FOODBORNE AND WATERBORNE DISEASE OUTBREAK INVESTIGATION MANUAL

Department of Health and Family Services
Wisconsin Division of Public Health
Bureau of Communicable Diseases and Preparedness
Communicable Disease Epidemiology Section

"When an outbreak or epidemic occurs, the local health officers shall immediately report to the department, and shall at all times keep the department informed of the prevalence of the communicable diseases in the locality in the manner and with the facts the department requires." **Wisconsin State Statute 252.05**

PPH 4722 (Rev 09/05)

Revised January 2005

Guidelines for Reporting Suspected Outbreak-related Illnesses

If an individual is suspected of having a foodborne illness, the health care provider should:

1. **Collect clinical samples for laboratory analysis:**
   (Stool specimens from up to **10** persons in a suspected outbreak can be tested at the WSLH on a fee-exempt basis)
   If suspected food item(s) are available, instruct the individual not to ingest or discard food, but to keep it refrigerated. Arrangements will be made to collect and analyze the food samples pending further investigation. Arrangements must be made for the LHD to collect and hold the food items under refrigeration. Questions regarding sample collecting/testing of food samples should be directed to the WDATCP – Bureau of Laboratory Services (608-267-3509).
2. **Inquire whether there are other ill persons.**
3. **Immediately Contact the Communicable Disease Epidemiology Section (608-267-9009 or 608-267-7422) and/or your Regional Office. ***
   Please provide the following information:
   - Brief description of situation
   - Names of ill persons
   - Address, telephone number
   - Age, sex
   - Onset of symptoms (date, time)
   - Description of symptoms
   - Hospitalization status
   - Other available information (other ill persons, possible food sources, etc.)
   - Name of physician (if different than reporter), address, telephone number

Definition of Foodborne Outbreak:

2 or more persons experience a similar illness after ingestion of a common food

* 24 hour Division of Public Health Emergency HOTLINE: 608-258-0099 (This number is only for local health departments or health care providers.)

TABLE OF CONTENTS

List of Tables

List of Figures

Acknowledgments

This manual was developed with the input and assistance of the following: Wisconsin Division of Public Health, Bureau of Communicable Diseases and Preparedness / Communicable Disease Epidemiology Section; Bureau of Environmental and Occupational Health Section, Wisconsin Department of Agriculture Trade and Consumer Protection / Bureau of Laboratory Services; Wisconsin State Laboratory of Hygiene; and Wisconsin Department of Natural Resources. The 2005 *FOODBORNE AND WATERBORNE DISEASE OUTBREAK INVESTIGATION MANUAL* has been upgraded and revised to replace the 1997 version. Please discard all old versions. Questions and comments regarding this manual should be directed to John Archer, Epidemiologist, Communicable Disease Epidemiology Section, (608) 267-9009.

Report forms and worksheets

Many of the communicable diseases listed in this manual have follow-up forms or worksheets requested by either the Bureau of Communicable Diseases and Preparedness or the Centers for Disease Control and Prevention (CDC). All these report forms can now be found on the Wisconsin **HEALTH ALERT NETWORK** (**HAN**). After you login, go into **TOPICS**, click **COMMUNICABLE**, then under **EPINET** click on **REPORT FORMS**.

I. INTRODUCTION AND BACKGROUND

I. INTRODUCTION AND BACKGROUND

Foodborne and waterborne disease outbreaks are of urgent public health importance and immediate reporting of these diseases or outbreaks by physicians, laboratory directors and other public private health care providers to local health departments is mandated by Wisconsin law (Statute Chapter 252 COMMUNICABLE DISEASES). The public depends on health departments and food regulators for protection from foodborne illness. Such protection relies on rapid detection of outbreaks, determination of the cause of the outbreak, and incorporation of control measures to protect the public.

The careful and diligent investigation of foodborne and waterborne outbreaks is essential for disease control and prevention. Several key questions need to be addressed to determine the most effective control measures. What is the extent of the illness and who was affected? When and where did the critical exposure take place? What was the vehicle or how was the disease transmitted? What is the etiologic agent? Investigations of foodborne and waterborne outbreaks should proceed scientifically and professionally and not in reaction to the media or political pressures.

Much has been learned about the etiology, clinical characteristics and risk factors of gastrointestinal diseases as a result of careful investigations of foodborne and waterborne disease outbreaks. The quality of the data in a foodborne or waterborne disease outbreak investigation depends on the commitment to surveillance by local and state health staff. A local health department's interest in outbreak investigations and its investigative capabilities are important determinants in the quality of the investigation.

Investigation of food and waterborne disease outbreaks are rarely, if ever, accomplished by a single individual. A proper investigation generally requires the efforts of a team of individuals with different areas of expertise. This manual is intended to provide a structure for coordinating the activities of the various public health, laboratory and administrative agencies responsible for the investigation, prevention, and control of food and waterborne disease in Wisconsin.

List of agency abbreviations:

BCDP	Bureau of Communicable Diseases and Preparedness
BEOH	Bureau of Environmental and Occupational Health
BLHS& EMS	Bureau of Local Health Support & Emergency Medical Services
BLS	Bureau of Laboratory Services (WDATCP)
BQA	Bureau of Quality Assurance
CDC	Centers for Disease Control and Prevention
CDES	Communicable Disease Epidemiology Section
DATCP	Wisconsin Department of Agriculture, Trade and Consumer Protection
DHFS	Department of Health and Family Services
DNR	Wisconsin Department of Natural Resources
DPH	Wisconsin Division of Public Health
DPI	Department of Public Instruction
EPA	U.S. Environmental Protection Agency
FDA	U.S. Food and Drug Administration
LHD	Local Health Department
WSLH	Wisconsin State Laboratory of Hygiene

Definitions of terms

2 x 2 Table: A tabular cross-classification of data such that subcategories of one characteristic are indicated horizontally (in rows) and subcategories of another characteristic are indicated vertically (in columns). Tests of association between characteristics in the columns and rows can be readily applied. Also known as a contingency table.

	ill	not ill
Exposed	a	b
Not Exposed	c	d

Attack Rate: A type of cumulative incidence rate which expresses the occurrence of a disease among a specific population at risk observed for a limited period of time, often due to a very specific exposure.

Carrier: A person or animal that harbors a specific infectious agent, is asymptomatic, and is a potential source of infection for man or animals.

Case-control study: A type of observational analytic study. Enrollment into the study is based on presence ("case") or absence ("control") of disease. Characteristics such as previous exposures are then compared between cases and controls.

Case definition: A set of criteria used for investigative purposes to decide whether a person has a particular disease or whether a person is to be included in a "case" category by specifying clinical and laboratory criteria and by specifying limitations on time, place and person.

Case finding: The process of identifying all possible cases; this typically uses a broad case definition and occurs early in the investigation. Later in the investigation, case finding might be performed to assess the extent of the outbreak.

Cluster: Aggregation of relatively uncommon events or diseases in space and/or time in amounts believe or perceived to be greater than could be expected by chance.

Cohort study: A type of observational analytic study. Enrollment in the study is based on exposure characteristics or membership in a group. Disease, death of other health-related outcomes are then ascertained and compared.

Common source outbreak: An outbreak that results from a group of persons being exposed to an infectious agent or toxin from a single source.

Confirmed case: A case with a laboratory-identified etiology.

Contact: Exposure to a source of an infection, or a person so exposed.

Controls: Subject with whom comparison is made in a case-control study or other type of epidemiologic study. Selection of appropriate controls is crucial to the validity of epidemiologic studies.

Epidemic: The occurrence of more cases of disease than expected in a given area or among a specific group of people during a particular period of time.

Epidemic curve (Epi curve): A histogram plotting the distribution of cases by time of onset. Epi curves help characterize an outbreak and give clues about the source of the outbreak (e.g., point source vs. on-going outbreaks).

Epidemiology: The study of the distribution and determinants of health-related states or events in specified populations, and the application of this study to the control of health problems.

Foodborne outbreak (FBO): A FBO is the occurrence of two or more cases of a similar illness resulting from the ingestion of a common food. (Prior to 1992 only one case of botulism or marine or chemical intoxication was required to constitute a FBO; since 1992, two or more cases are now required for these diseases to be defined as an outbreak.)

High-risk group: A group in the community with an elevated risk for a particular disease.

Host: A person or other living organism that can be infected by an infectious agent under natural conditions.

Host factors: An intrinsic factor (e.g., age, sex, race, behaviors) which influences an individual's exposure, susceptibility, or response to a causative agent.

Incidence rate: The measure of frequency of new cases of a particular disease in a population during a specified period of time.

Incubation period: The period of time between exposure to an infectious agent and the onset of signs and symptoms of disease.

Index case: The first case among a number of similar cases that are epidemiologically related.

Line list: A table listing case names, age, sex, onset time, residence, symptoms, employment, etc. which facilitates comparisons of many characteristics for possible similarities or associations.

Morbidity: Any departure from a state of physiological or psychological well-being.

Onset: The time the first clinical signs or symptoms begin to occur.

Outbreak: Same as epidemic. Often the preferred word as it may avoid the sensationalism associated with the word epidemic.

PFGE: Pulse-field gel electrophoresis – a molecular method that allows for the specific classification of pathogens by "fingerprinting" the DNA from the pathogen; this method generates visually observable patterns which can be digitized and then compared with other pathogens of the same genus and species.

Point source outbreak: Outbreak due to exposure of a group of persons to an infectious agent common to the individuals in the group.

Prevalence: The number or proportion of cases or events or conditions in a given population.

Prevalence rate: The measure of frequency of all current cases of a particular disease, regardless of the time of onset, within a particular population either at a specified instant or during a specified period of time.

Probable case: A case without laboratory confirmation that has typical clinical features of the particular disease under investigation without laboratory confirmation.

PulseNet: The National Molecular Subtyping Network for Foodborne Disease Surveillance; a network of laboratories throughout the U.S. that perform testing on foodborne pathogens using standard PFGE methods and compare results via images on a computer network.

Questionnaire: Predetermined set of questions used to collect data.

Recreational water: Waters used for swimming, whirlpools, hot tubs, spas and water parks; it may also include naturally occurring fresh and marine surface waters.

Reservoir: The habitat or organism in which an infectious agent normally lives, grows and multiplies.

Serotype: Subdivision of a species or subspecies distinguishable from other strains therein on the basis of antigenic character.

Surveillance: The detection of health problems through the appropriate collection of data, followed by its collation, analysis, interpretation, and dissemination.

Susceptible: A person lacking sufficient resistance to a particular disease agent to prevent disease if or when exposed.

Vehicle: An inanimate intermediary in the indirect transmission of an agent that carries the agent from a reservoir to a susceptible host.

Virulence: The degree of pathogenicity of an infectious agent.

Waterborne outbreak (WBO): Two criteria required: (1) two or more people experience a similar illness after the ingestion of drinking water or after exposure to water used for recreational purposes, and (2) epidemiologic evidence must implicate water as the probable source of the illness. (The requirement for "two or more" is waived for single cases of laboratory-confirmed primary amebic meningoencephalitis and for single cases of chemical poisoning if the water-quality data indicate contamination by the chemical.)

> **Note:** Outbreaks caused by contamination of water or ice at the point of use (e.g., contaminated water containers) should be reported as FBOs.

Zoonosis: An infection or an infectious disease transmissible under natural conditions between animals and man.

Purpose of the outbreak investigation

Control and prevention

The primary reason to investigate an outbreak is to control the occurrence of disease and prevent further disease. Therefore, it is necessary to first determine whether the outbreak is ongoing or is over. If the outbreak is ongoing, the first goal should be to prevent new cases. If the outbreak has already occurred, the goal should be to determine the factors or sources that contributed to the outbreak and prevent them from occurring in the future.

Surveillance

Outbreak investigations can add valuable information to ongoing public health surveillance activities. The goal of surveillance is not to compile numbers of cases of illness for administrative purposes, but to provide data that are important to guide public health policy and action. Continual surveillance adds to existing knowledge regarding the potential for and occurrence of a disease in a population.

Research opportunities

An important objective of an outbreak investigation is to gain additional knowledge regarding the natural history of the disease. Carefully conducted investigations may reveal trends, new or overlooked disease agents, novel vehicles or transmission modes, groups at risk or specific risk factors. New knowledge may also be gained by assessing the impact and effectiveness of control measures.

Training opportunities

Outbreak investigations may offer the LHD an opportunity to work closely with more experienced epidemiologists, become familiar with investigative techniques or practices, develop thought processes used in designing questionnaires and interviewing, and gain valuable on-the-job training and experience for future outbreaks.

Administrative concerns

Identifying the cause of outbreaks may be used to evaluate and improve current health programs in the community, identify high-risk groups or etiologic agents previously overlooked and guide future strategies and future allocations in these areas.

Political or legal concerns

There may be overwhelming pressures placed on the LHD by families of affected individuals, the media, local politicians and others to determine the source of an outbreak and whether it may pose a continued or future threat to the community.

II. SUMMARY OF FOODBORNE AND WATERBORNE OUTBREAKS

II. SUMMARY OF FOOD AND WATERBORNE OUTBREAKS

Foodborne outbreaks (FBOs)

During 1994-2003, a total of 242 FBOs were reported to the Bureau of Communicable Diseases and Preparedness / Communicable Disease Epidemiology Section. These outbreaks were associated with over 7,441 illnesses, 273 hospitalizations and one fatality (Table 1).

Table 1. Morbidity Table of FBO's, Wisconsin, 1995-2004.

Etiologic Agent	FBOs	# Cases	# Hosp.	# Deaths
Bacterial				
Bacillus cereus	1	4	0	0
Campylobacter sp.	11	253	1	0
Campylobacter / Salmonella sp.	2	111	0	0
Campylobacter / Staphylococcus aureus	1	20	3	0
Clostridium perfringens	19	656	0	0
E. coli 0157:H7	13	1088	116	1
Enterotoxigenic *E. coli* (ETEC)	1	21	0	0
Salmonella sp.	53	903	75	2
Shigella sp.	4	17	1	0
Staphylococcus aureus	4	62	6	0
Streptococcus sp.	1	2	0	0
Yersinia enterocolitica (Biotype 4)	1	4	4	0
Total	**111**	**3111**	**206**	**3**
Viral				
Hepatitis A virus	1	13	1	0
Norovirus	80	2240	32	0
Total				
Parasitic				
Cryptosporidium parvum	**1**	**18**	**0**	**0**
Chemical				
Scombroid fish poisoning	2	24	15	0
Mushroom poisoning	1	2	2	0
Total	**3**	**26**	**17**	**0**
Unknown				
Unknown	**57**	**1533**	**7**	**0**
Total	**253**	**6941**	**263**	**3**

Foodborne outbreaks caused by bacterial etiologic agents accounted for 44% of the reported FBOs from 1995-2004. The highest percentage (48%) of bacterial FBOs were associated with *Salmonella* species, but the *E. coli* O157:H7 FBOs accounted for the highest number of cases (35%) and the highest number of hospitalizations (56%) (Table 1).

Foodborne outbreaks by counties (n=49) (1994-2004):

Foodborne outbreak reports were reported by the following counties: Adams (3); Barron (3); Brown (11); Burnett (1); Calumet (3); Chippewa (3); Clark (1); Columbia (2); Crawford (1); Dane (29); Dodge (2); Door (5); Dunn (3); Eau Claire (7); Fond du Lac (3); Grant (1); Green (2); Iron (1), Jefferson (7); Kenosha (8); La Crosse (4); Manitowoc (1); Marathon (4); Marinette (4); Menominee (1); Milwaukee (33); Monroe (1); Oconto (2); Oneida (3); Outagamie (13); Ozaukee (7); Pepin (2); Pierce (2); Polk (2); Portage (5); Racine (6); Rock (2); Rusk (1); Sauk (2); Sawyer (1); Shawano (4); Sheboygan (4); St. Croix (1); Taylor (1); Trempealeau (2); Vernon (2); Vilas (1); Walworth (11); Washington (7); Waukesha (8); Waupaca (1); Winnebago (5); Wood (6). Eight FBOs involved multiple counties in Wisconsin. The number of FBOs reported per county may only be a reflection of geography, population base, reporting methods, and experience in outbreak investigation among local health departments and not a true indicator of outbreak occurrence. In many cases, the LHDs that report the most cases or outbreaks may also be those with the most sensitive public surveillance systems or those that perform more thorough follow-up investigations of foodborne complaints.

Seasonality of outbreaks:

Foodborne outbreaks occurred during all months of the year but were most frequent June-August. Occurrence of outbreaks with defined bacterial etiologic agents tended to increase in the late spring, peak in summer, and gradually taper off in late fall. Viral (norovirus) outbreaks and outbreaks of unknown origin occurred throughout the year, but demonstrated peaks in the late spring and fall. (Figures 1-3)

Figure 1. Wisconsin viral FBOs by month of occurrence 1995-2004

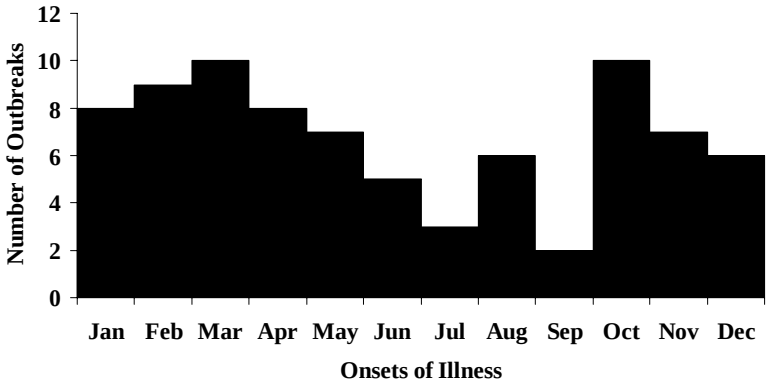


Figure 2. Wisconsin bacterial FBOs by month of occurrence
1995-2004

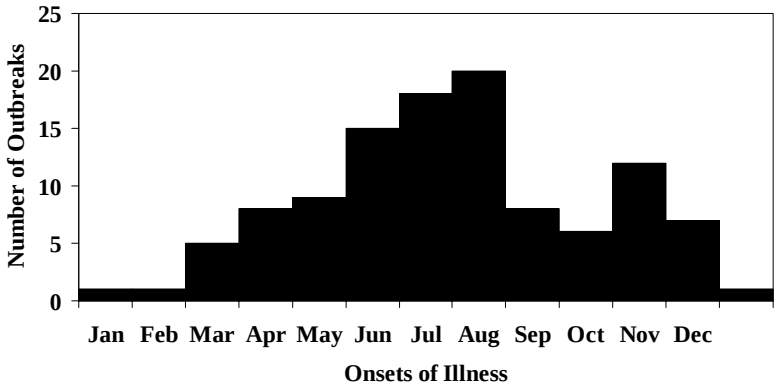


Figure 3. Wisconsin unknown FBOs by month of occurrence
1995-2004

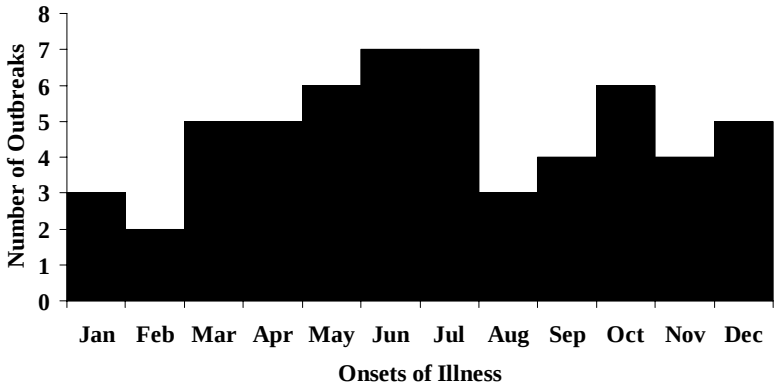


Table 2. Annual FBOs in Wisconsin, 1995-2004.

