date of Discharge: ___ / ___ / _____

Hospital 2: _____
Date of admission: ___ / ___ / _____
Date of discharge: ___/ ___ / _____

IV. LABORATORY INFORMATION
(check all that apply, list laboratory name, and date specimen collected)

Laboratory: _____
Specimen collected: ____ /____ / _____
Specimen Source: ☐ stool ☐ other; specify _____
What lab test was performed: _____
Species_____ *If available, attach a copy of the lab report

For State Use:
Specimen to GPHL: ☐ Yes ☐ No ☐ Unk
GPHL # _____
Is case associated with an outbreak? ☐ Yes ☐ No ☐ Unk
Is this case associated with a known case? ☐ Yes ☐ No ☐ Unk

V. POSSIBLE SOURCES OF INFECTION – 5 days prior to onset
(circle correct response and provide details to the right)

V. A. Suspect Foods – refer to the 5 days prior to onset
(ask the case if he/she consumed the following in the 5 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Eating or handling undercooked / raw chicken; Store Location: _____
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ____
2. Y N DK Eating or handling undercooked / raw pork; Store Location: _____
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ____
3. Y N DK Raw milk / other unpasteurized dairy products; specify _____
4. Y N DK Eat in a Restaurant Date: ___ / ___ / ____ Name/Location _____
   Date: ___ / ___ / ____ Name/Location _____
   Date: ___ / ___ / ____ Name/Location _____
5. Y N DK Well on property Details: _____
6. Y N DK Is drinking water filtered?
   Please specify what is normal drinking water for case / family: _____

V. B. Other Potential Sources – refer 5 days prior to onset
(ask the case if he/she had contact with the following in the 5 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Contact with diapered children; Details:_____
2. Y N DK Exposure to human or animal feces; Details:_____
3. Y N DK Swimming / Recreational water exposure (lake, pool, etc.); Location: _____
   Date: ___ / ___ / ____
4. Y N DK Exposure to Pets (esp. puppies and kittens); Details: _____
5. Y N DK Exposure to farm animals; Details: _____
6. Y N DK Travel outside community; Location:_____
   Date Arrived: ___/___/___ Date Left: ___/___/___
7. Y N DK Attend Large Gatherings; Describe Location _____
   Date ___ / ___ / ____ Details: _____
8. Y N DK Came in contact with someone with a similar illness; Specify Dates_____
   Names: _____
9. Y N DK Other; Specify _____

- ❑ **Please emphasize hand washing to case / family.**
- ❑ **Send them a hand washing brochure if applicable.**
- ❑ **Mention that we might contact them in the future.**

VII. REPORT COMPLETED

Case Report Completed by: _____ Phone Number: ( ) _____

Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____

*** Fax the completed report to the Notifiable Disease Section at 404-657-7517**

Cryptosporidosis Form for Case Interview

For State Use **ID #** __ __ __ __ -CR- __ __ __

I. CASE IDENTIFICATION
(Fill out contact information for the patient)

Name: _____ (Last, First)

County: _____

Address: _____ (Street)

Occupation/Grade: _____

_____ (City) _____-_____ (Zip Code)

Work/School/Childcare: _____

Home Phone:( ) _____ **Work Phone**: ( ) _____ **Other**: ( ) _____

II. CASE DEMOGRAPHICS
(Check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Race: ☐ White ☐ Black ☐ Asian ☐ Other → Please specify _____
☐ Multiracial ☐ American Indian/Alaska Native ☐ Hawaiian/Pacific Islander

Ethnicity: ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

Date of Birth: ____ / ____ / _____
Age: _____ years

III. CLINICAL DATA (Check all appropriate boxes)

Symptomatic: ☐ YES ☐ NO ☐ Unknown

If yes, **Date of onset**: _____ / _____ / _____

Date of Diarrhea onset: _____ / _____ / _____

Symptoms

Diarrhea: ☐ YES ☐ NO ☐ Unknown
Duration_____

Vomiting ☐ YES ☐ NO ☐ Unknown

Appetite loss ☐ YES ☐ NO ☐ Unknown

Abdominal pain: ☐ YES ☐ NO ☐ Unknown

Other ☐ YES ☐ NO ☐ Unknown

Specify: _____

Physician Name: _____

Phone: _____

Hospitalized: ☐ YES ☐ NO ☐ Unknown
(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____
Date of admission: ___ / ___ / _____
Date of Discharge: ___ / ___ / _____

Hospital 2: _____
Date of admission: ___ / ___ / _____
Date of discharge: ___/ ___ / _____

Outcome: ☐ ALIVE ☐ DIED ☐ Unknown
Date of death: ___ / ___ / _____

IV. LABORATORY INFORMATION

(List specimen collection date, test performed, specimen tested, laboratory name, and species. If available, please attach a copy of the lab report)

COLLECTION DATE	TEST NAME (culture, serology, etc.)	SPECIMEN (blood, stool, urine, etc.)	LABORATORY NAME	SPECIES

V. POSSIBLE SOURCES OF INFECTION – 15 days prior to onset
(Circle correct response and provide details to the right. Attach additional sheets if necessary.)

1. Please **circle** all sources of drinking water and ice (including water used to wash produce):
   Bottled water *Municipal/city water* *Well water* *Foreign water* (Country:_____)
2. Y N DK Well on property? Details: _____
   If yes, is there cattle within ½ mile of well? Yes No Unknown
3. Y N DK Is water filtered?
4. Y N DK Eaten or handled undercooked / raw meat? Store: _____
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ____ Item: _____
5. Y N DK Eaten oysters? **Circle** how prepared: *Steamed* *Raw* *Other* (Specify:_____)
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ___
6. Y N DK Eaten raw fruit or vegetables?
   Item: _____
7. Y N DK Eaten unpasteurized dairy products, non-dairy products, or juice?
   Item: _____
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ____ Store: _____
8. Y N DK Eaten in a Restaurant? Date: ___ / ___ / ____ Name/Location _____
   Date: ___ / ___ / ____ Name/Location _____
9. Y N DK Contact with diapered children or bedridden patients? Details: _____
10. Y N DK Exposure to human or animal feces? Details: _____
11. Y N DK Contact with any animals (specifically cats, cattle, or animals less than 6 months of age)? List animals and type of contact: _____
12. Y N DK Visited a farm? When? ___/___/___ - ___/___/___ Animals present?_____
13. Y N DK Swimming/ Recreation water exposure (lake, pool, etc): Date and Location: _____
14. Y N DK Did any water get into mouth, eyes, nose, or open wounds?: Details: _____
15. Y N DK Work with soil/gardening. Details:_____
16. Y N DK Travel outside community?; Location:_____
    Date Arrived Destination: ___/___/___ Date Left Destination: ___/___/___
17. Y N DK Attend Large Gatherings? Location: _____Date: ___ / ___ / ____
18. Y N DK Came in contact with someone with a similar illness?; _____
    Names, dates, and contact info (household / day care, etc.)_____
19. Y N DK Other; Specify _____

VI. Additional Questions for the Case

1. Does case work as food handler, healthcare worker, daycare attendee? Specify:_____
2. Does case have any of the following conditions: cancer or chemotherapy for cancer, recently had or are planning to have an organ transplant, AIDS or HIV infection, IV drug use, long-term steroid use, or illness from excessive use of alcohol? (***Please Do Not Specify**) (Please circle the correct response) YES NO REFUSED UNKNOWN

VII. REPORT COMPLETED **Please fax completed form to the Notifiable Disease Section: 404-657-7517**

Case Report Completed by: _____ **Phone Number:** ( ) _____
Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____

For State Use:
Date Received First Report: ____ / ____ / _____ Case associated with an outbreak? Yes No Unk
Specimen to GPHL: Y N U MM# _____ Case associated with a known case? Yes No Unk

Cyclospora Form for Case Interview

For State Use **ID #** __ __ __ __ -YR- __ __ __

I. CASE IDENTIFICATION
(Fill out contact information for the patient)

Name: _____ (Last, First) **County**: _____

Address: _____ (Street) **Occupation/Grade**: _____

_____ _____-_____ (City, Zip Code) **Work/School/Childcare**: _____

Home Phone:( ) _____ **Work Phone**: ( ) _____ **Other**: ( ) _____

II. CASE DEMOGRAPHICS
(Check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Date of Birth: ____ / ____ / _____
Age: _____ years

Race: ☐ White ☐ Black ☐ Asian ☐ Multiracial ☐ American Indian/Alaska Native ☐ Hawaiian/Pacific Islander ☐ Other → Please specify _____

Ethnicity: ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

III. CLINICAL DATA (Check all appropriate boxes)

Symptomatic: ☐ YES ☐ NO ☐ Unknown

If yes, **Date of onset**: _____ / _____ / _____

Date of Diarrhea onset: _____ / _____ / _____

Symptoms

Diarrhea:	☐ YES	☐ NO	☐ Unknown
Fatigue:	☐ YES	☐ NO	☐ Unknown
Nausea:	☐ YES	☐ NO	☐ Unknown
Weight loss:	☐ YES	☐ NO	☐ Unknown
Abd. Cramping:	☐ YES	☐ NO	☐ Unknown
Appetite Loss:	☐ YES	☐ NO	☐ Unknown
Other:	☐ YES	☐ NO	☐ Unknown

Specify: _____

Describe severity: _____

Physician Name: _____

Physician Phone: ( ) _____

Hospitalized: ☐ YES ☐ NO ☐ Unknown

(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____

Date of admission: ___ / ___ / _____

Date of Discharge: ___ / ___ / _____

Hospital 2: _____

Date of admission: ___ / ___ / _____

Date of discharge: ___/ ___ / _____

Outcome: ☐ ALIVE ☐ DIED ☐ Unknown

Date of death: ___ / ___ / _____

IV. LABORATORY INFORMATION

(List specimen collection date, test performed, specimen tested, laboratory name, and species. If available, please attach a copy of the lab report)

COLLECTION DATE	TEST NAME (culture, serology, etc.)	SPECIMEN (blood, stool, urine, etc.)	LABORATORY NAME	SPECIES

V. POSSIBLE SOURCES OF INFECTION – 14 days prior to onset

(Circle correct response and provide details to the right)

V. A. Suspect Foods – refer to the 14 days prior to onset

(Ask the case if he/she consumed the following in the 14 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Eaten fresh berries: List berries:_____ Store Location:_____
   Washed? Y N DK
2. Y N DK Eaten fresh fruit: List fruits: _____Store Location:_____
   Washed? Y N DK
3. Y N DK Eaten raw vegetables: List: _____Store Location:_____
   Washed? Y N DK
4. Y N DK Eaten salad, Alfalfa sprouts, or basil: Details: _____Store Location:_____
   Washed? Y N DK
5. Y N DK Eaten in a Restaurant? Date: ___ / ___ / ____ Name/Location _____
   Date: ___ / ___ / ____ Name/Location _____

V. B. Other Potential Sources – refer 14 days prior to onset

(Ask the case if he/she had contact with the following in the 14 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Drank well water/ well on property? Details:_____
2. Y N DK Is water filtered?
   Please specify what is normal drinking water for case / family: _____
3. Y N DK Consumption of untreated water? Details:_____
4. Y N DK Travel outside community?; Location:_____
   Date Arrived Destination: ___/___/___ Date Left Destination: ___/___/___
   Please specify all sources of water and ice if traveled outside U.S._____
5. Y N DK Attend Large Gatherings? Location: _____Date: ___ / ___ / ____
6. Y N DK Came in contact with someone with a similar illness?; _____
   Names, dates, and contact info (household / day care, etc.)_____
   _____
7. Y N DK Other; Specify _____

VI. Additional Questions for the Case

1. Y N DK Does case work as food handler, healthcare worker, daycare attendee?
   Specify:_____
2. Y N DK Does case have any of the following conditions: cancer or chemotherapy for cancer, recently had or are planning to have an organ transplant, AIDS or HIV infection, IV drug use, long-term steroid use, or illness from excessive use of alcohol? (***Please Do Not Specif**y).

Please emphasize hand washing to case / family.

VII. REPORT COMPLETED **Please fax completed form to the Notifiable Disease Section: 404-657-7517**

Case Report Completed by: _____ Phone Number: ( ) _____

Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____

For State Use:

Date Received First Report: ____ / ____ / _____ Case associated with an outbreak? Yes No Unk

Specimen to GPHL: Y N U MM# _____ Case associated with a known case? Yes No Unk

Escherichia coli O157 or Shiga Toxin positive
Form for Case Follow-up

I. CASE IDENTIFICATION
(fill out contact information for the patient)

For State Use **ID #** __ __ __ __ - __ __ __

Name: _____ (Last, First)

County: _____

Address: _____ (Street)

Occupation/Grade: _____

_____ (City) _____-_____ (Zip Code)

WorkSite/School: _____

Home Phone: ( ) _____ **Work Phone**: ( ) _____

II. CASE DEMOGRAPHICS
(check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Race: ☐ White ☐ Black ☐ Asian ☐ Other → Please specify _____

Ethnicity: ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

Date of Birth: ____ / ____ / _____
Age: _____ years

III. SOURCES OF REPORTS
(check all that apply, list name and phone number)

Date Received First Report: ____ / ____ / _____

☐ Laboratory _____ ( ) _____

☐ Infection Control Practitioner _____ ( ) _____

☐ Physician _____ ( ) _____

☐ Other _____ ( ) _____

IV. CLINICAL DATA (check all appropriate boxes)

Symptomatic: ☐ YES ☐ NO ☐ Unknown

If yes, **Date of onset**: _____ / _____ / _____

Symptoms

Diarrhea: ☐ YES ☐ NO ☐ Unknown

Bloody Diarrhea: ☐ YES ☐ NO ☐ Unknown

Vomiting: ☐ YES ☐ NO ☐ Unknown

Fever: ☐ YES ☐ NO ☐ Unknown

Other: ☐ YES ☐ NO ☐ Unknown

If yes, Specify Other: _____

HUS: ☐ YES ☐ NO ☐ Unknown

TTP: ☐ YES ☐ NO ☐ Unknown

Outcome: ☐ Survived ☐ Died ☐ Unknown

Date of death: ____ / ____ / _____

(fill in physician and hospital information)

Physician Name: _____

Physician Phone: ( ) _____

Hospitalized: ☐ YES ☐ NO ☐ Unknown

(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____

Date of admission: ____ / _____ / _____

Date of discharge: ____ / ____ / _____

Hospital 2: _____

Date of admission: ____ / ____ / _____

Date of discharge: ____ / ____ / _____

Treated with antibiotics? ☐ YES ☐ NO ☐ UNK
(List antibiotic and date treatment started.)

_____ (antibiotics) ____ / ____ / _____ (date treatment started)

V. LABORATORY INFORMATION

(check all that apply, list laboratory name, and date specimen collected)

☐ E. coli O157 + **Laboratory**: _____

☐ Shiga toxin + **Specimen collected**: ____ /____ / _____

Specimen Source: ☐ stool ☐ other _____

*If available, please attach a copy of the laboratory report

For State Use:

Specimen to GPHL: ☐ YES ☐ NO ☐ UNK

GPHL # _____

Shiga toxin ☐ ST1 ☐ ST2 ☐ UNK ☐ ND

☐ H7 ☐ NM ☐ Other _____

☐ PFGE Pattern #: _____

☐ PFGE Match ID#s _____

VI. POSSIBLE SOURCES OF INFECTION – 7 days prior to onset

(circle correct response and provide details to the right)

VI. A. Suspect Foods – refer to the 7 days prior to onset

(ask the case if he/she consumed the following in the 7 days prior to onset)

Details about possible sources:

1.	Y	N	DK	Undercooked / raw meat (esp hamburger)
2.	Y	N	DK	ANY Ground Beef
3.	Y	N	DK	RAW milk /other unpasteurized dairy products
4.	Y	N	DK	Dried meat (salami, jerky, etc.)
5.	Y	N	DK	Venison or other game
6.	Y	N	DK	Alfalfa sprouts
7.	Y	N	DK	Other sprouts
8.	Y	N	DK	Unpasteurized juice / cider

VI. B. Other Potential Sources – refer 7 days prior to onset

(ask the case if he/she had contact with the following in the 7 days prior to onset)

1.	Y	N	DK	Contact with diapered children
2.	Y	N	DK	Exposure to human or animal feces
3.	Y	N	DK	Recreational water exposure (lake, pool, etc.)
4.	Y	N	DK	Livestock (esp bovine)
5.	Y	N	DK	Hunting / Butchering (Rendering) animals
6.	Y	N	DK	Travel outside community
7.	Y	N	DK	Other; specify _____

VI. C. Restaurant Exposures – refer to the 7 days prior to onset

Ask the case if he/she ate ground beef, other beef, or salad (self-serve vs. prepared) at a restaurant in the 7 days prior to illness. Record the name of the restaurant and when he/she ate; check the appropriate boxes. Please attach additional sheets if necessary.

