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Food-borne Infection Prevention & Investigation Manual

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Contents

1-Introduction

Food-borne illness in the United States is a major cause of personal distress, social disruption, preventable death and avoidable economic burden. The economic impact of illness is staggering since the unpleasant symptoms of even a mild case of food-borne illness may require absence from school or work. 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. While benefits of the availability of such a variety of foods are many, the potential for transmission of food-borne pathogens to large populations spread over large geographic areas also increases with modern food production and distribution.

Changing food industry practices, dietary choices of the American people and increasing global distribution of food supplies bring new challenges to providing a diet safe from pathogens. Commonly consumed food items contaminated with infectious agents place large numbers of persons at risk. In addition to the dangers inherent in the modern food distribution system, newly emerging or reemerging infectious diseases influence and complicate the occurrence of food-borne illness. Transmission of a new pathogen may be poorly understood and laboratory methods for diagnosis may be difficult or unavailable.

2-The Infectious Disease Epidemiology Section (IDEpi)

The purpose of the Infectious Disease Epidemiology Section is to study the distribution and determinants of infectious diseases in the community, to conduct infectious disease outbreak investigations, to institute disease control measures, and to coordinate programs that prevent the spread of communicable diseases.

The program was started in 1855 when the State Board of Health was first established with the purpose of tracking yellow fever cases. The main activities are:

2.1-Tracking of infectious diseases of public health importance

This is the surveillance component of the section. There is a list of diseases that must be reported by all health professionals. This list is set by law. Section epidemiologists look at the number of cases, their location and numerous other characteristics to study the distribution of these diseases and to draw some conclusions that will guide the communicable disease control programs.

2.2-Investigation of disease outbreaks

Outbreaks identified by the surveillance system or those reported by the public or health professionals in order to recommend preventive measures. Common outbreaks and settings investigated include: Food-borne diseases, vector-borne diseases (encephalitis), hospital-acquired infections, school and day-care centers, nursing homes, prisons and other institutions, community-acquired infections and potential bio-terrorist events.

2.3-Special programs to:

1. Maintain situational awareness for conditions of public health importance;
2. Promote appropriate use of antibiotics and prevent the spread of antibiotic resistance;
3. Coordinate activities related to the prevention of health care-associated infections in hospitals, nursing homes, other long term health care facilities, dialysis centers and surgery centers;
4. Provide advice to infection preventionists about infection control and carry educational programs;
5. Monitor death from infectious diseases;

6. Prevent hepatitis A cases with immuno-prophylaxis, coordinate the prevention of hepatitis C and facilitate the development of state plan for hepatitis prevention activities;
7. **Collect specimens from food and food-borne infections to carry out fingerprinting of the bacterial strains and identify clusters of related infections;**
8. **Coordinate the prevention of seafood related infections with sanitarian services; the seafood industry, Restaurant Association, and the Food and Drug Agency;**
9. Prevent invasive diseases (meningococcal and Hemophilus) with chemoprophylaxis;
10. Provide counseling and recommendations for rabies exposure and coordinate the prevention of zoonotic diseases with the Louisiana Department of Agriculture Veterinary services and the veterinary community;
11. Maintain state of preparedness for mitigation of bioterrorism events, disasters and pandemics.

2.4-Advice and education

For prevention of communicable diseases to the community, media and health professionals.

3-Definitions

Complaints by citizens of symptoms that they feel are caused by food are common. These complaints often involve only one or two related people and cannot be shown to be food-related.

- **A suspected food-borne disease outbreak** is a clustering of people (two or more unrelated persons) with onset of similar objective symptoms (for example, vomiting or diarrhea) within a 48-hour period after eating a common food or eating at a common restaurant/gathering. Most single-source, food-borne outbreaks will meet this definition however, continuous source outbreaks or outbreaks involving diseases with long incubation periods (hepatitis A for example), do not meet this definition.
- **A probable food-borne disease outbreak** includes, in addition, a strong association (OR >1.5) between some of the food and the illness.
- **A confirmed food-borne disease outbreak** includes isolation of identical microorganisms both in the food and in clinical specimens.
- A **food-related complaint** is defined as a report by persons of symptoms of which they believe are related to a food source, but which does not fit the definition of a food-borne disease outbreak. Food-related complaints either occur over more than 48 hours, involve only one person, involve only people from one household, or are characterized only by subjective symptoms (such as nausea, headache, or dizziness).
- **A Food establishment complaint** is a complaint related to food such as the sale of spoiled or adulterated food or unsanitary conditions at a restaurant. It is important to track consumer complaints and review the data periodically for clusters of illness or changes in trends of illness.

4-Mandates and Legal Requirements

4.1-Reporting requirements

The Louisiana Administrative Code (LAC) Title 51 Part II. The control of Diseases 105 lists the infectious conditions that must be reported:

There is a list of some eighty (80) infectious diseases that must be reported by all health professionals. This list is set by law and regularly updated by rulemaking upon proposals submitted by IDEpi. These infectious diseases are divided in several classes:

Class A Diseases/Conditions - Reporting Required Within 24 Hours

Diseases of major public health concern because of the severity of disease and potential for epidemic spread-report by telephone immediately upon recognition that a case, a suspected case, or a positive laboratory result is known; in addition, all cases of rare or exotic communicable diseases, unexplained death, unusual cluster of disease and all outbreaks shall be reported.

Food-borne diseases in this category are: Acute Flaccid Paralysis Fish/ Shellfish Poisoning (Domoic Acid, neurotoxic, Anthrax (rarely acquired from food), Ciguatera, Scombroid, Staphylococcal Enterotoxin B (SEB), food-borne Botulism, Brucellosis, Tularemia (*Francisella tularensis*). Cholera.

Class B Diseases/Conditions - Reporting Required Within 1 Business Day

Diseases of public health concern needing timely response because of potential of epidemic spread-report by the end of the next business day after the existence of a case, a suspected case, or a positive laboratory result is known.

Salmonellosis, *Escherichia coli*, Shiga-toxin producing bacteria, Shigellosis (STEC), including *E. coli* 0157:H7, Typhoid Fever.

Class C Diseases/Conditions - Reporting Required Within 5 Business Days

Diseases of significant public health concern-report by the end of the work week after the existence of a case, suspected case, or a positive laboratory result is known.

Listeria, Campylobacteriosis, Eosinophilic meningitis, Transmissible Spongiform Encephalopathies (TSE), Cyclosporiasis, Trichinosis, Vibrio Infections (other than cholera), Yersiniosis.

Class D Diseases/Conditions - Reporting Required Within 5 Business Days

Heavy Metal (Arsenic, Cadmium, Mercury) Exposure

4.2-Federal grant requirements

The CDC Epidemiology and Laboratory Capacity Grant and the CDC Public Health Preparedness Grant (Response to Infectious Diseases and Public Health Emergencies) both have performance measures for timeliness of case reporting and timeliness, documentation and quality of outbreak investigations.

5-Investigation Leadership

During an investigation, the focus of activities might shift between roles described below. They also might shift between levels of government in accordance with authority and the availability of resources to carry out the required tasks. Responsibilities are distributed as follows:

5.1-Infectious Disease Epidemiology

• Epidemiologic studies to identify transmission routes, exposure sources, or food vehicles and risk factors for disease

5.2-Sanitarian Food Services

• Regulatory investigations of food-production sources and distribution chains to identify where, during production of the food, contamination occurred and facilitate recall of food items;

• Environmental assessments of food production, processing, and service facilities to identify routes of contamination, contributing factors, and environmental antecedents;

5.3-Public Health Laboratory

• Laboratory studies to identify an agent, including microbiological studies and applied food-safety research;

5.4-Bureau of Media & Communications

• Communication of investigation findings to the public and the food industry to support control and prevention measures.

6-Organizational Response to a Suspected Food-borne Outbreak

6.1-Public Health Response Teams

When a potential outbreak situation occurs, the first person involved should ensure that all the stakeholders are informed. This would include the Regional Medical Director /Administrator, other regional staff (Epidemiologist, Disease Surveillance Specialist, Sanitarian), and the Infectious Disease Epidemiology Section.

All relevant information pertaining to the outbreak/condition will be discussed in order to determine the course of action. A decision will be made whether to activate the Rapid Response Team (RRT).

The RRT are multidisciplinary groups of specially trained Office of Public Health (OPH) staff who can respond promptly to emergency epidemiological outbreaks/conditions. The OPH Regional Office in partnership with IDEpi, supervises and directs the RRT's specific activities during an investigation or intervention.

IDEpi will assign a lead epidemiologist for each investigation who will collaborate with the RRT and can outline correct protocols to follow.

The regional RRT Coordinator will coordinate the investigative tasks with the other team members and will be responsible for keeping the Regional Administrator/Medical Director informed of local activities on a daily basis.

It may not always be possible to have all team members pulled from their regular job responsibilities and work together continually on an outbreak. Team members may not be at their home base when the investigation begins. However, there are quite a few activities that can be done away from the home base, such as designing questionnaires, making calls, faxing information and conferencing with other team members.

At the end of the investigation a member of the RRT, regional staff or IDEpi (to be discussed by the team), will prepare a summary report on the activities and analysis of data and interpretation of results, recommendations.

A post-exit conference with IDEpi staff and RRT members may be conducted (most likely via telephone conferencing) to review the investigative process and evaluate effectiveness and appropriateness of the outbreak activities.

Upon initiation of activities, the RRT members will be provided with the appropriate project code number for charging their time.