Etiologic Agent	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Bacterial											
Bacillus cereus										1	1
Campylobacter sp.	2	1		1		1	1	1	4		11
Campylobacter / Salmonella sp.		1					1				2
Campylobacter / Staph. aureus							1				1
Clostridium perfringens		3		3	3	2	1	3		4	19
Enterotoxigenic *E. coli*							1				1
E. coli 0157:H7	1			3		5	2	2			13
Salmonella sp.	2	4	10	2	5	2	3	8	10	7	53
Shigella sp.		1	1			1			1		4
Staphylococcus aureus			1		1	1		1			4
Streptococcus sp.			1								1
Yersinia enterocolitica									1		1
Viral											
Hepatitis A virus	1										1
Norovirus			1	6	8	6	7	16	5	31	80
Parasitic											
Cryptosporidium parvum			1								1
Chemical											
Scombroid fish poisoning				1				1			2
Mushroom poisoning				1							1
Unknown											
Unknown	17	9	12	7	2	6	3	1	0	0	57
Total	**23**	**19**	**27**	**24**	**19**	**24**	**20**	**33**	**21**	**43**	**253**

* Began RT-PCR testing for norovirus in 1997

Vehicle of disease transmission

A specific vehicle of pathogen transmission was identified in 115 (48%) of 240 FBOs in Wisconsin from 1994-2003 (Table 3).

Table 3. Foods associated with FBOs in Wisconsin, 1994-2003.

Vehicle, FBOs, 1994-2003

Vehicle of transmission	**FBO**	**Cases**	**Hosp**	**Death**	**Etiology**				
Vehicles	**No.**	**No.**	**No.**	**No.**	**Bact.**	**Viral**	**Para.**	**Chem.**	**UNK**
Dairy Products									
Cheese	3	85	24	0	1	0	0	0	2
Eggs	13	163	9	0	12	0	0	0	1
Ice cream	1	18	0	0	0	1	0	0	0
Milk (Pasteurized)	1	2	0	0	1	0	0	0	0
Milk (Unpasteurized)	3	89	0	0	3	0	0	0	0
Meats and Poultry									
Beef	14	474	28	0	15	0	0	0	2
Pork or ham	8	147	7	0	7	0	0	0	1
Poultry	19	474	8	0	16	2	0	0	1
Sausage	1	28	1	0	0	1	0	0	0
Seafood (Fish or shellfish)	4	48	20	0	1	0	0	2	1
Gravies or sauces	3	238	5	0	3	0	0	0	0
Produce									
Fruits / Fruit salads	3	817	35	1	2	1	0	0	0
Vegetables	1	47	3	0	0	1	0	0	0
Alfalfa sprouts	1	61	6	0	1	0	0	0	0
Mushrooms	1	2	2	0	0	0	0	1	0
Salads									
Coleslaw	3	75	6	0	1	1	0	0	1
Lettuce salad	4	101	1	0	1	3	0	0	0
Pasta salad	2	77	0	0	0	2	0	0	0
Poultry, fish, egg salads	4	171	1	0	1	2	0	0	1
Miscellaneous vehicles									
Appetizers	1	21	0	0	1	0	0	0	0
Baked foods or desserts	5	79	0	0	0	3	0	0	2
Ethnic food	5	104	3	0	4	1	0	0	0
Submarine sandwich	12	283	13	0	1	7	0	0	4
Other miscellaneous foods	8	131	10	0	2	6	0	0	0
Multiple vehicles	11	387	2	0	3	4	0	0	4
Unknown vehicles	119	2819	79	2	35	45	1	0	38
Totals 1995-2004	**253**	**6941**	**263**	**3**	**111**	**80**	**1**	**3**	**58**

Food preparation contributing to FBOs

In the majority of FBOs reported, the place of preparation was a cafeteria, caterer, delicatessen, or restaurant accounting for cases (Table 4).

Table 4. Place of food preparation contributing to FBOs in Wisconsin, 1995-2004.

Etiologic Agent	PH	R, D	C	S	Ca	Ch	NH/AL	O	U	Total
Bacterial										
Bacillus cereus		1								**1**
Campylobacter	1	2	1	1	1			5		**11**
Campylobacter / Salmonella	1								1	**2**
Campylobacter / Staphylococcus	1									**1**
Clostridium perfringens	2	10	2	3		1		1		**19**
ETEC		1								**1**
E. coli 0157:H7	1	2	1	2		3		2	2	**13**
Salmonella sp.	10	19	4			1	7	8	4	**53**
Shigella sp.	2	2								**4**
Staphylococcus aureus		2	1			1				**4**
Streptococcus sp.								1		**1**
Yersinia enterocolitica	1									**1**
Viral										
Hepatitis A virus								1		**1**
Norovirus	6	40	9	6	1	4	5	9		**80**
Parasitic										
Cryptosporidium parvum	1									**1**
Chemical										
Scombroid fish poisoning		2								**2**
Mushroom poisoning	1									**1**
Unknown										
Unknown	5	40	3		1	2	1	2	3	**57**
Total	**32**	**121**	**21**	**12**	**3**	**12**	**13**	**29**	**10**	**253**

PH = Private Home
R,D = Restaurant, Deli
C = Caterer
S = School
Ca = Camp
Ch = Church
W = Workplace
NH/AL = Nursing Home / Assisted Living
O = Other
U = Unknown

Comment on foodborne norovirus infections

Noroviruses are a common cause of gastroenteritis and frequently cause foodborne outbreaks. Contamination of food by infected food workers is probably the most common cause of norovirus foodborne illness. Food items such as salads, submarine sandwiches and dessert dishes that receive considerable handling during preparation and are not cooked before being served are often implicated in foodborne norovirus outbreaks. Following a norovirus FBO, secondary infections acquired by person-to-person transmission are commonly noted in individuals who did not consume contaminated foods.

Survival of viruses

Noroviruses are hardy and may survive for prolonged periods on foods or the food handling environment. They are highly resistant to chilling, freezing, preservatives, ionizing radiation, alcohol, and high sugar concentrations. They are also resistant to acidic conditions (pH 3) and can survive on acidic fruits (such as strawberries and raspberries) and can survive processes such as pickling in vinegar or yogurt production. Noroviruses can survive temperatures up to 60^{o} C (140^{o} F) for 30 minutes.

Illness caused by noroviruses is usually sudden in onset, and is characterized by vomiting, diarrhea and abdominal pain. Vomiting occurs more frequently in children and adolescents than in adults, usually occurs without warning, and may be projectile. The incubation period is usually 24-48 hours after eating an implicated food, and is dependent on the number of virus particles ingested. Because the viruses involved are highly infectious, the attack rate in an outbreak can be very high. Duration of illness usually ranges from 24-48 hours, although ill individuals may not feel completely recovered for several weeks.

Source

Viruses require a host in order to multiply, and the original source of all foodborne viruses is the human intestine. Because viruses cannot grow in or on food, contamination of food may occur either during preparation by infected food workers or by contact with contaminated water.

Fruits and raw vegetables that have been fertilized or irrigated with sewage-contaminated water or prone to other modes of fecal contamination, may act as vehicles of infection when consumed as condiments or salad ingredients if not properly washed beforehand. Consumption of contaminated water and ice or their use in food preparation may also cause viral illness and should not be overlooked in FBO investigations.

Management of food workers

All food workers symptomatic with vomiting or diarrhea should be immediately excluded from work. It is recommended that unless a person has excellent hygiene, they not return to work until at least 48 hours after cessation of symptoms. Food managers may overlook these infections because, after the initial onset of symptoms, the illness may appear mild enough to allow the food worker to continue working. Early return to work should be avoided because even

relatively low numbers of virus particles transferred to food may result in illness. Staff should also be made aware they could transfer virus particles to food via hands and clothing following contact with an ill family member even though they themselves are not ill. Prevention of foodborne norovirus outbreaks requires good staff supervision, and food workers should be encouraged, not penalized, for reporting signs and symptoms of illness as soon as they occur.

Control

Contamination of food usually occurs on the surface of the food, where viruses will be more susceptible to heat treatment. Heat processes commonly used in the food industry will significantly reduce the level of norovirus contamination, but may not destroy or inactivate all viruses if the contamination level was very high.

The number of norovirus particles required to cause infection is very low and contamination of food by infected food workers and person-to-person spread can easily occur. After using the toilet and before all preparation of food thorough hand washing with soap and warm running water and drying with disposable towels or hand dryers are essential to minimize the spread of contamination.

If vomiting has occurred in the kitchen, a disinfection program appropriate for norovirus decontamination of the environment must be implemented. Care should be taken while cleaning vomitus since inhalation of viral particles may take place while cleaning contaminated surfaces. Cleaning and disinfection of these surfaces is best achieved by using hot water and detergent followed by chlorine-based disinfectant at a strength of 500 ppm available chlorine (1:100 dilution of 5% chlorine bleach or ¼ cup of bleach in one gallon of water). Bleach solutions should be made fresh daily. Contaminated food items should be disposed of to prevent cross-contamination and re-infection. Any soiled clothing should be rinsed to remove gross contamination, preferably into the toilet bowl, and then laundered in a domestic or commercial washing machine with a hot cycle.

Detection

Methods used for detection of noroviruses in feces are based on Reverse Transcription Polymerase Chain Reaction (RT-PCR) assay. The RT-PCR test is sometimes able to detect norovirus particles in feces up to seven days after onset of symptoms, although as each day passes, the number of norovirus particles may become diminished. Use of this test should enable the laboratory to confirm the detection of norovirus infections and reduce the number of "suspected" viral or "unknown" foodborne disease outbreaks.

Detection of viruses in food is not possible in a routine laboratory because norovirus particles do not grow or multiply in a contaminated food and require a living host for growth. The use of RT-PCR is being evaluated for detection of viruses in foods implicated as the source of outbreaks, but is still under investigation.

Summary

All foodborne noroviruses originate from the human intestine; contamination of food can occur either during preparation by infected food workers or fecally contaminated water. Viruses are too small to be seen with a conventional microscope, cannot be cultured on bacterial media, and can cause diseases that cannot be successfully treated with conventional drugs. Control measures mainly depend on staff education and good personal and kitchen hygiene. All staff should be made aware of the ease with which foods can be contaminated by viruses; food workers experiencing signs or symptoms of illness should be excluded from work immediately. The use of clean water for irrigation of crops that are likely to be eaten raw and cultivation of molluscan shellfish in sewage-free seawater are also essential to prevent viral contamination of food.

Waterborne outbreaks

During 1995 - 2004, a total of 30 WBOs were reported to the BCDP / CDES. These outbreaks accounted for over 629 illnesses, 77 hospitalizations, but no fatalities.

Table 5. Morbidity, etiologic agents and mode of infection associated with Wisconsin waterborne outbreaks, 1995-2004.

Etiologic Agent	# WBOs	Ill	Hosp.	Fatal	Ingestion	Contact	Inhalation
Bacterial							
Campylobacter jejuni	2	33	2	0	2	0	0
E. coli O157:H7	3	22	8	0	3	0	0
Legionella pneumophila	3	39	4	0	0	0	3
Legionella micdadei	1	68	45	0	0	0	1
Pseudomonas aeruginosa	5	69	4	0	0	5	0
Bacterial Total	**14**	**231**	**64**	**0**	**5**	**5**	**4**
Parasitic							
Cryptosporidium parvum	6	59	9	0	6	0	0
Viral							
Norovirus	4	190	0	0	4	0	0
Rotavirus	1	26	1	0	1	0	0
Viral Total	**5**	**216**	**1**	**0**	**5**	**0**	**0**
Chemical							
Copper	1	22	0	0	1	0	0
Nitrates	1	1	1	0	1	0	0
Chemical Total	2	23	1	0	2	0	0
Multiple Organisms							
Cryptosporidium, Norovirus & *Shigella sonnei*	1	61	2	0	1	0	0
Unknown							
Unknown	2	39	0	0	2	0	0
Totals	**30**	**629**	**77**	**0**	21	5	4

Bacterial agents accounted for the most frequent (47%) class of etiologic agents reported for WBOs (Table 5). *Cryptosporidium parvum* (20%) was the most common etiologic agent for WBOs. *Pseudomonas aeruginosa* causes a contact dermatitis ("*Pseudomonas* folliculitis") commonly associated with hot tubs, whirlpools, saunas, swimming pools, waterslides and physiotherapy pools. It was the third most common etiologic agent among WBOs and involved seven (16%) of the 30 WBOs (Figures 4 & 5).

Figure 4. Etiologic class of agents responsible for Wisconsin waterborne outbreaks (n=30), 1995-2004

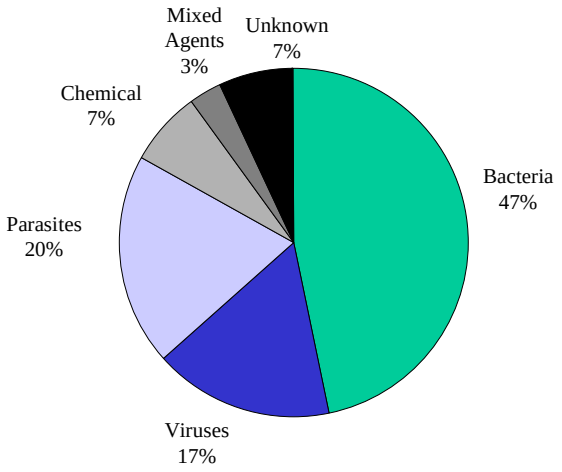
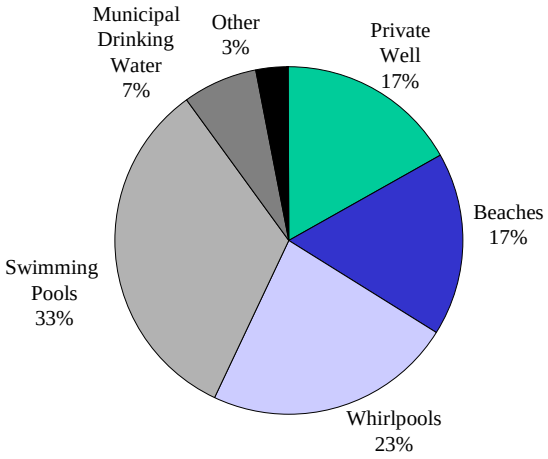


Figure 5. Sources of Wisconsin waterborne outbreaks (n=30), 1995-2004



In 1995, Wisconsin recorded its first waterborne outbreak in recreational water caused by *E. coli* 0157:H7 an organism more commonly thought to be associated with undercooked ground beef. This reinforces the importance of reviewing clinical data, epidemiologic data and laboratory results to get the whole diagnostic picture.

Waterborne outbreaks (n=30) were reported in 19 Wisconsin counties between 1995-2004: Jefferson = 5, Dane = 4, Door = 3, Eau Claire and Grant = 2 each, Ashland, Barron, Chippewa, Green Lake, LaCrosse, Lafayette, Manitowoc, Oneida, Price, Rock, Sawyer, Washington, Waupaca and Wood = 1 each.

Table 6. WBOs in Wisconsin, 1995-2004

Etiologic Agent	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Totals
Bacterial											
Campylobacter jejuni							1			1	2
E. coli O157:H7	1				1				1		3
Legionella micdadei				1							1
Legionella pneumoniae		1				1			1		3
Pseudomonas aeruginosa		1		2			1			1	5
Viral											
Norovirus	1			1		1		1			4
Rotavirus	1										1
Parasitic											
Cryptosporidium parvum				3	1				1	1	6
Chemical											
Copper	1										1
Nitrates					1						1
Unknown		1								1	2
Multiple Agents*								1			1
Total	4	3	0	7	3	2	2	2	3	4	30

* Beach outbreak with Norovirus, *Shigella sonnei, Cryptosporidium parvum*

III. ROLES AND RESPONSIBILITIES

III. ROLES AND RESPONSIBILITIES

Food worker

"Any person knowingly infected with a disease in a form that is communicable by food handling who handles food products to be consumed by others and any persons knowingly employing or permitting such a person to handle food products to be consumed by others shall be punished as provided by s. 252.25." (Wisconsin State Statutes)

1. Maintain good personal hygiene, including frequent and thorough hand washing practices.
2. Practice good food handling procedures.
3. Notify employers of illness, and exclude self from work when ill with gastrointestinal symptoms (e.g., abdominal cramping, vomiting, diarrhea, jaundice), optimally for 48-72 hours following resolution of symptoms. This may also apply when the food worker has exposed skin lesions.
4. Fully cooperate with LHD during investigations of foodborne illness.

Food establishment licensee

1. Train employees and management as to proper food handling practices and hand washing.
2. Exclude employees with apparent gastrointestinal illness or exposed skin lesions from work.
3. Avoid practices that punish or discourage employees from reporting illness.
4. Cooperate with LHDs during investigations of foodborne illness.
5. Provide adequate toilet and hand washing facilities for employees and ensure proper use.

Physicians, Health care providers

"Any person licensed, permitted, registered or certified under ch. 441 or 448 knowing or having reason to know that a person treated or visited by him or her has a communicable disease, …., shall report the appearance of the communicable disease or the death to the local health officer."

1. Report to LHD by telephone immediately upon recognition of a suspected outbreaks. Although not required by law, the physician should consider contacting the LHD regarding any person with a communicable enteric disease that they know works as a food worker.
2. Cooperate with LHD in the investigation and control of an outbreak, including collecting specimens if requested.
3. Encourage patients to adhere to the prevention and control recommendations of the LHD.

Local health department

"Local health officers may do what is reasonable and necessary for the prevention and suppression of disease;..."

1. Conduct the initial investigation of a suspected outbreak. The investigation should be directed by the LHD in whose jurisdiction the outbreak originated.
2. Provide direction to food establishment operators regarding the application and removal of food employee exclusions and restrictions.
3. Immediately notify the CDES and/or LHS&EMS Regional Office of any outbreak as early in the investigation as possible.
4. Request assistance of the CDES and/or LHS&EMS Regional Office, if needed, to control the spread of the outbreak.
5. Obtain clinical and environmental specimens, conduct interviews, compile line lists, record onset times and other important epidemiologic data.
6. Provide education to food workers regarding proper food handling and personal hygiene.
7. Complete a foodborne or waterborne outbreak report and mail a copy to CDES. (This may be done in conjunction with the CDES).
8. Maintain an ongoing foodborne disease complaint file or log.
9. Assume costs of the investigation. BCDP will cover expenses incurred by CDES staff when on-site.