Did the case eat at a restaurant in the 7 days prior to onset? ☐ YES ☐ NO (skip to VI. D.) ☐ UNK (skip to VI. D.)

DATE	TIME	NAME/LOCATION	Ground Beef	Other Beef	Self-Serve Salad	Prepared Salad
____ /____	___:___am/pm	_____	☐	☐	☐	☐
____ / ____	___:___am/pm	_____	☐	☐	☐	☐
____ / ____	___:___am/pm	_____	☐	☐	☐	☐
____ / ____	___:___am/pm	_____	☐	☐	☐	☐
____ / ____	___:___am/pm	_____	☐	☐	☐	☐

Comments:

VI. D. Meat at Home – refer to the 7 days prior to onset

Did the case eat ground beef at home? ☐ YES ☐ NO (skip to VI. E.) ☐ UNK (skip to VI. E.)

(list all ground beef eaten at home: where purchased, purchase date, date eaten, product description with fat content, and if there is any leftover / remaining meat. Refer to 7 days prior to illness)

STORE / LOCATION	PURCHASE DATE	DATE EATEN	PRODUCT DESCRIPTION (Specify Extra lean / lean / regular / other)	LEFT-OVERS?
_____	___ / ___ / ___	___ / ___ / ___	_____	Y N DK
_____	___ / ___ / ___	___ / ___ / ___	_____	Y N DK
_____	___ / ___ / ___	___ / ___ / ___	_____	Y N DK
_____	___ / ___ / ___	___ / ___ / ___	_____	Y N DK

VI. E. Other Meat Prepared at Home – refer to the 7 days prior to onset

Was any other ground beef prepared / eaten in the home that was NOT eaten by the case? ☐ YES ☐ NO (skip to VI. F.) ☐ UNK (skip to VI. F.)

(List any ground beef eaten or prepared in the home that was NOT eaten by the case, include where purchased, purchase date, date eaten, product description, and fat content. Refer to 7 days prior to illness)

STORE / LOCATION	PURCHASE DATE	DATE EATEN	PRODUCT DESCRIPTION (Specify Extra lean / lean / regular / other)
_____	____ / ____ / ____	____ / ____ / ____	_____
_____	____ / ____ / ____	____ / ____ / ____	_____

VI. F. Dried Meat Products – refer to the 7 days prior to onset

Did the case eat any dried meat? ☐ YES ☐ NO (skip to VI. G.) ☐ UNK (skip to VI. G.)

(List any dried meat [salami, jerky, etc.] eaten by the case, include where purchased, purchase date, date eaten, and product description. Refer to 7 days prior to illness)

STORE / LOCATION	PURCHASE DATE	DATE EATEN	PRODUCT DESCRIPTION
_____	____ / ____ / ____	____ / ____ / ____	_____
_____	____ / ____ / ____	____ / ____ / ____	_____

VI. G. Other Sources of Beef or Game – refer to the 7 days prior to onset

Did the case eat other beef or game at home? ☐ YES ☐ NO (skip to VI. H.) ☐ UNK (skip to VI. H.)

(List any other beef or game eaten by the case, include where purchased/obtained, purchase date, date eaten, and product description. Refer to 7 days prior to illness)

STORE / LOCATION	PURCHASE DATE	DATE EATEN	PRODUCT DESCRIPTION
_____	____ / ____ / ____	____ / ____ / ____	_____
_____	____ / ____ / ____	____ / ____ / ____	_____

VI. H. Uncooked Produce – refer to the 7 days prior to onset

Did the case eat any uncooked produce (vegetables or fruit) at home? ☐ YES ☐ NO (skip to VI. I.) ☐ UNK (skip to VI. I.)

(List any uncooked produce [vegetable or fruit] eaten by the case at home, include where purchased/obtained, purchase date, date eaten, and product description. Refer to 7 days prior to illness. Attach extra pages if necessary.)

STORE / LOCATION	PURCHASE DATE	DATE EATEN	UNCOOKED PRODUCE (vegetables and fruits)
_____	____ / ____ / ____	____ / ____ / ____	_____
_____	____ / ____ / ____	____ / ____ / ____	_____
_____	____ / ____ / ____	____ / ____ / ____	_____
_____	____ / ____ / ____	____ / ____ / ____	_____

VI. I. Milk Consumption – refer to the 7 days prior to onset

Did the case drink any milk? ☐ YES ☐ NO (skip to VI. J.) ☐ UNK (skip to VI. J.)

Was the milk pasteurized? ☐ YES ☐ NO ☐ UNK

(List any milk that the case drank, include where purchased, purchase date, date drank, and brand. Refer to 7 days prior to illness.)

STORE / LOCATION	PURCHASE DATE	DATE EATEN	BRAND
_____	____ / ____ / ____	____ / ____ / ____	_____
_____	____ / ____ / ____	____ / ____ / ____	_____

VI. J. Travel – refer to the 7 days prior to onset

Did the case travel (outside usual circles)? ☐ YES ☐ NO (skip to VI. K.) ☐ UNK (skip to VI. K.)

(List places and dates traveled. Refer to the 7 days prior to illness.)

LOCATION	DATE ARRIVED	DATE LEFT
_____	____ / ____ / ____	____ / ____ / ____
_____	____ / ____ / ____	____ / ____ / ____

VI. K. Contact with Similar Illness – refer to the 7 days prior to onset

Did the case come in contact with anyone with a similar illness? ☐ YES ☐ NO (skip to VII.) ☐ UNK (skip to VII.)

(List name, nature of contact, date of contact, and if known the contact's date of onset. Refer to the 7 days prior to illness.)

CONTACT'S NAME	TYPE OF CONTACT (e.g. household, daycare, etc.)	DATE OF CONTACT	DATE OF ONSET
_____	_____	____ / ____ / ____	____ / ____ / ____
_____	_____	____ / ____ / ____	____ / ____ / ____
_____	_____	____ / ____ / ____	____ / ____ / ____

VII. HOUSEHOLD ROSTER

(List the names of everyone living in the case's household, their ages, occupations, if they had diarrhea [circle the correct response], and the onset date.)

NAME	AGE	OCCUPATION	DIARRHEA	ONSET
_____	_____	_____	Y N DK	____ / ____ / ____
_____	_____	_____	Y N DK	____ / ____ / ____
_____	_____	_____	Y N DK	____ / ____ / ____
_____	_____	_____	Y N DK	____ / ____ / ____
_____	_____	_____	Y N DK	____ / ____ / ____
_____	_____	_____	Y N DK	____ / ____ / ____

VIII. FOOD HANDLER, HEALTHCARE WORKER, DAYCARE ATTENDEE

(Give details about the job / daycare location, job description (if applicable), dates worked / attended after onset of illness.)

LOCATION	JOB DESCRIPTION	DATES WORKED / ATTENDED
_____	_____	____ / ____ / ____ through ____ / ____ / ____
_____	_____	____ / ____ / ____ through ____ / ____ / ____
_____	_____	____ / ____ / ____ through ____ / ____ / ____

IX. SUMMARY OF FOLLOW-UP

(Check the boxes of the measures you implemented and provide any details.) **DETAILS:**

- ☐ Hygiene and food preparation education provided
- ☐ Work or Daycare restriction for case*
- ☐ Additional stool specimens obtained
- ☐ Daycare inspection
- ☐ Testing of home / other water supply
- ☐ Testing of food products
- ☐ Restaurant inspection
- ☐ Other _____

*Food handlers and children in daycare should be restricted from handling food or returning to their daycare until they have 2 consecutive negative stool specimens (at least 24 hours apart).

X. EPIDEMIOLOGY INFO

Is this case associated with an outbreak? ☐ YES ☐ NO ☐ UNK

Is this cases associated with a known case? ☐ YES ☐ NO ☐ UNK

If yes, Has the above case been reported? ☐ YES ☐ NO ☐ UNK

Please give detailed information about the case:
(include name, nature of contact, dates, places, etc.)

X. REPORT COMPLETED

Case Report Completed by: _____ **Phone Number:** ( ) _____

Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____

* Fax the completed report to the Notifiable Disease Section at 404-657-7517

Giardiasis Form for Case Interview

For State Use **ID #** __ __ __ __ -YR- __ __ __

I. CASE IDENTIFICATION

(Fill out contact information for the patient)

Name: _____ (Last, First)

Address: _____ (Street)

_____ _____-_____ (City, Zip Code)

County: _____

Occupation/Grade: _____

Work/School/Childcare: _____

Home Phone:( ) _____ **Work Phone**: ( ) _____ **Other**: ( ) _____

II. CASE DEMOGRAPHICS

(Check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Race: ☐ White ☐ Black ☐ Asian ☐ Multiracial ☐ American Indian/Alaska Native ☐ Hawaiian/Pacific Islander ☐ Other → Please specify _____ ☐ Unknown

Ethnicity: ☐ Hispanic ☐ Non-Hispanic

Date of Birth: ____ / ____ / _____

Age: _____ years

III. CLINICAL DATA (Check all appropriate boxes)

Symptomatic: ☐ YES ☐ NO ☐ Unknown

If yes, **Date of onset**: _____ / _____ / _____

Date of Diarrhea onset: _____ / _____ / _____

Symptoms

Diarrhea: ☐ YES ☐ NO ☐ Unknown

Bloating: ☐ YES ☐ NO ☐ Unknown

Abdominal pain: ☐ YES ☐ NO ☐ Unknown

Vomiting: ☐ YES ☐ NO ☐ Unknown

Weight loss: ☐ YES ☐ NO ☐ Unknown

Fatigue: ☐ YES ☐ NO ☐ Unknown

Nausea: ☐ YES ☐ NO ☐ Unknown

Other: ☐ YES ☐ NO ☐ Unknown

Specify: _____

Physician Name: _____

Physician Phone: ( ) _____

Hospitalized: ☐ YES ☐ NO ☐ Unknown

(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____

Date of admission: ___ / ___ / _____

Date of Discharge: ___ / ___ / _____

Hospital 2: _____

Date of admission: ___ / ___ / _____

Date of discharge: ___/ ___ / _____

Outcome: ☐ ALIVE ☐ DIED ☐ Unknown

Date of death: ___ / ___ / _____

IV. LABORATORY INFORMATION

(List specimen collection date, test performed, specimen tested, laboratory name, and species. If available, please attach a copy of the lab report)

COLLECTION DATE	TEST NAME (culture, serology, etc.)	SPECIMEN (blood, stool, urine, etc.)	LABORATORY NAME	SPECIES

V. POSSIBLE SOURCES OF INFECTION – 10 days prior to onset
(Circle correct response and provide details to the right)

V. A. Suspect Foods and Water – refer to the 10 days prior to onset
(Ask the case if he/she consumed the following in the 10 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Eaten in a Restaurant? Date: ___ / ___ / ____ Name/Location _____
   Date: ___ / ___ / ____ Name/Location _____
2. Y N DK Drank stream water? Details:_____
3. Y N DK Drank well water/ well on property? Details:_____
   If well, how far is septic system from well? _____
4. Y N DK Filter/boil water? Details: _____
   Please specify what is normal drinking water for case/family? _____

V. B. Other Potential Sources – refer 10 days prior to onset
(Ask the case if he/she had contact with the following in the 10 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Exposure to human or animal feces (Include contact with fertilizer)? Details:_____
2. Y N DK Contact with diapered children or bedridden patients? Details:_____
3. Y N DK Visited a farm? When? ___/___/___ - ___/___/___ Animals present?_____
4. Y N DK Camping? Location: _____Date: __/ __/__ Details: _____
5. Y N DK Swimming/ Recreational water exposure (Lake, pool, river, etc). Location: _____
   Date: __/ __/ __ Details: _____
6. Y N DK Travel outside community? Location:_____
   Date Arrived Destination: ___/___/__ Date Left Destination: ___/___/___
7. Y N DK Attend Large Gatherings? Location: _____Date: ___ / ___ / ____
8. Y N DK Came in contact with someone with a similar illness?_____
   Names, dates, and contact info (household / day care, etc.)_____
   _____
9. Y N DK Other; Specify _____

VI. Additional Questions for the Case

1. Y N DK Does case work as food handler, healthcare worker, daycare attendee?
   Specify:_____
2. Y N DK Does case have any of the following conditions: cancer or chemotherapy for cancer, recently had or are planning to have an organ transplant, AIDS or HIV infection, IV drug use, long-term steroid use, or illness from excessive use of alcohol? (***Please Do Not Specif**y).

Please emphasize hand washing to case / family. Please discuss safe Chitterling preparation if applicable.
Also emphasize that we might contact them for more information in the future.

VII. REPORT COMPLETED **Please fax completed form to the Notifiable Disease Section: 404-657-7517**

Case Report Completed by: _____ Phone Number: ( ) _____

Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____

For State Use:

Date Received First Report: ____ / ____ / _____ Case associated with an outbreak? Yes No Unk

Specimen to GPHL: Y N U MM# _____ Case associated with a known case? Yes No Unk

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
Centers for Disease Control
Center for Infectious Diseases
Atlanta, Georgia 30333

GUIDE TO INVESTIGATION OF INFANT BOTULISM

PERSONAL DATA

A. EPIDEMIOLOGIC (OBTAIN PRINCIPALLY FROM PARENT(S)

Name (Last) (First) | Date of Birth Mo. (1-2) Day (3-4) Yr. (5-6)

SEX (7)
1 ☐ Male
2 ☐ Female

RACE/ETHNICITY (8)
1 ☐ White, not Hispanic
2 ☐ Black, not Hispanic
3 ☐ Hispanic
4 ☐ Asian or Pacific Islander
5 ☐ American Indian or Alaska native
6 ☐ Unknown

ADDRESS (No. and Street)	City	County	State (9-10)	Phone

MOTHER'S AGE (11-12)	OCCUPATION (13)	FATHER'S AGE (14-15)	OCCUPATION (16)

EDUCATION (17)
1 ☐ Some grade school
2 ☐ Grade school graduate
3 ☐ Some high school
4 ☐ High School graduate
5 ☐ Jr. College/Trade school graduate
6 ☐ College graduate
7 ☐ Higher

EDUCATION (18)
1 ☐ Some grade school
2 ☐ Grade school graduate
3 ☐ Some high school
4 ☐ High school graduate
5 ☐ Jr. College/Trade school graduate
6 ☐ College graduate
7 ☐ Higher

MATERNAL AND PERINATAL HISTORY

NO. OF PREGNANCIES (19) (including case) _____

NO. OF LIVE BIRTHS (20) _____

TYPE OF DELIVERY:
(21) 1 ☐ VAGINAL 2 ☐ C-SECTION

Complications: (22) 1 ☐ Yes 2 ☐ No 9 ☐ Unknown

If yes, describe (23) _____

Was infant premature? (24) 1 ☐ Yes 2 ☐ No 9 ☐ Unk

If yes, gestational age (25-26) _____ Weeks

What was infant's birth weight; _____ lb (27-28) _____ oz. (29-30) _____ (Gms) (31-34)

DIETARY HISTORY (BEFORE ONSET OF PRESENT ILLNESS)

PRESENT ILLNESS – INFANT BOTULISM
DEFINED AS ONSET OF CONSTIPATION OR IF NO CONSTIPATION WHEN MOTHER SAYS CHILD BECAME ILL

BEFORE ONSET OF PRESENT ILLNESS

Was infant ever breast fed? (35) 1 ☐ Yes 2 ☐ No If yes, for how many weeks _____ (36-37)

Was infant ever formula fed? (38) 1 ☐ Yes 2 ☐ No

Was infant primarily (more than 50%) (39) 1 ☐ Breast fed 2 ☐ Formula fed 3 ☐ Both approximately equally

Did infant ever eat or taste (before onset of illness):

FOOD/LIQUID		NEVER 1	ONCE OR A FEW TIMES 2	MANY TIMES 3	DAILY OR MOST DAYS 4	PRINCIPAL TYPE OR BRAND
Formula	(40)	☐	☐	☐	☐	_____ (41)
Cow's Milk (Past.)	(42)	☐	☐	☐	☐	
Unpasteurized (raw milk)	(43)	☐	☐	☐	☐	
Fruit juices	(44)	☐	☐	☐	☐	
Cereal	(45)	☐	☐	☐	☐	
Bread	(46)	☐	☐	☐	☐	
Syrup/water	(47)	☐	☐	☐	☐	_____ (48)
Honey/water	(49)	☐	☐	☐	☐	_____ (50)
Sugar/water	(51)	☐	☐	☐	☐	
Tea/water	(52)	☐	☐	☐	☐	
Fruits, cooked	(53)	☐	☐	☐	☐	
Fruits, raw	(54)	☐	☐	☐	☐	
Vegetables, cooked	(55)	☐	☐	☐	☐	
Vegetables, raw	(56)	☐	☐	☐	☐	
Home-canned foods	(57)	☐	☐	☐	☐	
Baby Foods (Jars)	(58)	☐	☐	☐	☐	
Other _____	(59)	☐	☐	☐	☐	

DIETARY HISTORY

Dietary History (Cont'd.)