6.2-Health Unit Staff

Whereas handling a food-related complaint is the responsibility of the sanitarian, investigation of a food-borne disease outbreak is a joint effort by the sanitarian, parish health unit nurse, Regional Office, Regional RRT Coordinator and staff from IDEpi. Initially, a nurse or sanitarian may be the first to hear of a food-borne outbreak. In this case, the nurse or sanitarian's first responsibility is to notify the Regional staff, RRT Coordinator and IDEpi of the outbreak so that the investigation can be organized. In carrying out the investigation, the RRT team - in conjunction with the local sanitarian, will investigate the food-service establishment and ensure that continued food contamination does not occur. The local parish health unit nurse may need to assist and collaborate with the RRT team in obtaining stool and/or blood specimens from ill persons. Both the nurse and sanitarian may need to assist the RRT team and IDEpi in completing questionnaires on ill and non-ill persons and assist in obtaining stool cultures from foodhandlers.

6.3-Role of the State Laboratory

The Central and Regional Laboratories are state reference laboratories where hospitals and other laboratories send specimens or isolates for confirmation and serotyping. In addition to reference laboratory activities, these laboratories examine implicated food and clinical specimens (in outbreak and non-outbreak situations) to identify the organism or extraneous materials responsible for human illness.

Feces and food specimens are considered appropriate for food-borne related-illness testing. Blood is an acceptable specimen when typhoid, botulism or other relevant microorganisms are suspected. Pathogen testing on fecal specimens during outbreak situations include: *Bacillus cereus* toxin, *Campylobacter,* Cholera toxin, *Clostridium perfringens* toxin, *Escherichia coli* 0157, *Escherichia coli* non-0157 toxin, *Norovirus, Salmonella* Species, *Shigella* Species, *Staph aureus* toxin, *Vibrio,* and *Yersinia enterocolitica.* Food items can be tested for the following pathogens during outbreak situations: *Bacillus cereus* toxin, *E. Coli 0157, Listeria monocytogenes, Salmonella* Species, and *Staphylococcus aureus* toxin. In special circumstances, the CDC in Atlanta may be utilized for laboratory assistance in conducting viral testing on fresh stool specimens.

In 1998, a Molecular Epidemiology Laboratory had been established that was capable of performing molecular subtyping of bacterial pathogens by pulsed field gel electrophoresis (PFGE). Traditionally, epidemiologic investigations of infectious disease outbreaks had relied primarily on detailed evaluation of cases and comparison of those cases with carefully selected controls. Both differences and similarities between cases and controls were used to identify factors that may have been associated with a specific illness under investigation. Laboratory isolation and identification of an etiologic agent from the suspected source provided independent confirmation of the probable source of the outbreak. When laboratory methods such as serotyping were developed to characterize bacteria below the species level, these methods were also applied to more definitively match between case isolates and isolates from suspected sources of infection.

PFGE is a technique used to produce the DNA fingerprints. PFGE testing can determine how closely related bacteria are to one another by comparing their fingerprints. Identical or very similar DNA fingerprint patterns strongly suggest a close relationship, while bacteria with distinctly different patterns are not closely related.

7-Reporting of foodborne infections /illness

7.1-Reportable diseases

There is a list of some eighty (80) infectious diseases that must be reported by all health professionals. This list is set by law and regularly updated by rulemaking upon proposals submitted by IDEpi. These infectious diseases are divided in several classes:

A- Class A Diseases/Conditions - Reporting Required Within 24 Hours

Diseases of major public health concern because of the severity of disease and potential for epidemic spread-report by telephone immediately upon recognition that a case, a suspected case, or a positive laboratory result is known; (in addition, all cases of rare or exotic communicable diseases, unexplained death, unusual cluster of disease and all outbreaks shall be reported.)

B- Class B Diseases/Conditions - Reporting Required Within 1 Business Day

Diseases of public health concern needing timely response because of potential of epidemic spread-report by the end of the next business day after the existence of a case, a suspected case, or a positive laboratory result is known.

C- Class C Diseases/Conditions - Reporting Required Within 5 Business Days

Diseases of significant public health concern-report by the end of the work week after the existence of a case, suspected case, or a positive laboratory result is known.

7.2-Case definitions

To ascertain that reportable diseases are counted in a standardized manner, IDEpi maintains case definitions for each reportable condition and even for some other conditions. Case definitions used in Louisiana are usually conforming to the case definitions in the National Notifiable Disease List, prepared by the Council of State & Territorial Epidemiologists (CSTE).

7.3-The Infectious Disease Reporting Information System (IDRIS)

The main surveillance tool is the Infectious Disease Reporting Information System (IDRIS) which went live in 2009. It was upgraded in 2014 to be based on the CDC NEDSS Base System (NBS)

Management of reported cases

Health care facility staff enter data on reportable cases. IDEpi disease surveillance specialists have real time access to the data entered. They review the data, ask more questions if necessary, process the report, follow up with more detailed case investigation, ensure that infected individuals requiring counseling /follow-up, contacts requiring counseling and contacts requiring post exposure prophylaxis are all appropriately managed.

7.4-Syndromic surveillance

Syndromic Surveillance is the collection and analysis of pre-diagnostic and non-clinical disease indicators using pre-existing electronic data. Unlike traditional surveillance, syndromic surveillance does not use actual diagnoses. Data sources included in IDEpi syndromic surveillance are initially limited to clinical data, such as patient visits at emergency departments and urgent care centers.

The goals of syndromic surveillance are to:

-Rapidly detect clusters of symptoms and health complaints that might indicate a disease outbreak or other public health threat

-Monitor trends in syndromes of public health importance.

Because syndromic surveillance seeks to detect unusual increases in the occurrence of symptoms, it augments traditional surveillance by providing earlier detection and awareness of outbreaks or disease trends of public health significance, natural or man-made. This presumably will allow for a timelier pub-

lic health response than that afforded by traditional surveillance. In addition, if laboratory testing does not occur, syndromic surveillance can increase the possibility of identifying cases that might go undetected.

Louisiana Early Events Detection System (LEEDS)

IDEpi has developed the Louisiana Early Events Detection System (LEEDS) which is a system that automatizes the data collection, data compilation and reporting. LEEDS provides IDEpi with:

- ease of importing data from different sources
- the automatic production of reports for feedback to the reporting institution
- the production of spot and aggregate maps
- the ability to quickly adapt syndromes or create new ones based on circumstances such as natural disasters or outbreak investigations.
- LEEDS flags records for 35 syndromes across numerous program areas including: bioterrorism, infectious disease, environmental epidemiology, injury, radiological exposure and mental health.

7.5-Outbreak reporting

Disease outbreaks are identified by the reportable disease surveillance system or by reports from the public or health professionals. Investigations are carried out by regional teams supported by the section's staff. Regional personnel including Infectious Disease - Rapid Response Team (ID-RRT) staff are regularly trained by IDEpi.

Investigation of disease outbreaks identified by the surveillance system or those reported by the public or health professionals in order to recommend preventive measures. Common outbreaks and settings investigated include:

- Food-borne diseases
- Vector-borne diseases (encephalitis)
- Hospital-acquired infections
- School and day-care centers
- Nursing homes, prisons and other institutions
- Community-acquired infections
- Potential bioterrorist events

8-Performance Measures

IDEpi has a set of performance measures used for the evaluation of cooperative agreements.

8.1-Surveillance

ID01	IDRIS	% of PHEP* case report received within 1 weekday of lab result (Dx date)
ID02	IDRIS	% reports of PHEP case report with initial recommendations within 1 workday
ID03	IDRIS	% completion of case classifications within 10 workdays of report date
ID04	IDRIS	% case report with 12 key fields completely filled
ID05	IDRIS	% completion of supplementary forms within 10 workdays of report
LE01	LEEDS	Number of acute care facilities in which LEEDS is deployed
LAB01	% lab cultures sent for PFGE	

**PHEP disease=Bot/Tul/STEC/HAV/Mea/men*

8.2-Outbreak

OB01	OBKdbase	% outbreak investigations initiated within 1 workday of report
OB02	OBKdbase	% complete investigation for 95% outbreaks or clusters initiated

OB03	OBKdbase	% food-borne outbreaks with identified etiology
OB04	OBKdbase	% outbreaks invest with all minimal elements
OB05	OBKdbase	% outbreak investigations that generate reports
OB06	OBKdbase	% Single standard investigative questionnaire in outbreak.

8.3-Training

Number of participants attending RRT
Number of participants attending FET
Number of LMRs published annually
Number of learnlincs (Ilinc) presented annually
Completion of yearly RRT training

9-PROCEDURES FOR OUTBREAK INVESTIGATIONS

9.1-Determining the cause of the food-borne outbreak

Food poisoning results from consumption of raw, cooked or processed food and of beverage contaminated with either:

1-Toxic substance (toxin) produced by a microorganism
2-Toxin naturally occurring in the food /beverage
3-Artificial chemical compound added accidentally or intentionally
4-Pathogenic microorganisms

In evaluating an outbreak that could be the result of food poisoning:

- List the suspected foods
- List the individuals that attended and the foods that they ate or did not eat
- List the delays between food consumption and onset of symptoms (incubation period)
- List the main symptoms experienced by each individual

Inquire about food preparation (details are known by the patient if food was prepared at home). Foods more likely to be contaminated are those stored at room temperature for several hours, food cooked in large quantities and stored in a large container in the refrigerator (improper cooling), inadequate cooking of meat (oozing blood in the center), and inadequate reheating of left-over food.

9.2-Confirm the etiologic diagnosis

If food poisoning is suspected, it is essential to obtain an etiologic diagnosis that will guide the preventive actions to be taken.

If possible, request that all suspect food and its original container or packages be kept. If the original container is not available, use an unused plastic bag or a clean (preferably boiled) jar. They should be placed in a paper or plastic bag and sent to the laboratory. If immediate transfer to the laboratory is impossible, the specimens should be kept in a refrigerator (not in the freezer). Some pathogens (e.g. the vegetative form of *C.perfringens*) are killed by freezing. Between 50 and 75 grams of each food item should be collected.

Collect also samples of vomitus and stools. If unavailable, consider obtaining samples by gastric lavage or rectal swab. These methods may not be well accepted by the patients.

To collect vomitus: if the patient is vomiting, get the patient to vomit in a large sterile specimen container, or transfer vomitus from a clean receptacle or lavatory into a sterile container. Use a clean spoon to transfer the vomitus.