Bureau of Local Health Support & Emergency Medical Services - Regional Office Director and Staff

1. Provide assistance in coordinating outbreak investigations (especially those involving multiple jurisdictions) and ensure the involvement of all appropriate local agencies.
2. Provide consultation and obtain appropriate technical assistance for the LHD in epidemiologic investigation of disease outbreaks.
3. Assign appropriate regional staff (e.g., public health nurses, sanitarians, nutritionists, educators, regional staff) to participate in investigations, as needed.
4. Notify CDES of all investigations, and other agencies indicated in Appendix B as necessary.
5. Assist the LHDs in completing outbreak investigations, initiating control measures, and submitting the DPH and/or CDC report forms to CDES.

Regional Public Health Sanitarian or Agency Sanitarian

1. Coordinate environmental investigation with epidemiologic investigations being conducted by LHDs.
2. Inspect establishment and enforce rules pertaining to the regulation of hotels, tourist rooming houses, bed & breakfast establishments, restaurants, food and beverage machines, vending commissaries, campgrounds, public swimming pools, recreational and educational camps.

3. Conduct or direct a complete sanitation investigation of the facility or site of a suspected outbreak. Do a Hazard Analysis and Critical Control Points (HACCP) investigation for implicated food(s).
4. Collect food, water, and other specimens as needed.
5. Consult and participate (as needed) in investigations of outbreaks not specifically involving licensed facilities or sites.
6. Send copy of the sanitarian's inspection report and narrative of inspection to LHD and CDES.

Bureau of Communicable Diseases and Preparedness / Communicable Disease Epidemiology Section

1. Provide consultation and technical assistance to regional office staff and LHD staff in the epidemiologic investigation of disease outbreaks.
2. Provide guidelines for the epidemiologic investigation and control of a specific outbreak consistent with state and national objectives, current policy, and current medical and scientific literature.
3. Determine whether a particular outbreak warrants further epidemiologic investigation and the nature and extent of additional epidemiologic or laboratory data required.
4. Keep BEOH and regional offices informed of the progress of any outbreak investigation.
5. Identify and arrange for additional staff and material resources from the BCDP if an outbreak exceeds the resource capacity of the LHD and the regional office.
6. Provide advice on collection of food, water, or other specimens in coordination with WSLH and/or DATCP / BLS.
7. Recommend and request implementation of control measures.
8. Maintain and distribute surveillance information and summary reports relating to outbreaks to LHDs, regional offices, physicians and other agencies.
9. Provide training materials instructive in the methods of outbreak investigations.

Bureau of Environmental and Occupational Health

1. License the following establishments and facilities regulated under Chapter 254, ENVIRONMENTAL HEALTH, Subchapter IV and VII of the Wisconsin Statutes: restaurants, hotels, motels, tourist rooming houses, public swimming pools, recreational and educational camps, bed and breakfast establishments, vending commissaries, and food vending machines.
2. Provide technical assistance, training and support to regional offices and agent health departments, when requested, regarding the investigation and follow-up of outbreaks related to the above-mentioned licensed establishments.
3. Contract with LHD agents to provide investigation services for the above-mentioned establishments and facilities within their jurisdiction.

Note: Not all LHDs are agents for the BEOH. Only those LHDs with qualified personnel and an "Agent Terms of Agreement" are considered agents by BEOH for the purpose of licensing and inspecting facilities and establishments regulated under Chapter 254, Subchapter IV and VII of the Wisconsin Statutes.

4. Monitor and evaluate the inspection and enforcement procedures and practices of regional offices and agent health department environmental sanitation programs to promote uniform interpretation and application of rules relating to the above-mentioned licensed establishments.
5. Evaluate regional office and agent health department policies and procedures for the investigation of food and waterborne disease complaints and suspected outbreaks.
6. In conjunction with regional office sanitarians and LHD, take official action to close DPH licensed facilities and establishments if necessary and direct the implementation of other control measures as needed.
7. Authorize the reopening of the above facilities and establishments when an investigation determines that the threat to public health no longer exists.

Wisconsin State Laboratory of Hygiene

1. Provide consultation regarding proper collection and handling of clinical or environmental specimens.
2. Test clinical or environmental specimens for evidence of microorganisms, microbial toxins.
3. Report laboratory test results to LHD and CDES.
4. Forward specimens to CDC for more specific testing when indicated or requested by CDES or CDC for surveillance purposes.

Wisconsin Department of Agriculture, Trade and Consumer Protection and Bureau of Laboratory Services

1. Assure good manufacturing practices in all commercial food operations, prevent contamination at producer or packer level, and perform testing of food products distributed in Wisconsin.
2. Test dairy, meat and food products, including fruits and vegetables to determine if food is microbiologically or chemically contaminated.
3. If a suspected vehicle of human illness is a commercial food product (dairy, processed food, beef, poultry or fruits and vegetables) produced in Wisconsin or may have been contaminated while in storage, distribution, or sale in Wisconsin, the DATCP will:
   - Conduct appropriate testing of suspect product.
   - Check plant records and inspect to determine if good manufacturing practices were or are followed and if contamination may have occurred.
   - Coordinate recall and/or public notice if contaminated food is in distribution.

4. Inform CDES staff of significant findings related to outbreak investigations and product recalls.

Bureau of Quality Assurance

1. Conduct surveys and complaint-related investigations of nursing homes, general and special hospitals, home health agencies and other health care providers to determine compliance with state licensure rules and federal Title 18/19 certification regulations.
2. Conduct epidemiologic investigations, in cooperation with the LHD, at a health care facility when an outbreak is suspected to determine the cause and prevent further infections.
3. Evaluate the facility's infection control techniques, food handling techniques, communicable disease-related procedures and communicable diseases reporting to assure that the measures comply with appropriate state and federal regulations and are properly implemented.
4. Take enforcement actions in the event the facility fails to comply with appropriate rules, regulations and procedures.

Wisconsin Department of Natural Resources

1. Issue boil water advisories as warranted.
2. Advise on water specimen collection and analysis interpretation.
3. Ensure correction of water supply system if necessary.

IV. STEPS IN INVESTIGATING AN OUTBREAK

IV. STEPS IN INVESTIGATING AN OUTBREAK

Prompt response to food or water-related complaints is the foundation of a successful investigation. Important steps and information necessary to determine the initiation and extent of an investigation include examination of test results and preliminary evidence such as onset times, symptoms and duration of illness, development of hypotheses, assessment of the magnitude of the problem, and evaluation of available resources.

Once an outbreak has been identified, immediately notify the CDES and/or the BLHS&EMS Regional Office, especially if there are cases from outside the jurisdiction of the LHD. These offices may assist in coordinating the investigation, assist in the investigation if requested by the LHD, and can be consulted on collection of food, clinical, or environmental specimens.

The procedure for the investigation and determination of the existence of an outbreak is reasonably standard regardless of the disease being investigated. The steps listed below are not sequential and some contingency planning can be done before an outbreak. The steps in this procedure include:

- preparation for a detailed epidemiologic investigation
- establish the existence of an outbreak or epidemic
- verify diagnosis
- formulate a tentative hypothesis
- put control measures into operation
- conduct the investigation
- relate the outbreak to time, place and person
- analyze and interpret data
- test hypothesis and formulate conclusions
- prepare a final report of the investigation

Preparation for a detailed epidemiologic investigation

Although the steps in investigating an outbreak are not always implemented sequentially, planning an epidemiologic investigation may be considered as the initial step in the process because part of the planning can be done before an outbreak occurs. The LHD can begin by training personnel in how to compile line lists, develop questionnaires, conduct interviews, and use EPI-INFO. The LHD should have 6-8 stool culture kits on hand or readily available should an outbreak occur because in most cases stool specimens must be collected within 72 hours of onset of illness to isolate and identify certain pathogens (e.g., *Clostridium perfringens*, *Bacillus cereus*, *Staphylococcus aureus*). Lists of contacts such as administrative contacts, additional personnel, sanitarians, regional contacts, physicians, clinical laboratories, or other persons who may become involved in outbreak investigations should be assembled. Resource materials describing signs and symptoms, incubation times and specifics regarding specimen collection and appropriate kits to be used should be maintained and readily available to those processing

the initial calls. This may help in formulating an initial hypothesis. It is also very important for the LHD to realize in advance the limits of the LHD's resources. It is critical to determine at the beginning of an outbreak investigation whether the LHD has the resources to properly conduct the investigation. If an outbreak investigation requires additional resources, they should immediately notify the CDES and/or the regional office. Once the investigation is underway, the proper clinical specimens should be collected as soon as possible before patients recover and become less likely to submit specimens, and before the general interest in the investigation wanes. All suspected outbreaks should be examined and a determination made regarding the feasibility of conducting an investigation even if the time to collect proper clinical specimens has passed. This is done in order to determine the source of the outbreak and to prevent similar outbreaks from recurring.

Establish the existence of an outbreak or epidemic

Establish the existence of an outbreak by comparing the incidence of the disease in a specified population during a comparable previous time period or when point source outbreaks occur. Be familiar with disease trends in the community and determine whether there actually is a higher than expected number of cases in a community. This can be done through diligent public health surveillance that provides an accurate assessment of the status of the health of the community and helps to determine any increases or decreases in communicable diseases in the local population. Surveillance data should be reviewed by the LHD on a regular basis to become familiar with the status of all communicable diseases in the area of jurisdiction. Be aware of artificial causes of increases such as: (1) changes in local reporting, (2) changes in case definitions of reportable diseases, (3) increased local or national interest in particular diseases, (4) new physicians in the area, (5) new diagnostic procedures which might identify new or existing infectious agents, and (6) increased populations or new arrivals into the area.

Verify diagnosis

Analyze clinical histories of cases and have laboratory tests performed in order to confirm the etiologic agent associated with the illness. Clinical, laboratory and epidemiologic evidence should be considered. Verify that laboratory results are consistent with the clinical evidence as laboratory errors sometimes occur. In verifying the diagnosis, it is crucial to collect clinical and environmental samples as soon as possible because many etiologic agents become more difficult to isolate with time (e.g., *Bacillus cereus*, *Clostridium perfringens, Staphylococcus aureus*). As case-patients begin to recover they may become more reluctant to submit clinical samples. Also, when delay occurs, environmental samples are more likely to be discarded or disinfected.

Formulate a tentative hypothesis

Formulate a tentative hypothesis to explain the most likely cause of illness, etiologic agent, vehicle, and distribution of cases. Hypothesis generating is an ongoing process. It may begin with the first phone call. This hypothesis may be based on known incubation periods, symptoms,

duration of illness or foods eaten, as well as knowledge about the various agents responsible for outbreaks. The tentative hypothesis directs the course of an investigation and control measures, and is tested by data gathered during the investigation. Develop several hypotheses if necessary. A series of hypotheses may evolve during an investigation. First, facts are examined and broad hypotheses are formulated. As more facts are gathered, a more specific hypothesis may be formulated. Confirm the diagnosis if laboratory testing has been completed. Examine case histories to determine if there are common exposures, or if signs and symptoms and onset of illness are consistent with etiologic agents. Next, additional facts to test the new hypothesis are gathered. The cycle is continued as necessary. Consult the CDES if your LHD needs assistance generating hypotheses.

Put control measures into operation

The priority during each investigation should be to implement effective control measures. This should be done early in the course of the investigation based on the initial hypotheses. Factors to consider when determining the most effective control measures include the extent of the illness, who was affected, when and where did the critical exposure take place, what was the vehicle, how was the disease transmitted, what is the etiologic agent and whether or not there is a potential for ongoing or future transmission. Control measures should focus on specific agents, sources, or reservoirs of infection and should be targeted to interrupt the transmission of disease or reduce exposure to disease. These measures should be instituted as soon as possible to control the current problem and demonstrate to the community that efforts are being made to control the problem. Use the information collected during the investigation to control the current situation and to prevent future problems in the community.

Conduct the investigation

1. Prepare a line list of ill persons listing signs, symptoms, onset times, duration of illness.
2. Gather appropriate community and environmental information; investigate potential sources of the responsible agent and factors that may have contributed to the outbreak.
3. Obtain clinical specimens (usually stool specimens) from up to **10** ill case patients for laboratory analysis of enteric pathogens.
4. When possible, obtain samples of implicated food or environmental samples for laboratory analysis. **Hold these samples under refrigeration until a known etiologic agent has been identified.**

Relate the outbreak to time, place and person

If an outbreak occurs following a common meal or exposure (e.g., wedding, parties), conduct a survey of known cases to investigate commonalties, such as onset of illness (**time**), population characteristics (e.g., age, gender) (**person**) and where they could have been infected or exposed (**place**). If an outbreak does not have an established common meal or exposure (e.g., an increase of cases of illness in a community within a close time frame), it may be necessary to start with an

informational or a more general survey in order to select case patients. Develop a questionnaire and perform a case-control study or cohort study. It is imperative to interview non-ill (control) persons who are similar or had similar experiences regarding time and place to those ill. Begin by interviewing and analyzing data from **20-25 ill** persons (if available) **AND 20-25 well** persons who had the same exposures but remained well. Obtain identifying information (name, address, telephone number, etc.); demographic information (age, sex, race, occupation or group characteristics); and clinical information (symptoms, onset times, and duration of illness).

Establish a Case Definition. Begin with broad or "loose" definitions that may be narrowed as more cases are defined. Classify cases as "lab-confirmed" or "probable". Not all cases need to be lab-confirmed. Make case counts and relate these to the appropriate population to determine those groups at risk (e.g., same age groups, same sex, and occupation). Develop a line listing of cases. Contact those with information on the illness or environmental circumstances contributing to the outbreak (e.g., physicians, sanitarians). When attempting to identify cases, additional contacts may need to be surveyed such as physicians, clinics, hospitals, laboratories and friends of case-patients. In some situations the media may be used to solicit case-patients, but this approach should be considered carefully to avoid biasing an epidemiologic investigation and damaging the reputation of local establishments unnecessarily.

Analyze and interpret data

Summarize field investigations. Compare and interpret all information collected and results of tests conducted. Construct **epidemic curves** to detect the course of the outbreak and to determine if the illness originated from a single source or is on going, calculate **attack rates**, develop appropriate **tables** and charts, apply **statistical tests (EPI-INFO software)** and interpret the cumulative data. Define the geographic extent of the outbreak and the population at risk.

Test hypothesis and formulate conclusions

Accept or reject the hypothesis on the basis of the available data and appropriate statistical analysis. For a hypothesis to be accepted, the patterns of disease must fit the nature of the agent, its source, its mode of transmission, and the contributory factors that allowed the outbreak to occur. If the hypothesis is rejected, another hypothesis should be developed and additional data gathered in order to test this new hypothesis. A more systematic study can be conducted as needed to improve the sensitivity and specificity of the findings, establish the true number of cases, and assist in arriving at more definitive conclusions.

Prepare a final report of the investigation

Investigations should be summarized as soon as completed and a final report sent to the CDES. These can also be done with the assistance of the CDES. These final reports serve as a record of the rationale and provide documentation for the activities conducted during the investigation. The final report can also be used to improve future investigations and prevention

measures. The report should follow the usual **scientific format** of introduction, background, methods, results, discussion, references and recommendations (See below). Do not use the names of case-patients. The names of LHD personnel or authorized personnel involved in the investigation may be included. The names of facilities or locations where the outbreak occurred may be included at the discretion of the LHD.

The **background** is a short paragraph describing why the outbreak investigation was initiated and may include who was affected, how many people were ill and how many exposed, where the outbreak occurred, the severity and clinical presentation of the cases. Note whether or not the outbreak involved a particular setting or social event (e.g., school, restaurant, wedding, festival) or to particular population (e.g., nursing home, day care center).

The **methods** section should list how cases were identified, how questionnaires were developed, methods used to collect data, as well as clinical and environmental samples, laboratory tests performed, statistical methods (e.g., EPI-INFO software), control methods instituted, and other features of the investigations used during the outbreak investigation.

The results section should list what was discovered in the investigation, results of laboratory testing of clinical or environmental samples, results of the epidemiologic investigation, the sanitarian's report, statistical results, epi-curves, tables, charts and other studies used during the investigation.

The **discussion** should briefly summarize the findings of the investigation. Evaluate the control and methods used in the investigation. Were they successful? Could they be instituted in similar outbreaks in the future or how should they be changed? What problems were encountered by the LHD? Is the current surveillance program sufficient to identify and control future outbreaks? List any important or unique aspects of the outbreak or a specific disease agent uncovered during the investigation.

V. REFERENCES AND WEB SITES

V. REFERENCES

The following references are recommended for LHDs as guides in investigating outbreaks or other sporadic cases of infectious diseases.

FOODBORNE DISEASES AND OUTBREAKS

1. CDC. Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians and Other Health Care Professionals. *MMWR* 2004;53(No. RR-4):1-33.
2. CDC. Diagnosis and Management of Foodborne Illnesses: A Primer for Physicians. *MMWR* 2001;50(No. RR-2):1-69.
3. CDC. "Norwalk-like viruses:" Public health consequences and outbreak management. *MMWR* 2001;50(No. RR-9):1-17.
4. CDC. Surveillance of foodborne-disease outbreaks -- United States, 1993-1997. *MMWR* 2000;49(No.SS-01):1-66.
5. Heymann DL, ed. *Control of Communicable Diseases Manual*. 18th ed. Washington, DC: American Public Health Association, 2004.
6. Cliver DO, ed. Foodborne Diseases. San Diego, CA. Academic Press, Inc. 1990.
7. EPINET Manual. Madison, WI: Wisconsin Division of Public Health, Communicable Disease Epidemiology Section, (Revised December 2004).
8. *Giardia*: Guidelines for Prevention and Control for Local Health Departments. Madison, WI: Wisconsin Division of Public Health, BCDP / CDES, 1996.
9. Gregg, MB, ed. Field Epidemiology. New York, NY: Oxford University Press, 1996.
10. Hepatitis A: A Handbook for Public Health Personnel. Madison, WI: Wisconsin Division of Public Health (POH 4554), DHFS, Communicable Disease Epidemiology Section, 1992.
11. Tauxe RV, Swerdlow DL,, Hughes JM. Foodborne disease. In: Mandell GL, Bennett JE, Dolin R, eds. *Principles and Practice of Infectious Diseases*, 5th ed. New York: Churchill Livingston; 2000:1150-1165.
12. Tauxe RV. Emerging foodborne diseases: an evolving public health challenge. *Emerging Infectious Diseases* 1997;3:425-434. [serial online] www.cdc.gov/ncidod/eid/vol3no4/tauxe.htm

WATERBORNE DISEASES AND OUTBREAKS

1. CDC. Surveillance for Waterborne-Disease Outbreaks - United States, 1999-2000. *MMWR* 2002;51(No. SS-8): 1-48.
2. CDC. *Cryptosporidium* infections associated with swimming pools - Dane County, Wisconsin, 1993. *MMWR* 1994;43(31):561-563.
3. CDC. Swimming-associated cryptosporidiosis - Los Angeles, County. *MMWR* 1990; 39(20):343-345.