Did infant use a pacifer? (60) 1 ☐ Often 2 ☐ Sometime 3 ☐ Rarely 4 ☐ No

If yes, was it ever dipped in: (61) 1 ☐ Syrup 2 ☐ Honey 3 ☐ Other _____ 4 ☐ Nothing

INFANT'S MEDICAL HISTORY (PRIOR TO ONSET OF INFANT BOTULISM)

Were infant's usual bowel movements: (62) 1 ☐ Two or more per day 2 ☐ One per day 3 ☐ Every other day 4 ☐ Less than every other day

Illness prior to onset of present illness (infant botulism)

		Yes 1	No 2	Unk 9	Age in weeks
Fever (>101°F)	(63)	☐	☐	☐	_____ (64-65)
Cold(s)	(66)	☐	☐	☐	_____ (67-68) _____ wks. (69-70)
Constipation (Mother's opinion)	(71)	☐	☐	☐	_____ (72-73)
Diarrhea (Mother's opinion)	(74)	☐	☐	☐	_____ (75-76)
Other	(77)	_____			

Did infant receive antibiotics prior to onset of present illness (Infant botulism)? (78) 1 ☐ Yes 2 ☐ No 9 ☐ Unk.

If yes, give

AGE (IN WEEKS)	REASON	DRUG	ROUTE (Oral, Parenteral or Both)	DURATION (Days)
_____ (79-80)	_____ (81)	_____ (82)	_____ (83)	_____ (84-85)
_____ (86-87)	_____ (88)	_____ (89)	_____ (90)	_____ (91-92)
_____ (93-94)	_____ (95)	_____ (96)	_____ (97)	_____ (98-99)

ENVIRONMENTAL HISTORY (PRIOR TO ONSET OF INFANT BOTULISM)

Was there any construction, excessive dust, or environmental change around home from birth of infant until onset of present illness (Infant botulism)? (100)

1 ☐ Yes 2 ☐ No 9 ☐ Unk.

If yes, describe (101) _____

Was parent(s) involved in gardening or yard work from birth of infant until onset of present illness? (102) 1 ☐ Yes 2 ☐ No 9 ☐ Unk.

If yes, describe (103) _____

Did infant remain away from home for more than 1 week prior to onset of present illness? (104) 1 ☐ Yes 2 ☐ No 9 ☐ Unk.

If yes, describe (105) _____

SYMPTOMS OF PRESENT ILLNESS (INFANT BOTULISM)

a) Mother first noted infant was ill on Mo. ☐☐ (106-107) Day ☐☐ (108-109) Yr. ☐☐ (110-111), at _____ (112-113) weeks of age.

(114) First symptom _____

(115) Second symptom _____

b) The initial visit to a physician was on Mo. ☐☐ (116-117) Day ☐☐ (118-119) Yr. ☐☐ (120-121), at _____ (122-123) weeks of age?

c) Infant was hospitalized on Mo. ☐☐ (124-125) Day ☐☐ (126-127) Yr. ☐☐ (128-129), at _____ (130-131) weeks of age?

d) Symptoms noted before patient hospitalized:

		Yes 1	No 2	Unk. 9	Mo.	Day	Yr.	Weeks old
Constipation	(132)	☐	☐	☐	☐☐ (133-134)	☐☐ (135-136)	☐☐ (137-138)	_____ (139-140)
Poor feeding	(141)	☐	☐	☐				

(Symptoms cont'd on next page)

SYMPTOMS OF PRESENT ILLNESS (INFANT BOTULISM)

d) Symptoms noted before patient hospitalized: (Cont'd)

		Yes 1	No 2	Unk 9
Altered cry	(142)	☐	☐	☐
Irritable	(143)	☐	☐	☐
Poor Head Control	(144)	☐	☐	☐
General Weakness	(145)	☐	☐	☐
Difficulty Breathing	(146)	☐	☐	☐
Fever	(147)	☐	☐	☐
Other	(148) _____	☐	☐	☐

If infant had constipation, how many bowel movements were occurring? (149)

1 ☐ Two or more per day 2 ☐ One per day 3 ☐ One every other day 4 ☐ Two-three times per week

5 ☐ One per week 6 ☐ Less than one per week 7 ☐ Other _____

Interviewee(s) (150) 1 ☐ Mother 2 ☐ Father 3 ☐ Both 4 ☐ Other _____

Interviewer: (Name) _____ Title (151) _____

(Agency) (152) _____ (Phone) _____

Are there problems with this case history form (153) 1 ☐ Yes 2 ☐ No

If yes, describe _____

HOSPITAL DATA

B. HOSPITALIZATION DATA (OBTAIN PRINCIPALLY FROM MEDICAL RECORD OR PHYSICIAN)

Hospital where diagnosis established Medical Record No. _____

Name (154) | Address | Phone

Primary Physician(s) | Phone

	Mo.	Day	Yr.
Date of first hospital admission	☐☐ (155-156)	☐☐ (157-158)	☐☐ (159-160)
Date of last hospital discharge	☐☐ (161-162)	☐☐ (163-164)	☐☐ (165-166)

Total days _____ (167-168) hospitalization

PHYSICAL FINDINGS

Symptoms and Physical Findings observed at any time during illness:

		Yes 1	No 2	Unk. 9
Loss of facial expression	(169)	☐	☐	☐
Ptosis	(170)	☐	☐	☐
Extraocular muscle palsies	(171)	☐	☐	☐
Pupils dilated	(172)	☐	☐	☐
constricted	(173)	☐	☐	☐
sluggish pupil reactivity	(174)	☐	☐	☐
Trouble swallowing	(175)	☐	☐	☐
Constipation	(176)	☐	☐	☐
Diarrhea	(177)	☐	☐	☐
Altered cry	(178)	☐	☐	☐
Weak sucking	(179)	☐	☐	☐
Muscle weakness				
Poor head control	(180)	☐	☐	☐
Upper extremeties	(181)	☐	☐	☐
Lower extremeties	(182)	☐	☐	☐
"Floppy"	(183)	☐	☐	☐
Knee Deep Tendon Reflex				
Absent	(184)	☐	☐	☐
Depressed	(185)	☐	☐	☐
Somnolent	(186)	☐	☐	☐
Irritable	(187)	☐	☐	☐
Fever	(188)	☐	☐	☐
Dehydration	(189)	☐	☐	☐
Respiratory difficulty	(190)	☐	☐	☐
Respiratory arrest	(191)	☐	☐	☐
Pneumonia	(192)	☐	☐	☐
Other _____	(193)	☐	☐	☐

TREATMENT

		1	2	9	
Respiratory Assistance Needed	(194)	☐	☐	☐	_____ (195-196) No. of Days
Oxygen only	(197)	☐	☐	☐	
Intubation	(198)	☐	☐	☐	
Tracheostomy	(199)	☐	☐	☐	
Ventilator	(200)	☐	☐	☐	
Infant feeding					
Feeding tube	(201)	☐	☐	☐	_____ (202-203) No. of Days

TREATMENT

Treatment (Cont'd.)
Antibiotics Given:

Drug	Oral or Parenteral	Dose (Gms/day)	Duration (days)	Date started Mo.	Date started Day
(204)	(205)	(206-208)	(209-210)	(211-214)	
(215)	(216)	(217-219)	(220-221)	(222-225)	
(226)	(227)	(228-230)	(231-232)	(233-236)	
(237)	(238)	(239-241)	(242-243)	(244-247)	

Was antitoxin given? (248) 1 ☐ Yes 2 ☐ No

If yes, give route of administration (249) 1 ☐ I.V. 2 ☐ I.M. 3 ☐ Both 9 ☐ Unk.

If yes, how many C.C. Total (Connaught Adult 10cc/vial, Connaught Ped. 2cc/vial

_____ Total cc (250-51)

Other specific therapeutic medication given: (252) _____

DIAGNOSTIC TESTS

Was a spinal tap done? (253) 1 ☐ Yes 2 ☐ No 9 ☐ Unk. Date Mo. Day Yr. (254-259)

Was spinal tap reported as normal? (260) 1 ☐ Yes 2 ☐ No 9 ☐ Unk.

Spinal fluid protein _____ mgm% (261-263)

Total number of white cells _____ (264-266)

Was a Tensilon test done? (267) 1 ☐ Yes 2 ☐ No 9 ☐ Unk. Date Mo. Day Yr. (268-273)

If yes, results (274) 1 ☐ Pos. 2 ☐ Neg. 3 ☐ Equivocal 9 ☐ Unk.

Was an EMG (electromyography) done? (275) 1 ☐ Yes 2 ☐ No 9 ☐ Unk. Date Mo. Day Yr. (276-281)

If yes, was it interpreted as compatible or diagnostic of botulism? (282)

1 ☐ Yes 2 ☐ No 3 ☐ Not sure 9 ☐ Unk.

If EMG done, was BSAP noted? (283) 1 ☐ Yes 2 ☐ No 9 ☐ Unk.

Source of hospitalization data: (284)

1 ☐ Physician 2 ☐ Medical Record 3 ☐ Both 4 ☐ Other _____

_____

Hospitalization section completed by:

Name _____ Title (285) _____

Agency (286) _____ Phone No. _____ Date _____

C. SPECIMEN TESTING FOR *C. BOTULINUM* (OBTAIN FROM MEDICAL RECORDS, STATE LABORATORY, OR CDC BOTULISM LABORATORY)

Serum sample for toxin: (287) 1 ☐ Type A 2 ☐ Type B 3 ☐ Type E 4 ☐ Neg 5 ☐ Not tested 6 ☐ Toxic but not typed

Stool sample: (288) 1 ☐ Type A 2 ☐ Type B 3 ☐ Type E 4 ☐ Neg 5 ☐ Not tested

STOOL SPECIMEN(S)

Date Mo. Day Yr.	Infant's Age (Wks)	Direct Toxin Assay			Enrichment Culture			Organism Isolated	
		Type Specific Toxic 1	Non-Specific Toxic 2	Non Toxic 3	Type Specific Toxic 1	Non-Specific Toxic 2	Non Toxic 3	Yes 1	No 2
☐☐ ☐☐ ☐☐ (289-294)	____ (295-296)	☐	☐	☐ (297)	☐	☐	☐ (298)	☐☐	(299)
☐☐ ☐☐ ☐☐ (300-305)	____ (306-307)	☐	☐	☐ (308)	☐	☐	☐ (309)	☐☐	(310)
☐☐ ☐☐ ☐☐ (311-316)	____ (317-318)	☐	☐	☐ (319)	☐	☐	☐ (320)	☐☐	(321)
☐☐ ☐☐ ☐☐ (322-327)	____ (328-329)	☐	☐	☐ (330)	☐	☐	☐ (331)	☐☐	(332)

Date Mo. ☐☐ Day ☐☐ Yr. ☐☐ (333-338) of first negative follow-up specimen.

Were food, medications, or environmental samples tested? (339) 1 ☐ Yes 2 ☐ No 9 ☐ Unk.

If yes, list: (340) _____

_____

Samples positive for: (341) 1 ☐ Performed toxin 2 ☐ *C. botulinum* 3 ☐ Both 4 ☐ Neither

If any positive for toxin or organisms, please describe: (342) _____

_____

Specimen testing section completed by:

Name _____ Title _____ (343)

Agency _____ (344) Phone No. _____ Date _____

Patient outcome (345) 1 ☐ Improving 2 ☐ Recovered 3 ☐ Death

If patient died, date Mo. ☐☐ Day ☐☐ Yr. ☐☐ (346-351)

Form Reviewed and Submitted by:

Name _____ Title _____ (352)

Agency _____ (353) Phone No. _____ Date _____

*PROTECTION OF PRIVACY INFORMATION

Public Law 93-579 entitled the Privacy Act of 1974 requires that individuals asked to furnish information such as that requested in this form be informed of the purpose for collecting such information and what the information will generally be used for. The following information is accordingly provided:

Authority: The Center for Disease Control, an agency of the Department of Health, and Human Services, is authorized to solicit the information requested in the attached form under the authority of the Public Health Service Act, Section 301, 361 (42 U.S.C. 241, 264).

Purpose: The information requested is considered relevant and necessary in the investigation of infant botulism.

Uses: The information requested may be shared with federal, state and local health authorities and will be used to implement appropriate control measures if any health problems are identified. An accounting of such disclosures will be made available to you upon request.

Effects of Non-Disclosure: Your disclosure of the requested information is voluntary, and no penalty will be imposed if you choose not to respond.

Listeria Case Form Instructions

BACKGROUND

In 2003, the Council for State and Territorial Epidemiologists (CSTE) and the Centers for Disease Control and Prevention (CDC) recommended prompt routine interviewing of all patients with culture-confirmed listeriosis using a standardized CDC questionnaire to facilitate the investigation of outbreaks due to *Listeria* (CSTE 2003 position statement ID-01). Prospective interviewing of cases of listeriosis with a standardized CDC questionnaire that includes questions about consumption of high-risk food, together with swift subtyping of *L. monocytogenes* isolates through PulseNet, will shorten the time interval between outbreak detection and the identification and recall of contaminated foods, and reduce the resources required to investigate listeriosis outbreaks.

INSTRUCTIONS

Please complete all sections of this questionnaire. Page 1 (demographics) should be completed from speaking with the healthcare provider and if necessary the patient or surrogate. Page 2-13 (food consumption information) ideally should be completed from an interview with the patient or surrogate. If the patient or family is unavailable, page 2-13 should be completed as best as possible by speaking to the health care provider.

Please obtain information about children ≥ one month of age and adults. In the event of a fetal or neonatal (<1 month of age) infection, the mother is considered the case-patient, and the mother's food consumption history should be collected.

> **Note**: If either the mother or the child in a mother-neonate pair had a positive *Listeria* culture, the mother is a case-patient and should be interviewed for her food consumption history. Only one interview should be performed for each mother-neonate pair, even if both the mother and the neonate had a positive culture.

Please try not to leave food consumption questions blank. The case (or surrogate) should answer each question as best as he/she can. They should be able to answer that they "**Ate**", "**Likely ate**", "**Likely did NOT eat**", and "**Did NOT eat**" each item. Again, if neither the case nor surrogate are available, please contact the healthcare provider to see if they have any pertinent information.

Please call the case-patient or family as soon as possible to minimize loss of recall. Information such as state identification numbers, laboratory ID number for the isolate, PFGE pattern numbers, will be completed by state epidemiology personnel.

SUGGESTIONS FOR INTERVIEWING:

- Interview the case preferentially
- If only a proxy or surrogate is available to obtain information about a case, then interview the person(s) who knows the most about the case's food history (spouse/partner, cook, sibling, children).

- You may interview multiple proxies, but please use one questionnaire form. Try to do the best that you can to get a single answer for each question.
- If there are multiple proxies, make sure to record the information for each proxy.
- The interviews should be handled over the telephone, unless there are special circumstances that would not permit for phone interview.

CALCULATING THE 4 WEEK INTERVAL OF FOOD EXPOSURES:

For all LISTERIOSIS patients EXCEPT MOTHER-NEONATE PAIRS:

Last day of the 4 week period: Date of positive *Listeria monocytogenes* culture

First day of 4 week period: Count back 4 weeks (28 days) from date of culture.

For MOTHER-NEONATE pairs:

Last day of the 4 week period: Date of neonate birth

First day of 4 week period: Count back 4 weeks (28 days) from date of birth.

WHAT TO DO WITH COMPLETED QUESTIONNAIRES

After completing the form, please fax to Stepy Thomas in the Notifiable Disease Section at 404-657-7517.

THANK YOU

Listeria Case Form

Completed by_____ Date completed_____

Please obtain information from children ≥ one month of age and adults. In the event of a fetal or neonatal (<1 month of age) infection the mother is considered the case-patient and the mother's food consumption history should be collected.

CASE INFORMATION

Patient's name:

Patient's address:

(Street Address) (City) (State) (Zip)

Phone numbers: (h) ( ) (w) ( ) (mobile) ( )

DOB (mm/dd/yyyy): ___/___/___

Ethnicity: (check all that apply)
[ ] Hispanic/Latino
[ ] Non Hispanic/Latino
[ ] Unknown

Race: (check all that apply)
[ ] American Indian/Alaska Native [ ] African American/Black
[ ] Asian [ ] White
[ ] Native Hawaiian/Pacific Islander [ ] Unknown

---------- Please detach at perforation to remove personal identifiers----------

Age: ___ years ___ months **Sex:** [ ] M [ ] F [ ] Unknown

State of residence: _____ **PulseNet Pattern Numbers:** *Asc*I: GX6A16._____

State (laboratory) ID No _____ *Apa*I: GX6A12._____

State Outbreak ID No_____ Other enzyme:_____

CDC ID No _____ **Serotype** ____

CDC Outbreak (EFORS) ID No_____ **Ribotype**_____

PREGNANCY ASSOCIATED CASES AND NEONATAL INFECTIONS (<1 MONTH OF AGE)

PREGNANCY ASSOCIATED CASE? [ ] Yes [ ] No [ ] Unknown.