Several methods can be used to collect stools: Provide the patient with a stool specimen container and a disposable plastic or wooden spoon or tongue depressor. If a patient is not producing stools, a rectal swab is necessary. This can be collected by an experienced technician. If unacceptable, the patient may collect the swab him/herself. Excrement-smeared toilet paper or tissue are also acceptable. If examination is not carried out immediately, a transport medium is necessary.

In patients with acute fever, a blood sample may be useful.

9.3-Investigation activities related to foodborne infections reports

Objective	**Identify etiologic agent.**
Epidemiology	• Contact health-care providers of cases who have sought medical attention. • Interview cases to characterize symptoms, incubation period, and duration of illness. • Obtain stool specimens from cases. • Determine whether symptoms, incubation period, or duration of illness suggest a likely pathogen. • Establish case definition based on confirmed diagnosis or clinical profile of cases. • Interview management to determine whether it has noticed any ill employees or any circumstances that could cause a foodborne illness. • Interview food workers to determine illness. This activity also could be conducted by nursing/healthcare staff. • Obtain stool specimens from ill or all food workers.
Environmental Health	• Obtain and store samples of implicated and suspected food items and ingredients. • Determine whether setting or food item suggests a likely pathogen.
Public Health Lab	• Contact clinical laboratories that might have performed primary cultures on cases, and obtain specimens. • Test stool samples to identify agent. • Test samples of implicated food items to identify agent. • Subtype all isolates as soon as possible after receipt.
Objective	**Identify persons at risk and determine size and scope of outbreak.**
Epidemiology	• Obtain from event organizer a list of persons attending event, or, if possible, list of persons patronizing the establishment during the outbreak period. • Interview persons who attended event or patronized establishment to determine attack rates, by time. • Contact health-care providers to identify additional persons seeking medical care whose illnesses meet the case definition. • If identified agent is reportable, review recently reported cases to identify possible exposures to event or establishment. • Obtain list of reservations for establishment, credit card receipts, receipts for take-out orders, inventory of foods ordered at establishment, or guest lists for events. Where possible, obtain information electronically.
Environmental Health	
Public Health Lab	• Contact clinical laboratories to identify additional stool specimens being cultured.
Objective	**Identify mode of transmission and vehicle.**
Epidemiology	• Interview identified cases and controls or well meal companions about all common exposure sources. • Calculate odds ratios or risk ratios for specific exposures. • Interview persons with identified exposures to determine attack rates and relative risks for specific exposures. • Combine descriptive and analytical epidemiology results to develop a model for the outbreak.
Environmental Health	• Identify how the food item(s) responsible for the transmission was contaminated /spoiled • Obtain menu from establishment or event. • Interview food workers to determine food preparation responsibilities. • Reconstruct food flow for implicated meal or food item. • Identify contributing factors and environmental antecedents.

	• Obtain samples of implicated food. • Obtain environmental samples from food contact surfaces or possible environmental reservoirs.
Public Health Lab	• Test implicated food and environmental samples to confirm presence of agent. • Subtype all isolates as soon as possible after receipt. • Conduct applied food safety research to determine ability of agent to survive or multiply in implicated vehicle and how vehicle might have become contaminated.
Objective	**Identify source of contamination**
Epidemiology	
Environmental Health	• Interview food workers to determine food preparation responsibilities. • Reconstruct food flow for implicated meal or food item. • Evaluate food flow for implicated meal or food item to identify contamination event at point of preparation or service. • If no contamination event identified, trace source of ingredients of implicated food item back through distribution to point where a contamination event can be identified or, if no contamination events can be identified during distribution, to source of production.
Public Health Lab	• Evaluate results of all outbreak-associated cultures to highlight possible relations among isolates from clinical, food, and environmental samples
Objective	**Identify contributing factors and antecedents**
Epidemiology	• Summarize information to identify confirmed or suspected agent. • Summarize information to identify confirmed or suspected food vehicle.
Environmental Health	• Evaluate results of environmental assessment, given identification of agent and results of epidemiologic investigation, to identify factors most likely to have contributed to outbreak and their environmental antecedents.
Public Health Lab	• Summarize information about culture results from clinical, food, and environmental samples.
Objective	**Determine potential for ongoing transmission and need for abatement procedures.**
Epidemiology	• On the basis of agent, incubation period, and likelihood of secondary spread, create epidemic curve, and evaluate the course of the epidemic to determine whether additional cases may still be occurring. • If outbreak appears to be ongoing, review possible control measures in collaboration with environmental health specialists.
Environmental Health	• Implement control measures to prevent further exposures: o Verify that all food workers who pose a risk for transmission have been excluded or restricted, as needed; o Verify that potentially contaminated foods have been properly disposed; o Verify that food contact surfaces and potential environmental reservoirs have been adequately cleaned and sanitized; o Train staff in safe food-preparation practices; o Modify food-production and food-preparation processes with appropriate preventive controls; and o Modify menu. • If any of these measures cannot be verified, review additional control measures, or if further exposure appears likely, alert public or close premises.
Public Health Lab	• Assess status of completed and pending cultures to identify gaps that suggest a potential for ongoing transmission.
Objective	**Identify mode of transmission and vehicle.**
Epidemiology	• Interview cases as soon as possible with standardized detailed exposure history questionnaire to identify possible common exposures (described in detail below). In some situations, cases are interviewed as soon as they are reported and before an outbreak has been recognized. • Establish case definition on the basis of characteristics of agent that led to detection of outbreak. • Characterize cases by person, place, and time, and evaluate this descriptive epidemiology to identify pattern possibly associated with particular food items or diets. • Compare detailed exposure history questionnaire frequencies against known or estimated background exposure rates, such as those in FoodNet Atlas of Exposures, to identify suspected food item. • Interview non-ill community controls or non-outbreak associated ill persons to obtain detailed exposure information to be used in a case-comparison analysis of exposures.

	• Obtain shopper card information to identify and verify grocery purchases and possibly determine background rates of purchase of item. • Document brand names and product code information for prepackaged food items. • Analyze exposure information comparing cases to relevant comparison group (e.g., non-ill controls or cases not associated with outbreak) to implicate food item or nonfood-exposure source.
Environmental Health	• Contact restaurants, grocery stores, or other locations identified by multiple cases to verify menu choices, identify ingredients, and identify distributors and/or source(s) for ingredients and/or food items of interest. • Obtain samples of suspected food items. Work with appropriate regulatory authority to ensure that food samples are collected and maintained with appropriate chain of custody (for example, USDA-FSIS Directive 10,000.1). This will help the regulatory authority to take appropriate regulatory action. • Conduct an investigational traceback to determine whether a suspected food vehicle from multiple cases has a distribution or other point in common. • If specific food item or ingredient is implicated, conduct formal regulatory traceback.
Public Health Lab	• Store collected food samples, pending results of epidemiologic analyses. • Culture implicated food samples to confirm presence of agent. • Conduct serotype/ genotype tests, and further characterize pathogen as necessary for investigation. • Conduct applied food safety research to determine ability of agent to survive or multiply in implicated vehicle and how vehicle might have become contaminated.
Objective	**Identify persons at risk and determine size and scope of outbreak.**
Epidemiology	• Alert health-care providers of possible outbreak to identify additional persons seeking medical care, and review laboratory reports and medical charts at hospitals or physicians' offices to identify possible cases. • Ask cases if they know of others who are similarly ill. • Depending on nature of outbreak, take additional steps as warranted. Examples include reviewing employee or school absences, reviewing death certificates, surveying population affected, or directly asking members of the public to contact the health department if they have the illness under investigation.
Environmental Health	• Review foodborne illness complaints to identify undiagnosed cases that could be linked to outbreak. • Contact restaurants, grocery stores, or other points of final service visited by multiple cases to identify employee illnesses or foodborne illness complaints from patrons.
Public Health Lab	• Contact clinical laboratories to identify additional stool specimens being cultured. • Speed up referral and subtyping of outbreak pathogen.
Objective	**Identify source of contamination.**
Epidemiology	• Combine descriptive and analytical epidemiology results to develop a model for outbreak.
Environmental Health	• Trace source of implicated food item or ingredients through distribution to point where a contamination event can be identified or to source of production if no contamination events can be identified during distribution. • Conduct environmental assessment of likely source of contamination, including o Reconstruct food flow for implicated food item. o Interview food workers to determine food-preparation responsibilities and practices before exposure. o Obtain samples of implicated food or ingredients. o Obtain environmental samples from food contact surfaces or potential environmental reservoirs.
Public Health Lab	• Evaluate results of all outbreak-associated cultures to highlight possible relations among isolates from clinical, food, and environmental samples. • Conduct applied food safety research to examine likely sources of contamination. • Work with appropriate regulatory authority to ensure that food samples are collected and maintained with appropriate chain of custody (for example, USDA-FSIS Directive 10,000.1). This will help the regulatory authority to take appropriate regulatory action.
Objective	**Identify contributing factors and antecedents.**
Epidemiology	• Summarize information to identify confirmed or suspected food vehicle.
Environmental	• Evaluate results of environmental assessment, given identification of agent and results of

Health	epidemiologic investigation, to identify contributing factors and antecedents.
Public Health Lab	• Summarize information about culture results from clinical, food, and environmental samples. • Provide background statistics on pathogen prevalence.
Objective	**Determine potential for ongoing transmission and need for abatement procedures.**
Epidemiology	• Create and evaluate epidemic curve to determine whether additional cases might still be occurring. • If outbreak appears to be ongoing, continue surveillance, and review potential abatement procedures.
Environmental Health	• Create and evaluate epidemic curve to determine whether additional cases might still be occurring. • If outbreak appears to be ongoing, continue surveillance, and review potential abatement procedures. • Verify that food workers who might have been infected during outbreak and who pose a risk for transmission have been excluded or restricted, as needed. • Verify that potentially contaminated foods have been removed from distribution. • Train staff on safe food-preparation practices. • Modify food-production and food-preparation processes by implementing appropriate preventive controls. • Modify menu.
Public Health Lab	• Assess status of completed and pending cultures to identify gaps that may suggest a potential for ongoing transmission.