Reference list of communicable disease information on the World Wide Web:

Note: Care should be used when referencing materials from the Internet because of misinformation may be present from any number of unofficial or independent sites. The web sites listed below are scientifically accurate and originate from reputable sources.

1. **Centers for Disease Control and Prevention (CDC)**
   (Health and travelers health information, immunizations, health news releases, publications, training opportunities)
   http://www.cdc.gov
2. **Emerging Infectious Diseases Homepage**
   (Current scientific articles on emerging diseases)
   http://www.cdc.gov/ncidod/EID/eid.htm
3. **Fight Bac**
   (Consumer information site on food safety and food handling issues)
   http://www.fightbac.org
4. **"The Scrub Club"**
   (FDA consumer information site for kids on proper handwashing)
   http://www.scrubclub.org
5. **Prevention Guideline to Promote Your Personal Health and Safety**
   (Information on safety issues following floods)
   http://www.cdc.gov/nceh/programs/emergenc/prevent/flood/flood.htm
6. **MEDLINE**
   (World's most extensive collection of current published medical information, free Med-line searches)
   http://www.nlm.nih.gov
7. **National Food Safety Database**
   (Consumer information related to food safety)
   http://www.foodsafety.org
8. **U.S. Dept. of Agriculture (USDA)**
   (Current topics related to food issues)
   http://www.usda.gov/agency/fsis
9. **U.S. Environmental Protection Agency (EPA) - Beach Program**
   (Information on beach closings, swimming advisories, contacts for additional information on beach water quality)
   http://www.epa.gov/OST/beaches
10. **U.S. Environmental Protection Agency (EPA) - Microbiology Homepage**
    (Water-related issues, waterborne disease, regulations)
    http://www.epa.gov/microbes

11. U.S. Environmental Protection Agency (EPA)-Office of Ground Water and Drinking Water

(Consumer site for current ground water and drinking water information, publications and regulations)

http://www.epa.gov/OGWDW

12. U.S. Food & Drug Administration (FDA) - FDA News and Publications

(Press releases, publications and issues related to current food issues)

http://www.fda.gov/opacom/hpnews.html

13. Wisconsin Dept. of Health & Family Services (DHFS)

(Programs, employment, training and resource materials)

http://dhfs.wisconsin.gov

14. Wisconsin Dept. of Natural Resources (DNR)

(Directory of WDNR departments, services, permits, etc.)

http://www.dnr.state.wi.us

15. World Health Organization (WHO)

(Current health issue press releases, fact sheets and general information on international health)

http://www.who.ch/

VI. APPENDICES

APPENDIX A

Criteria for Confirmation of Etiologic Agents

Table 7A. Criteria for confirmation of bacterial agents responsible for foodborne and waterborne illness.

Etiologic Agent	Incubation Period Average (Range)	Clinical Syndrome	Characteristic Foods
Bacillus cereus	**A. Vomiting type** 2-4 hours (1-6 hours) **B. Diarrheal type** 12 hours (4-16 hours)	A. Vomiting, nausea, occasional diarrhea (Heat-stable enterotoxin) B. Diarrhea (watery), abdominal cramps (Heat-labile enterotoxin)	A. Boiled or fried rice B. Custards, sauces, meat loaf, cereal products, refried beans, dried potatoes
Campylobacter jejuni	2-5 days (1-10 days)	Abdominal cramps (often severe), diarrhea, bloody diarrhea, fever, headache	Poultry, unpasteurized milk, water, raw clams
Clostridium botulinum	12-48 hours (2 hours -8 days)	Acute bilateral cranial nerve impairment and descending weakness or paralysis; usually preceded by blurred or double vision, difficulty swallowing, dry mouth, vomiting and constipation	Canned low-acid foods, smoked fish, cooked potatoes, marine mammals
Clostridium perfringens	10-12 hours (6-24 hours)	Diarrhea (watery), colic, nausea and gas (Vomiting and fever are uncommon and symptoms usually resolve within 24 hours).	Inadequately heated or reheated meats, meat pies, stews, gravy, sauces, refried beans
Escherichia coli (Enteroinvasive or Enterotoxigenic)	10-12 hours (Heat-stable toxin) 10-12 hours (Heat-labile toxin)	Profuse watery diarrhea without blood or mucus, abdominal cramping, vomiting, low-grade fever and dehydration	A. Uncooked vegetables, salads, water
E. coli 0157:H7 (Enterohemorrhagic)	48-96 hours (up to 10 days)	Bloody or non-bloody diarrhea, severe abdominal cramps and occasional vomiting; fever infrequent	B. Undercooked ground beef and beef, raw milk, soft cheese, water
Salmonella spp. (Non-typhoid)	18-36 hours (12-72 hours)	Acute enterocolitis, diarrhea, fever, nausea, abdominal cramps, headache, occasional vomiting.	Poultry, egg products, meat, unpasteurized milk
Salmonella Typhi	3 days - 3 months (1-3 weeks)	Insidious onset of fever, headache, malaise, constipation or diarrhea, anorexia	Fecally contaminated foods such as shellfish, raw fruits, and water
Shigella	24-72 hours (12-96 hours)	Diarrhea, fever, nausea, vomiting, tenesmus, severe abdominal cramping	Fecally contaminated foods such as salads, cut fruit and water
Staphylococcus aureus	2-4 hours (1-8 hours)	Sudden onset of severe abdominal cramps, nausea, vomiting, diarrhea, chills, headache, weakness, dizziness	Ham, meat & poultry, cream filled pastries, custard, high protein leftover foods
Vibrio cholerae 01 or 0139	24-72 hours (few hours - 5 days)	Sudden onset of profuse watery diarrhea, rapid dehydration, vomiting	Raw fish or shellfish, crustacea, water, fecally contaminated foods
Vibrio cholerae non-01		Watery diarrhea, vomiting	
Vibrio parahaemolyticus	12-24 hours (4-96 hours)	Watery diarrhea, abdominal cramps, nausea, vomiting, fever, headache	Marine fish, shellfish, crustacea (raw or contaminated)
Vibrio vulnificus	24-48 hours	Fever, nausea, abdominal cramps and muscle aches; often leads to septicemia in immunocompromised persons	raw oysters

Table 7B. Criteria for confirmation of bacterial agents responsible for foodborne and waterborne illness.

Etiologic Agent	Laboratory and Epidemiologic Criteria for Confirmation	Specimen	WSLH Kit #
Bacillus cereus	Isolation of 10^6 *B. cereus*/gm of implicated food, **OR** Isolation of *B. cereus* from stool of ill person.	5-50 g stool	Kit # 10
Campylobacter jejuni	Isolation of *C. jejuni* from implicated food, **OR** Isolation of *C. jejuni* from stool or blood of ill person.	15 ml stool	Kit # 10
Clostridium botulinum	Detection of *C. botulinum* toxin from implicated food, **OR** Detection of *C. botulinum* toxin from human sera, or feces, **OR** Isolation of *C. botulinum* from stool of persons with clinical syndrome, **OR** Consistent clinical syndrome in persons known to have eaten same food as persons with laboratory proven cases.	25-50 g stool	sterile, leak-proof container
Clostridium perfringens	Isolation of $>10^5$ *C. perfringens*/gm of implicated food, **OR** Isolation of *C. perfringens* in stool of ill persons, **OR** Detection of enterotoxin by latex agglutination (from stool extracts of culture isolates).	5-50 g stool	Kit # 10
Escherichia coli (Enteroinvasive or Enterotoxigenic) *E. coli* 0157:H7 (Enterohemorrhagic)	Demonstration of *E. coli* of same serotype in implicated food and stools in persons, **OR** Isolation of *E. coli* of the same serotype shown to be enteroinvasive or enterotoxigenic from stool of ill persons, **OR** Demonstration of *E. coli* isolates from stools that are enterotoxigenic or enterohemorrhagic.	15 ml stool	Kit # 10
Salmonella spp. (Non-typhoid)	Isolation of *Salmonella* from implicated food or water, **OR** Isolation of *Salmonella* from stool from ill persons.	15 ml stool	Kit # 10
Salmonella typhi	Isolation of *S. typhi* from blood, stool or other clinical specimens.	15 ml stool	Kit # 10
Shigella	Isolation of *Shigella* from implicated food, **OR** Isolation of *Shigella* from stool of ill persons.	15 ml stool	Kit # 10
Staphylococcus aureus	Isolation of an enterotoxin producing strain of *S. aureus* in implicated food, **OR** Isolation of enterotoxin producing strain of *S. aureus* from stool of ill persons	5-50 g stool	Kit # 10
Vibrio cholerae 01 or 0139 *Vibrio cholerae* non-01	Isolation of toxigenic *V. cholerae* 01 or 0139 from implicated food, **OR** Isolation of *V. cholerae* 01 or 0139 from stool or vomitus of ill persons, **OR** Significant rise (fourfold) in vibriocidal antibodies. Isolation of *V. cholerae* non-01 from stool of ill person. Isolation of *V. cholerae* non-01 from implicated food is supportive evidence.	15 ml stool	Kit # 10
Vibrio parahaemolyticus	Isolation of 10^5/g *V. parahaemolyticus* from implicated food (usually seafood), **OR** Isolation of V. *parahaemolyticus* from stool of ill persons.	15 ml stool	Kit # 10
Vibrio vulnificus	Isolation of *V. vulnificus* from blood of ill persons.	Blood	Sterile Container

Table 8A. Criteria for confirmation of viral agents responsible for foodborne and waterborne illness.

Etiologic Agent	**Incubation Period** Average (Range)	**Clinical Syndrome**	**Characteristic Foods**
Hepatitis A virus	28-30 days (15-50 days)	Acute febrile illness with anorexia, fever, abdominal discomfort, nausea, jaundice	Fecally contaminated cold foods or water, raw shellfish
Norovirus (formerly called "Norwalk-like" viruses)	30-36 hours (10-96 hours)	Nausea, vomiting (often projectile), diarrhea, abdominal cramps, muscle aches, headaches, low-grade fever	Fecally contaminated cold foods or water, oysters or clams, frostings

Table 9A. Criteria for confirmation of parasitic agents responsible for foodborne and waterborne illness.

Etiologic Agent	**Incubation Period** Average (Range)	**Clinical Syndrome**	**Characteristic Foods**
Cyclospora cayetanensus	7 days (1-11 days)	Fatigue, protracted watery diarrhea, often relapsing	Fecally contaminated fruits, produce or water
Cryptosporidium parvum	7 days (2-12 days)	Profuse watery diarrhea, abdominal cramps, nausea, low-grade fever, anorexia, vomiting	Fecally contaminated fruits, produce or water
Entamoeba histolytica	2-4 weeks (few weeks - several months	Illness of varying severity ranging from mild chronic diarrhea to fulminant dysentery	Fecally contaminated fruits, produce or water
Giardia lamblia	7-10 days (2-25 days)	Diarrhea, abdominal cramps, bloating, weight loss, malabsorption; infected persons may be asymptomatic	Fecally contaminated fruits, produce or water
Trichinella spiralis	8-15 days (5-45 days)	Initially diarrhea, nausea, vomiting, abdominal discomfort, muscle aches, edema of the eyelids; variable symptoms depending on the number of larvae ingested	Undercooked pork or bear meat

Table 8B. Criteria for confirmation of viral agents responsible for foodborne and waterborne illness.

Etiologic Agent	Laboratory and Epidemiologic Criteria for Confirmation	Specimen	WSLH Kit #
Hepatitis A virus	Positive anti-HAV IgM test, **OR** Liver function tests compatible with hepatitis in persons who ate the implicated food.	3 ml serum or 7ml vacutainer, no additives	Kit # 22
Norovirus (formerly called "Norwalk-like" viruses)	Diagnosed is often based on symptoms, onset times, and ruling out other enteric pathogens, **OR** Identification of virus in stool by polymerase chain reaction (PCR).	15 ml stool	Kit # 10

Table 9B. Criteria for confirmation of parasitic agents responsible for foodborne and waterborne illness.

Etiologic Agent	Laboratory and Epidemiologic Criteria for Confirmation	Specimen	WSLH Kit #
Cyclospora cayetanensus	Demonstration of *C. cayetanensus* in stool of two or more ill persons.	Walnut-sized stool	Kit # 3 or 10% formalin
Cryptosporidium parvum	Isolation of *C. parvum* oocysts from implicated food, **OR** Isolation of *C. parvum* oocysts from stool of ill persons**, OR** Demonstration of *C. parvum* in intestinal fluid, or small bowel biopsy specimens, **OR** Demonstration of *C. parvum* antigen in stool by a specific immunodiagnostic test (e.g., enzyme-linked immunosorbent assay (ELISA).	Walnut-sized stool	Kit # 3 or 10% formalin
Entamoeba histolytica	Isolation of *E. histolytica* from stool of ill persons, **OR** Demonstration of *E. histolytica* trophozoites in tissue biopsy, culture or histopathology	Walnut-sized stool	Kit # 3 or 10% formalin
Giardia lamblia	Isolation of *G. lamblia* cysts from implicated food or water, **OR** Isolation of *G. lamblia* from stool of ill persons, **OR** Demonstration of *G. lamblia* trophozoites in duodenal fluid or small bowel biopsy, **OR** Demonstration of *G. lamblia* antigen by specific immunodiagnostic test (e.g., direct fluorescent antigen (DFA)).	Walnut-sized stool	Kit # 3 or 10% formalin
Trichinella spiralis	Detection of *T. spiralis* from muscle biopsy from ill person, **OR** Fourfold change or positive serologic test, **OR** Demonstration of *T. spiralis* in implicated food, OR Associated cases are confirmed if patient ate epidemiologically linked meal and is clinically compatible.	Tissue or serum	Sterile container

Table 10A. Criteria for confirmation of other agents responsible for foodborne and waterborne illness.

Etiologic Agent	**Incubation Period** Average (Range)	**Clinical Syndrome**	**Characteristic Foods**
Heavy metals (antimony, cadmium, copper, iron, tin, zinc)	Usually < 1 hour (5 minutes - 8 hours)	Compatible clinical syndrome - usually gastroenteritis with metallic taste	High acid foods/beverages stored or prepared in containers coated, lined, or contaminated with the offending metal
Scombroid fish poisoning	Usually < 1 hour (1 minute - 3 hours)	Flushing, headache, dizziness, burning of mouth and throat, upper and lower gastrointestinal symptoms, urticaria and generalized pruritis	Temperature abused fish (especially tuna, mahi-mahi, mackerel, bluefish)
Ciguatoxin	2-8 hours (1-48 hours)	Gastrointestinal symptoms followed by neurologic manifestations, including pricking or burning sensation of lips, tongue or extremities, reversal of hot/cold sensations	Fish (especially snapper, grouper, amberjack)
Paralytic shellfish poisoning (PSP)	30 minutes - 3 hours	First symptoms include tingling and numbness of lips and mouth, spreading to adjoining parts of face; symptoms vary depending on type, amount and retention of toxins in the body	Shellfish
Mushroom poisoning	6-24 hours (1-24 hours)	Initially nausea, vomiting, watery diarrhea which may progress to liver failure and death	Mushrooms (usually of the genus *Amanita*)
Monosodium glutamate poisoning	Usually < 1 hour (3 minutes - 2 hours)	Burning sensation in chest, neck, abdomen or extremities, sensations of lightness and pressure over face, or heavy feeling in the chest	Food containing large amounts of MSG (usually >1.5g)

Table 10B. Criteria for confirmation of other agents responsible for foodborne and waterborne illness.

Etiologic Agent	Laboratory and Epidemiologic Criteria for Confirmation	Specimen	WSLH Kit #
Heavy metals (antimony, cadmium, copper, iron, tin, zinc)	Demonstration of high concentrations of metallic ion in implicated food or beverage (e.g., >400 ppm for tin).	*	*
Scombroid fish poisoning	Demonstration of elevated histamine levels (>50mg/100g) in implicated fish, cheese, or other food, **OR** Clinical syndrome in persons known to have eaten fish of Order *Scombrodei* or types of fish previously associated with scombroid poisoning (e.g., mahi-mahi, tuna, bluefish).	*	*
Ciguatoxin	Demonstration of ciguatoxin in implicated fish, **OR** Clinical syndrome in persons who have eaten a type of fish previously associated with ciguatera poisoning (e.g., amberjack, snapper, grouper).	*	*
Paralytic shellfish poisoning (PSP)	Detection of toxin in implicated mollusks, **OR** Detection of large numbers of shellfish poisoning-associated species of dinoglagellates in water from which implicated mollusks were gathered.	*	*
Mushroom poisoning	Demonstration of toxic chemical in implicated mushrooms, **OR** Epidemiologically implicated mushrooms identified as toxic.	*	*
Monosodium glutamate poisoning	History of ingesting implicated foods containing large amounts of MSG (usually >1.5g).	*	*

* If an outbreak involves any of the agents listed on these tables, immediately contact the BCDP / CDES and receive instructions as to which specimens to collect, how to transport these specimens.

APPENDIX B

Contact Agencies and Personnel

CONTACTS FOR OUTBREAK INVESTIGATIONS

Wisconsin Division of Public Health
One West Wilson St.; Madison, WI; 53701
http://dhfs.wisconsin.gov/aboutDHFS/dph/dph.htm

Direct contacts for outbreak investigations:

BUREAU OF COMMUNICABLE DISEASES AND PREPAREDNESS (BCDP)

Jeffrey Davis, MD	State Epidemiologist/ Chief Medical Officer	608-267-9003	davisjp@dhfs.state.wi.us

Communicable Disease Epidemiology Section:

Patricia Fox	Section Chief	608-266-0749	
Annette Stephens	Program Assistant	608-267-7321	stephar@dhfs.state.wi.us

Food or waterborne outbreaks outbreaks:

John Archer	Epidemiologist	608-267-9009	archejr@dhfs.state.wi.us
Diep "Zip" Hoang-Johnson hoangdk@dhfs.state.wi.us	Epidemiologist	608-267-7422	

***Legionella* Outbreaks:**

Tom Haupt	Epidemiologist	608-266-5326	hauptte@dhfs.state.wi.us

Hepatitis A Outbreaks:

Jim Kazmierczak	Epidemiologist/ Public Health Veterinarian	608-266-2154	kazmijj@dhfs.state.wi.us

West Nile Virus / Arboviral:

Mark Sotir	Epidemiologist	608-267-9009	sotirmj@dhfs.state.wi.us

Meningitis / Invasive Bacteria:

Susann Ahrabi-Fard	Epidemiologist	608-261-6955	ahrabs@dhfs.state.wi.us

In case of an after hours emergency or outbreak, the Division of Public Health has an **Emergency HOTLINE** that can be reached 24 hours a day, seven days a week. This number is not given out to the general public and is used ONLY in emergency situations. The number is **608-258-0099**.