If NO, skip to 'CASES NOT ASSOCIATED WITH PREGNANCY'.

If yes,

Did the mother have culture-confirmed listeriosis during pregnancy? [ ] Yes [ ] No [ ] Unknown

What type of infection did the pregnant woman have?

[ ] Bacteremia/Sepsis [ ] Meningitis [ ] Febrile gastroenteritis
[ ] Amnionitis [ ] No symptoms [ ] Unknown [ ] Other, specify_____

Type of specimen collected on woman: [ ] Blood [ ] Stool [ ] CSF [ ] None [ ] Other, specify_____

Date specimen collected (mm/dd/yyyy): ___/___/___

What was the outcome of the pregnancy? [ ] Still pregnant [ ] Miscarriage [ ] Stillbirth [ ] Preterm delivery (live birth)
[ ] Term delivery (live birth) [ ] Other, specify_____

Was the mother hospitalized for her listeriosis illness [ ] Yes [ ] No [ ] Unknown

If yes, Date of admission (mm/dd/yyyy) ___/___/___ Date of discharge (mm/dd/yyyy) ___/___/___

Name of Hospital: _____

What was the mother's outcome? [ ] Survived [ ] Died [ ] Unknown

FETAL AND NEONATAL (<1 MONTH OF AGE) INFECTIONS

Did the fetus or neonate have culture-confirmed listeriosis? [ ] Yes [ ] No [ ] Unknown

If yes,

What type of infection did the child have? [ ] Meningitis [ ] Bacteremia/Sepsis [ ] Granulomatosis infantisepticum
[ ] Unknown [ ] Other, specify_____

Type of specimen collected on child: [ ] Blood [ ] CSF [ ] Placenta [ ] Other, specify_____

Date specimen collected (mm/dd/yyyy): ___/___/___ Child's DOB (mm/dd/yyyy): ___/___/___

Child's Outcome: [ ] Survived [ ] Died [ ] Unknown

CASES NOT ASSOCIATED WITH PREGNANCY

Type of specimen collected: [ ] Blood [ ] Stool [ ] CSF [ ] Other, specify_____

Date specimen collected (mm/dd/yyyy): ___/___/___

Type of infection: [ ] Bacteremia/Sepsis [ ] Meningitis [ ] Febrile gastroenteritis
[ ] Unknown [ ] Other, specify_____

Was patient hospitalized? [ ]Yes [ ] No [ ] Unknown

If yes, Date of admission (mm/dd/yyyy) ___/___/___ Date of discharge (mm/dd/yyyy) ___/___/___

Name of Hospital: _____

Case-patient's Outcome: [ ] Survived [ ] Died [ ] Unknown

***Listeria* Case Form** **Patient State Laboratory ID No._____**

CASE-PATIENT INTERVIEW

Date of interview(mm/dd/yyyy): ___/___/___ Initials of interviewer: _____

Interviewee: [ ] Case-patient [ ] Surrogate [ ] Unknown

If surrogate, relationship to patient: [ ] Parent [ ] Child [ ] Sibling [ ] Spouse [ ] Other, Specify _____

When did your illness begin? (Onset of illness) (mm/dd/yyyy): ___/___/___

During the 4 weeks before your illness, were you admitted to a hospital (≥overnight)? [ ]Yes [ ] No [ ] Don't know

During the 4 weeks before your illness, were you a resident in a nursing home, long term care facility or rehabilitation center? [ ]Yes [ ] No [ ] Don't know

If yes, Date of admission (mm/dd/yyyy) ___/___/___ Date of discharge (mm/dd/yyyy) ___/___/___

Which of the following symptoms were associated with illness? ***(read each)***

Fever	[ ] Yes	[ ] No	[ ] Don't know	Chills	[ ] Yes	[ ] No	[ ] Don't know
Headache	[ ] Yes	[ ] No	[ ] Don't know	Stiff Neck	[ ] Yes	[ ] No	[ ] Don't know
Muscle Aches	[ ] Yes	[ ] No	[ ] Don't know	Vomiting	[ ] Yes	[ ] No	[ ] Don't know
Diarrhea (≥3 loose stools/day)	[ ] Yes	[ ] No	[ ] Don't know	Preterm labor	[ ] Yes	[ ] No	[ ] Don't know
Other	[ ] Yes	[ ] No	[ ] Don't know				

Specify_____

If unknown hospitalization information on page 1 ask the following questions:

Were you hospitalized for your *Listeria* infection? [ ]Yes [ ] No [ ] Don't know

If yes, Date of admission (mm/dd/yyyy) ___/___/___ Date of discharge (mm/dd/yyyy) ___/___/___ Name of Hospital: _____

FOOD HISTORY

INSTRUCTIONS FOR INTERVIEWER:

Ask patient about the food that they purchased and consumed during the 4 weeks before onset of illness. In the event of a miscarriage, stillbirth, or neonatal infection (<1 month of age), ask MOTHER about her food history during the 4 weeks before delivery.

DATE 4 WEEKS BEFORE ONSET OF ILLNESS OR DELIVERY (MM/DD/YYYY): __/__/____

INSTRUCTIONS TO READ TO CASE-PATIENT (OR SURROGATE):

I am going to ask you whether you ate specific food items and where you typically purchase your food. I am most interested in the foods you ate and purchased during the 4 weeks before your illness *(or delivery*). I know that it can be difficult to remember that far back, but do the best you can.

FOOD PURCHASE HISTORY

Grocery Stores: Did you buy foods at any grocery stores during the month before your illness?

[ ] Yes [ ] It's likely [ ] It's unlikely [ ] No

If yes or likely,

Store Name	**Location (street, city or county)**
1.	
2.	
3.	
4.	

Farmers markets and small local markets: Did you buy foods at any farmers markets, local markets or shops (including delicatessens) during the month before

your illness? [ ] Yes [ ] It's likely [ ] It's unlikely [ ] No

If yes or likely,

Store Name	**Location (street, city or county)**
1.	
2.	
3.	
4.	

Local farm or local home: Did you buy foods at any local farms or a local home during the month before your illness?
[ ] Yes [ ] It's likely [ ] It's unlikely [ ] No

If yes or likely,

Farm Name or Description	**Location (street, city or county)**
1.	

Sit-down Restaurants: Did you eat at any sit-down restaurants during the month before your illness?
[ ] Yes [ ] It's likely [ ] It's unlikely [ ] No

If yes or likely,

Restaurant Name	**Location (street address, county)**	**Dining dates (if known) (mm/dd/yyy)**
1.		
2.		
3.		
4.		
5.		
6.		
7.		

Cafeterias, take out restaurants, deli counters,(food to go): Did you eat at or purchase food from any cafeterias, take out restaurants, or deli counters during the month before your illness?
[ ] Yes [ ] It's likely [ ] It's unlikely [ ] No

If yes or likely,

Name	**Location (street address, county)**	
1.		
2.		
3.		
4.		
5.		
6.		

***Listeria* Case Form** **Patient State Laboratory ID No._____**

FOOD CONSUMPTION HISTORY

Note to interviewer: A DELICATESSEN COUNTER serves portions or helpings of meats, cheeses, and salad, sliced AT the delicatessen counter, from a refrigerated case. A delicatessen counter can be in a grocery store or food market, or in a local store, sometimes called a delicatessen. PRE-PACKAGED foods includes foods purchased in a grocery store, market, or local store, that are sold as pre-packaged containers, sliced AT the FACTORY, often from a self-serve display case.

MEATS: In the 4 weeks before your illness (or your delivery), did you eat any of the following meat items?

	Ate (=1)	**Likely Ate (=2)**	**Likely did NOT eat (=3)**	**Did NOT eat (=4)**	***If ate or likely ate,* How often?**	***If ate or likely ate,* Where did you purchase it? *(choose all that apply)***	**What types or brands? *(for each purchase)***
Ham	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Bologna	1	2	3	4	[[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Pepperoni	1	2	3	4	[[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Salami/ Pastrami	1	2	3	4	[[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

	Ate (=1)	**Likely Ate (=2)**	**Likely did NOT eat (=3)**	**Did NOT eat (=4)**	***If ate or likely ate,* How often?**	***If ate or likely ate,* Where did you purchase it?** ***(choose all that apply)***	**What types or brands?** ***(for each purchase)***
Chicken breast (pre-cooked)	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Other chicken Specify _____	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Turkey breast (pre-cooked)	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Other Turkey Cold Cuts (Specify _____)	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Chopped liver/ liverwurst	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

	Ate (=1)	Likely Ate (=2)	Likely did NOT eat (=3)	Did NOT eat (=4)	*If ate or likely ate,* **How often?**	*If ate or likely ate,* **Where did you purchase it?** *(choose all that apply)*	**What types or brands?** *(for each purchase)*
Patè or meat spreads (not canned patè)	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Hot dogs	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
If Yes, were the hot dogs: [ ] Heated to steaming before consumption [ ] Not heated (to steaming) before consumption (eaten directly out of package)							
Ground Beef	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Other meats Specify other meat _____	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

CHEESES: In the 4 weeks before your illness, did you eat any of the following cheese items?

	Ate (=1)	**Likely Ate (=2)**	**Likely did NOT eat (=3)**	**Did NOT eat (=4)**	***If ate or likely ate,* How often?**	***If ate or likely ate,* Where did you purchase it? *(choose all that apply)***	**What types or brands? *(for each purchase)***
Brie	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Feta	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Camembert	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Goat	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Blue or gorgonzola	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

	Ate (=1)	Likely Ate (=2)	Likely did NOT eat (=3)	Did NOT eat (=4)	*If ate or likely ate,* **How often?**	*If ate or likely ate,* **Where did you purchase it?** *(choose all that apply)*	**What types or brands?** *(for each purchase)*
Queso fresco (Mexican-style cheese)	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Farmer's cheese	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Cottage cheese	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Raw (Unpast-eurized) milk cheese	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Ricotta cheese	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

	Ate (=1)	Likely Ate (=2)	Likely did NOT eat (=3)	Did NOT eat (=4)	*If ate or likely ate,* **How often?**	*If ate or likely ate,* **Where did you purchase it?** *(choose all that apply)*	**What types or brands?** *(for each purchase)*
Cream cheese	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Mozzarella	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Monterrey Jack	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Muenster	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Other cheese 1 2 3 4 Specify other cheese type _____					[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

READY-TO-EAT SALADS: In the 4 weeks before your illness, did you eat any of the following ready-to-eat salads (not prepared at home)?

	Ate (=1)	**Likely Ate (=2)**	**Likely did NOT eat (=3)**	**Did NOT eat (=4)**	***If ate or likely ate,* How often?**	***If ate or likely ate,* Where did you purchase it? *(choose all that apply)***	**What types or brands? *(for each purchase)***
Potato salad	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Pasta salad	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Seafood salad	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Bean salad	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Hummus	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

	Ate (=1)	Likely Ate (=2)	Likely did NOT eat (=3)	Did NOT eat (=4)	*If ate or likely ate,* **How often?**	*If ate or likely ate,* **Where did you purchase it?** *(choose all that apply)*	**What types or brands?** *(for each purchase)*
Cole slaw	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Macaroni salad	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Fruit salad	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Other meat, fruit, or vegetable salad Specify other salad _____	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

FISH: In the 4 weeks before your illness, did you eat any of the following fish items purchased from a delicatessen counter?

	Ate (=1)	**Likely Ate (=2)**	**Likely did NOT eat (=3)**	**Did NOT eat (=4)**	***If ate or likely ate,* How often?**	***If ate or likely ate,* Where did you purchase it? *(choose all that apply)***	**What types or brands? *(for each purchase)***
Precooked scallops	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Precooked crab	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Precooked shrimps	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Precooked Lobster	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____
Sushi (raw fish)	1	2	3	4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store [ ] Prepackaged at a grocery store [ ] Delicatessen counter at local shop/deli [ ] Prepackaged at a local store/shop/deli [ ] Cafeterias, restaurants, or venders [ ] Other, Specify_____ [ ]Don't know	_____ _____ _____ _____ _____ _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

Ate (=1) / Likely Ate (=2) / Likely did NOT eat (=3) / Did NOT eat (=4)	*If ate or likely ate,* **How often?**	*If ate or likely ate,* **Where did you purchase it?** *(choose all that apply)* / **What types or brands?** *(for each purchase)*
Smoked fish 1 2 3 4 Specify type of smoked fish _____	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store _____ [ ] Prepackaged at a grocery store _____ [ ] Delicatessen counter at local shop/deli _____ [ ] Prepackaged at a local store/shop/deli _____ [ ] Cafeterias, restaurants, or venders _____ [ ] Other, Specify_____ [ ]Don't know _____
Preserved (marinated) fish 1 2 3 4 Specify type of preserved fish_____	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store _____ [ ] Prepackaged at a grocery store _____ [ ] Delicatessen counter at local shop/deli _____ [ ] Prepackaged at a local store/shop/deli _____ [ ] Cafeterias, restaurants, or venders _____ [ ] Other, Specify_____ [ ]Don't know _____
Fresh fish (Salmon, Tuna, Cod, Swordfish) 1 2 3 4	[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store _____ [ ] Prepackaged at a grocery store _____ [ ] Delicatessen counter at local shop/deli _____ [ ] Prepackaged at a local store/shop/deli _____ [ ] Cafeterias, restaurants, or venders _____ [ ] Other, Specify_____ [ ]Don't know _____
Other seafood 1 2 3 4 Specify other seafood _____	[[ ] approximately 1-2 x/month [ ] approximately 1x/week [ ] approximately 2-4x/week [ ] almost everyday (5-7x/week) [ ] not sure [ ] none	[ ] Delicatessen counter at a grocery store _____ [ ] Prepackaged at a grocery store _____ [ ] Delicatessen counter at local shop/deli _____ [ ] Prepackaged at a local store/shop/deli _____ [ ] Cafeterias, restaurants, or venders _____ [ ] Other, Specify_____ [ ]Don't know _____

***Listeria* Case Form** **Patient State Laboratory ID No._____**

MILK & OTHER DAIRY PRODUCTS

In the 4 weeks before your illness, did you drink any milk or milk-based drink(s) at home or away from home?