9.4-Laboratory procedures

9.4.1-Procedures for Stool Sample Collection and Submission

Each Regional Rapid Response Team has been provided with a laboratory RRT kit containing all necessary supplies. The Regional RRT Coordinator is responsible for maintaining inventory of supplies and requesting replacements as needed.

9.4.1.1-Collection time of samples

Diagnosis of most food-borne diseases can be made more easily when etiologic agents are isolated from clinical specimens of ill persons. Encourage ill persons to submit stool specimens while they are still experiencing symptoms. Collect stool specimens prior to antibiotic treatment.

9.4.1.2-Methods of stool collection

It is preferable to obtain a whole stool sample to make sure there is enough material for viral and bacterial isolation. The stools may be collected in a screw cap container or any container with a tight lid. Refrigerate the specimen immediately. Stools submitted for viral testing should be at least a cupful of fresh stool (even if liquid) in a clean spill-proof container. Rectal swabs are not usually recommended; however, if it is the only available method, the swab should be inserted past the anal sphincter muscle to obtain a representative fecal sample.

9.4.1.3- Transporting and Labeling

Each stool sample should be labeled with the patient's name, date of birth, date and time of collection and be accompanied by the appropriate laboratory requisition slip with completed information as required. Place samples in a zip lock bag to prevent spillage or leakage during transport and place lab slips in a separate plastic bag or waterproof envelope. Place these samples in a cooler or styrofoam box, insert frozen icepacks to avoid deterioration of the specimens. To be accepted for testing by the State Lab: samples must be received by the State Lab within 7 days from the time of collection. For the testing of most pathogens/toxins, the stool samples should be kept at 2°C-8°C. Samples should be transported on ice.

9.4.1.4- Shipping

It is preferable that all outbreak-related specimens be shipped as quickly as possible to the receiving lab. If specimens cannot be hand-carried to the laboratory, the samples can be delivered by the Statewide courier system or shipped via FedEx. Please do not ship on a Friday or before a holiday. If stool has been frozen, stool must be transported frozen. The date and time of freezing must be noted. If shipping by FedEx, the specimens must be double boxed. In the primary container, the samples (properly labeled in a spill proof container in a zip lock bag) should be wrapped in a cushioning, absorbent material with ice packs. The secondary container should be leak proof and hold the inner container snugly. The second container should be addressed, and marked as "BIOLOGICAL SUBSTANCE, CATEGORY B" and labeled with UN3373. An itemized list of contents should be placed between the two packages and should include the name and telephone number of the person responsible for the samples.

9.4.2-Procedures for Food Sample Collection and Submission

Collect at least 25 grams of food item per organism to be tested. Record the date and time when the food plate or samples were taken. Keep the food in a sturdy leak proof container such as a clean and dry plastic container. If there is more than one item in the meal, keep food samples separate. If the specimen is frozen, the food must be stored frozen and shipped with dry ice or enough ice packs to keep frozen during transit. If the specimen is refrigerated, the food must be stored refrigerated, and shipped with enough ice packs to keep refrigerated during transit. Do not ship in wet ice; use ice packs. Food sample must be shipped overnight to the laboratory. Each food sample should be accompanied by a separate food request form. Pre-numbered adhesive tags are provided at the bottom of these forms; attach tags to the appropriate sample to avoid mismatching.

REMINDER: Key Components of Lab Collection Process

- Timeliness of specimen collection - usually during the acute phase of illness
- Specimen type - based on suspected disease
- Proper handling - temperature control and follow biohazardous procedures
- Proper labeling/packaging - be sure to include patient identifiers, submitter's identification, and abide by established protocols for packaging
- Proper modes of transportation - consider the length of time the specimen will remain viable, level/timeliness of follow-up needed and location of specimen/laboratory
- Common types of specimens used to identify agents: **viruses** - serology, stool, throat cultures; **bacteria** - stool, food, tissue cultures (CSF, wound); **parasites** - stool.

9.4.3-Procedures for Collection of Serum Specimens

The identification of specific antigens and/or antibodies in serum is the method of choice when the acute stage of disease is past or when the agent is difficult or dangerous to isolate. Diagnosis of viral infection using serological testing must be done using both the laboratory data and clinical observations. The laboratory can provide two types of serological analysis helpful in diagnosing acute viral infection – 1) total antibody titers on paired serum specimens or 2) detection of virus specific IgM class antibodies. It is important that the acute or single specimen be collected as soon as possible after onset of the illness. Timely collection, careful transport and accurate analysis of a specimen are all essential to insure clinically useful test results.

Collect one tube of blood in a red/gray serum separator blood collection tube, for analysis as early as possible after the onset of illness. Consult with the lab at the time of collection regarding the type of blood tube that should be used. Specimens may be submitted as **separated serum** or as **whole** blood.

Specimens submitted as whole blood must comply with the following requirements:

-- For each serological analysis requested, optimally draw 7 - 10 ml of blood into one gray/red-topped tube with serum separator. Allow the tube to completely fill during venipuncture; partially filled tubes limit the number of tests that the laboratory can perform and increases the number of redraws.

-- Allow the whole blood to clot. It is not necessary to remove the clot or separate the serum from the clot for transport to the laboratory unless there will be a delay of several days to arrive at the lab. If a delay is expected, the serum must be separated from the clot and frozen.

-- Blood should be stored at refrigerator temperature and should remain cool during transport. Blood tubes should be packed in insulated cryotube mailing containers with sufficient refrigeration packs to maintain the integrity of the specimens. The refrigerant cold packs must not come in direct contact with the blood tubes as this may cause hemolysis.

-- Specimens submitted as serum must be spun down and separated from the cells. Serum or plasma must be received in the laboratory within 48 hours of collection. If more than 48 hours will elapse between spinning the blood and arrival at the laboratory, the plasma or serum must be decanted into fresh cryotubes for freezing. The specimen must remain frozen for both storage and shipment.

-- When submitting acute and convalescent specimens, it is better to hold the acute sera until the convalescent sera has been collected and forward both specimens to the laboratory at the same time. The acute specimen should be collected as early as possible and not later than 5 days after onset. The convalescent specimen should be collected 14 - 21 days after onset. Occasionally upon request, the acute serum may need to be sent as soon as collected if there are available methods for rapid testing on single specimens.

-- Please be sure the tube is labeled with appropriate identification, such as bar-coded labels from the bar coded-lab forms, and submit the laboratory slip with complete information requested on the form. All forms accompanying specimens should be placed in a separate water-proof bag or envelope and placed outside of the specimen container.

9.4.4-Submission of Clinical Specimens to the State Laboratory:

Laboratory identification of a pathogen can validate the hypothesis and allow easier implementation of control and preventive measures. Increased certainty results if the statistical association of illness is combined with the isolation of a pathogen from the ill person and the implicated food item(s). Therefore, time is of the essence when requesting and collecting clinical and food specimens. Stool specimens should be collected within 48 to 72 hours after onset of symptoms during the period of active diarrhea.

10-Reporting and Confidentiality

Louisiana law stipulates that all epidemiologic investigations are confidential.

TITLE 40: PUBLIC HEALTH AND SAFETY, CHAPTER 1. DIVISION OF HEALTH AND HEALTH OFFICERS, PART I. STATE DIVISION OF HEALTH, §3.1. Confidentiality of public health investigations; prohibited disclosure and discovery; civil penalties

A. All records of interviews, questionnaires, reports, statements, notes, and memoranda procured by and prepared by employees or agents of the office of public health or by any other person, agency, or organization acting jointly with that office, including public or private colleges and universities, in connection with special morbidity and mortality studies and research investigations to determine any cause or condition of health, and any documents, records, or other information produced or given to the state health officer in response to a court order issued pursuant to R.S. 40:8, hereinafter referred to as "confidential data", are confidential and shall be used solely for statistical, scientific, and medical research purposes relating to the cause or condition of health, or for the purposes of furthering an investigation pursuant to R.S. 40:8, except as otherwise provided in this Section.

The following are guidelines to be considered when discussing the investigation with media, patients, food handlers and business owners:

10.1- Individual patient information:

Details about individual illness history, results of individual laboratory tests shall only be discussed with the patient him/herself. For example do not give specific individual information on lab results to the business owner (food handler that was ill), or the party organizer (who was ill).

10.2-Lab test results:

Individual lab test results should only be given to the individual patient from whom the samples were collected. Collective results can be divulged: for example one may say "this was a norovirus outbreak" as long as the names of the ill persons are not mentioned.

10.3-Food Service establishment /food preparation:

When collecting the information on food preparation, the epidemiologist assures the food preparer that the specific information will be kept confidential. The purpose is to make the food preparer comfortable enough to discuss possible mistakes made during preparation without fear of reprisals. Therefore, that information is to be kept confidential and will only be discussed with the business owner/food preparer to prevent future mishandling of food. While the epidemiologic investigation is confidential by law, the inspections made by the sanitarians are public documents. It is acceptable to discuss the results of the sanitary inspection.

10.4- Statistical results:

Basic statistical numbers can be given out. For example "in this outbreak there were 20 cases", or "we carried out a case control study with 25 cases and 25 controls, the odds ratio was…"

10.5-Media questions:

The media often obtains information from the public and expects to gain more information from the epidemiologists. Information already in the media is not confidential and can be discussed as long as the above guidelines are followed.

10.6-Public summary:

When an outbreak has gained large media attention, it is useful to prepare an outbreak investigation summary limited to statistical results, sanitarians' inspection and common knowledge already in the media's hands.