BUREAU OF ENVIRONMENTAL & OCCUPATIONAL HEALTH (BEOH)
608-266-1120 http://dhfs.wisconsin.gov/eh

Tom Sieger	Bureau Director	608-264-9880
siegetl@dhfs.state.wi.us		
Henry Anderson	Chief Medical Officer	608-266-1253
anderha@dhfs.state.wi.us		

Food Safety and Recreational Licensing:

Greg Pallaske	Section Chief	608-266-8351
pallaga@dhfs.state.wi.us		
Barbara Hellpap	Office Manager	608-266-0915
hellpba@dhfs.state.wi.us		

Outbreaks related to:
Beaches or swimming pools:

Tracynda Davis	Eval.& Training Officer	608-266-8284
davist@dhfs.state.wi.us		

Restaurants, Temporary Restaurants and Vending Machines:

Jim Kaplanek	Eval.& Training Officer	608-261-8361
kaplajh@dhfs.state.wi.us		

School Lunch Programs:

Jim Kaplanek	Eval.& Training Officer	608-261-8361
kaplajh@dhfs.state.wi.us		

Campgrounds, Recreational and Educational Camps:

Tracynda Davis	Eval.& Training Officer	608-266-8284
davist@dhfs.state.wi.us		

Licensing and Inspections:

Liz Temple	Eval.& Training Officer	608-266-8018
templea@dhfs.state.wi.us		

Health Hazard Evaluation:

Bill Otto	Section Chief	608-266-9337
ottowh@dhfs.state.wi.us		

Chemical Exposure Health Assessments:

Henry Nehls-Lowe		608-266-3479
nehlslh@dhfs.state.wi.us		
Rob Thiboldeaux		608-267-6844
thiborl@dhfs.state.wi.us		
Chuck Warzecha		608-267-3734
warzecj@dhfs.state.wi.us		

Toxicology (Chemical hazards, pesticides, water issues):

Lynda Knobeloch	Toxicologist	608-266-0923
knobelm@dhfs.state.wi.us		
Janice Lee	Toxicologist	608-267-7199
leejs@dhfs.state.wi.us		
Rob Thiboldeaux	Toxicologist	608-267-6844
thiborl@dhfs.state.wi.us		
Mark Werner	Toxicologist	608-266-7480
wernema@dhfs.state.wi.us		

Wisconsin State Laboratory of Hygiene:
465 Henry Mall; Madison, WI; 53706
1-888-494-4324
http://www.slh.wisc.edu/

Microbiology Laboratory
608-263-3421

Pulsed-Field Gel Electrophoresis Laboratory
608-262-3302

Virology Laboratory (Norovirus PCR Testing)
608-262-3185

Wisconsin State Laboratory of Hygiene (Water testing)
2601 Agriculture Drive; Madison, WI
http://www.slh.wisc.edu/

Water Testing
608-224-6262

WI Dept. of Agriculture, Trade & Consumer Protection (DATCP)
Division of Food Safety (DFS)
2811 Agriculture Drive, Madison, WI 53718-6777
608-224-4700
http://datcp.state.wi.us/index.jsp

Bureau of Laboratory Services (Food Testing)
4702 University Ave.; Madison, WI 53705
608-267-3509

WI Dept. of Natural Resources (DNR)
Dept. of Natural Resources (Central Office): 101 S. Webster; Madison, WI; 53703
http://www.dnr.state.wi.us/

Bureau of Local Health Support & Emergency Medical Services, Regional Offices and Staff

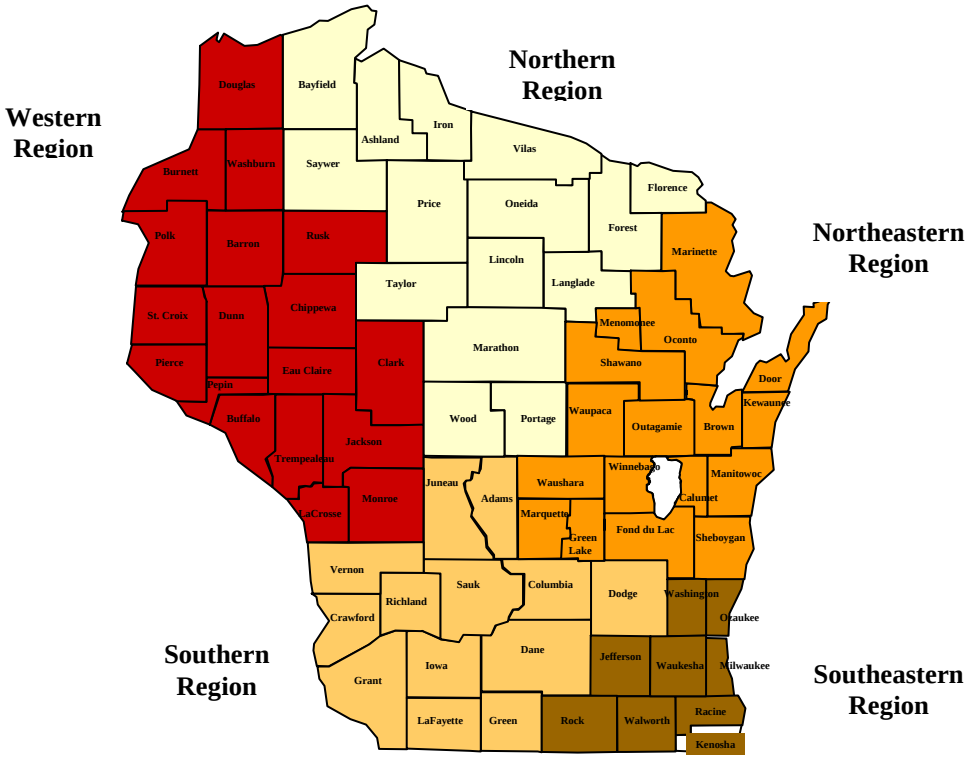
Northeastern Regional Office - Green Bay
http://dhfs.wisconsin.gov/R_Counties/RegionalStaffListings/NER_DPH_staff.htm

Northern Regional Office - Rhinelander
http://dhfs.wisconsin.gov/R_Counties/RegionalStaffListings/NR_DPH_staff.htm

Southern Regional Office - Madison
http://dhfs.wisconsin.gov/R_Counties/RegionalStaffListings/SR_DPH_staff.htm

Southeast Regional Office - Milwaukee
http://dhfs.wisconsin.gov/R_Counties/RegionalStaffListings/SER_DPH_staff.htm

Western Region - Eau Claire
http://dhfs.wisconsin.gov/R_Counties/RegionalStaffListings/WR_DPH_staff.htm



APPENDIX C

Collection of Clinical Samples

Collection of Clinical Samples

One of the most important factors in the identification of etiologic agents responsible for foodborne or waterborne disease outbreaks is the collection of clinical samples as early in the course of the investigation as possible. This is especially true for those agents that may only be shed for several days such as *Clostridium perfringens*, *Bacillus cereus* or *Staphylococcus aureus*. The LHD should provide the CDES with a name for the outbreak (preceded by the county name) so that all associated clinical and environmental samples can be identified and located under the same identifying name. It is also important for the laboratory to be notified about these specimens as early as possible because several of these agents require special plating media that may need to be ordered before the samples reach the laboratory.

Clinical Samples

Collect clinical specimens (usually stools) from **up to 10** ill cases for laboratory analysis of enteric bacteria and viral pathogens. The amount of sample required for bacterial and viral testing is less than for parasites. For parasite testing a walnut-sized portion of stool is submitted in formalin (See Criteria for Confirmation). For bacterial and norovirus testing, about 15 ml. of stool in a Kit # 10 will suffice. Do not overfill and follow the directions on the specimen container. Rectal swabs are not preferred.

NOTE: If chemical poisoning is suspected, contact a toxicologist from BEOH or use the DPH after hours Emergency HOTLINE at 608-258-0099.

APPENDIX D

Collection and Handling of Food Samples

Food Sampling

1. **Food specimens are tested only after a foodborne pathogen has been isolated or its toxin identified from clinical patient specimens.** However, suspected foods should be collected by the LHD as early in the investigation as possible. Foods should be refrigerated, not frozen. If the food item was already frozen, hold it in the freezer until a determination can be made about testing. Freezing causes significant loss of viability for certain organisms. Contact the CDES at (608) 267-9009 or (608) 267-7422 as soon as a FBO is suspected to report the situation, receive consultation regarding specimen collection and testing by the Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP), Bureau of Laboratory Services (BLS).
2. If available, the sanitarian or LHD staff should obtain a sample of the implicated food(s). If none is available, obtain an associated sample (same lot or batch).
3. If the volume of the implicated food sample is less than 200 grams (1/2 lb.), the whole sample should be collected and submitted in its original container. (BE SURE THAT THE CONTAINER IS LEAKPROOF!). If the volume of sample is greater than 200 grams, obtain a 200-gram sample. Sampling should be representative (i.e., taken from food throughout the sample, not just one portion of the sample).
4. Samples should be labeled with the name of the outbreak or establishment where the sample was collected, type of specimen, time and date of collection, a unique sample number and the investigating official's initials. All food samples should be held under refrigeration until clinical specimens have been tested. **If clinical samples on case patients are negative or not tested, food samples are not tested unless there is compelling epidemiologic evidence incriminating a particular food item. Laboratory procedures for the isolation of microbial foodborne disease agents are complicated and time consuming. It is important the laboratory has good epidemiologic information before analyzing food samples to insure a proper analysis.**
5. If the sample being submitted is a commercial food, the name of the manufacturer or processor, code or lot number, and other identifying characteristics are important. If still available, it is important to submit the original food container.
6. If a clinical specimen from at least one ill individual is positive for a foodborne pathogen, food samples should then be transported to the laboratory on ice or under refrigeration as rapidly as possible in order to maintain the population of organisms present.
7. If food kit #32 is not available, an insulated container with frozen kool-pacs or ice cans should be used when shipping samples to the laboratory. Food samples should be shipped UPS or FED EX only. Do NOT send food samples through the US Postal Service. Packages received at the local post office by late afternoon or evening must be sent by Overnight Express Mail to guarantee next day delivery. Food samples collected on Friday may be held under refrigeration until the following Monday. Consult DATCP / BLS regarding any questions on transporting or holding of food samples.

NOTE: All food specimens from a suspected outbreak are sent to the BLS **only after CDES notification and approval.**

Laboratory testing and interpretation

1. With some microbial agents of foodborne disease, it is necessary that large numbers of the organisms be present in a food for it to be hazardous. Examples of these agents would be: *Bacillus cereus, Clostridium perfringens* and *Staphylococcus aureus.* Usually 10^6 organisms per gram of food are necessary before there is a danger of food poisoning from these agents. For these kinds of agents the laboratory reports the number of organisms present per gram of food, and whether or not this would be considered a significant level. If *S. aureus* is identified, the laboratory will also examine the isolates for enterotoxin production.
2. With other bacteria, any number of organisms present in a ready-to-eat food may be significant. Examples of such agents are *Salmonella*, *Shigella*, *Campylobacter*, and *Yersinia*. For these kinds of agents, the laboratory reports their presence or absence. Their presence in a ready-to-eat food should be considered significant.

Food sample kit

1. Mailing Container and Contents:
    a) Mailing Container (Styrofoam interior, corrugated carton exterior).
    Measurements: O.D. = 15" x 15" x 15"
    I.D. = 11" x 11" x 11" Quantity: 1
    b) Kool-pacs - large (8" x 8" x 11") Quantity: 2
    c) Sterile disposable sample scoops Quantity: 8
    d) Whirl-pac bags - sterile, labeled Quantity: 10
    e) Sterile swabs / transport media Quantity: 5
    f) Instructions
2. Other Materials
    a) "*Procedures to Investigate Foodborne Illness*" IAMFES, Ames, IA, or "*Guide for Investigating Foodborne Disease Outbreaks and Analyzing Surveillance Data*" CDC, Atlanta, GA
    b) Food preparation, sanitation, sample collecting, etc. forms
    c) DATCP / BLS Sample Collection Record Ref. #TSS-007
3. Cost:
    One-time cost of $25.00 for each kit.
4. Replacement:
    Once the kit is used, the WSLH will restock supplies and requisition forms in the kit and return it o the LHD.

APPENDIX E

Exclusion Guidelines for Food Workers

Exclusion guidelines for food employees

Any person with a communicable disease listed in Table 12 should be excluded from food preparation, handling or serving. This should also included food employees with symptoms consistent with those diseases such as diarrhea, vomiting, abdominal cramping, fever, jaundice, etc.

Table 11. Exclusion guidelines for food employees

Etiologic Agent	Recommendation for Exclusion from Food Employees
Campylobacter	Exclude until asymptomatic
Clostridium perfringens	Exclude until asymptomatic
Entamoeba histolytica	Exclude until chemotherapy is completed
E. coli 0157:H7	Exclude until 2 consecutive negative stools cultures collected at least 24 hours apart and obtained at least 48 hours after discontinuance of antimicrobial therapy*
Enterotoxigenic *E. coli (STEC)*	Exclude until 2 consecutive negative stools cultures collected at least 24 hours apart and obtained at least 48 hours after discontinuance of antimicrobial therapy*
Cryptosporidium	Exclude until asymptomatic
Cyclospora	Exclude until asymptomatic
Giardia	Exclude until asymptomatic
Hepatitis A	1) Exclude for an interval extending through day 10 following onset of **jaundice** 2) Exclude for an interval extending through day 14 following onset of symptoms if **no jaundice** present
Salmonella (Non-typhoid)	Exclude until asymptomatic
Salmonella typhi (Typhoid fever)	Exclude until 3 negative stools taken at least 24 hours apart and at least 48 hours after antibiotics have been stopped, and not earlier than 1 month after onset of symptoms
Salmonella typhi carriers	Exclude until 3 negative stools taken at least 1 month apart and at least 48 hours after antibiotic therapy has stopped
Shigella	Exclude until 2 consecutive negative stools cultures collected at least 24 hours apart and obtained at least 48 hours after discontinuance of antimicrobial therapy
Viral infections	Exclude until asymptomatic
Yersinia enterocolitica	Exclude until asymptomatic

* Antimicrobials are not usually administered with these infections because of the possibility of hemolytic uremic syndrome, especially in children.

These exclusion guidelines are recommendations of the BCDP / CDES and are based on current scientific literature and on CDC commendations. **Final decisions regarding exclusion of individual food workers rest with the LHD and should be made with consideration given to the personal hygiene of the individual, the specific duties of the food worker, the nature of the food handled, and the level of hygienic conditions and supervision in the food establishment.**

Management of high risk contacts of cases

Table 12. Exclusion guidelines for high-risk contacts of cases.

Etiologic Agent	Recommendation for exclusion of contacts in sensitive occupations (food workers, child care, health care, etc.)
Campylobacter	Exclude if symptomatic, may return once asymptomatic *
Clostridium perfringens	Exclude if symptomatic, may return once asymptomatic *
Entamoeba histolytica	Exclude if symptomatic, may return once asymptomatic *
E. coli 0157:H7	Symptomatic contacts should be excluded from sensitive occupations should be excluded until asymptomatic and 2 consecutive negative stool cultures are obtained. [1]
Enterotoxigenic *E. coli*	Symptomatic contacts should be excluded from sensitive occupations should be excluded until asymptomatic and 2 consecutive negative stool cultures are obtained. [1]
Cryptosporidium	Exclude if symptomatic, may return once asymptomatic *
Cyclospora	Exclude if symptomatic, may return once asymptomatic *
Giardia	Exclude if symptomatic, may return once asymptomatic *
Hepatitis A (HAV)	See Hepatitis A Manual (POH 4554) [2]
Salmonella (Non-typhoid)	Exclude if symptomatic, may return once asymptomatic *
Salmonella typhi (Typhoid fever)	Household and close contacts should not be employed in sensitive occupations (e.g., food handlers) until at least 2 negative stool cultures, taken at least 24 hours apart are obtained. [1]
Salmonella typhi carriers	Household and close contacts should not be employed in sensitive occupations until at least 2 negative stool cultures, taken at least 24 hours apart are obtained. [1]
Shigella	Symptomatic contacts should be excluded from sensitive occupations should be excluded until asymptomatic and 2 consecutive negative stool cultures are obtained. [1]
Viral infections (not HAV)	Exclude if symptomatic, may return once asymptomatic *
Yersinia enterocolitica	Exclude if symptomatic, may return once asymptomatic *

* Return to work is at the discretion of the LHD.

1. Heymann DL, ed. Control of Communicable Diseases Manual. 18th ed. Washington, DC: American Public Health Association, 2004.
2. Hepatitis A: A Handbook for Public Health Personnel. Madison, WI: Wisconsin Division of Public Health, DHFS, Communicable Disease Epidemiology Section, 1992.

APPENDIX F

Final Report for a Foodborne Outbreak Investigation

Preparing a final report

PURPOSE

- To document the progression and rationale behind activities in the investigation
- To document information in case of potential legal issues
- To provide a reference for education and improve investigations and prevention methods for future outbreaks

Background

- What was the setting in which the problem occurred or what were the circumstances initiating the investigation? Were any special events surrounding the outbreak?
- Who was involved in the outbreak? (Do not use names of case-patients or contacts. The names of LHD personnel or authorized personnel involved in the investigation may be included. The names of facilities or locations where FBO / WBOs occurred may be included at the discretion of the LHD.)
- Demographic setting (age, gender, occupation, etc.)
- How many exposed? How many people were ill? (Those meeting the case definition)
- What was the severity and clinical picture of cases? (e.g., # ill, # hospitalized, # fatalities, list of symptoms, unusual clinical cases or onset times)
- Where did it occur? Relevant geography (e.g., home environment, work environment, school environment)
- Is it an ongoing problem?

Methods

- What control methods were employed? Was an inspection of the facility conducted?
- What lab tests were done? What was the rationale for these tests (clinical? epidemiological?)
- How was the data analyzed? (e.g., line lists, epi-curves, EPI-Info software)
- Include a copy of the questionnaire used. Who developed and administered questionnaire?

Results

- What did the investigation reveal? (What was the etiologic agent? What was the vehicle? What was the primary problem? Has it been resolved?)
- What did the sanitarian's report reveal (Did environmental factors contribute to the outbreak?)
- Laboratory results (Clinical or environmental samples. Do they support the hypotheses?)
- Epidemic curve, charts, etc. (Indication of source? Time of exposure?)
- Statistical analysis (What sources were statistically associated with illness?)