[ ] Drank [ ] Likely drank [ ] Unlikely drank [ ] Did not drink

If drank or likely drank,

Which of the following types of milk did you drink? ***(check all that apply)***

[ ] Buttermilk If checked, Brand name _____
[ ] Whole milk If checked, Brand name _____
[ ] 2% milk If checked, Brand name _____
[ ] 1% milk If checked, Brand name _____
[ ] Skim milk If checked, Brand name _____
[ ] Chocolate If checked, Brand name _____
[ ] Other, Specify_____

Was any of the milk Unpasteurized (raw)? [ ] Yes [ ] No [ ] Don't know

If yes, what is the location _____ and date of purchase (mm/dd/yyyy)? __/___/____

In the 4 weeks before your illness, did you eat any of the following dairy products? ***(read each)***

	Ate (=1)	**Likely Ate (=2)**	**Likely did NOT eat (=3)**	**Did NOT eat (=4)**		**Ate (=1)**	**Likely Ate (=2)**	**Likely did NOT eat (=3)**	**Did NOT eat (=4)**
Cream	1	2	3	4	Sour cream	1	2	3	4
Butter (not margarine)	1	2	3	4	Yogurt	1	2	3	4
Other (dairy)	1	2	3	4					

Specify_____

Where do you buy your dairy products? ***(check all that apply)***

[ ] Grocery store [ ] Farmer's market or small local market [ ] Other, specify_____

Salmonellosis Form for Case Follow-up

For State Use **ID #** __ __ __ __ -SL- __ __ __ __

I. CASE IDENTIFICATION
(fill out contact information for the patient)

Name: _____ (Last, First) **County**: _____

Address: _____ (Street) **Occupation/Grade**: _____

_____ (City) _____-_____ (Zip Code) **Work/Childcare/School**: _____

Home Phone: ( ) _____ **Work Phone**: ( ) _____

II. CASE DEMOGRAPHICS
(check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Race: ☐ White ☐ Black ☐ Asian ☐ Multiracial ☐ American Indian/Alaskan Native ☐ Hawaiian/Pacific Islander ☐ Other please specify _____

Ethnicity: ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

Date of Birth: ____ / ____ / _____

Age: _____ years/mo/days

III. CLINICAL DATA (check all appropriate boxes)

Symptomatic: ☐YES ☐NO ☐Unknown

If yes, **Date of onset**: ____ / ____ / _____

Date of Diarrhea onset: ____ / ____ / _____

Symptoms

Fever (____°F)	☐YES	☐NO	☐Unknown
Diarrhea:	☐YES	☐NO	☐Unknown
Vomiting:	☐YES	☐NO	☐Unknown
Headache:	☐YES	☐NO	☐Unknown
Nausea:	☐YES	☐NO	☐Unknown
Abdominal Pain:	☐YES	☐NO	☐Unknown
Other:	☐YES	☐NO	☐Unknown

Specify: _____

Date Received First Report: ____ / ____ / _____

Physician Name: _____

Physician Phone: ( ) _____

Hospitalized: ☐YES ☐NO ☐Unknown

(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____

Date of admission: ____ / ____ / _____

Date of Discharge: ____ / ____ / _____

Hospital 2: _____

Date of admission: ____ / ____ / _____

Date of discharge: ____/ ____ / _____

Outcome: ☐Survived ☐Died ☐Unknown

Date of death: ____ / ____ / _____

IV. LABORATORY INFORMATION (please attach copy of laboratory report if available; list specimen collection date, test performed, specimen tested, laboratory name, Serogroup and Serotype)

Collection Date	Test Name	Specimen source (stool, blood, urine, etc)	Laboratory Name	Serogroup/Serotype

V. POSSIBLE SOURCES OF INFECTION – 7 days prior to onset (circle correct response and provide details to the right)

A. Suspect Foods – refer to the 7 days prior to onset

(ask the case if he/she consumed the following in the 7 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Eating or contact with undercooked / raw meat or poultry;
   Specify type of meat: _____ & Store Location: _____
   Date Purchased: ____ / ____ / _____ Date Eaten/Contact: ____ / ____ / _____
2. Y N DK Eating or contact any pork or pork products;
   Specify type of pork:_____& Store Location:_____
   Date Purchased: ____ / ____ / _____ Date Eaten/Contact: ____ / ____ / _____
3. Y N DK Raw fruit or vegetables; Specify types: _____
4. Y N DK Raw milk /other unpasteurized dairy products; specify_____
5. Y N DK Eating raw or undercooked eggs and egg products; Store Location: _____
6. Y N DK Eat in a Restaurant Date: ____ / ____ / _____ Name/Location _____
   Date: ____ / ____ / _____ Name/Location _____
7. Y N DK Well on property Details: _____
8. Y N DK Is normal drinking water filtered?
9. Please specify what is normal drinking water or case/family (i.e. well,city,bottled,etc):_____

For children less than 1 year of age.

10. Y N DK Drink Formula? Specify Formula Type: _____

If yes, what water type is used to mix formula? _____

V. B. Other Potential Sources – refer 7 days prior to onset

(ask the case if he/she had contact with the following in the 7 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Contact with diapered children or other human feces; details:_____
2. Y N DK Contact with animal feces; details:_____
3. Y N DK Contact with animals (especially reptiles but including birds, dogs, livestock); Specify animal and location (home, school, zoo) of contact:_____
4. Y N DK Swimming / Recreational water exposure (lake, pool, etc.);
   Type: _____ Location: _____ Date: ____ / ____ / _____
5. Y N DK Travel outside community; Location:_____
   Date departed home: ____ /____ /_____ Date returned home ____ / ____ /_____
6. Y N DK Attend Large Gatherings; Describe Location _____Date ____ / ____ / _____
7. Y N DK Came in contact with someone with a similar illness; Specify Dates_____
   Names & details: _____
8. Y N DK Other; Specify _____

VI. Comments:

VII. Additional Case-Specific Information

1. Is the case a food handler, healthcare worker, daycare attendee? Y N DK Specify: _____

VIII. Education and Follow-up

☐ **Emphasize hand washing and food preparation to case / family.**
☐ **Please ask if case can be contacted again in the future for additional questions**
☐ **Ensure environmental health follow-up if any daycare, restaurant or other facility implicated**

IX. REPORT COMPLETED

Case Report Completed by: _____ **Phone Number:** ( ) _____

Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____

Fax the completed report to the Notifiable Disease Section at (404)-657-7517

For State Use Only:

Date received first report: ____ /____ / _____

Is case associated with an outbreak? ☐ YES ☐NO ☐UNK

If Yes, EFORS #_____

Is case associated with a known case? ☐YES ☐NO ☐UNK

Specimen to GPHL: Y N UNK

CX:____ /____/_____ MM#1_____

CX:____/____/_____ MM# 2_____

Shigellosis Form for Case Follow-up

I. CASE IDENTIFICATION
(fill out contact information for the patient)

For State Use **ID #** __ __ __ __ -SG- __ __ __

Name: _____ **County**: _____
Last, First

Address: _____ **Occupation/Grade**: _____
Street

_____ _____-_____ **WorkSite/childcare/School**: _____
City Zip Code *please include daycare

Home Phone: ( ) _____ **Work Phone**: ( ) _____

II. CASE DEMOGRAPHICS
(check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Race: ☐ White ☐ Multiracial ☐ Black ☐ American Indian/Alaskan Native ☐ Asian ☐ Hawaiian/Pacific Islander ☐ Other → Please specify _____

Ethnicity: ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

Date of Birth: ____ / ____ / _____
Age: _____ years

III. CLINICAL DATA (check all appropriate boxes)

Symptomatic: ☐ YES ☐ NO ☐ Unknown

If yes, **Date of onset**: _____ / _____ / _____

Date of Diarrhea onset: _____ / _____ / _____

Symptoms

Diarrhea: ☐ YES ☐ NO ☐ Unknown
Vomiting: ☐ YES ☐ NO ☐ Unknown
Fever: ☐ YES ☐ NO ☐ Unknown
Nausea: ☐ YES ☐ NO ☐ Unknown
Bloody Stool: ☐ YES ☐ NO ☐ Unknown
Other: ☐ YES ☐ NO ☐ Unknown
Specify: _____

Outcome: ☐ **Survived** ☐ **Died** ☐ **Unknown**

Date of death: ___ / ___ / _____

Date Received First Report: ____ / ____ / _____

Physician Name: _____

Physician Phone: ( ) _____

Hospitalized: ☐ YES ☐ NO ☐ Unknown
(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____
Date of admission: ___ / ___ / _____
Date of Discharge: ___ / ___ / _____

Hospital 2: _____
Date of admission: ___ / ___ / _____
Date of discharge: ___/ ___ / _____:

Treatment w/ antibiotics; specify antibiotic and date
_____

IV. LABORATORY INFORMATION (please attach copy of laboratory report if available; list specimen collection date, test performed, specimen tested, laboratory name, Species and Serotype)

Collection Date	**Test Name**	**Specimen source** (Stool, etc.)	**Laboratory Name**	**Serotype/Species**

Date first isolated: ___ / ___ / _____

V. POSSIBLE SOURCES OF INFECTION – 7 days prior to onset
(circle correct response and provide details to the right)

V. A. Suspect Foods – refer to the 7 days prior to onset
(ask the case if he/she consumed the following in the 7 days prior to onset. ** Attach additional sheets if necessary.)

1. Y N DK Eat in a Restaurant Date: ___ / ___ / ____ Name/Location _____

Date: ___ / ___ / ____ Name/Location _____

V. B. Other Potential Sources – refer 7 days prior to onset
(ask the case if he/she had contact with the following in the 7 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Attend or work in daycare or school; Specify where_____
2. Y N DK Contact with diapered children; Details:_____
3. Y N DK Exposure to other human feces; Details:_____
4. Y N DK Swimming / Recreational water exposure (lake, pool, etc.);

   If Y check: ☐ lake, pond, river, stream
   ☐ Water park
   ☐ Swimming or wading pool
   ☐ Hot tub/spa, whirlpool, Jacuzzi

   Location: _____

   Date: ___ / ___ / ____
5. Y N DK Travel outside community, including internationally;

   Location (country if international):_____

   Date Arrived: ___/___/___ Date Left: ___/___/___
6. Y N DK Attend Large Gatherings; Describe Location _____

   Date ___ / ___ / ____
7. Y N DK Came in contact with someone with a similar illness;

   If Y check: ☐ child in daycare
   ☐ Child in school
   ☐ Household member, not sexual partner
   ☐ Household member, sexual partner
   ☐ Male sexual partner
   ☐ Female sexual partner

   Specify Dates_____

   Names: _____
8. What is usual source of drinking water? (circle) municipal well bottled other_____
9. Y N DK Drink untreated water from pond, stream, spring, or lake?
10. Other exposure; Specify _____

VI. Additional Case-Specific Information

1. Does case work as food handler, healthcare worker, daycare attendee; Specify _____

VII. Education and Follow up
Please emphasize hand washing to case / family.
Please ensure case will be excluded* if occupation involves food handling, direct patient care, or child care.
Please ensure case can be contacted in the future for additional questions, specimen collection
Please ensure environmental health follow-up if any daycare, restaurant or other facility implicated

***Food handlers or children in daycare should be restricted from their activities until they have 2 consecutive negative stool specimens at least 24 hours apart off antibiotics**

VIII. REPORT COMPLETED

Case Report Completed by: _____ Phone Number: ( ) _____
Address: _____

Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____
* Fax the completed report to the Notifiable Disease Section at 404-657-7517

For State Use:
Date received first report : ____ /____ / _____
Specimen to GPHL: YES NO UNK MM#_____

Is case associated with an outbreak? YES NO UNK If Yes, EFORS #_____

Is case associated with a known case? YES NO UNK

Typhoid Fever Form for Case Follow-up

For State Use **ID #** __ __ __ __ -ST- __ __ __

I. CASE IDENTIFICATION
(fill out contact information for the patient)

Name: _____ (Last, First) **County**: _____

Address: _____ (Street) **Occupation/Grade**: _____

_____ (City) _____-_____ (Zip Code) **Work/School/Childcare**: _____

Home Phone: ( ) _____ **Work Phone**:( ) _____ **Other**: ( )_____

II. CASE DEMOGRAPHICS
(check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Race: ☐ White ☐ Multiracial ☐ Black ☐ American Indian/Alaskan Native ☐ Asian ☐ Hawaiian/Pacific Islander ☐ Other → Please specify _____

Ethnicity: ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

Date of Birth: ____ / ____ / _____
Age: _____ years

III. CLINICAL DATA (check all appropriate boxes)

Symptomatic: ☐ YES ☐ NO ☐ Unknown

If yes, **Date of onset**: _____ / _____ / _____

Date of fever onset: _____ / _____ / _____

Symptoms

Fever: (___°F)	☐ YES	☐ NO	☐ Unknown
Diarrhea:	☐ YES	☐ NO	☐ Unknown
Constipation:	☐ YES	☐ NO	☐ Unknown
Headache:	☐ YES	☐ NO	☐ Unknown
Abd Pain:	☐ YES	☐ NO	☐ Unknown
Rash:	☐ YES	☐ NO	☐ Unknown
Other:	☐ YES	☐ NO	☐ Unknown

Specify: _____

Date Received First Report: ____ / ____ / _____

Physician Name: _____

Physician Phone: ( ) _____

Hospitalized: ☐ YES ☐ NO ☐ Unknown
(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____
Date of Admission
Date of Discharge

Hospital 2:_____
Date of Admission: ___ / ___ / _____
Date of discharge: ___/ ___ / _____

Outcome: ☐ Survived ☐ Died ☐ Unknown

Date of death: ___ / ___ / _____

Was patient ever treated as a chronic carrier in the past?	YES	NO	Unknown
Is patient immunocompromized?	YES	NO	Unknown
Does patient have gastric disease (prior surgery, taking acid blockers)?	YES	NO	Unknown

IV. LABORATORY INFORMATION (please attach copy of laboratory report if available; list specimen collection date, test performed, specimen tested, and laboratory name)

Collection Date	Test Name	Specimen source (stool, blood, bone marrow, gall bladder, etc)	Laboratory Name	Species/Serotype

Date Salmonela Typhi first isolated ___ / ___ / ____

Was antibiotic testing performed: ☐ Yes ☐ No ☐ Unknown If *yes*, was organism resistant to:

Ampicillin	☐ Yes	☐ No	☐ Not tested
Trimethoprim-Sulfamethoxazole	☐ Yes	☐ No	☐ Not tested
Fluoroquinolones	☐ Yes	☐ No	☐ Not tested
Cloramphenicol	☐ Yes	☐ No	☐ Not tested

V. POSSIBLE SOURCES OF INFECTION – 30 days prior to onset
(circle correct response and provide details to the right)

V. A. Suspect Foods – refer to the 30 days prior to onset
(ask the case if he/she consumed the following in the 30 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Eating shellfish Store Name and Location: _____
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ____
2. Y N DK Raw fruit or vegetables Store Location: _____
3. Y N DK Raw milk /other unpasteurized dairy products
4. Y N DK Eat in a Restaurant Date: ___ / ___ / ____ Name/Location _____
   Date: ___ / ___ / ____ Name/Location _____

V. B. Other Potential Sources – refer 30 days prior to onset
(ask the case if he/she had contact with the following in the 30 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Contact with diapered children; Details:_____
2. Y N DK Exposure to other human feces; Details:_____
3. Y N DK Swimming / Recreational water exposure (lake, pool, etc.); Location: _____
   Date: ___ / ___ / ____
4. Y N DK Attend Large Gatherings; Describe Location _____
   Date ___ / ___ / ____
5. Y N DK Came in contact with someone with a similar illness; Specify Dates_____
   Names: _____

VI. Additional Case-Specific Information (circle correct response and provide **details to the right)**

1. Does case work as food handler, healthcare worker, laboratory worker, daycare attendee;
Specify location and dates_____
2. What is the citizenship of the case? _____
3a. Y N DK Was the case traced to a typhoid carrier?
3b. Y N DK If yes, was the carrier previously known to the health department?
4. Y N DK Is this case a typhoid carrier?
5. Do any household or other close contacts work as food handlers, healthcare workers, daycare attendees?
Specify_____

6a. Y N DK Did the case receive typhoid vaccination (primary series or booster) within five years before the onset of illness?

6b. If yes, indicate the type of vaccine rec'd:

Standard killed typhoid shot	Y	N	DK	YR Rec'd: _____
Oral Ty21a or Vivotif (Bema) four pill series	Y	N	DK	YR Rec'd: _____
VICPS or Typhim Vi shot	Y	N	DK	YR Rec'd: _____

7a. Y N DK Did the patient travel or live outside the United States during the 30 days before the illness began

7b. If yes, please list countries and dates of travel _____

7c. What was the most recent date of entry or return to the United States? : ___ / ___ / ____

7d. What was the purpose of the international travel? BUSINESS TOURISM VISITING RELATIVES OR FRIENDS

IMMIGRATION TO U.S. OTHER; specify_____

VII. Education and Follow up
Please emphasize hand washing to case / family.
Please ensure case will not be handling food.
Please ensure case will be excluded if occupation involves food handling, direct patient care, or child care.
Please ensure case can be contacted for stool cultures to be obtained 1 month after onset of illness (off antibiotics at least 48 hours)

VIII. REPORT COMPLETED

Case Report Completed by: _____ Phone Number: ( ) _____
Address: _____

Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____
* Fax the completed report to the Notifiable Disease Section at 404-657-7517

For State Use:
Date received first report : ____ /____ / _____
Specimen to GPHL: YES NO UNK MM#_____

Is case associated with an outbreak? YES NO UNK If Yes, EFORS #_____

Is case associated with a known case? YES NO UNK

PATIENT'S NAME:	TEL.: Home ( )	Work ( )
ADDRESS:		
PHYSICIAN'S NAME:		TEL.: ( )

– PATIENT IDENTIFIERS NOT TRANSMITTED TO CDC –

SEND COMPLETED REPORT TO STATE INFECTION CONTROL

CDC
CENTERS FOR DISEASE CONTROL AND PREVENTION

CHOLERA AND OTHER VIBRIO ILLNESS SURVEILLANCE REPORT

State will forward to: Centers for Disease Control and Prevention
Foodborne and Diarrheal Diseases Branch M/S A38
1600 Clifton Road
Atlanta, GA 30333

OMB 0920-0322 Exp. Date 12/31/2002

I. DEMOGRAPHIC AND ISOLATE INFORMATION

1. First three letters of patients first name: ☐☐☐ (1-3)

REPORTING HEALTH DEPARTMENT

State: ☐☐ (4-5)

City: (6-15)

County/Parish: (16-26)

State No.: (27-37)

CDC USE ONLY ☐☐☐☐☐☐☐☐ (38-48)

FDA No.: (49-57)