11-Training

Two full-time IDEpi staff members coordinate activities related to education and training. Such activities include continued education for public health personnel to ensure that they are well-informed and competently trained. In addition, IDEpi offers infectious disease and epidemiology trainings to the healthcare community. This helps to ensure that the healthcare providers in Louisiana have the most up-to-date information related to infectious diseases of public health importance. It also provides a reciprocal service to infection control practitioners and other healthcare professionals that submit reportable disease information to IDEpi. The following education and training activities are regularly offered:

Data related to both surveillance and outbreak investigations are analyzed to provide education for prevention of communicable diseases to the community and health professionals. Feedback is provided through OPH websites, mass e-mails and publications such the Annual Report of Infectious Diseases and the bi-monthly Louisiana Morbidity Report (LMR).

11.1-Rapid Response Team (RRT)

IDEPI held trainings for the nine regional Infectious Disease-Rapid Response Teams (ID-RRT). The ID-RRTs are made up of regional epidemiologists, disease surveillance specialists, sanitarians, nurses, and other health professionals who might be asked to aid in a food, water or other enteric disease outbreak. Trainings for new and current members will be held each year of this new award project period. The training includes breakout sessions to practice outbreak investigation techniques pertaining to foodborne and other infectious diseases. These sessions provide the teams an opportunity to implement steps of outbreak investigations including recognizing and responding to an outbreak, data collection and analysis, and the provision of public health recommendations.

11.2-Field Epidemiology Training (FET)

IDEPI offers a Field Epidemiology Training (FET) to infection preventionists, nurses, OPH staff that may participate in a large outbreak investigation but are not part of an ID-RRT and healthcare workers outside of OPH. These trainings are similar to the RRT trainings in that they include breakout sessions to practice outbreak investigations.

11.3-Web-based Training

11.3.1-Ilinc system:

IDEPI conducts trainings through the web-based iLinc system which are targeted towards OPH personnel and hospital infection preventionists in all nine regions of the state. iLinc is designed for distance learning by creating a virtual classroom. The educator can be seen talking about the topic using presentation materials (slides, spreadsheets, database or other software). Participants have the ability to raise their hands and ask questions verbally or in writing. Lessons are recorded and can be reviewed by the participants at a later date.

11.3.2-Web: www.infectiousdisease.dhh.louisiana.gov

The IDEpi web site includes pages for:

-Epidemiology manual with 80 infectious disease topics with emphasis on etiology, epidemiology, laboratory diagnosis, prevention and control
-Bioterrorism manual
-Infection control manual for public health facilities
-Public information sheets for each disease
-Summary sheets for providers
-Antibiotic resistance and stewardship
-Food-borne infections and prevention
-Healthcare associated infection prevention and control
-Surveillance report for each disease (about 80) including results of case and outbreak detected in Louisiana, trends for the past 40 years
-Vector control, rabies, zoonosis

11.3.3- IDEpi staff is an important source of speakers

The IDEpi staff gives about 100 presentations a year for infection preventionists in hospitals and nursing homes, health care facilities educators, and local medical, nursing and allied health societies.

12-Communication

12.1-Bureau of Media and Communication

All communication to the media is handled by the DHH Bureau of Media and Communication that arranges for interviews.

12.2-Louisiana Morbidity Report

The Louisiana Morbidity Report is published on the web bimonthly. Its targeted audience includes clinicians, health care providers and public health professionals throughout the state. This publication often highlights outbreak investigation success stories and encourages physicians and other public health professionals to report outbreaks and send isolates to the State Lab for confirmation, serotyping and PFGE.

13-Collaboration / Coordination

13.1-CDC

13.1.1-OUTBREAKNET

The foodborne epidemiologist coordinates activities in outbreak investigations including coordinating with the State Laboratory, developing questionnaires, maintaining databases associated with the outbreak, data collection, and analysis and summary reports. The epidemiologist oversees Louisiana's role in multi-state outbreaks by participating in conference calls with the CDC and coordinating the follow up with Louisiana's cases and forwarding questionnaires to the CDC. Along with maintaining the State's databases, the epidemiologist also continues to report outbreaks in the National Outbreak Reporting System (NORS). The foodborne epidemiologist serves as a liaison between other surveillance epidemiologists and the state laboratory. The epidemiologist ensures that bacteriology reports from the laboratory reach the regional disease surveillance personnel to facilitate timely disease surveillance activities such as data entry, data collection, and forwarding data to appropriate OPH personnel for follow up. The foodborne epidemiologist coordinates follow up with enteric diseases of importance including Vibrio, Listeria,and shiga toxin producing *E.coli* cases. The epidemiologist ensures that all cases of Vibrio, Listeria and STEC are interviewed using the COVIS, Listeria Initiative form and the state's STEC surveillance form, respectively. The foodborne epidemiologist coordinates the follow up of enteric disease cases to determine exposure. All consumer complaints calls are followed up on to determine if it is an isolated illness or an outbreak.

The foodborne program supports outbreak investigations if they are suspected to be foodborne related and coordinates the prevention of seafood related infections with sanitarian services, the seafood industry, Restaurant Association, and the Food and Drug Agency (FDA).

13.1.2-NORS:

The foodborne epidemiologist is responsible for reporting outbreaks in NORS. After the initial follow up on an outbreak has been completed, the information is entered into NORS. As additional information is collected such as gender and age breakdown, incubation period, exposure, and lab results, they are entered into the reporting system. All food-borne related outbreaks as well as person-to-person norovirus outbreaks are entered for each calendar year into NORS.

13.1.3-CALICINET

Noroviruses are suspected as the causative agent in many of the foodborne outbreaks that are investigated. IDEpi requests stool samples related to possible outbreaks to be sent to the OPH Central Laboratory for testing. The Molecular Biology Laboratory uses a Real Time RT-PCR method for the detection and differentiation of Norovirus GI and GII. The procedure used is an adaptation of the CDC assay which is a duplex real time (TaqMan®) RT-PCR assay to detect human norovirus GI and GII RNA in

human fecal and emesis specimens. An internal control using Cepheid's QC-RNA bead into this assay for further quality control is included. Norovirus positive stools meeting shipping criteria will be forwarded to our designated contract laboratory in Tennessee for further characterization.

13.1.4-PULSENET

The PFGE Laboratory at the Louisiana State Public Health Laboratory is a PulseNet participant and processes over 1000 samples a year. Hospital laboratories are asked to send enteric isolates to the State Laboratory for confirmation, serotyping, PFGE, and uploading to PulseNet. The PulseNet laboratory conducts PFGE on all *Shigella, Escherichia coli* O157: H7, selective isolates of *Salmonella (enteritidis, newport*), and other species of Salmonella including typhi. Enteric disease outbreaks are posted on the PulseNet web-board by the laboratory, while Salmonella outbreaks are posted on SODA (Salmonella Outbreak Detection Algorithm). PFGE testing will be applied to all possible foodborne outbreaks and requests from the IDEPI. PFGE results will be submitted two to three times per week.

Hospitals are asked to send to the Public Health Laboratory, all *Escherichia coli* O157 isolates and any shiga toxin positive broth or stool where O157 has not been isolated. Hospitals that do not have the capability to identify O157 are asked to send sorbitol-negative *E. coli* isolates for additional testing. The General Bacteriology Laboratory confirms *E. coli* isolates using biochemical methods and checks for agglutination against O157 antiserum. The Molecular Biology Laboratory runs conventional PCR for four targets (eco, O157, stx1 and stx2) on both the isolates and culture generated directly from the stool or broth specimens. All STEC isolates confirmed by the State Laboratory are sent to the State's PFGE Lab as well as to the CDC for confirmation. In the first quarter of 2013, the Sanitary Code of Louisiana was updated to make the submission of enteric pathogen isolates to the State Public Health Laboratory mandatory.

13.1.5-NARMS:

The IDEpi and State Public Health Bacteriology Laboratory Section participate in the National Antibiotic Resistance Monitoring System (NARMS), which is able to monitor emerging patterns of resistance. The Bacteriology Laboratory will continue to be responsible for sending every twentieth non-typhi Salmonella, every *Salmonella typhi*, every *Salmonella* serotype *Paratyphi* A and C isolate, every twentieth *Shigella*, every twentieth *E. coli* O157, and every non-toxigenic Vibrio isolate for testing at the NARMS laboratory. The Bacteriology Laboratory will send isolates from enteric disease outbreaks to the CDC for NARMS testing. Funds are requested to support these activities. IDEpi will continue to be responsible for interviewing persons from whom enteric bacterial isolates have been cultured with uncommon antimicrobial patterns.The foodborne epidemiologist and the State Bacteriology Laboratory will continue to participate in the NARMS conference calls.

In collaboration with the Bacteriology State Laboratory section, IDEpi participates in the National Antibiotic Resistance Monitoring System (NARMS) for monitoring the antibiotic susceptibility of enteric pathogens and in PulseNet investigations concerning the detection of clusters and comparison of Pulse Field Gel Electrophoresis (PFGE) patterns to those involved in outbreaks from other states.