Discussion

- Were the control measures effective and would they be effective in future outbreaks?
- Were there any important or unusual outcomes or findings?
- Assess current surveillance procedures (Are current surveillance strategies effective enough to detect a similar outbreak in the future? What methods need to be enhanced or curtailed?)
- Summarize important aspects of the investigation (What important elements were learned from this investigation that could be used by the LHD or other LHDs)

The following sections within this section will discuss and provide examples of the components of a final report for an outbreak investigation. The information is then compiled into a narrative report. The narrative report provides valuable information following an outbreak investigation. The narrative report may be beneficial to the LHD by documenting the rationale for activities undertaken during the investigation, providing documentation for potential legal issues, and information that may be used to improve future investigations, recognize future outbreaks and plan prevention strategies. In addition, the narrative report may increase information already known about enteric diseases, their etiologic agents, vehicles of infection, and changes in the nature of the diseases.

Components of a final report:
Example of a line listing for a FBO investigation

Line list: A table listing case identifiers, age, gender, onset time, incubation period, duration of illness, symptoms, or any other information which facilitates comparisons of many characteristics for possible similarities or associations.

The line list is started early in the investigation and consists of a detailed listing of cases, line by line, and may include demographic features, occupation, special activities or any other variables which might be associated with the outbreak. Each column represents an important variable and each row represents a different case. A line list provides the data needed to construct an epi curve.

No.	Age	M/F	Onset	Time	N	V	D	BD	AC	Fe	HA	Ch	Fa
1	25	M	20-Dec	16:00	+	+	+	+	+	+	+	-	+
2	35	M	21-Dec	19:00	+	-	+	+	+	+	-	-	-
3	48	F	21-Dec	6:00	+	-	+	-	+	+	+	-	+
4	33	M	20-Dec	23:00	-	-	+	-	+	-	-	-	-
5	56	M	21-Dec	7:00	+	+	+	-	+	+	+	+	+

M/F=Gender; Onset=Onset day of illness; Time=Time of day; N=Nausea; V=Vomiting; D=Diarrhea; BD=Bloody Diarrhea; AC=Abdominal Cramps; Fe=Fever; HA=Headache; Ch=Chills; Fa=Fatigue

Example of an Attack Rate Table

Attack Rate: A type of cumulative incidence rate that expresses the occurrence of a disease among a specific population at risk observed for a limited period of time, often due to a very specific exposure.

Attack rates are presented on an **attack rate table** used to demonstrate the association between exposure (i.e., food items) and occurrence of disease.

Food & Drink Items Served	**# who ate specified foods**				**# who did NOT eat foods**			
	Ill	Not Ill	Total	%	Ill	Not Ill	Total	%
Hot beef	6	5	11	55	9	5	14	64
Ham	14	7	21	67	1	3	4	25
Fried chicken	11	7	18	61	4	3	7	57
Potato salad	10	9	19	53	5	1	6	83
Baked beans	7	6	13	54	8	4	12	67
Deviled eggs	**14**	**1**	**15**	**93**	**1**	**9**	**19**	**10**
Fruit salad	12	5	17	71	3	5	8	38

Food & Drink Items Served	**# who ate specified foods**				**# who did NOT eat foods**			
	Ill	Not Ill	Total	%	Ill	Not Ill	Total	%

Example of an epidemic or epi curve

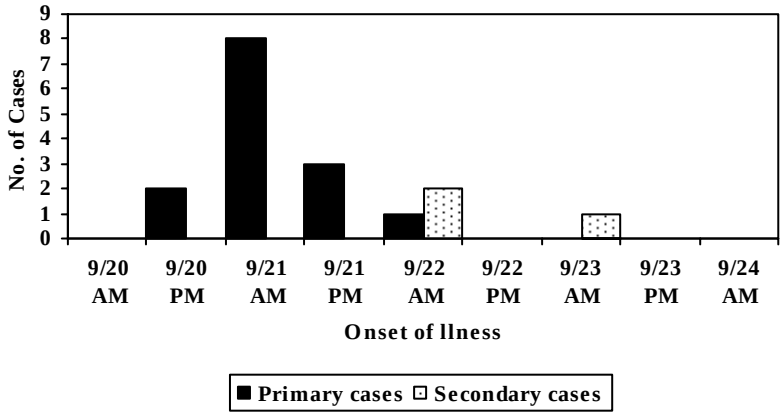
Epidemic curve (Epi curve): A histogram (a type of bar graph) that shows the course of a disease outbreak by plotting the number of cases by time of onset**.** The cases are plotted along the Y axis and the time intervals are plotted along the X axis.

An epi curve may provide information regarding the **magnitude of the outbreak** and where you are in the **time course of the outbreak**. The configuration often suggests the nature of the etiologic agent, source and mode of spread. If a specific etiologic agent (with a known incubation period) is suspected or confirmed, investigators can deduce the time of exposure and develop their investigation around that time period.

The overall shape of the curve may give an indication of the source. For example, a curve having a steep slope with a gradual down slope may indicate that ill persons were exposed over a brief period of time (**point source outbreak**). An example of a point source outbreak would be a wedding, party or other event in which the outbreak is associated with a common meal.

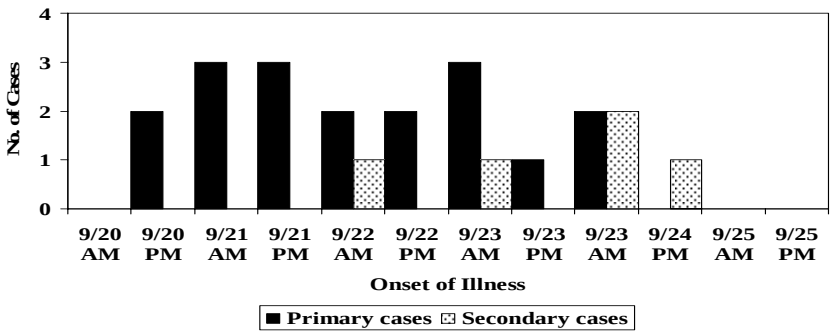
An epi curve having a plateau of cases rather than a peak might indicate that exposure occurred over a prolonged period of time or is ongoing. This would be referred to as a **continuous common source outbreak**. An example of a continuous common source outbreak would be an outbreak associated with a restaurant in which cross contamination of food in the kitchen was extended over a number of days.

Figure 1. Example of a Point Source Outbreak



An epi curve having a plateau of cases rather than a peak might indicate that exposure occurred over a prolonged period of time or is ongoing. This would be referred to as a **continuous common source outbreak**. An example of a continuous common source outbreak would be an outbreak associated with a restaurant in which cross contamination of food in the kitchen was extended over a number of days (Figure 2).

Figure 2. Example of a Continuous Common Source Outbreak



Considerations when reporting on an outbreak related to restaurants, weddings, or banquets:

Eating establishments

- Did the eating establishment have a history of violations or food complaints?
- Did the facility maintain an accurate record of food workers missing work due to illness? Were any workers ill at the time of the outbreak? Were there any illnesses in the families of food workers?
- Did the facility have a policy regarding ill food workers? Any exclusions?
- Was the schedule of staff working at the time of, or shortly before the outbreak available?
- Did food workers wear disposable gloves?
- Where there adequate hand washing facilities available?
- Before the outbreak, did the facility change the menu or serve unusual food items? Offer any specials?
- Were invoices of suspect foods available and obtained if tracebacks were warranted?
- Were foods prepared ahead in batches or precooked (e.g., roasts)?
- Were foods held at room temperature before food preparation (e.g., pooled eggs for omelets)?
- Did facility use municipal or well water (If well, record of last well test available)?
- Were there opportunities for cross contamination of foods during food handling?
- Were there opportunities for cross contamination of foods in coolers (e.g., poultry dripping on lettuce)?
- Were there opportunities for cross contamination or back flow from the plumbing system?

Additional comments for weddings or banquets

- Is a table arrangement available? Location of buffet lines?
- How was food prepared? (In batches? Precooked portions? Uniform cooking facilities? How long were foods held before serving?, etc.)
- Was food left out on the buffet tables? How long?
- Were meals cooked in-house or catered? (If catered, see restaurant recommendations)
- Are there leftover food items available?
- Can illnesses be linked to rehearsal dinner? (Location? Time? Foods? etc.)
- Were there any other social events in conjunction with the wedding or banquet? (e.g., happy hour, hotel parties, brunches)
- Hotel arrangements? (foods, parties, swimming pool or whirlpools, room numbers, ice machines, etc.)

Example of a final report:

Staphylococcal foodborne outbreak associated with a ethnic food store Smith City, WI 11/26/00

Final Report
(WI-25-00)

Smith City Health Department
414 John Doe Drive
Smith City, WI

and

Department of Health and Family Services
Wisconsin Division of Public Health
Bureau of Communicable Diseases and Preparedness
Communicable Disease Epidemiology Section
1 West Wilson St., Room 318
Madison, WI 53701-2659

BACKGROUND

On Monday, November 26, 2000, the Smith City Health Department (SCHD) received a call from a local hospital emergency room (ER). The ER reported that 15 people were seen in the ER with vomiting and diarrhea. All 15 had eaten carnitas (a deep fried pork food product) purchased from an ethnic food store in Smith City, WI. The meat had been purchased by the food store earlier in the day from a food wholesaler in Chicago, IL.

METHODS

Surveillance

Case Finding and Assessment

A line list of persons who were known to have eaten the carnitas and became ill was assembled by the SCHD.

Interagency Notification

Upon notification that a meat product transported across state lines was associated with the outbreak of gastrointestinal illness, appropriate city, state and federal agencies were immediately notified (See Interagency Notifications, page 2). The Wisconsin Division of Public Health-Southern Regional Office, Illinois Health Department, City of Chicago Health Department, FDA,USDA offices were notified about the outbreak.

Case Definition

A case was defined as a person who developed clinical symptoms of vomiting or nausea and/or diarrhea and cramps within 6.5 hours of consuming carnitas from the Smith City ethnic food store on November 26, 2000.

Epidemiologic Investigation

Epidemic Curve

An epidemic curve was constructed to assess the magnitude of the outbreak and determine incubation periods.

Laboratory Investigation

Bacteriologic Testing of Human Subjects

Stool cultures for bacterial pathogens were ordered for the ER patients at the Smith City Medical Center. If any bacterial pathogens were isolated, they were sent to the WSLH for confirmation, serotyping, reversed passive latex agglutination to identify staphylococcal enterotoxin and pulsed field gel electrophoresis (PFGE) analysis. A food worker at the ethnic food store was also cultured for enteric bacterial pathogens.

Environmental Investigation

A sanitarian from the SCHD was notified of the possible foodborne outbreak and went to the food store to interview the food manager. He noted the delicatessen operation was shut down and the carnitas in question were in a corrugated box that was unrefrigerated. The food manager stated carnitas are purchased from a food wholesaler in Chicago every Saturday and Sunday. The Smith City food store obtains 60 to 70 pounds every Saturday and Sunday. Nineteen pounds had been sold by the time the food store was told by the ER doctor to stop selling the meat.

The sanitarian was informed the hot carnitas are placed in a double plastic bag, layered in butcher paper in a corrugated box, and placed in a Styrofoam container to keep the carnitas hot during transport. No heat is used during transport. Carnitas usually arrive at the food store between 8 and 9 am, are placed in large stainless steel pans and transferred to a steam table. Some of the carnitas are placed in an aluminum foil lined bowl and under a heat lamp from which customers are served from this area. Most customers purchase 3-5 pounds to carry out. The manager stated the food store usually sells the entire batch of meat each day. The delicatessen portion of the store was ordered closed at 5:20 pm, 11/26/00. A portion of the leftover carnitas from the food store was sent to the DATCP / Burerau of Laboratory Services for analysis.

RESULTS

Surveillance

Case Finding

The outbreak involved customers of a ethnic food store in Smith City, WI. Seventeen persons were identified who purchased carnitas on Sunday, 11/26/00, from the food store and became ill within 7 hours.

Epidemiologic Investigation

Clinical and Descriptive Epidemiology Features

The most frequently reported signs and symptoms among the 17 cases included: diarrhea (88%); vomiting (82%); abdominal cramping (82%); nausea (76%); sweats (65%) and chills (59%) (Table 1). The incubation period ranges from ½ to 6 ½ hours (mean=2.6 hours; median=2.0 hours).

Table 1a. Line list of Smith City *S. aureus* cases related to consumption of carnitas, 11/26/00.

#	ID	Age	Sex	Ate	N	V	D	Ac	Fe	S	C	HA	Ma	W	Onset(Hr)	L-C*	Enterotoxin
1	YG	49	F	11:00	X	X		X		X	X	X			1.5		
2	MG	29	F	11:00	X	X	X	X		X	X				1.5		
3	DG	17	F	11:00	X	X	X	X			X			X	3		
4	CS	24	M	9:00	X	X	X	X		X		X			2	+	A,B
5	RS	26	F	9:00	X	X	X	X		X					2	+	A,B
6	YS	19	F	9:00	X	X	X	X		X		X			2	+	A,B
7	JE	38	M	10:30	X	X	X	X		X	X				0.5	+	A,B
8	VM	39	M	10:30	X	X	X	X		X	X	X	X		1		
9	MH	40	M	10:30	X	X	X	X	X	X	X	X	X		1		
10	NQ	45	F	10:30		X	X								4		
11	MH	26	M	10:30		X	X								4		
12	RQ		M	10:30			X								4		
13	RG	12	M	11:00	X	X	X	X		X	X	X			3.5	+	A,B
14	RG	10	M	11:00	X	X		X			X				3.5		
15	TG	24	M	11:00			X	X							0.5		
16	AR	10	M	11:00	X		X	X		X	X				6.5		
17	VB	27	F	11:00	X	X	X	X		X	X	X	X	X	3		
Totals					14	13	15	14	1	11	10	7	3	2		5	

N=Nausea, V=Vomiting; D=Diarrhea; Ac=Abdominal. Cramps; Fe=Fever;

S=Sweats; C=Chills; HA=Head ache; Ma=Muscle ache; W=Weakness

* Lab-confirmed

Table 1b. Meat (carnitas) samples isolates related to *S. aureus* outbreak, 11/26/00.

Environmental Samples	**Meat Sample A**	+	A,B
	Meat Sample B	+	A,B

Food Specific Studies

All 17 persons who became ill experienced onset of illness within 7 hours after eating the carnitas.

Laboratory Investigation

Bacteriologic Testing of Human Subjects

Staphylococcus aureus was isolated from five persons tested for enteric bacterial pathogens. Preformed staphylococcal enterotoxins type A and B were found in all five clinical isolates and two meat sample isolates collected from the food store. An asymptomatic food worker at the Hispanic food store was found to carry the *Staphylococcus aureus* bacteria. Preformed staphylococcal enterotoxin type C was found in the isolate from the asymptomatic food worker from the food store (Table 1a).

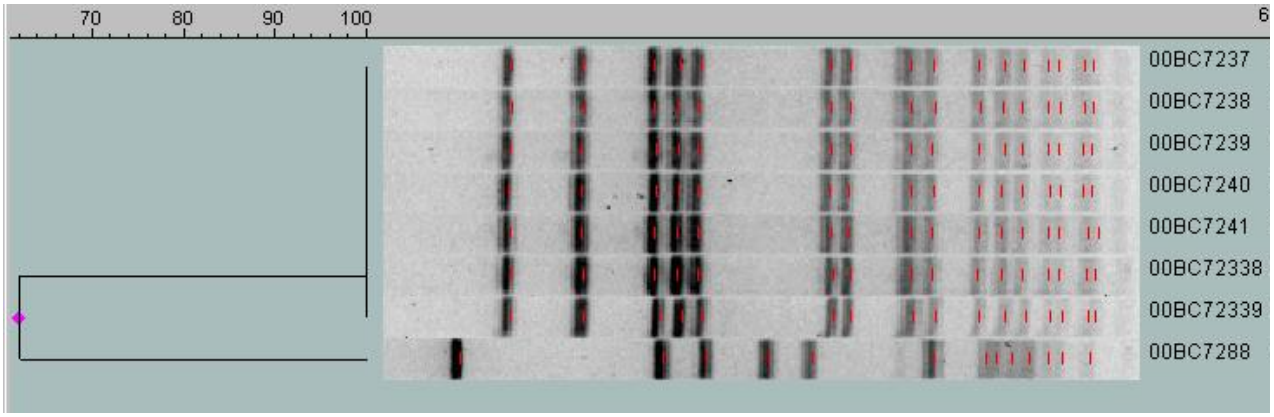
Isolates were also compared by PFGE analysis. All the clinical cases (BC7237, BC7238, BC7239, BC7240, BC7241) and meat isolates (BC7238, BC7239) were indistinguishable by PFGE analysis (Figure 1*). The isolate from the asymptomatic food worker (BC-7288) did not match the outbreak strain.

**** PFGE results are to be only used for epidemiologic, not diagnostic purposes.***

Environmental Investigation

Meat samples (BC-7338, BC-7339) collected on 11/27/00, from the food store were cultured and were positive for *Staphylococcus aureus* with counts of 1.0×10^6 and 1.0×10^9 organisms per gm (Appendix A –WDATCP-BLS Lab Sample Reports).

Figure 1. Dendrogram of *S. aureus* isolates from the Smith City outbreak, 11/26/00.



DISCUSSION

Staphylococcal food poisoning is an intoxication (not infection) caused by enterotoxins produced by the bacteria *Staphylococcus aureus* [1]. The onset of symptoms is usually rapid and in many cases acute, depending upon individual susceptibility to the enterotoxin, the amount of contaminated food ingested, and the general health of the victim. The most common symptoms include nausea, vomiting, retching, abdominal cramping and prostration [2]. The duration of illness is short and almost always self-limited, some deaths have been reported in Wisconsin.

In this outbreak the vehicle for intoxication was the carnitas (deep-fried pork). The meat was somehow contaminated at the Chicago wholesaler and bacterial levels increased because of temperature abuse during transport. Transporting foods under inadequate holding temperatures would allow for the toxin-producing staphylococci to multiply and elaborate the heat-stable toxins. Holding temperatures were also questionable after arrival at the food store. This outbreak re-emphasizes the importance of maintaining proper holding temperatures for foods during transport.

REFERENCES:

1. Heymann DL, ed. STAPHYLOCOCCAL FOOD INTOXICATION. In: *Control of Communicable Diseases Manual*. 18th ed. Washington, DC: American Public Health Association, 2000:212-214.

2. FDA - CFSAN. Bad Bug Book: *Staphylococcus aureus*. In*: Foodborne Pathogenic Microorganisms and Natural Toxins Handbook*, January 1992. (http://vm.cfsan.fda.gov/~mow/badbug.zip).

Other suggested references:

1. Olson RK, Eidson M, Sewell CM. Staphylococcal Food Poisoning from a Fundraiser. *Environmental Health*, 1997;601(5):7-11.

2. CDC. Outbreak of Staphylococcal Food Poisoning Associated with Precooked Ham – Florida, 1997. *MMWR*, 1997;46(50):1189-91.

3. Martin SE & Myers ER. *Staphylococcus aureus*. In: Hui YH, Gorham JR, Murrell KD, Cliver DO, eds. *Foodborne Disease Handbook: Diseases Caused by Bacteria*. Volume 1. New York: Marcel Dekker, Inc., 1994: pp. 345-394.