2. Date of birth: Mo. ☐☐ Day ☐☐ Yr. ☐☐ (58-63)

3. Age: Years ☐☐ Mos. ☐☐ (64-67)

4. Sex: (68)
☐ M (1)
☐ F (2)
☐ Unk. (9)

5. Race/Ethnicity: (69)
☐ White (not Hispanic) (1)
☐ Black (not Hispanic) (2)
☐ Hispanic (3)
☐ Asian/Pacific Islander (4)
☐ American Indian/ Alaska Native (5)
☐ Other: _____ (8)
☐ Unk. (9)

6. Occupation: (70-81) _____

7. *Vibrio* species isolated (check one or more):

Species	Source of specimen(s) collected from patient: Stool	Blood	Wound	Other	Date specimen collected (If more than one specify earliest date) Mo. Day Yr.	If wound or other, specify site :
☐ *V. alginolyticus*	☐ (82)	☐ (83)	☐ (84)	☐ (85)	☐☐ ☐☐ ☐☐ (86-91)	_____ (92-103)
☐ *V. cholerae* O1	☐ (104)	☐ (105)	☐ (106)	☐ (107)	☐☐ ☐☐ ☐☐ (108-113)	_____ (114-125)
☐ *V. cholerae* O139	☐ (126)	☐ (127)	☐ (128)	☐ (129)	☐☐ ☐☐ ☐☐ (130-135)	_____ (136-147)
☐ *V. cholerae* ***non***-O1, ***non***-O139	☐ (148)	☐ (149)	☐ (150)	☐ (151)	☐☐ ☐☐ ☐☐ (152-157)	_____ (158-169)
☐ *V. cincinnatiensis*	☐ (170)	☐ (171)	☐ (172)	☐ (173)	☐☐ ☐☐ ☐☐ (174-179)	_____ (180-191)
☐ *V. damsela*	☐ (192)	☐ (193)	☐ (194)	☐ (195)	☐☐ ☐☐ ☐☐ (196-201)	_____ (202-213)
☐ *V. fluvialis*	☐ (214)	☐ (215)	☐ (216)	☐ (217)	☐☐ ☐☐ ☐☐ (218-223)	_____ (224-235)
☐ *V. furnissii*	☐ (236)	☐ (237)	☐ (238)	☐ (239)	☐☐ ☐☐ ☐☐ (240-245)	_____ (246-257)
☐ *V. hollisae*	☐ (258)	☐ (259)	☐ (260)	☐ (261)	☐☐ ☐☐ ☐☐ (262-267)	_____ (268-279)
☐ *V. metschnikovii*	☐ (280)	☐ (281)	☐ (282)	☐ (283)	☐☐ ☐☐ ☐☐ (284-289)	_____ (290-301)
☐ *V. mimicus*	☐ (302)	☐ (303)	☐ (304)	☐ (305)	☐☐ ☐☐ ☐☐ (306-311)	_____ (312-323)
☐ *V. parahaemolyticus*	☐ (324)	☐ (325)	☐ (326)	☐ (327)	☐☐ ☐☐ ☐☐ (328-333)	_____ (334-345)
☐ *V. vulnificus*	☐ (346)	☐ (347)	☐ (348)	☐ (349)	☐☐ ☐☐ ☐☐ (350-355)	_____ (356-367)
☐ *Vibrio* species - not identified	☐ (368)	☐ (369)	☐ (370)	☐ (371)	☐☐ ☐☐ ☐☐ (372-377)	_____ (378-389)
☐ Other (specify): _____ (390-405)	☐ (406)	☐ (407)	☐ (408)	☐ (409)	☐☐ ☐☐ ☐☐ (410-415)	_____ (416-427)

8. Were other organisms isolated from the same specimen that yielded *Vibrio*? Yes (1) ☐ No (2) ☐ Unk. (9) ☐ (428)

Specify organism(s): _____ (429-450)

9. Was the identification of the species of *Vibrio* (e.g., *vulnificus, fluvialis*) confirmed at the State Public Health Laboratory? Yes (1) ☐ No (2) ☐ Unk. (9) ☐ (451)

10. Complete the following information if the isolate is *Vibrio cholerae* O1 or O139:

Serotype (452) (check one)
☐ Inaba (1)
☐ Ogawa (2)
☐ Hikojima (3)
☐ Not Done (4)
☐ Unk. (9)

Biotype (453) (check one)
☐ El Tor (1)
☐ Classical (2)
☐ Not Done (3)
☐ Unk. (9)

Toxigenic? (454) (check one) Yes (1) ☐ No (2) ☐ Unk. (9) ☐

If YES, toxin positive by: (check all, that apply)
☐ ELISA (455)
☐ Latex agglutination (456)
☐ Other (specify): _____ (457-471)

Name of Hospital: _____

Address: _____

State: ____ Age: ____ Sex: ____

II. CLINICAL INFORMATION

Vibrio species: _____

1. Date and time of onset of first symptoms:

Mo. Day Yr. (472-7)

Hour Min. am (1) pm (2) (478-9) (480-1) (482)

2. Symptoms and signs:

	Yes (1)	No (2)	Unk. (9)		Yes (1)	No (2)	Unk. (9)	
Fever ..... max. temp. ____.____ F (1) C (2) (483-5) (486) (487) (488)				(489)	Headache			(497)
Nausea				(490)	Muscle pain ..			(498)
Vomiting				(491)	Cellulitis			(499) Site: _____ (500-514)
Diarrhea				(492)	Bullae			(515) Site: _____ (516-530)
(max. no. stools/24 hours: _____) (493-494)					Shock ..... (systolic BP <90)			(531)
Visible blood in stools				(495)	Other			(532) (specify): _____ (533-549)
Abdominal cramps				(496)				

3. Total duration of illness: _____ (days) (550-552)

4. Admitted to a hospital for this illness? (553)

Yes (1) No (2) Unk. (9)

Admission date: Mo. Day Yr. (554-559)

Discharge date: Mo. Day Yr. (560-565)

5. Any sequelae? (e.g., amputation, skin graft) (566)

If YES, describe:

Yes (1) _____

No (2) _____

Unk. (9) _____ (567-635)

6. Did patient die? (636)

Yes (1) No (2) Unk. (9)

If YES, date of death: Mo. Day Yr. (637-642)

7. Did patient take an antibiotic as treatment for this illness? (643)

Yes (1) No (2) Unk. (9)

If YES, name(s) of antibiotic(s):

		Date began antibiotic: Mo. Day Yr.		Date ended antibiotic: Mo. Day Yr.	
1. _____	(644-646)	(647-652)		(653-658)	
2. _____	(659-661)	(662-667)		(668-673)	
3. _____	(674-676)	(677-682)		(683-688)	

8. Pre-existing conditions?

	Yes (1)	No (2)	Unk. (9)			Yes (1)	No (2)	Unk. (9)	
Alcoholism				(689)					
Diabetes				(690)	on insulin?				(691)
Peptic ulcer				(692)					
Gastric surgery				(693)	type: _____				(694-709)
Heart disease				(710)	Heart failure?				(711)
Hematologic disease				(712)	type: _____				(713-728)
				(729)	type: _____				(730-745)
Immunodeficiency ...				(746)	type: _____				(747-762)
Liver disease				(763)	type: _____				(764-779)
Malignancy				(780)	type: _____				(781-796)
Renal disease				(797)	specify: _____				(798-810)
Other									

9. Was the patient receiving any of the following treatments or taking any of the following medications in the 30 days before this *Vibrio* illness began?

	Yes (1)	No (2)	Unk. (9)		If YES, specify treatment and dates:
Antibiotics				(811)	_____ (812-830)
Chemotherapy				(831)	_____ (832-850)
Radiotherapy				(851)	_____ (852-870)
Systemic steroids ..				(871)	_____ (872-890)
Immunosuppressants				(891)	_____ (892-910)
Antacids				(911)	_____ (912-930)
H_2-Blocker or other ulcer medication ..... (e.g., Tagamet, Zantac, Omeprazole)				(931)	_____ (932-950)

III. EPIDEMIOLOGIC INFORMATION

1. Did this case occur as part of an outbreak? (Two or more cases of *Vibrio* infection) Yes (1) No (2) Unk. (9) (951) If YES, describe: _____ (952-970)

2. Did the patient travel outside his/her home state in the 7 days before illness began?

Yes (1) No (2) Unk. (9) (973)

Patient home state: ____ (971-972)

If YES, list destination(s) and dates:

	City/State/Country	Date Entered: Mo. Day Yr.		Date Left: Mo. Day Yr.	
1.	(974-1004)	(1005-1010)		(1011-1016)	
2.	(1017-1047)	(1048-1053)		(1054-1059)	
3.	(1060-1090)	(1091-1096)		(1097-1102)	

3. Please specify which of the following seafoods were eaten by the patient in the 7 days before illness began: (If multiple times, most recent meal)

Type of seafood	Yes (1)	No (2)	Unk. (9)		Mo. Day Yr.		Any eaten raw? Yes (1)	No (2)	Unk. (9)	
Clams				(1103)		(1104-1109)				(1110)
Crab				(1111)		(1112-1117)				(1118)
Lobster ...				(1119)		(1120-1125)				(1126)
Mussels ..				(1127)		(1128-1133)				(1134)
Oysters ..				(1135)		(1136-1141)				(1142)

Type of seafood	Yes (1)	No (2)	Unk. (9)		Mo. Day Yr.		Any eaten raw? Yes (1)	No (2)	Unk. (9)	
Shrimp				(1143)		(1144-1149)				(1150)
Crawfish				(1151)		(1152-1157)				(1158)
Other shellfish				(1159)		(1160-1165)				(1166)
(specify): _____						(1167-1191)				
Fish				(1192)		(1193-1198)				(1199)
(specify): _____						(1200-1225)				

State: ____ Age: ____ Sex: ____

III. EPIDEMIOLOGIC INFORMATION (CONT.)

Vibrio species: _____

4. In the 7 days before illness began, was patient's skin exposed to any of the following?

	Yes (1)	No (2)	Unk. (9)	
A body of water (fresh, salt, or brackish water)	☐	☐	☐	(1226)
Drippings from raw or live seafood	☐	☐	☐	(1227)
Other contact with marine or freshwater life	☐	☐	☐	(1228)

If YES, specify body of water location: _____ (1229-1242)

Date of exposure: Mo. ☐☐ Day ☐☐ Yr. ☐☐ (1250-5)

Time of exposure: Hour ☐☐ (1256-7) Min. ☐☐ (1258-9) ☐ am (1) ☐ pm (2) (1260)

If YES to any of the above, answer each:

	Yes (1)	No (2)	Unk. (9)		Yes (1)	No (2)	Unk. (9)	
Handling/cleaning seafood	☐	☐	☐	(1243)				
Swimming/diving/wading	☐	☐	☐	(1244)				
Walking on beach/shore/ fell on rocks/shells	☐	☐	☐	(1245)				
Boating/skiing/surfing	☐	☐	☐	(1246)				
					☐	☐	☐	(1247)
Construction/repairs								
Bitten/stung	☐	☐	☐	(1248)				
Other: (specify)	☐	☐	☐	(1249)				

_____ (1261-1275)

- If skin was exposed to water, indicate type: (1276)

☐ Salt (1) ☐ Brackish (3) ☐ Unk. (9)
☐ Fresh (2) ☐ Other (8) (specify): _____ (1277-1284)

Additional comments:

_____
_____ (1285-1290)

- If skin was exposed, did the patient sustain a wound during this exposure, or have a pre-existing wound? (choose one): (1291)

☐ YES, sustained a wound. (1) ☐ YES, had a pre-existing wound. (2) ☐ YES, uncertain if wound new or old. (3) ☐ NO. (4) ☐ Unk . (9)

If YES, describe how wound occurred and site on body :
(Note: Skin bullae that appear as part of the acute illness should be recorded in section II, Clinical Information, only).

_____ (1292-1320)

If isolate is *Vibrio cholerae* O1or O139 please answer questions 5 - 8.

5. If patient was infected with *V. cholerae* O1 or O139, to which of the following risks was the patient exposed in the 4 days before illness began:

	Yes (1)	No (2)	Unk. (9)	
Raw seafood	☐	☐	☐	(1321)
Cooked seafood	☐	☐	☐	(1322)
Foreign travel	☐	☐	☐	(1323)
Other person(s) with cholera or cholera-like illness	☐	☐	☐	(1324)
Street-vended food	☐	☐	☐	(1325)
Other	☐	☐	☐	(1326)

(specify): _____ (1327-1350)

6. If answered "yes" to foreign travel (question III. 5), had the patient been educated in cholera prevention measures before travel? ☐ Yes (1) ☐ No (2) ☐ Unk. (9) (1351)

If YES, check all source(s) of information received:

☐ Pre-travel clinic (1352) ☐ Friends (1355) ☐ Travel agency (1358)
☐ Airport (departure gate) (1353) ☐ Private physician (1356) ☐ CDC travelers' hotline (1359)
☐ Newspaper (1354) ☐ Health department (1357) ☐ Other (specify): (1360) _____ (1361-1400)

7. If answered "yes" to foreign travel (question III. 5), what was the patient's reason for travel? (check all that apply)

☐ To visit relatives/friends (1401)
☐ Business (1402)
☐ Tourism (1403)
☐ Military (1404)
☐ Other (specify): (1405) _____ (1406-1426)
☐ Unk. (1427)

8. Has patient ever received a cholera vaccine? ☐ Yes (1) ☐ No (2) ☐ Unk. (9) (1428)

(If YES, specify type most recently received):

☐ Oral (1429) ☐ Parenteral (1430)

Most recent date: Mo. ☐☐ Day ☐☐ Yr. ☐☐ (1431-1436)

If domestically acquired illness due to <u>any</u> *Vibrio* species is suspected to be related to seafood consumption, please complete section IV (Seafood Investigation).

ADDITIONAL INFORMATION or COMMENTS

Person completing section I - III: _____ **Date:** Mo. ☐☐ Day ☐☐ Yr. ☐☐ (1437-1442)

Title/Agency: _____ **Tel.:** ( )

CDC Use Only

Comment: (1444-1454)

Source: (1443) ☐

Syndrome: (1455) ☐

CDC Isolate No.

_____ (1456-1463)

State: ___ Age: ___ Sex: ___

IV. SEAFOOD INVESTIGATION SECTION

Vibrio species: _____

For each seafood ingestion investigated, please complete as many of the following questions as possible. (Include additional pages section IV if more than one seafood type was ingested and investigated.)

1. Type of seafood (e.g., clams): _____ (1464-1480)

Date consumed: Mo. Day Yr. (1481-1486)

Time consumed: Hour (1487-8) Min. (1489-90) ☐ am (1) ☐ pm (2) (1491)

Amount consumed: (1492-1512)

If patient ate multiple seafoods in the 7 days before onset of illness, please note why this seafood was investigated (e.g.,consumed raw, implicated in outbreak investigation):

_____

2. How was this fish or seafood prepared? (1513)

☐ Raw (1) ☐ Baked (2) ☐ Boiled (3) ☐ Broiled (4) ☐ Fried (5) ☐ Steamed (6) ☐ Unk. (9) ☐ Other (8) (specify): _____ (1514-1530)

3. Was seafood imported from another country? ☐ Yes (1) ☐ No (2) ☐ Unk. (9) (1531) If YES, specify exporting country if known: _____ (1532-1554)

4. Was this fish or shellfish harvested by the patient or a friend of the patient? ☐ Yes (1) ☐ No (2) ☐ Unk. (9) (1555) (If YES, go to question 12.)