13.1.6-ISSC:

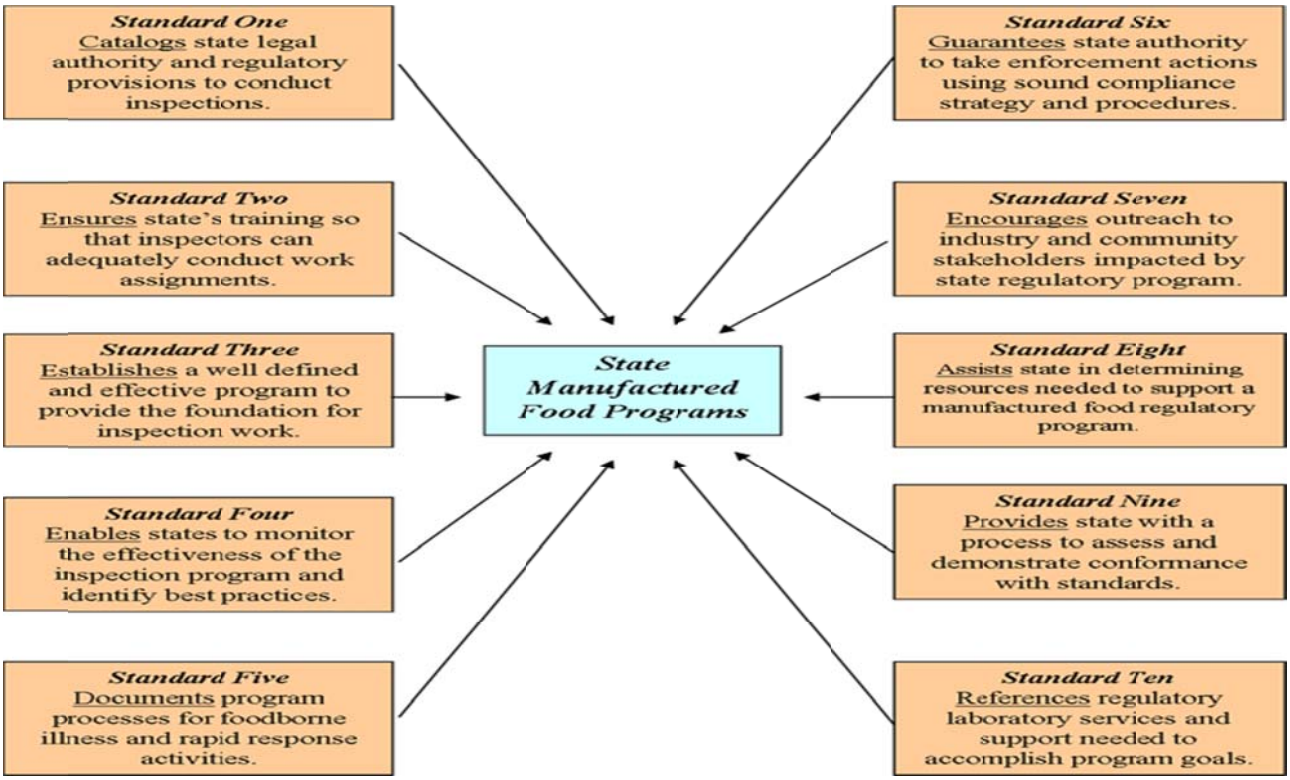
IDEpi collaborates with the **Interstate Shellfish Sanitation Commission (ISSC),** and the Louisiana Center for Environmental Health Shellfish Sanitation Program to track Vibrio infections caused by the consumption of raw seafood (mainly oysters).

13.2-Food & Drug Administration: Manufactured Food Regulatory Program Standards (MFRPS)

The Louisiana OPH IDEpi Section uses the Manufactured Food Regulatory Program Standards (MFRPS), which are a set of standards developed by the FDA as a guide for continuous improvement for state food manufacturing programs.

The goal of the standards is to leverage resources and share common successes to build systems within Louisiana regulatory food programs. The standards promote development of a high-quality state manufactured food regulatory program and include a process for continuous improvement. Gaps are identified, improvement plans are developed and strategic goals are identified. The areas of focus include regulatory foundation, training, inspection programs, auditing, food defense, enforcement and compliance, stakeholder outreach and laboratory services.

This standard describes the functions and related activities necessary to investigate food-related illnesses, outbreaks, and hazards as well as coordinating roles and responsibilities with other jurisdictions and notifying the public.



13.2.1-Program Elements

The State program must have (or contract for) a system to:

- Conduct illness or injury investigations and collect information using established epidemiology procedures similar to those found in the "International Association for Food Protection Procedures to Investigate a Foodborne Illnesses, Fifth Edition" and the "Guidelines for Foodborne Disease Outbreak Response."
- Provide laboratory support for investigations of illness, injury, or outbreaks
- Maintain a current list of relevant agencies and emergency contacts
- Coordinate the traceback and trace-forward of food implicated in an illness, injury, or outbreak
- Identify contributing factors for reports of illness, injury, or incidents implicating food
- Maintain investigational findings

- Distribute the final report of illness or injury implicating food to relevant agencies,
- Immediately notify all relevant agencies if intentional contamination is suspected or threatened, e.g. tampering or terrorism
- Establish criteria for releasing information to the public (includes identifying a media person and developing guidelines for coordinating media information with other jurisdictions)
- Mitigate and contain food-related illness and injury using enforcement activities and public awareness programs
- Provide guidance to prevent or reduce the incidence of food-related illness, injury, and intentional contamination, e.g. tampering or terrorism
- Collaborate as necessary with FDA and other Federal authorities under conditions of increased threat or intentional contamination

13.2.2-Outcome

The State program has written procedures for documenting and investigating alleged food-related illnesses, injuries, and unintentional or deliberate food. Additionally, the State program must have a rapid response system and team that is capable of detecting and distinguishing between outbreaks of foodborne disease and possible intentional contamination.

13.2.3-Documentation

The program maintains the records listed here:

- A written description of epidemiology support or an agreement that defines epidemiology support
- A complaint log or database
- Up-to-date emergency contact list for all relevant jurisdictions
- Procedure and contact person for releasing information to the public
- Documented timeframes for responding to complaints
- The illness, injury, or outbreak response procedures and the data collection forms
- Policies and procedures for handling incidents and threats of deliberate contamination and for collaborations with FDA and other jurisdictions under conditions of increased threat or intentional contamination
- Written agreements that identify and describe sources of supplemental laboratory capacity and expertise including laboratory support to detect contaminants not normally found in food
- Investigation reports and summaries

13.3-Other States

When IDEPI is notified that a Louisiana case is part of a multi-state outbreak, the foodborne epidemiologist will coordinate with the State Public Health Laboratory to obtain case information. The epidemiologist will also coordinate with other epidemiologists in the follow up of the case. The foodborne epidemiologist will ensures that the CDC questionnaires are completed and faxed to the CDC. The time from notification of case to follow-up of the case will be documented in IDEpi's epistories.

Table 1: Incubation and Symptoms of Food Poisoning

Agent	Incubation		Symptoms			
	Common	**Limits**	**Vomit**	**Diarrhea**	**Abdo Pain**	**Fever**
Staphylococcus aureus	2-4 hrs	up 8 hrs	+++	+	±	±
Bacillus cereus	2-4 hrs	8-16 hrs	+++ +	+ +++	- ++	- -
Salmonella	18-24 hrs	6-72 hrs	±	++	+++	+
***E.coli* ETEC** **EIEC** **EHEC**	12-48 hrs 12-48 hrs 2-3 days		± + -	++ ++ ++	++ ++ ++	- + -
Shigella	1-3 days		±	++ bld	++	++
Campylobacter jejuni	3-5 days		±	++ bld	+++	+
Vibrio parahemolyticus	12 hrs	2-48 hrs	+	++	++	+
Yersinia enterolytica	3-5 days		++	++	++	++
Clostridium botulinum	12-36 hrs	2-72 hrs	-	rare mostly neurological	+	-
Clostridium perfringens	10-12 hrs	6-24 hrs	±	+++	++	-
Norovirus	16-48 hrs		+++	++	+	±
Viral gastroenteritis	16-48 hrs		+	++	+	±

Table2 : Food Type and Source of Contamination

Agent	Food Commonly Involved	Source of Contamination			
		Improper Handling	Inadequate Cooling	Poor Hygiene	Contaminated Equipment
Staph. aureus	Beef, poultry, ham, pastries	+	-	++	-
Bacillus cereus	Cooked Rice	++	+	+	-
Salmonella	Beef, raw milk, poultry, pork, ice cream,	++	+	+	+
***E.coli* ETEC**	Salad, raw veg, cheese, water	++	+	+	+
EIEC	Salad, raw veg, cheese, water	++	+	+	+
EHEC	Beef, raw milk, water	++	+	+	+
Shigella	Salad, raw	+	-	+++	-
Campylobacter jejuni	Raw milk, poultry, water	+	+	-	-
Vibrio parahaemolyticus	Shellfish	+	++	-	-
Y enterolytica	Pork	++	+	+	+
Clos. botulinum	Vegetables, fish	+	++	-	-
Clos. perfringens	Beef, poultry				-
Norwalk					-
Viral agent					-

Table 3-List of Illnesses Attributed to Food

1. Upper gastro intestinal tract signs & symptoms, nausea & vomiting, incubation less than 1 hour

-Mushroom: eating unknown varieties of mushrooms.

-Antimony, Cadmium, Copper, Lead: eating from newly purchased utensils, enamel-ware poorly fired, highly acidic food and beverages.

-Tin, Zinc: eating from food stored in zinc or tin containers, high acidic foods.

2. Upper gastro intestinal tract signs & symptoms, nausea & vomiting, incubation 1 to 6 hours

-*Bacillus cereus*: poorly handled food (1)* see Table 4 – Clinical Classification).

-*Staphylococcus aureus*: poorly handled food (1).

-Nitrite: cured meats, vegetables from field with excessive nitrate administration.

-Shellfish poisoning: mussels, shell, scallops

3. Upper respiratory symptoms, incubation less than 1 hour

-Sodium hydroxide poisoning: inadequate rinsing of dishes with caustic soda

-ß-hemolytic streptococcal infections: contaminated raw milk or eggs

4. Lower gastrointestinal signs & symptoms, abdominal cramps & diarrhea, incubation 6-12 hours (up to 72hrs)

-*Clostridium perfringens*: poorly handled food (1).

-*Campylobacter jejuni*: raw milk or raw meat, poorly cooked milk or meat.

-Cholera: fish, shellfish, poorly handled food (1).

-*Vibrio cholera*-like gastro-enteritis: raw fish, shellfish.

-Pathogenic *E.coli*: poorly handled food (1).

-*Salmonella*: poultry, meat, egg products, milk and dairy poorly cooked.

-*Shigella*: poorly handled food (1).