APPENDIX G

Collection and Handling of Water Samples

Municipal Water Systems

Sample collection and handling of potable waters

Most tap water in Wisconsin is suitable for drinking and other home uses. There are, however, circumstances that can lead to contamination of water supplies, both public and private. Public water supplies are regularly tested by local municipalities for indicators of fecal pollution and toxic chemicals and must meet state and federal standards. Despite routine monitoring, problems can occur as demonstrated during the 1993 Milwaukee C*ryptosporidium* outbreak.

When an outbreak occurs and is thought to be waterborne, the involved water system should be inspected. The following factors should be assessed: the source of the water, the method of water treatment, recent problems with the system, recent water testing results, any recent repairs or alternations of the distribution system, and any recent power or water pressure disruptions which might have resulted in contamination through cross contamination or back-siphonage.

The identification of etiologic agents responsible for WBOs is dependent on the timely recognition of outbreaks so that appropriate clinical and environmental samples can be collected. The surveillance systems, interests and expertise of LHDs, and available revenues and resources often affect this.

Another consideration in water sampling is timing. Samples should be collected, transported to the testing laboratory, and processed as quickly as possible after an outbreak occurs because the contamination may have been transient, and samples collected during later dates may not reflect the condition of the water when it was potentially contaminated.

The same procedures are used for collecting water samples from municipal water supplies and private wells. Sampling procedures are provided with the sample container by the WSLH, Water Microbiology Unit, but can also be used when submitting water samples to over 90 private laboratories "certified" to do bacteriological testing by the DATCP. Their telephone number is (608) 224-6262.

Chlorinated water samples

Samples of continuously chlorinated water, such as city water supplies, swimming pools and whirlpools, must be collected in a special bottle containing a chlorine neutralizing substance such as sodium thiosulfate. These special bottles are not appropriate for sampling wells that have been temporarily chlorinated. Temporarily chlorinated wells should be pumped until they are free of chlorine prior to sampling.

Collection of water samples for *Legionella*

A 200-ml water sample should be collected in sterile plastic bottles. If the water has been recently treated with chlorine or other halogens (e.g., bromine), sodium thiosulfate (0.5 ml of 0.1 N sodium thiosulfate) should be added as a reducing agent. Neutralization of the biocide present in a water sample at the time of collection will prevent continued bactericidal activity during transit of the sample and will allow for a more accurate determination of the number of *Legionella* present. Always notify the testing laboratory before the collection and submission of samples. If other sources are suspected, consult with CDES regarding sample collection procedures.

a) Faucets, shower heads, etc.

Showerheads and faucets with aerators or flow restrictors may become colonized with *Legionella* and are suitable for sampling if implicated. Swab specimens of faucet aerators and showerheads should be obtained before water samples from these sites. The water sample should be obtained with the aerator or showerhead removed if possible.

1) Collect sample when faucet or showerhead has not been used for several hours.
2) Swab the internal surfaces of faucet or showerhead with sterile cotton applicator.
3) Place the swab in collection bottle and submerge with three to five ml. of water from the same source to prevent drying during transport.
4) If it is not possible to swab the inside of the faucet or showerhead, collect a full bottle of water.

b) Hot water heaters

1) Collect sample from faucet at bottom of tank.
2) If possible, sterilize faucet by heating it with a flame. Let cool for several minutes.
3) Let water run for 30 seconds, then open bottle and collect sample. Fill bottle to within one inch of the top. Indicate to testing laboratory whether the faucet was sterilized before the collection of water sample.

Collection of water samples for chemical contamination

If an outbreak (or single case) is suspected to be chemically-induced, immediately contact the BEOH and the BCDP / CDES (See Appendix B - *Contact Agencies and Personnel*). These offices should be contacted before collecting samples. It is imperative to discuss the case or investigation before collecting samples because the laboratory would need to know the type of chemical suspected in order to know what samples to collect, how to store the specimens, and how to ship the samples to the proper laboratory.

Private water systems

Wells

For those individuals with a private water system, usually a well, the responsibility for testing resides with the individuals who own the well site. Annual testing of wells is recommended, especially if the well is located near sources of potential contamination. Even if the water is currently safe, routine testing provides a water quality record if problems arise. Routine testing should include screening for coliform bacteria and *E. coli*, nitrates, lead, copper, and triazines.

Circumstances for which more frequent testing (both bacteriological and chemical) would be recommended include: a well located near septic fields, a dump, landfill, factory, underground storage tank, or a mining operation, intensive agriculture or livestock operations, or when a consumer of the water is pregnant. Natural disasters such as flooding may also necessitate water testing. If flooding occurs, bottled water or water brought to a "rolling boil" for one minute should be used until the well can be tested and, if necessary, disinfected. Consideration should be given to the fact that boiling water will concentrate nitrate levels if the water is consumed by pregnant women or infants.

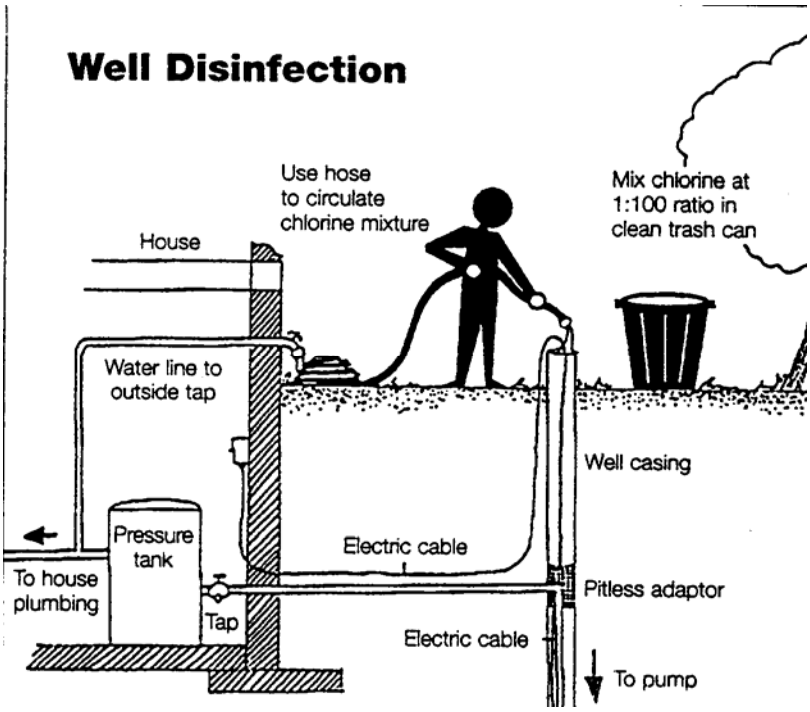
Collection of potable water from wells

a) Locate a sample tap near the well, preferably not a swing, leaky or outside faucet. Remove any screens or aerators from the tap.
b) Sterilize metal taps by heating with a flame (e.g., butane lighter, propane torch, alcohol lamp). Eliminate this step for plastic or partially plastic taps.
c) Allow the water to run for several minutes. **Do not change the flow rate, do not shut the faucet off, and do not wipe or wash the faucet prior to sample collection.**
d) Do not open the bottle until ready to collect the sample. Take care not to touch the top of the collection bottle or inside of the cap. Fill the bottle to within ½ inch of top.

Possible sources of bacterial contamination of wells

- Not following sampling instructions properly.
- Insects getting into the well through non-vermin-proof cap or seal or a loose well cap.
- The well casing is not properly sealed into the rock formation.
- The well casing does not terminate at least 12 inches above the ground.
- The well terminates in a nonconforming pit, which may be subject to flooding or seepage from groundwater.
- Contamination of new wells because the drill hole becomes contaminated through dirty tools, pipe and drilling water.
- Recent repairs or construction to the plumbing system may contaminate the system.
- Flooding or other natural disasters.

Disinfection of the well and water system



Source: Wisconsin Water Well Association

Wells may be disinfected once an inspection has determined that the water system is free from any continual contamination.

a) Mix one gallon of household laundry bleach with 100 gallons of water. If the well is more than 150 feet deep, mix two gallons of bleach with 200 gallons of water. If there is no container large enough to mix the solution, it can be made up 25 gallons at a time in four clean plastic garbage cans.
b) Remove the cap from the well and pour the entire bleach and water solution into the well in rapid succession.
c) Rinse down the sides of the well casing with a garden hose for five to 10 minutes. The rinse water should be from a hose on the water system being disinfected. This procedure circulates the bleach through the water system to insure better disinfection.
d) If the plumbing system is to be disinfected, turn on all the cold water taps until you smell the bleach, then turn the taps off.
e) Let the bleach remain in the system for at least eight hours (preferably 24 hours).

f) Pump all the bleach out of the water system by running the water through a garden hose to an area where the bleach will not damage lawns, shrubs, or septic systems. Pump until the bleach odor is no longer apparent.

g) Two or three days after the disinfection, a water sample from the well should be submitted for bacteriological analysis. One month after the disinfection, a sample from the well should be submitted for bacteriological analysis to assure the well is maintaining safe, quality water.

Collection of water samples for chemical contamination

If an outbreak (or single case) is suspected to be chemically-induced, immediately contact the BEOH and the BCDP / CDES (See Appendix B - *Contact Agencies and Personnel*). These offices should be contacted before collecting samples. It is imperative to discuss the case or investigation before collecting samples because the laboratory would need to know the type of chemical suspected in order to know what samples to collect, how to store the specimens, and how to ship the samples to the proper laboratory.

Recreational water

Collection of water from beaches for bacterial enteric pathogens

a) Routine monitoring programs

In Wisconsin routine monitoring programs are established for only a portion of the state's recreational beaches. The needs for such programs are established locally and generally include:

- **Sample sites** (sites with high beach usage, sites exposed to frequent runoff problems, sites with historic pollution problems)
- **Frequency of sampling** (5 samples/site for a 30 day period)
- **Duration of sampling season** (June 1 through September 1)
- **Sample depth** (just below water surface, in ankle-to-knee deep water)
- **Sampling kits** (containing sterile collection bottles, instructions, shipping instructions, lab slips, and directions regarding repeat sampling)
- **Tests for indicator organisms** (*E. coli* and *Enterococcus*)

b) Monitoring following events with potential pollution

In addition to routine monitoring, beach water testing may take place following events with potential pollution problems resulting in beach closings or advisories. Major pollution sources for beach closings and advisories include:

- **Polluted (urban and non-urban) runoff** containing septic wastes and sewage sludge, animal (wild and domestic) wastes, fertilizer, pesticides, gas & oil, etc.
- **Sewer spills or overflows** following heavy rains or floods.

Collection of water from swimming pools and whirlpools for bacterial enteric pathogens

Testing for specific pathogenic bacteria or parasites is not routinely available or practical in recreational waters such as swimming pools or whirlpools. Therefore, when investigating a WBO, water quality may be determined by testing for the presence or absence of coliform bacteria. In addition to testing following a suspected WBO, proprietors of licensed public pools are encouraged to routinely sample for bacteriologic contamination. Sample the pool during a period of average use, dependent on individual pool usage. Using a sweeping motion, collect a sample from a depth of 18 inches. Please ensure that the chlorine neutralizing substance is not rinsed from the bottle.

In addition to these procedures, swabs from skimmers, filters, and drains may also be used for investigations of outbreaks of *Pseudomonas* folliculitis outbreaks involving swimming pools or whirlpools.

Collection of water from swimming pools and whirlpools for *Legionella*

a) Sand filters

1) Collect approximately 5 teaspoons of sand from the filter and place in a sterile 200 ml bottle (or two 100 ml bottles) containing sodium thiosulfate.
2) Fill the bottle(s) with water from filter casing to within 1" of the top of the bottle.
3) Indicate on a laboratory requisition "sand filter" for *Legionella* testing.

b) Diatomaceous earth and cartridge filters

1) Consult with the BCDP or BEOH staff before collecting these specimens.

Swimming pools and whirlpools contaminated with *Cryptosporidium*

Because of the large number of oocysts shed by symptomatic persons and high infectivity of *Cryptosporidium*, even limited fecal contamination could result in sufficient oocyst concentrations in localized areas of a pool to cause additional human infections. Since *Cryptosporidium* oocysts are very small (4-6 microns) and resistant to chlorine (The chlorine CT* of 9600 needed to kill *Cryptosporidium* oocysts is approximately 640 times greater than required for *Giardia* cysts), rapid sand filters and recommended chlorine levels commonly used in swimming pools may not be effective in removing *Cryptosporidium* oocysts. However, a well-maintained fine-grade diatomaceous earth (DE) filtration system may remove *Cryptosporidium*.

If the swimming pool is believed to be fecally contaminated, the pool should be closed until the chlorine level and contact time is sufficient to kill *Giardia* cysts. Draining the pool and replacing contaminated filter media in filters are not considered effective against *Cryptosporidium*. Maintaining the high level chlorine necessary to kill *Cryptosporidium* in swimming pools is not feasible; therefore, such recreational water used should be recognized as a potential increased risk for cryptosporidiosis in immunocompromised persons. In systems that use DE filters, one option may be to close contaminated pools until relatively complete filtration has occurred (typically three turnovers or approximately one day). [1,2]

Pool operators can reduce the risk of initial contamination by following some of the guidelines listed in the ***CRYPTOSPORIDIUM FACT SHEET FOR SWIMMING POOL OPERATORS.***

* CT = Pool chlorine concentration (in parts per million) multiplied by time (in minutes)

1. CDC. Swimming-associated cryptosporidiosis - Los Angeles, County. MMWR 1990;39(20):343-345.
2. CDC. *Cryptosporidium* infections associated with swimming pools - Dane County, Wisconsin, 1993. *MMWR* 1994;43(31):561-563.

Cryptosporidium fact sheet for swimming pool operators

CRYPTOSPORIDIUM FACT SHEET FOR SWIMMING POOL OPERATORS

Cryptosporidium is a coccidian protozoan found mainly in fecally contaminated environments. One of these environments may be swimming pools. The organism resides in the intestinal tract and is transmitted through the fecal-oral route. The infective dose is very low; as few as 10 oocysts (the infective stage of the organism) have been demonstrated to cause illness. The time between exposure to C*ryptosporidium* and the onset of disease ranges from 1 to 12 days with an average of about 7 days. The most common sign of illness is diarrhea that is usually profuse and watery, often accompanied by abdominal cramping. Malaise, fever, loss of appetite, nausea, and vomiting can also occur.

Oocysts appear in the stool at the onset of symptoms and can continue to be excreted in the stool for several weeks after symptoms resolve. Outside the body they may be infective for 2-6 months in a moist environment. The oocyst stage is highly resistant to halogen (chlorine/bromine) disinfection. It can withstand relatively high levels of hypochlorous acid for a long period of time. This is a concern in pools where the primary protection against disease transmission is the halogen disinfection system.

Because of the size of the oocysts (2-4 microns in size), they can pass through a sand filter or most cartridge filters. A diatomaceous earth filter can capture most of the oocysts. However, even with good removal it may take as long as 2 ½ days to remove the majority of the oocysts from a pool (assuming a six-hour turnover and good capture).

Once the pool is contaminated, the oocysts resistance to halogens and the difficulty of removing the cysts by filtration can result in pools which are contaminated for long periods of time.

Recommendations for training and operating pools

- Provide training for all persons responsible for the maintenance and operation of the swimming pool.
  Sources of training include state and local health department (LHD) training and the National Swimming Pool Foundation Certified Pool Operator courses.
- Train staff (e.g., lifeguards and instructors) to report illnesses they experience to the management and not to swim if ill with diarrhea or abdominal cramps.
- Maintain the re-circulation and filtration equipment to provide maximum filtration. Many pools are periodically overused (e.g., winter weekend usage at many hotels and motels). These pools need filtration equipment that exceeds state-required minimums just to maintain normal water quality.
- Maintain chemical feed equipment and chemical levels at optimal levels. This includes maintaining optimal disinfectant levels, pH, total alkalinity, hardness, and temperature. Lack of proper water balance can greatly effect disinfection times.

- Follow recommended disinfection procedures whenever a fecal accident occurs, or whenever it is suspected the pool may be contaminated by *Cryptosporidium* oocysts.
- Develop policies for pool usage by diaper-aged children.
- Provide signage in a conspicuous location before pool entry. The sign might state: "*If you have diarrhea, please do not use the pool*", "*Shower before entering the pool*", "*Report illnesses to the management*." Then enforce the rules.
- Use club or organization newsletters to remind patrons not to use the pool if they are or have recently been ill.

Pool disinfection after fecal accidents or with suspected contamination

Our best recommendation for handling fecal accidents is to treat any accident involving unformed stool as a possible *Cryptosporidium* contamination and disinfect accordingly. The following steps need to be taken if a pool is either suspected or is known to be contaminated with *Cryptosporidium*:

a) Close the pool and notify the LHD.
b) Add chlorine to raise the disinfectant residual to 50 ppm. Stabilize the pH to 7.2-7.8 for the chlorine to be effective. (Remember high levels of chlorine can cause a purple interference color when using phenol red to test for pH. If this happens, neutralize the sample with a small amount of sodium thiosulfate.) Run the circulation equipment for 12 hours with the high level of chlorine.
c) Clean and brush down the walls of the pool, skimmers, housings, and skimmer baskets.
d) Backwash the filter thoroughly. If this is a whirlpool, drain the pool at this time.
e) Disinfect the filter.
    - **Sand Filters**: Add a gallon of chlorine bleach (sodium hypochlorite) directly into the filter and let stand 4-6 hours (more may be needed with filters of 36 inch diameter). Backwash again.
    - **Cartridge Filters**: Remove the cartridge and clean the filter casing thoroughly with a 200 ppm solution of chlorine bleach (sodium hypochlorite). Allow it to stand several hours. Clean the cartridge thoroughly and soak in a 200 ppm solution of bleach. Rinse and allow the cartridge to dry completely.
    - **Diatomaceous Earth (D.E.) Filters**: Clean the D.E. off the filters, dispose of the D.E., and soak the tank and septums in a 100 ppm solution of chlorine bleach.
f) Restart the recirculation system and neutralize the chlorine slowly back to normal or fill, if a whirlpool.
g) Balance the water and reopen.
h) Monitor the disinfectant levels carefully.

Additional assistance can be obtained by calling your LHD. For more specific information on this procedure, please call the Bureau of Environmental and Occupational Health at (608) 266-8284.

Mailing water samples to the laboratory

The testing laboratory should receive the water samples within 48 hours (preferably 24 hours) of collection because old samples may give inaccurate results. Samples should be in transit no longer than 24 hours. Samples that will not arrive at the laboratory within 24 hours of collection should be refrigerated before shipment. Be sure the request form is completely filled out and the sample bottle is placed in a plastic whirl-pak bag (U. S. Post office requirement) before placing it in an insulated mailing container with ice-paks. Take the water sample to the post office and have it processed before the last daily mail dispatch to prevent delay of shipment over a weekend or holiday.

.