5. Where was this seafood obtained? (1556) (Check one)

☐ Oyster bar or restaurant (1) ☐ Seafood market (4) ☐ Unk. (9)
☐ Truck or roadside vendor (2) ☐ Other (8)
☐ Food store (3) (specify): _____ (1557-1590)

6. Name of restaurant, oyster bar, or food store: _____ Tel.: ( )

Address: _____

7. If oysters, clams, or mussels were eaten, how were they distributed to the retail outlet? (1591)

☐ Shellstock (sold in the shell) (1) ☐ Shucked (2) ☐ Unk. (9) ☐ Other (8) (specify): _____ (1592-1610)

8. Date restaurant or food outlet received seafood: Mo. Day Yr. (1611-1616)

9. Was this restaurant or food outlet inspected as part of this investigation? ☐ Yes (1) ☐ No (2) ☐ Unk. (9) (1617)

10. Are shipping tags available from the suspect lot? (1618) ☐ Yes (1) ☐ No (2) ☐ Unk. (9)

(Attach copies if available)

11. Shippers who handled suspected seafood: (please include certification numbers if on tags)

_____

_____

12. Source(s) of seafood:

_____

_____

13. Harvest site:

_____ (1619-1639) **Date:** Mo. Day Yr. (1640-1645) **Status:** (1646) ☐ Approved (1) ☐ Prohibited (2) ☐ Conditional (3) ☐ Other (8) (specify): _____ (1647-1666)

_____ (1667-1687) Mo. Day Yr. (1688-1693) (1694) ☐ Approved (1) ☐ Prohibited (2) ☐ Conditional (3) ☐ Other (8) (specify): _____ (1695-1714)

14. Physical characteristics of harvest area as close as possible to harvest date:

	Result		Date Measured (Mo. Day Yr.)
Maximum ambient temp. (1715-1718)		☐ F (1) ☐ C (2) (1719)	(1720-1725)
Surface water temp. (1726-1727)		☐ F (1) ☐ C (2) (1728)	(1729-1734)
Salinity (ppt) (1735-1736)			(1737-1742)
Total rainfall (inches in prev. 5 days) (1743-1744)			(1745-1750)
Fecal coliform count (1751-1755)			(1756-1761) (Attach copy of coliform data)

15. Was there evidence of improper storage, cross-contamination, or holding temperature at any point? ☐ Yes (1) ☐ No (2) ☐ Unk. (9) (1762) If YES, specify deficiencies:

_____

_____

Person completing section IV: _____

Date: Mo. Day Yr. (1763-1768)

Title/Agency: _____

Tel.: ( )

Yersiniosis Form for Case Interview

For State Use **ID #** __ __ __ __ -YR- __ __ __

I. CASE IDENTIFICATION

(Fill out contact information for the patient)

Name: _____ (Last, First)

County: _____

Address: _____ (Street)

Occupation/Grade: _____

_____ (City) _____-_____ (Zip Code)

Work/School/Childcare: _____

Home Phone:( ) _____ **Work Phone**: ( ) _____ **Other**: ( ) _____

II. CASE DEMOGRAPHICS

(Check the appropriate boxes; fill out date of birth and age in years)

Sex: ☐ Female ☐ Male

Race: ☐ White ☐ Black ☐ Asian ☐ Other → Please specify _____

☐ Multiracial ☐ American Indian/Alaska Native ☐ Hawaiian/Pacific Islander

Ethnicity: ☐ Hispanic ☐ Non-Hispanic ☐ Unknown

Date of Birth: ____ / ____ / _____

Age: _____ years

III. CLINICAL DATA (Check all appropriate boxes)

Symptomatic: ☐ YES ☐ NO ☐ Unknown

If yes, **Date of onset**: _____ / _____ / _____

Date of Diarrhea onset: _____ / _____ / _____

Symptoms			
Diarrhea:	☐ YES	☐ NO	☐ Unknown
Bloody Stool:	☐ YES	☐ NO	☐ Unknown
Fever: (_____ °F)	☐ YES	☐ NO	☐ Unknown
Vomiting:	☐ YES	☐ NO	☐ Unknown
Abdominal pain:	☐ YES	☐ NO	☐ Unknown
Joint pain:	☐ YES	☐ NO	☐ Unknown
Skin rash:	☐ YES	☐ NO	☐ Unknown
Other:	YES	NO	Unknown

Specify: _____

Physician Name: _____

Physician Phone: ( ) _____

Hospitalized: ☐ YES ☐ NO ☐ Unknown

(list all hospitals, admit and discharge dates; attach extra page)

Hospital 1: _____

Date of admission: ___ / ___ / _____

Date of Discharge: ___ / ___ / _____

Hospital 2: _____

Date of admission: ___ / ___ / _____

Date of discharge: ___/ ___ / _____

Outcome: ☐ ALIVE ☐ DIED ☐ Unknown

Date of death: ___ / ___ / _____

IV. LABORATORY INFORMATION

(List specimen collection date, test performed, specimen tested, laboratory name, and species. If available, please attach a copy of the lab report)

COLLECTION DATE	TEST NAME (culture, serology, etc.)	SPECIMEN (blood, stool, urine, etc.)	LABORATORY NAME	SPECIES

V. POSSIBLE SOURCES OF INFECTION – 7 days prior to onset
(Circle correct response and provide details to the right)

V. A. Suspect Foods – refer to the 7 days prior to onset
(Ask the case if he/she consumed the following in the 7 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Eaten or handled **undercooked / raw** pork or pork products? Store: _____
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ____ Item: _____
2. Y N DK Eaten or handled **other** pork or pork products? Store: _____
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ___ Item: _____
3. Y N DK Prepared or been in the same household when pork **chitterlings** have been prepared?
   Store / location where chitterlings were purchased: _____
   Chitterling Brand Name: _____ Lot #: _____
   Date purchased: ___ / ___ / _____ Date prepared: ___ / ___ / _____
4. Y N DK Eaten raw milk or unpasteurized dairy products? Store Location: _____
   Date Eaten: ___ / ___ / ____ Date Purchased: ___ / ___ / ____
5. Y N DK Eaten in a Restaurant? Date: ___ / ___ / ____ Name/Location _____
   Date: ___ / ___ / ____ Name/Location _____
   Date: ___ / ___ / ____ Name/Location _____

V. B. Other Potential Sources – refer 7 days prior to onset
(Ask the case if he/she had contact with the following in the 7 days prior to onset. Attach additional sheets if necessary.)

1. Y N DK Well on property? Details: _____
2. Y N DK Is water filtered?
   Please specify what is normal drinking water for case / family: _____
3. Y N DK Contact with any animals (specifically cats or dogs)? List animals and type of contact: _____
   _____
4. Y N DK Visited a farm? When? ___/___/___ - ___/___/___ Animals present?_____
5. Y N DK Travel outside community?; Location:_____
   Date Arrived Destination: ___/___/___ Date Left Destination: ___/___/___
6. Y N DK Attend Large Gatherings? Location: _____Date: ___ / ___ / ____
7. Y N DK Came in contact with someone with a similar illness?; _____
   Names, dates, and contact info (household / day care, etc.)_____
   _____
8. Y N DK Other; Specify _____

VI. Additional Questions for the Case

1. Does case work as food handler, healthcare worker, daycare attendee? Specify _____
2. Is the patient / family aware of the **Georgia Division of Public Health's Chitterlings campaign** (Share the Traditions, Not the Germs)? **Y N DK** **if not, please send them the Chitterlings pamphlet if applicable**

Please emphasize hand washing to case / family. Please discuss safe Chitterling preparation if applicable.
Also emphasize that we might contact them for more information in the future.

VII. REPORT COMPLETED **Please fax completed form to the Notifiable Disease Section: 404-657-7517**
Case Report Completed by: _____ Phone Number: ( ) _____
Date Report Completed: ____ /____ / _____ **Date Sent to State:** ____ /____ / _____

For State Use:
Date Received First Report: ____ / ____ / _____ Case associated with an outbreak? Yes No Unk
Specimen to GPHL: Y N U MM# _____ Case associated with a known case? Yes No Unk

FORM APPROVED
OMB NO.0920-0004

INVESTIGATION OF A FOODBORNE OUTBREAK

This form is used to report foodborne disease outbreak investigations to CDC. A foodborne outbreak is defined as the occurrence of **two or more cases** of a similar illness resulting from the ingestion of a common food in the United States. This form has **two** parts: Part 1 asks for the minimum data needed and Part 2 asks for additional information. For this investigation to be counted in the CDC annual summary, Part 1 must be completed. **We encourage you to complete as much of Part 1 and Part 2 as you can.**

CDC USE ONLY
__ __-__ __ __ __ __ __

STATE USE ONLY
_____

Part 1: Required Information

1. Location of Exposure:

State: ___ ___
☐ Multi-state exposure

County: _____
☐ Multi-county exposure

List other states/counties in Comments, bottom of this page

2. Dates:

Date first case became ill: ___ ___ / ___ ___ / ___ ___ ___ ___
Month Day Year

Date of first known exposure: ___ ___ / ___ ___ / ___ ___ ___ ___
Month Day Year

Date of last known exposure: ___ ___ / ___ ___ / ___ ___ ___ ___
Month Day Year

3. Numbers of Cases Exposed:

Lab-confirmed cases: _____ *(A)*

Probable cases: _____ *(B)*

Estimated total ill: _____
(If greater than sum of A+B)

4. Approximate Percentage of Total Cases in Each Age Group:

<1 year: _____% 20-49 yrs: _____%

1-4 yrs: _____% ≥ 50 yrs: _____%

5-19 yrs: _____%

5. Sex: (Estimated percent of total cases)

Male: _____ %

Female: _____ %

6. Investigation Methods: (Check all that apply)

☐ Interviews of cases only
☐ Case-control study
☐ Cohort study
☐ Food preparation review
☐ Food product traceback
☐ Investigation at factory or production plant
☐ Investigation at original source (farm, marine estuary, etc.)
☐ Environment / food sample cultures

7. Implicated Food(s): (based on Reasons listed in Item 15 on page 3)

_____
_____
_____
_____
_____

☐ Could not be determined

8. Etiology: (Name the bacteria, virus, parasite, or toxin. If available, include details such as phage type, virulence factors, molecular fingerprinting, antibiogram, metabolic profile.

Etiology	**Serotype** (if avail.)	**Other Characteristics** (if avail.)

☐ Confirmed*
☐ Suspected

☐ Unknown etiology
☐ Multiple etiologies (list in Comments)

Isolated/identified from (check all that apply)
☐ Patient specimen(s)
☐ Food specimen(s)
☐ Environment specimen(s)
☐ Food Worker specimen(s)

* see criteria at http://www.cdc.gov/ncidod/dbmd/outbreak/ or MMWR2000/Vol 49/SS-1/Appendix B

9. Contributing Factors: (See list on page 2, check all that apply)

☐ Contributing factors unknown

Contamination Factor:
☐ C1 ☐ C2 ☐ C3 ☐ C4 ☐ C5 ☐ C6 ☐ C7 ☐ C8 ☐ C9
☐ C10 ☐ C11 ☐ C12 ☐ C13 ☐ C14 ☐ C15 *(describe in Comments)* ☐ N/A

Proliferation/Amplification Factor (bacterial outbreaks only):
☐ P1 ☐ P2 ☐ P3 ☐ P4 ☐ P5 ☐ P6 ☐ P7 ☐ P8 ☐ P9
☐ P10 ☐ P11 ☐ P12 *(describe in Comments)* ☐ N/A

Survival Factor (microbial outbreaks only):
☐ S1 ☐ S2 ☐ S3 ☐ S4 ☐ S5 *(describe in Comments)* ☐ N/A

Was food-worker implicated as the source of contamination? ☐ Yes ☐ No
If yes, please check ***only one*** of following:
☐ laboratory *and* epidemiologic evidence
☐ epidemiologic evidence (w/o lab confirmation)
☐ lab evidence (w/o epidemiologic confirmation)
☐ prior experience makes this the likely source *(please explain in Comments)*

10. Agency reporting this outbreak:

_____

Contact Person:

NAME: _____
TITLE: _____
PHONE NO: _____
FAX NO: _____
E-MAIL: _____

Date of completion of this form:

___ ___ / ___ ___ / ___ ___ ___ ___
Month Day Year

☐ **Initial Report**
☐ **Updated Report**
☐ **Final Report**
☐ **Additional data suggests this is not a foodborne outbreak**

Comments: _____

The following codes are to be used to fill out Part 1 (question 9) and Part 2 (question 15).

Contamination Factors:[1]

C1 - Toxic substance part of tissue (e.g., ciguatera)
C2 - Poisonous substance intentionally added (e.g., cyanide or phenolphthalein added to cause illness)
C3 - Poisonous or physical substance accidentally/incidentally added (e.g., sanitizer or cleaning compound)
C4 - Addition of excessive quantities of ingredients that are toxic under these situations (e.g., niacin poisoning in bread)
C5 - Toxic container or pipelines (e.g., galvanized containers with acid food, copper pipe with carbonated beverages)
C6 - Raw product/ingredient contaminated by pathogens from animal or environment (e.g., *Salmonella enteriditis* in egg, Norwalk in shellfish, *E. coli* in sprouts)
C7 - Ingestion of contaminated raw products (e.g., raw shellfish, produce, eggs)
C8 - Obtaining foods from polluted sources (e.g., shellfish)
C9 - Cross-contamination from raw ingredient of animal origin (e.g., raw poultry on the cutting board)
C10 - Bare-handed contact by handler/worker/preparer (e.g., with ready-to-eat food)
C11 - Glove-handed contact by handler/worker/preparer (e.g., with ready-to-eat food)
C12 - Handling by an infected person or carrier of pathogen (e.g., *Staphylococcus*, *Salmonella*, Norwalk agent)
C13 - Inadequate cleaning of processing/preparation equipment/utensils – leads to contamination of vehicle (e.g., cutting boards)
C14 - Storage in contaminated environment – leads to contamination of vehicle (e.g., store room, refrigerator)
C15 - Other source of contamination (*please describe in Comments*)

Proliferation/Amplification Factors:[1]

P1 - Allowing foods to remain at room or warm outdoor temperature for several hours (e.g., during preparation or holding for service)
P2 - Slow cooling (e.g., deep containers or large roasts)
P3 - Inadequate cold-holding temperatures (e.g., refrigerator inadequate/not working, iced holding inadequate)
P4 - Preparing foods a half day or more before serving (e.g., banquet preparation a day in advance)
P5 - Prolonged cold storage for several weeks (e.g., permits slow growth of psychrophilic pathogens)
P6 - Insufficient time and/or temperature during hot holding (e.g., malfunctioning equipment, too large a mass of food)
P7 - Insufficient acidification (e.g., home canned foods)
P8 - Insufficiently low water activity (e.g., smoked/salted fish)
P9 - Inadequate thawing of frozen products (e.g., room thawing)
P10 - Anaerobic packaging/Modified atmosphere (e.g., vacuum packed fish, salad in gas flushed bag)
P11 - Inadequate fermentation (e.g., processed meat, cheese)
P12 - Other situations that promote or allow microbial growth or toxic production (*please describe in Comments*)

Survival Factors:[1]

S1 - Insufficient time and/or temperature during initial cooking/heat processing (e.g., roasted meats/poultry, canned foods, pasteurization)
S2 - Insufficient time and/or temperature during reheating (e.g., sauces, roasts)
S3 - Inadequate acidification (e.g., mayonnaise, tomatoes canned)
S4 - Insufficient thawing, followed by insufficient cooking (e.g., frozen turkey)
S5 - Other process failures that permit the agent to survive (*please describe in Comments*)

Method of Preparation:[2]

M1 - Foods eaten raw or lightly cooked (e.g., hard shell clams, sunny side up eggs)
M2 - Solid masses of potentially hazardous foods (e.g., casseroles, lasagna, stuffing)
M3 - Multiple foods (e.g., smorgasbord, buffet)
M4 - Cook/serve foods (e.g., steak, fish fillet)
M5 - Natural toxicant (e.g., poisonous mushrooms, paralytic shellfish poisoning)
M6 - Roasted meat/poultry (e.g., roast beef, roast turkey)
M7 - Salads prepared with one or more cooked ingredients (e.g., macaroni, potato, tuna)
M8 - Liquid or semi-solid mixtures of potentially hazardous foods (e.g., gravy, chili, sauce)
M9 - Chemical contamination (e.g., heavy metal, pesticide)
M10 - Baked goods (e.g., pies, eclairs)
M11 - Commercially processed foods (e.g., canned fruits and vegetables, ice cream)
M12 - Sandwiches (e.g., hot dog, hamburger, Monte Cristo)
M13 - Beverages (e.g., carbonated and non-carbonated, milk)
M14 - Salads with raw ingredients (e.g., green salad, fruit salad)
M15 - Other, does not fit into above categories *(please describe in Comments)*
M16 - Unknown, vehicle was not identified

[1] Frank L. Bryan, John J. Guzewich, and Ewen C. D. Todd. Surveillance of Foodborne Disease III. Summary and Presentation of Data on Vehicles and Contributory Factors; Their Value and Limitations. Journal of Food Protection, 60; 6:701-714, 1997.
[2] Weingold, S. E., Guzewich JJ, and Fudala JK. Use of foodborne disease data for HACCP risk assessment. Journal of Food Protection, 57; 9:820-830, 1994.