-*Vibrio parahemolyticus*: fish, shellfish poorly cooked or contamination by sea water.

-*Yersinia enterolytica*: milk poorly pasteurized or cooked.

5. Lower gastrointestinal signs & symptoms, abdominal cramps & diarrhea, incubation >72 hours

-Norwalk agent: Raw shellfish, green vegetables, pastry, poorly handled food (1).

-Viral gastro enteritis (ECHO, Coxsackie, Reo, Adeno, Rota and Polio viruses): food contaminated by carrier and poorly reheated.

-Amoebic dysentery: raw vegetables and fruits.

-Giardiasis: raw vegetables and fruits.

-Anisakiasis: Raw fish.

-Beef tape worm (teniasis): Poorly cooked beef meat.

-Pork tape worm (teniasis): Poorly cooked pork meat.

-Fish tapeworm (diphyllobothriasis): Raw fish.

6. Neurological symptoms: visual disturbances, confusion, tingling, twitching or paralysis, incubation less than 1 hour

-Mushroom poisoning by ibotenic acid group or muscarinic group.

-Organophosphorous: food accidentally contaminated by pesticide.

-Carbamate: food accidentally contaminated by pesticide.

-Neurologic shellfish poisoning: shellfish from areas with red tide.

-Puffer fish

7. Neurological symptoms: visual disturbances, confusion, tingling, twitching or paralysis, incubation 1 to 6 hours

-Chlorinated hydrocarbons: food accidentally contaminated by pesticide.
-Ciguatera: tropical fish in specific areas

8. Neurological symptoms: visual disturbances, confusion, tingling, twitching or paralysis, incubation 12 to 72 hours

-Botulism: poorly canned low acid food, improperly cured ham and fish, food held at room temperature for long time.

9. Neurological symptoms: visual disturbances, confusion, tingling, twitching or paralysis, incubation > 72 hours

-Mercury: grain treated with mercury, fish from heavily polluted area.

10. Generalized infection: fever, chills, malaise, incubation > 72 hours

-Brucellosis: raw milk and dairy products.
-Listeriosis: raw milk and dairy products.
-Typhoid: poorly handled food (1).
-*Vibrio vulnificus* septicemia: raw shellfish.
-Hepatitis A: poorly handled food (1), shellfish from contaminated areas.
-Toxoplasmosis: poorly cooked meat.
-Angiostrongyliasis: raw crab, shrimp, salad with slugs.
-Trichinosis: poorly cooked pork meat.

Table 4- Clinical Classification

1. Nausea and Vomiting within 1 to 6 Hours: *Staphylococcus aureus* and *Bacillus cereus*

The short incubation period results from the action of a preformed enterotoxin. Both staphylococcal and short-incubation *B. cereus* outbreaks are illnesses of short duration, usually lasting less than 12 hours.

Staphylococcal food poisoning is characterized by vomiting (82% of cases) and diarrhea (68%); fever is relatively uncommon (16%). Staphylococcal enterotoxins are multiple serologically distinct enterotoxins (currently, A through Q, excluding F) but not all are emetic. More than 99% of enterotoxigenic staphylococci associated with food poisoning are coagulase positive

B. cereus strains can cause two types of food poisoning syndromes:
1- characterized primarily by nausea and vomiting with an incubation period of 1 to 6 hours (short-incubation "emetic" syndrome). The short-incubation syndrome, characterized by vomiting (100% of cases), abdominal cramps (100%), and, less frequently, diarrhea (33%), is caused by a toxin resistant to heat, pH and proteolysis
2- characterized primarily by abdominal cramps and diarrhea with an incubation period of 8 to 16 hours (long-incubation "diarrhea" syndrome)..

Other major etiologic considerations for nausea, vomiting and abdominal cramps within 1 Hour: This syndrome may be caused by **heavy metals** - copper, zinc, tin and cadmium. Incubation periods most often range from 5 to 15 minutes. Nausea, vomiting and abdominal cramps result from irritation of the gastric mucosa and usually resolve within 2 to 3 hours after removal of the offending agent during emesis.

Nausea, vomiting, abdominal cramps and diarrhea may occur after ingestion of **mushrooms** containing gastrointestinal irritants that are not well characterized.

2. Paresthesias within 1 Hour.

When patients have this symptom - fish poisoning, shellfish poisoning, Chinese restaurant syndrome and niacin poisoning are the major possibilities.

Histamine fish poisoning (scombroid) is characterized by symptoms resembling those of a histamine reaction. Burning of the mouth and throat, flushing, headache and dizziness are common; abdominal cramps, nausea, vomiting and diarrhea also occur in most cases (see Manual section on Food poisoning due to Fish consumption).

The Chinese restaurant syndrome is characterized by a burning sensation in the neck, chest, abdomen, or arms and by a sensation of tightness over the face and chest. Headache, flushing, diaphoresis, lacrimation, weakness, nausea, abdominal cramps and thirst frequently occur. Symptoms appear to be caused by excessive amounts of monosodium L-glutamate in foods, although other undefined substances may also play a role. The illness usually resolves within several hours.

Niacin poisoning produces a burning facial erythema within 20 minutes of ingestion, which rapidly resolves.

3. Paresthesias or other neurological symptoms within 1 to 6 Hours.

The major diagnostic considerations for this syndrome are **Paralytic Shellfish Poisoning**, **ciguatera fish poisoning** and **mushroom poisoning**..

Ciguatera is characterized by an onset of abdominal cramps, nausea, vomiting and diarrhea, preceded or followed by numbness and paresthesias of the lips, tongue and throat.

Miscellaneous Mushroom Poisoning Syndromes with Onset within 2 Hours.

At least four clinical syndromes may occur within 2 hours of ingestion of toxic mushrooms.

1-Species containing ibotenic acid and muscimol cause an illness that mimics acute alcoholic intoxication and is characterized by confusion, restlessness and visual disturbances followed by lethargy; symptoms resolve within 24 hours.

2-Species containing muscarine cause an illness characterized by evidence of parasympathetic hyperactivity (e.g., salivation, lacrimation, diaphoresis, blurred vision, abdominal cramps, diarrhea). Some patients experience miosis, bradycardia and bronchospasm. Symptoms usually resolve within 24 hours.

3-Species containing the toxic substances psilocybin and psilocin cause an acute psychotic reaction manifested by hallucinations and inappropriate behavior, which usually resolves within 12 hours.

4-The mushroom *Coprinus atramentarius* contains a disulfiram-like substance that can result in headache, flushing, paresthesias, nausea, vomiting and tachycardia if alcohol is consumed during the 48-hour period after ingestion.

4. Abdominal Cramps and Diarrhea within 8 to 16 Hours: *Clostridium perfringens* and *B. cereus*.

In contrast to staphylococcal food poisoning and the short-incubation *B.cereus* disease, caused by ingestion of preformed enterotoxins in food, *C. perfringens* and long-incubation *B. cereus* food poisoning are caused by toxins produced in vivo, accounting for the longer incubation period. Although nausea occurs in many patients with *C. perfringens* and long-incubation *B. cereus* food poisoning, vomiting occurs infrequently. In fact, occurrence of vomiting in more than one third of affected persons suggests that these organisms are not involved. Although these illnesses last longer than staphylococcal and short-incubation *B. cereus* food poisoning, symptoms usually resolve within 24 hours. However, in some long-incubation *B. cereus* outbreaks, the mean duration of illness can be more than 2 days and occasionally illness may last several weeks.

In ***C. perfringens*** food poisoning, the most common symptoms are diarrhea and abdominal cramps. Although nausea may occur, vomiting and fever are uncommon, occurring in less than 10% of the patients. Although five types of *C. perfringens* toxin have been described, type A is almost always the toxin causing this food poisoning syndrome. *C. perfringens* enterotoxin is heat-labile.

B. cereus strains, cause a similar long-incubation syndrome that produces diarrhea (96%) and abdominal cramps (75%), sometimes vomiting (33%), and rarely fever.

5. Abdominal Cramps and Diarrhea within 6 to 24 Hours, Followed by Hepatorenal Failure.

Species of poisonous mushrooms containing amatoxins and phallotoxins are responsible for this syndrome. The most common implicated species are *Amanita phalloIDEpi, Amanita virosa* and *Amanita verna*. The illness is typically biphasic; the abdominal cramps and diarrhea, which may be severe, usually resolve within 24 hours. The patient then remains well for 1 to 2 days before evidence of hepatic and renal failure supervenes. A mortality rate of 20% to 50% has been reported.

A similar clinical syndrome occurs after ingestion of mushrooms of the *Gyromitra* genus, which contain the toxic substance gyromitrin. Hemolysis, seizures, and coma can occur, but this toxin does not cause acute renal failure.

6. Fever, Abdominal Cramps, and Diarrhea within 16 to 48 Hours.

The major etiologies for this syndrome are **Salmonella, Shigella, *Campylobacter jejuni, Vibrio parahaemolyticus* and *E. coli***. Bloody diarrhea and vomiting occur in a varying proportion of patients infected with these pathogens. These illnesses usually resolve within 2 to 7 days.

C. jejuni is the most common foodborne bacterial pathogen. Salmonella is the second most common foodborne bacterial pathogen and the most common bacterial pathogen associated with foodborne outbreaks.

7. Abdominal Cramps and Watery Diarrhea within 16 to 72 Hours.

The major etiologies for this syndrome are enterotoxigenic strains of ***E. coli, V. parahaemolyticus, V. cholerae* non-O1** and, in Louisiana, ***V. cholerae* O1 and O139**; ***C. jejuni*, Salmonella and Shigella** may also cause this syndrome. Enterotoxins synthesized in vivo are usually responsible for this syndrome.

Severe cholera manifests as a profuse, watery diarrhea accompanied by muscular cramps. With the other infections, fever and vomiting occur in a minority of cases. With the exception of cholera, which may last for 5 days and disease caused by *V. cholerae* non-O1, which may last for 2 to 12 days, these illnesses usually resolve within 72 to 96 hours.

8. Vomiting and Nonbloody Diarrhea within 24 to 48 Hours

Noroviruses are the most common etiology. The syndrome progresses to include watery, nonbloody diarrhea, abdominal pain and nausea. Vomiting is more common among children, whereas diarrhea is more likely to predominate among adults. Fever occurs in one third to one half of patients, is usually low grade and lasts for less than 24 hours. Symptoms usually resolve in 1 to 3 days. It is impossible to distinguish between norovirus and some bacterial causes of gastroenteritis, such as enterotoxigenic strains of *E. coli* (ETEC), for a single patient based on clinical course, but a few simple criteria have been used epidemiologically to assess whether norovirus was the likely cause of outbreaks. Criteria that suggest norovirus infection include:

(1) failure to detect a bacterial or parasitic pathogen in stool specimens
(2) the occurrence of vomiting in greater than 50% of patients
(3) a mean duration of illness of 12 to 60 hours and
(4) a mean incubation period of 24 to 48 hours.

9. Fever and Abdominal Cramps within 16 to 48 Hours, without Diarrhea

Yersinia enterocolitica is the usual etiology. In older children and adults, the clinical illness may be prolonged and one syndrome may closely resemble acute appendicitis; nausea and vomiting are relatively uncommon, occurring in less than 25% to 40% of the cases. Duration of the illness ranges from 24 hours to 4 weeks.

10. Bloody Diarrhea without Fever within 72 to 120 Hours

The distinctive syndrome of hemorrhagic colitis has been linked to **Shiga toxin–producing strains of *E. coli***, most often serotype O157-H7. The illness is characterized by severe abdominal cramping and diarrhea, which is initially watery but may later be grossly bloody. Patients with uncomplicated infection usually remain afebrile. The duration of uncomplicated illness ranges from 1 to 12 days. Other *E. coli* serogroups that produce Shiga toxins can also cause hemorrhagic colitis and hemolytic uremic syndrome.

11.Persistent Diarrhea within 1 to 3 Weeks

Two distinctive persistent diarrheal syndromes can be foodborne: **cyclosporiasis** and **Brainerd diarrhea**.

Cyclosporiasis emerged as a major foodborne infection in the United States in 1996, when it caused many outbreaks related to imported raspberries. In 1997 and 1999, outbreaks of cyclosporiasis were associated with fresh mesclun and fresh basil. The diarrhea is often intermittent and relapsing; it is associated

with anorexia, weight loss, nausea and profound fatigue; it begins after a median incubation period of 7 days.

A distinctive chronic watery diarrhea, known as **Brainerd diarrhea**, was first described in persons who had consumed raw milk. After a mean incubation period of 15 days, affected persons developed acute, watery diarrhea with marked urgency and abdominal cramping. Diarrhea persisted for a mean of 2 years. No etiologic agent was identified.

12. Nausea, Vomiting, Diarrhea and Paralysis within 18 to 36 Hours

The occurrence of acute gastrointestinal symptoms simultaneously with, or just before the onset of descending weakness or paralysis strongly suggests the diagnosis of foodborne botulism. Constipation is common once the neurologic syndrome is well established, but nausea and vomiting occur at onset in 50% of the patients and diarrhea occurs in approximately 20% to 25% of the patients. The disease in older children and adults results from ingestion of preformed toxin. The syndrome of infant botulism results from ingestion of spores, with subsequent toxin production in vivo. Both illnesses last from several weeks to several months. Clinical suspicion is critical if the disease is to be correctly diagnosed.

Guillain-Barré syndrome has been associated with serologic evidence of recent infection with *C. jejuni*. In a multicenter study of 118 patients in the United States with Guillain-Barré syndrome, 36% had serologic evidence of a preceding *C. jejuni* infection. When preceding diarrheal illness is reported, it typically occurs 1 to 3 weeks before the onset of neurologic symptoms. In contrast to botulism, this syndrome is usually manifested by an ascending paralysis accompanied by sensory findings and abnormal nerve conduction velocity.

13. Systemic Illness

Some foodborne diseases manifest mainly as invasive infections in immunocompromised patients.

Listeriosis typically affects pregnant women, fetuses and persons with compromised cellular immunity, who present with fever, myalgias and primary bacteremia or meningitis. Sources are most often foods, including cold processed meats and dairy products. The incubation period is prolonged, ranging from 2 to 6 weeks and the case-fatality rate is 23%.

***Vibrio vulnificus* infections** cause fulminant myonecrosis or primary bacteremia after ingestion of raw oysters. This severe syndrome is seen almost exclusively in patients with underlying liver disease, especially if associated with iron-overload states.

Other infectious diseases causing systemic illnesses include **group A β-hemolytic streptococci** (most commonly in potato and egg salads), **typhoid fever** (shellfish), **brucellosis** (goat's milk cheese), **anthrax** (meat), **tuberculosis** (milk), **Q fever** (milk), **hepatitis A** (shellfish, fresh produce), **trichinosis** (pork), **toxoplasmosis** (beef), **anisakiasis** (fish), and **tapeworms** (beef, pork, and fish).

14. Postinfection Syndromes.

Reactive arthritis (Reiter's syndrome) may develop after infection with Salmonella, Yersinia, Campylobacter, or Shigella, as well as after nonfoodborne infections such nongonococcal urethritis and Cyclospora infection.

Reiter's syndrome consists of the classic triad of aseptic inflammatory polyarthritis, urethritis and conjunctivitis, although not all components occur in all patients.

Case History Forms

OPH-EPI-27 FOOD-BORNE CASE HISTORY FORM							Record No.	
Name (Last First)					Age Yr Mo		Sex M F	
Address					City		ZIP	
Phone			Occupation				Grade	
Did you attend the event/meal? Yes No Not Sure								
Date of the suspected meal / / 200				Time: : am pm				
Did you bring left over? Yes No Not sure				Date eaten / /200			Time: : am pm	
Did you eat the following food?				Yes	No	Not sure	Remark	
Which of the following symptoms did you have?								
Diarrhea	Yes	No	Not sure	# stools/day:		Duration days		
Fever	Yes	No	Not sure	Temperature				
Blood/stools	Yes	No	Not sure	Abdominal cramps		Yes	No	Not sure
Nausea	Yes	No	Not sure	Vomiting		Yes	No	Not sure
Headache	Yes	No	Not sure			Yes	No	Not sure
	Yes	No	Not sure			Yes	No	Not sure
	Yes	No	Not sure			Yes	No	Not sure
When did symptoms started / / 200				Time: : am pm				
How long did symptoms last? hours days								
Did you consult a physician? Yes No				Physician's Name				
Were you hospitalized? Yes No				Hospital name				
Did you suffer any complications? Yes No								
Was a stool specimen submitted? Yes No								
Comments								
Person completing form				Date				

A food-borne case history form (see below) is a tool that is essential to any food-borne disease outbreak investigation. It is not possible to have a standard form that would apply to all food-borne disease outbreaks. However IDEpi has prepared a generic case history form that can easily be adapted to a particular outbreak (call for information). Prior to officially investigating all individuals involved in the outbreak, the IDEpi and the RRT team coordinator will collaborate to prepare a special questionnaire or make modifications to existing questionnaires. Nonetheless, all food-borne disease outbreak questionnaires follow the same general principles. Below are guidelines for how these questionnaires are written and used:

-- Demographic information is addressed in the first section, followed by exposure information and finally the disease history. This format will help with collecting exposure data in the same manner on cas-

es and non-cases, independent as much as possible of disease status. It will also be easier to enter data information on non-cases in the computer program, since the disease information will not be applicable.

-- A section containing food items from the meal(s) in question with blank spaces is listed next. It is important for the investigator to remember to enter the complete menu in the blanks before making bulk number of copies that are necessary. Line listing food items will avoid open-ended questions such as what did you eat? (Open-ended questions may well result in incomplete information being obtained, especially if the individual being questioned forgets some of the food items served or if the individual is a child.)

-- There are three columns in the food history section for answers YES, NO, NOT SURE. When only YES and NO are allowed, it frequently results in blank entries that are difficult to handle in the analysis (it is always unclear whether the blank entries mean no, not sure, or data not collected).

-- The section containing a list of possible symptoms should follow the food history section. Once the investigator is able to develop a case definition, he/she will need specific symptoms, well defined, with YES –NO - NOT SURE answers for the same reasons as in the above.

-- Since diarrhea is the symptom used most often in establishing a case definition, there is a need to specify a standard definition for diarrhea. For the purpose of disease outbreak investigations, diarrhea shall be defined as three or more loose stools per day. Standardizing the definition for diarrhea should eliminate individual interpretations which result in conflicting information.

If the number of cases and non-cases are relatively small, it is essential to collect information contained on the food history questionnaire on all cases and all non-cases, if at all possible. If not, a way to draw a random sample of the non-cases to serve as controls will have to be designed by the IDEpi and should be discussed with that section early in the investigative process, before data are collected.

Depending on the suspected illness, the characteristics of the patients and the circumstances of the outbreak, other optional information might be necessary:

- date of birth
- place of employment, work phone numbers
- names/ages/disease status of household contacts (secondary cases/daycare/school)
- underlying conditions, medications
-travel history
- treatment: drug/dosage/duration
- places and times of exposure, if multiple

The epidemiologic investigation should also include information on both environmental and laboratory investigations. While each part of a food-borne investigation compliments the other, team work and ongoing communication is of utmost importance.

Investigation of an outbreak is a team effort where each member has an essential role to perform. The team may include a number of individuals at the local level (public health nurse, sanitarian, laboratory and disease investigator) as well as the Regional RRT team. It is important to remember that the RRT team and the IDEpi Section are available for guidance and assistance throughout each step of the investigation.

Analysis of Food-borne Case History Forms:

In general, IDEpi will be assisting the RRT Teams in analyzing the Food-borne Case History Forms to identify the specific food item that caused the outbreak.