Part 2: Additional Information (Please complete as much as possible)

11. Numbers of:

OUTCOME / SYMPTOM	**Cases** with **Outcome / Symptom**	**Total** cases for whom you have information available
Healthcare Provider Visit		
Hospitalization		
Death		
Vomiting		
Diarrhea		
Bloody stools		
Feverish		
Abdominal cramps		
*		
*		
*		
*		

12. Incubation Period:

(circle appropriate units)

Shortest: _____ (Hours, days)

Longest: _____ (Hours, days)

Median: _____ (Hours, days)

☐ Unknown

13. Duration of Acute Illness Among Those Who Recovered:

(circle appropriate units)

Shortest: _____ (Hours, days)

Longest: _____ (Hours, days)

Median: _____ (Hours, days)

☐ Unknown

* Use the following terms, if appropriate, to describe other common characteristics of cases:

anaphylaxis, arthralgia, bradycardia, bullous skin lesions, bradycardia, cough, coma, diplopia, descending paralysis, flushing, headache, hemolytic uremic syndrome (HUS), hypotension, itching, jaundice, lethargy, myalgia, paresthesia, septicemia, sore throat, tachycardia, thromobocytopenia, temperature reversal, urticaria, wheezing

14. If Cohort Investigation Conducted:

Event-specific Attack Rate = _____ **/** _____ **x 100 =** _____ **%**

 # ill **total # of persons for whom you have illness info.**

15. Implicated Food(s): (Please provide known information.)

Name of Food	**Main Ingredients**	**Contaminated Ingredient**	**Reason(s) Suspected** (see below)	**Method of Preparation** (see list on page 2)
e.g., lasagna	*pasta, sauce, eggs, beef*	*eggs*	*4*	*M1*

☐ Food vehicle could not be determined

Reason Suspected (choose all that apply):

1 - Statistical evidence from epidemiological investigation
2 - Laboratory evidence (e.g., identification of agent in food)
3 - Compelling supportive information
4 - Other data (e.g., same phage type found on farm that supplied eggs)
5 - Specific evidence lacking but prior experience makes this likely source

16. Where was Food Prepared? (Check all that apply)

☐ Restaurant or deli
☐ Day care center
☐ School
☐ Church, temple, etc.
☐ Camp
☐ Caterer
☐ Grocery store
☐ Hospital
☐ Workplace cafeteria
☐ Nursing home
☐ Prison, jail
☐ Private home
☐ Picnic
☐ Fair, festival, other temporary/mobile service
☐ Contaminated food imported into U.S.
☐ Commercial product, served without further preparation
☐ Other (please describe)

_____

17. Where was Food Eaten? (Check all that apply)

☐ Restaurant or deli
☐ Day care center
☐ School
☐ Church, temple, etc.
☐ Camp
☐ Grocery Store
☐ Hospital
☐ Workplace cafeteria
☐ Nursing home
☐ Prison, jail
☐ Private home
☐ Picnic
☐ Fair, festival, or mobile location
☐ Other (please describe)

_____

18. Other Available Info:

☐ Unpublished agency report (please attach)
☐ Epi-Aid
☐ Publication (please reference)

_____

☐ Not available

19. Remarks: Briefly describe important aspects of the outbreak not covered above

(e.g., restaurant closure, product recall, immunoglobulin administration, economic impact, etc.)

_____
_____
_____
_____
_____

State Health Departments: Please FAX this document to Foodborne and Diarrheal Diseases, DBMD, CDC, at (404) 639-2205.

CDC 52.13 REV. 10/2000

Foodborne OB Supplement State ____ County _____ EFORS ID # _____

How was the outbreak initially recognized by the public health system in your state?

❒ private citizen report ❒ medical professional report ❒ nursing home/ALC staff report
❒ reportable disease surveillance blip ❒ syndromic surveillance blip ❒ PFGE match
❒ inquiry from another state ❒ inquiry from CDC ❒ _____

On what date was outbreak first reported to or recognized by a local or county health dept? ___/___/___

On what date was outbreak first reported to or recognized by the state health dept? (m/d/y) ___/___/___

Which agencies were *substantively* involved in the investigation? (*check all that apply*)

❒ 1 local health dept ❒ multiple local HDs ❒ 1 state health dept ❒ multiple state HDs
❒ regional HD ❒ FoodNet group ❒ CDC ❒ FDA ❒ USDA ❒ state Ag ❒ _____

Who designed the investigation (i.e., made decisions about how it was to done)? (*check all that apply*)

❒ LHD sanitarians ❒ LHD CD nurses ❒ people with advanced epi training ❒ _____

How many food specimens were tested? ❒ _____ ❒ none

How many water specimens were tested? ❒ _____ ❒ none

How many fecal specimens were screened at *private* labs by the following? *(Be specific if possible.)*

___ bacterial cx ___ O & P *or, if no specifics....* ❒ some (number unknown) ❒ none ❒ no idea

How many fecal specimens were screened at a *public* health lab by the following basic test methods?

___ bacterial cx ___ O & P ___ NLV PCR ❒ some (number unknown) ❒ none ❒ no idea

How many other (non-fecal) clinical specimens were tested at a *public* health lab?

___ vomitus ___ blood ___ other (*specify*) _____ ❒ none ❒ no idea

If applicable, **what was the median lag time from onset of diarrhea or vomiting to collection of fecal specimens for testing at the *public* health lab?** (*enter exact number if possible; otherwise, estimate*)

____ days *(if known) or else....* ❒ within 3 days ❒ 4–7 days ❒ 8–14 days
❒ not applicable ❒ >14 days ❒ could not be determined

If the etiology was lab-confirmed, **where was the pathogen first identified?**

❒ private lab ❒ local/state PHL ❒ CDC ❒ _____

If no etiology was established through basic tests, what other lab tests were done? (*provide details below*)

❒ none ❒ toxin screening ❒ other PCR ❒ other culture ❒ referral to CDC ❒ _____

Overall, was the investigation was adequate given the nature of the outbreak? ❒ yes ❒ no ❒ can't say

What problems significantly affected the success of this investigation? (*check all that apply*)

❒ too few cases
❒ too few controls available
❒ couldn't identify good controls
❒ delayed notification of local HD
❒ delayed notification from local HD to state
❒ no trained HD staff available
❒ weekend/overtime staffing limits
❒ inadequate study design/ sampling methodology/bad questionnaire
❒ lack of cooperation from cases
❒ lack of cooperation from local HD
❒ lack of cooperation from restaurant, nursing home, or other institution
❒ remote location/travel time
❒ travel restrictions/travel cost
❒ paucity of stool specimens
❒ specimen shipping or handling
❒ local HD unwilling to accept help from state
❒ jurisdictional ambiguity or disagreement/turf issues
❒ lack of multi-state coordination
❒ OB scope underestimated
❒ delayed epi response
❒ _____

Comments

Completed by _____ **agency** _____ **date** _____

modified Sept 2003

Appendix F

STOOL COLLECTION

Directions for Collection of Stool Specimens
for Patients

Prepare the toilet to make collecting your specimen easier:

Raise the toilet ring. Place a small, clean, opened plastic garbage bag inside the toilet just as you would place the bag inside a garbage can. The bag should be over the rim of the toilet. Be careful not to get water in the bag. Lower the toilet ring to help hold the bag in place. Have bowel movement (BM) into garbage bag-lined toilet. **Do not urinate into the bag.** Collect the BM sample from the bag as follows, again being careful to not get water in the bag containing the BM.

The health department will provide you with containers to collect the stool specimen. You may receive one or more containers, depending on what testing is being done.

Bacterial Testing (orange top container with red liquid): Take the container out of the bag. Make sure that your name and date of the specimen collection are written on the container. With the scoop that is inside the lid, fill the container with BM until the liquid inside comes up to the red line. Close the lid tightly and shake the container to mix the BM with the liquid thoroughly. Return the specimen to the bag. **Store the bagged container at room temperature.**

Ova & Parasite Testing (white and blue topped containers with clear liquid): Take the two containers out of the bag. Make sure that your name and date of the specimen collection are written on the container. With the scoop that is inside the lid of each of the containers, fill each container with BM until the liquid inside comes up to the red line. Close each lid tightly and shake each container to mix the BM with the liquid thoroughly. Return the two specimens to the bag. **Store the bagged container at room temperature or refrigerate. DO NOT FREEZE**.

Viral Testing (clean, dry container): Take the container out of the bag. Using the provided tongue depressor, a plastic spoon, or a clean, disposable plastic cup (for liquid BM), collect enough BM to fill the container 1/4 to 1/2 full. Close the lid tightly. Place the container with the BM into the zip lock bag. Throw away the item you used as a scoop. **Store the bagged container in the refrigerator. DO NOT FREEZE**.

Empty any remaining BM from the garbage bag into the toilet. Place the dirty garbage bag inside another garbage bag and throw it in the trash. Wash your hands thoroughly with soap and water.

Depending upon arrangements made with the health department, please either call the contact person below for pick-up or take the specimen to the drop-off location when ready.

Thank you very much for your cooperation.

Contact Person _____ **Telephone (_____)**_____

Drop-Off Location (if applicable) _____

Address _____

Hours of Operation _____

Appendix G

FOODBORNE DISEASES SUMMARY

APPENDIX G
Foodborne Diseases

Agent	*Incubation period (possible range)*	*Symptoms*	*Illness duration*	*Associated foods*	*Testing*	*Person to person spread?*
Bacterial preformed toxins						
Bacillus cereus	2-4 hours (1-6h)	Nausea, vomiting, diarrhea, abrupt onset	24 hours	fried rice, other starches, meat, vegetables	stool, vomit, food culture	No
Clostridium botulinum (infant variety dose not have preformed toxin)	48 hours-4 days (24h-10d)	diplopia, dysphagia, descending paralysis (gastrointestinal symptoms)	days to months	canned, preserved foods with low acid content (vegetables, fruits, fish)	serum, stool, vomit, food toxin (culture also except serum)	No
Staphylococcus aureus	2-4 hours (.5-8h)	Nausea, vomiting, diarrhea, abrupt onset	24-48 hours	sliced meats, poultry, egg salads, pastries, reheated food	Stool, food, vomit culture (food toxin)	No
Bacteria						
Bacillus cereus	6-24 hours	cramps, diarrhea	24-48 hours	fried rice, meat, vegetables	stool, vomit, food culture	No
Campylobacter jejuni	2-5 days (1-10 d)	cramps, diarrhea (bloody), vomiting, fever	2-10 days	unpasteurized milk, poultry, water	stool, food culture	Yes
Clostridium perfringens	10-12 hours (6-24h)	cramps, watery diarrhea, fever	24-48 hours	meat, sauces, stews, poultry, Mexican food	stool, food culture (stool toxin)	No
EIEC (Enteroinvasive *E. coli*)	12-48 hours	cramps, diarrhea, fever, headache	5-10 days	raw vegetables salad water cheese (human contamination)	stool, food culture	Yes
ETEC (Enterotoxigenic *E. coli*)	24-48 hours (21-68 h)	cramps, watery diarrhea, vomiting, possible fever	24 hours-11 days	seafood, salads, foods served cold (human contamination)	stool, food culture	Yes

Enterohemorrhagic *E. coli* (0157:H7 and other shiga-toxin producing strains)	48 hours-8 days (24 h-10d)	bloody diarrhea, cramps, (possible mild fever), possible hemolytic uremic syndrome	5-10 days	beef, raw milk, water, produce, other food (human contamination)	stool, food culture	Yes
Listeria monocytogenes	3-70 days (3 weeks)	nausea vomiting, diarrhea, fever, meningitis/encephalitis, sepsis, spontaneous abortions, stillbirths	variable	fresh soft cheeses, unpasteurized milk and cheese, other dairy, ready to eat prepared deli meats and foods	clinical specimen and food culture	No
Salmonella typhi	1-3 weeks	fever, malaise, constipation, rash	3-4 weeks	food, water contaminated by infected person	blood, bone marrow, stool culture	Yes
Non-typhoid Salmonella	12-36 hrs (6 h-10d)	cramps, diarrhea, vomiting, fever, headache	4-7 days	poultry, eggs, meat, dairy, produce	stool, blood, food culture	Yes
Shigella	24-48 hrs (12h-6d)	cramps, diarrhea (bloody), fever	4-7 days	salads, raw vegetables, dairy products, poultry	stool, food culture	Yes
Vibrio parahaemolyticus	12-24 hours (2-48h)	cramps, watery diarrhea, nausea, vomiting, fever	2-5 days	seafood (crabs oysters)	stool, food culture	No
Vibrio vulnificus	12 hours-few days	gastroenteritis, chills, fever, skin lesions, sepsis	days-weeks	seafood (shellfish)	stool, blood, wound, food culture	No
Vibrio cholerae (01, 0139)	24-72 hours (12h-5d)	diarrhea, vomiting	72 hours-7 days	shellfish, water, other foods (human contamination)	stool, vomit, food culture	Yes
Vibrio cholerae (other)	12-24 hours (12h-5d)	profuse watery diarrhea, vomiting, severe dehydration	72 hours-7 days	shellfish	stool, food culture, serology	Yes
Yersinia enterocolitica	36-48 hours (1-10 d)	cramps, diarrhea, headache, vomiting, pseudo-appendicitis	1-3 weeks	milk, tofu, pork, water	stool, food culture	Yes
Viruses						
Hepatitis A	15-50 days	jaundice, malaise, fever, nausea, diarrhea	1-2 weeks	shellfish, water, salads	serology (IgM)	Yes

Norovirus and other caliciviruses	24-48 hours (10-72h)	vomiting, diarrhea, headache, myalgia, (fever)	24-72 hours	shellfish, water, salads, other foods (human contamination)	stool, food, vomit pcr, electron microscopy, serology	Yes
Rotavirus	1-3 days	vomiting, watery diarrhea, low-grade fever	4-8 days	water, ice, fecally contaminated foods, other foods (human contamination)	stool antigen detection	Yes
Parasites						
Cryptosporidium parvum	7 days (1-12 d)	cramping, watery diarrhea, possible fever and vomiting	4 days -3 weeks	water, raw fruits and vegetables, unpasteurized milk	stool microscopy or antigen detection	No
Cyclospora cayetanensis	1-11 days (1 week)	fatigue, severe diarrhea, anorexia, weight loss, bloating, cramping	weeks-months	berries, water, lettuce, marine fish, raw milk	stool microscopy	No
Giardia lamblia	3-25 days (7-10 days)	diarrhea, flatulence, bloating, fatigue, weakness, nausea, cramping	1-2 weeks	water, ice, salads	stool microscopy or antigen detection	No
Toxoplasma gondii	5-20 days	asymptomatic, lymphadenopathy, neurological	months	undercooked meat	microscopy (visualizing parasite), serology	No
Non-infectious						
Heavy metals (antimony, arsenic, cadmium, copper, iron, lead, mercury, tin, zinc	<1 hour (5 minutes-8 hours)	vomiting, nausea, cramps, diarrhea	self limited	acidic foods/beverages stored or prepared in metal lined containers	food metal concentration, various clinical specimens	No
nitrite	1-2 hours	nausea vomiting headache, weakness, dizziness, loss of consciousness, chocolate colored blood	self limited	cured meats, contaminated foods, spinach	chemical isolation from food, clinical specimens	No

pesticides	minutes-hours	nausea vomiting cramps diarrhea, headache, nervousness blurred vision, convulsions	self limited	contaminated food	chemical isolation from food	No
fluoride	minutes-2 hours	salty or soapy taste, mouth numbness, vomiting, diarrhea, dilated pupils, pallor, shock	self limited	dry foods contaminated with insecticide or rodenticide	chemical isolation from serum	No
Mushrooms Short acting	<2 hours	vomiting, diarrhea, confusion, hallucinations, vision disturbances, salivation, diaphoresis	self limited	wild mushrooms	stool, vomit, blood, food toxin	No
Mushrooms Long acting	4-8 hours	diarrhea, cramps, liver and kidney failure	fatal	mushrooms	stool, vomit, blood, food toxin	No
Shellfish poisoning	20 minutes-2 hours	cramps, diarrhea, headache, vomiting, amnesia, seizures	days	mussels oysters	food toxin from algae	No
Ciguatera poisoning	1-6 hours	diarrhea, nausea, vomiting, parasthesias, reversal of temperature sensation bradycardia, hypotension	days-months	large ocean fish (grouper, amberjack, snapper, barracuda)	food algae ciguatoxin	No
scombroid fish poisoning (histamine)	1 minute-3 hours	cramps, diarrhea, headache, nausea, flushing, throat burning, rash, urticaria	3-6 hours	mishandled fish (mahi mahi, tuna, mackerel, skipjack)	bacterial production of histamine	No
paralytic shellfish poisoning	30 minutes-3 hours	parasthesias, loss balance, dry mouth, double vision, dysarthia, dyspnea	days	clams, mussels, cockels	food toxin	No
tetrodotoxin	<30 minutes	numbness, vomiting, diarrhea, abdominal pain, ascending paralysis, respiratory failure	often fatal	puffer fish	food toxin	No

References

Mandell, Douglans, and Bennett's Principles and Practice of Infectious Diseases (2 Vol. Set) G. L. Mandell, J. E. Bennett & R. Dolin, Eds. Churchill Livingstone, 1999.

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Oregon Health Services Compendium of Acute Foodborne Diseases
http://www.shs.state.or.us/publichealth/odpe/guideln/compend.pdf