Laboratory (Bacteriological) interpretation for potable water tests

- **Coliform Absent (SAFE).** No coliform bacteria were found in the water sample.
- **Coliform Present (UNSAFE).** Coliform bacteria present in the water sample. The presence of coliform bacteria in a water sample indicates that unfiltered or poorly filtered surface or near-surface waters reached the groundwater or entered through an opening in, around, or at the top of the well casing or some point in the distribution system. This water is a potential health hazard.
- ***E. coli*** **Present (UNSAFE).** This water has direct evidence of fecal pollution and is a definite health hazard.

APPENDIX H

Boil Water Advisory

WISCONSIN DIVISION OF PUBLIC HEALTH POLICY

RESPONSE TO BACTERIOLOGICALLY UNSAFE DRINKING WATER

Water systems that test positive for total coliforms or fecal coliforms may contain pathogenic organisms. The Wisconsin Department of Natural Resources (DNR) has responsibility for enforcing U.S. Environmental Protection Agency (EPA) requirements for unsafe water systems serving the public and for assisting system operators in the identification and correction of the problem. The BLHS&EMS Regional Offices have responsibility for assisting local health departments (LHD) in the protection of the public's health.

In 1989, the EPA revised the total coliform regulations under the "Safe Drinking Water Act" which regulates contamination of public drinking water, including bacteriologic contamination. The changes were incorporated into Wisconsin code in March 1991 and are referred to as the "Total Coliform Rule". These changes require more testing and apply more stringent requirements to public drinking water.

Definition of terms used by the EPA and DNR:

Maximum Contamination Level (MCL) - refers to the maximum amount of any contaminant allowed by the Safe Drinking Water Act. Therefore, an "MCL violation" indicates that the maximum has been exceeded.

Total Coliform Positive - indicates the sample contained the general class of marker organisms referred to collectively as coliform bacteria. These organisms are common in the environment, but should not be in drinking water. A total coliform positive sample indicates these organisms are in the well or distribution system, or the sample was contaminated when it was collected. Whenever a water system is total coliform positive the positive samples are further analyzed for fecal coliform and additional samples are collected at the site of the original positive as well as upstream and downstream from the original contaminated sample.

Fecal Coliform / *E. coli* Positive - indicates fecal coliforms normally found in the intestinal tract of warm blooded animals were found in the water sample. Although fecal coliform may not be pathogenic, a fecal coliform positive test is presumptive evidence for fecal contamination of the water.

Monthly MCL Violation - when 5% or more of the samples collected in any month from systems in which at least 40 samples/month are collected or at least two samples from systems in which less than 40 sample/month are collected and are coliform positive (either total or fecal). For monthly MCL violations the DNR requires water system operators to notify users within 14 days.

Acute MCL Violation - both the original and follow-up (check) samples are total coliform positive **and either** the original or follow-up samples are also positive for **fecal coliform**. These always result in a "Boil / Bottled Water Notice" and the DNR will immediately notify the BLHS&EMS. The BLHS&EMS, in turn, will contact the LHD and licensed facilities following the protocol below.

Non-Acute MCL Violation - either a monthly MCL violation or when both the original and follow-up samples are total coliform positive, but neither is positive for fecal coliform. Whether or not a "Boil / Bottled Water Notice" is issued for a non-acute violation is usually the prerogative of the DNR district office that regulates the water system. Very rarely a monthly MCL violation may result in a "Boil/Bottled Water Notice" if the system was chlorinating when the samples were taken and the district office determines that additional chlorination may not remedy the problem. A total coliform positive may result in a "Boil / Bottled Water Notice" if the water system cannot be chlorinated to a level of 0.5 ppm within 4 hours. Even if the system can be chlorinated adequately within that period, the DNR will notify the BLHS&EMS and the BLHS&EMS will notify the LHD to follow part II of the protocol below.

The following protocol applies to public water systems, both community and non-community, determined to be bacteriologically contaminated.

When a "Boil / Bottled Water Notice" is issued

The DNR district office issuing the notice will contact the appropriate regional office immediately by telephone or FAX and report the details of the situation. The regional office staff will report these details by telephone to the staff in the BEOH at the DPH central office who will, in turn, notify the BCDP / CDES and the Bureau Director's Office (only when human illnesses are believed to be involved). The Bureau Director's Office will notify the Division Administrator's Office if warranted. The regional office staff, with assistance from central office staff as necessary will:

Note: If the DNR is unable to reach the regional office staff, the DPH Emergency HOTLINE (608-258-0099) should be call.

Contact the LHD of the city and/or county:

a) Inform them of "Boil / Bottled Water Notice" and ask that they heighten surveillance for waterborne diseases in the community affected.
b) Inform LHD staff that the regional office will contact establishments (or assist them if they are an agent health department) if the number of establishments involved is manageable or coordinate a media release with DNR staff if there are a large number of establishments involved; this release must include instructions for commercial establishments informing them that ice and water served to the public must be purchased

from an approved source; commercial establishments are not to use boiled water (the quantity they need precludes a safe boil/cool procedure).

c) Assist LHDs with information to instruct callers:
   1) Use bottled water or boil tap water for one minute (rolling boil) before using it for drinking, cooking, making baby formula, coffee, juices, other beverages or bathing infants.
   2) Throw out ice cubes in their freezer and use commercial ice.
   3) Do not brush teeth with unboiled tap water.
   4) Do not wash open wounds with unboiled tap water.
   5) Water is safe for bathing (except infants), showering, washing hands, and washing dishes if the final rinse is boiled water. Automatic dishwashers that heat-dry the dishes may be used safely.

d) LHD should notify the following agencies. The order of contact is a local decision and should be based on relative risk and local emergency plans.
   1) Hospitals and other health care facilities:
      - Inform staff and patients.
      - Provide bottled water for ingestion.
      - Use sterile water for flushing wounds, bottled water for surgical scrub, tube feeding, washing newborns, etc.
      - Report all suspected waterborne disease to LHD immediately.
   2) Medical and Dental Clinics:
      - Use bottled water for ingestion, sterile flushing of wounds, etc.
      - Dentists and dental hygienists discontinue use of water cooled instruments such as high-speed handpieces, air/water syringes, and cavitrons; substitute bottled water applied with a bulb syringe for cooling and rinsing purposes; use rubber dams as appropriate; defer treatment for patients who may be at risk, such as small children, the elderly, and those with chronic diseases and/or suppressed immune systems.
      - Report all suspected waterborne disease to LHD immediately.
   3) Schools and day care centers:
      - Inform staff and students of problem.
      - Turn off drinking fountains, provide commercially bottled water for ingestion.
      - Report all cases of waterborne disease to LHD immediately.
   4) Jails:
      - Provide commercially bottled water for ingestion.
      - Report all cases of waterborne disease to LHD immediately.
   5) Local Emergency Government:
      - Explain nature of problem.
      - Review DNR, regional office and LHD roles.

Contact food service facilities and instruct:

a) Water supply has tested "unsafe" - may contain harmful bacteria.
b) Use only commercially bottled water for ingestion, washing vegetables, making coffee, cooking, reconstituting juices or other drinks and any other use that might result in the ingestion of unboiled tap water.
c) Dump ice if made on location - purchase ice from safe source, clean and sanitize ice machine, following manufacturer's instructions, after "all clear" has been issued by DNR before making ice again.
d) Turn off all post-mix beverage machines, dump pre-mixed beverages on hand (e.g., juice, lemonade, coffee).
e) Turn off beverage vending machines using community water supply.
f) Post sign in restroom that instructs not to drink water or use for mixing baby formula.
g) Utensil washing: be sure to use proper procedure:
   - Manually: wash-rinse-sanitize following label directions on sanitizer.
   - Dishwashers: 180^{o} F hot water sanitizing or chemical sanitizer according to directions on sanitizer.
h) Use <u>single service gloves</u> for food preparation requiring extensive handling

   <u>Remember</u>: <u>Gloves are not a substitute for thorough hand washing!</u>

i) These procedures are in effect until "all clear" is given by DNR.

Contact hotels, motels, and instruct:

a) Post signs that instruct not to drink water or use for making coffee, brushing teeth, making baby formula or bathing infants.
b) Buy commercially bottled water for ingestion.
c) Dump ice if made on location-purchase ice from safe source, clean and sanitize ice machine after "all clear" has been issued by DNR before making ice again.

Contact vending machine operators.

Contact the Bureau of Quality Assurance (BQA) if facilities they license may be affected.

When DNR issues an "Unsafe Water Alert" but not a "Boil / Bottled Water Notice" (i.e., system can be chlorinated within 4 hours) BLHS&EMS regional staff, with assistance from BCDP central office staff if necessary, will:

Contact LHD:

a) Inform them of problem and explain difference from "Boil / Bottled Water Notice" situation.
b) Inform them BCDP / CDES will contact establishments (or assist them if they are an agent health department) if the number of establishments is manageable or coordinate a media release with DNR if there are a large number of establishments involved.

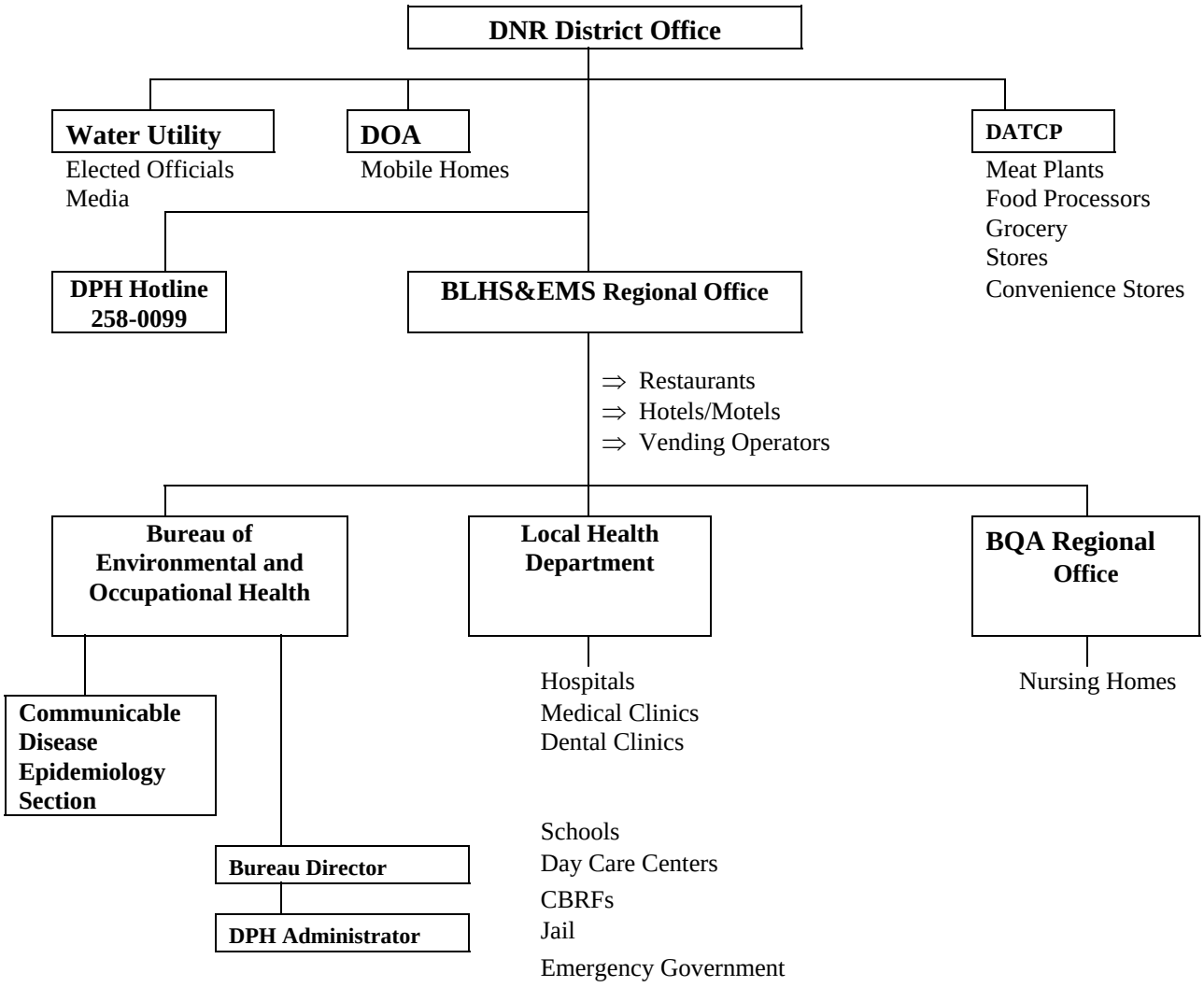
Contact restaurants and hotels/motels:

a) Inform them of the problem and explain the difference from "Boil / Bottled Water Notice" situation.
b) Dump ice. Clean and sanitize ice machine, reuse only after water system is chlorinated.
c) Dump pre-mixed beverages (e.g., juice, lemonade)
d) Until water has been safely chlorinated:
   - Use commercially bottled water.
   - Turn off all post mix beverage machines.
e) Be sure to use proper utensil washing procedure.

"All Clear" procedure for both "Boil Water" and Unsafe Water" situations:

DNR will notify the system operator and the DPH and the DPH will notify the LHD. Water system users will be notified by the media and through community word-of-mouth.

Figure 6. Hierarchy of information distribution system regarding "Bottled / Boiled Water" notices.



APPENDIX I

Public Health Concerns Following a Natural Disaster

Natural disasters

Each year natural disasters such as tornadoes, hurricanes, floods, fires and earthquakes affect the lives of people throughout the U.S. Homes can be damaged or destroyed, electricity and water cut off, and food supplies exhausted. When these natural disasters happen, important steps need to be taken to insure the health and safety from contaminated food and water supplies.

Preliminary survey following a disaster

Conduct a preliminary survey of the food establishment to determine the extent of the damage. If the electricity was off, determine how long it has been off and when it will be returned to service.

In case of a fire, determine if the water used to extinguish the fire came from a potable water source and what chemicals may have been used to extinguish the fire. The fire department may also have knowledge of the various temperatures reached in different areas of the premises. Find out what toxic gases were present in the air. These vapors can penetrate foods and food containers and contaminate the contents.

Governmental coordination

Coordination with other local, state, and possible federal agencies may be necessary in establishing individual responsibilities. Agencies may include: BCDP / CDES for investigation, consultation, epidemiological implications; BEOH for environmental mental health issues; DATCP / Food Safety and the U.S. Food and Drug Administration for consultation regarding commercial food items; or the USDA to aid in salvaging, disposition, reconditioning, disposal of foods, etc.

Local fire or police departments may be needed to prevent looting of damaged or non-salvageable food supplies. Utility companies may need to be contacted to prevent possible gas explosions or to remove fallen electrical lines.

Floods - Health and safety tips

Floods can be physically devastating as well as a threat to public health through contaminated water or food. In the case of municipal water supplies, the DNR will make a public announcement in the event there is a “boil water advisory”. When floodwaters rise above the well casing, a private well owner should assume that the well has been contaminated. Private well owners should refrain from using water from flooded wells until the floodwaters have receded and the well can be disinfected and tested. Water can be safely used if it is brought to a rolling boil for 1 minute before drinking, washing, brushing teeth, or cooking. Wells should be disinfected following the procedures listed in Appendix G, *Collecting Water Samples*. For additional information regarding safety issues following floods, consult the CDC brochure on the Internet entitled *“A Prevention Guide to Promote Your Personal Health and Safety”* (See *References and web sites*, page 36).

Food safety following floods

- Do not eat food that may have come into contact with floodwater. Discard any food that is not in a waterproof container and has come into contact with floodwater.
- Undamaged, commercially canned foods can be saved if the labels are removed, the cans are washed and then sanitized with a solution consisting of 6 ounces of bleach to 1 gallon of water.
- Food containers with screw-caps, snap-lids, crimped caps (soda pop bottles), twist caps, flip tops, and home canned foods should be discarded if they have come into contact with floodwater.
- For infants, use pre-prepared canned baby formula that requires no added water.
- If your refrigerator or freezer has been without power for a period of time, all stored items should be carefully checked. Perishable food left at room temperature for more than two hours should be discarded.

Drinking water concerns

Do not use water from a private well that has been or is flooded. If you are not certain about the safety of your water supply you should have the water tested for bacteria. Until test results are known, there are procedures to follow to ensure safe drinking water. Drink bottled water or water from a known, safe, source. If necessary, water can be made safe to drink by doing one of the following:

1) Boiling: Bring water to a **rolling** boil for 1 minute.
2) Bleach: Add household bleach (4-6%, do not use scented bleach), using 2 to 4 drops per quart, or 1/4 teaspoon per gallon of water, shake and let stand for 30 minutes.

Garbage precautions

Place household garbage in waterproof containers with tight fitting lids. Typically your municipality will have set up temporary disposal sites that should be used. It is important to remove household garbage every 4 days during the disaster. Garbage attracts animals and insects.

Sewer/Waste water concerns

- Private septic systems that have been flooded are no longer reliable. Portable toilets or other appropriate facilities should be used.
- Sewage can backflow from your septic or municipal system through floor drains, toilets, etc. any affected areas, such as basements, must be cleaned and disinfected with a chlorine solution or other affective disinfectants. Anything that cannot be cleaned should be thrown out.
- Wait until any floodwaters are below basement level before trying to drain or pump basement.

- Flush plumbing fixtures with buckets of water to be sure they are open. Have health authorities inspect sanitary disposal systems.

Injury prevention

Injuries are a major safety concern when flooding occurs. You need to take appropriate precautions to avoid injury to you or family members.

- **Electrical safety** - Do no attempt to restore or work on power sources without first contacting your utility. Homes that are flooded should have their power disconnected by your local utility.
- **Emergency generators** should **only** be used in well-ventilated areas. Do not use indoors because carbon monoxide, a colorless, odorless gas, can build up with fatal consequences.
- **Physical hazards** - Avoid wading in water without proper foot protection. Broken glass, metal fragments, and other debris may be submerged in the flooded are. Wear proper eyewear, gloves, and other protective equipment when cleaning an area. If you are cut or punctured, contact your physician or local health department as soon as possible. Tetanus vaccinations may be necessary.

Increased insect activity

- Insects - Use an insect repellent when outside. Mosquitoes and other insects can transmit diseases such as West Nile Virus and encephalitis. Follow the manufacturer's instructions carefully when applying repellents containing DEET to children. Keep chemicals used for disinfecting, and poisons used for insect and rodent control out of the reach of children.
- Stagnant water is a breeding place for disease carrying mosquitoes. Remove standing water from such artificial containers (e.g., tires, dishes, cans, or building materials).

Mold

Many persons have allergies when exposed to mold. Young children, the elderly and persons with underlying diseases such as asthma can be impacted by exposure to mold. The following recommendations should be considered:

- Household furnishings, carpets, etc. must be cleaned and dried as soon as possible to avoid mold growth. If that is not possible, discard furnishings such as carpet, drapes, stuffed toys, upholstered furniture, mattresses, wicker furniture, ceiling tiles, and other porous items.
- Remove and replace wet drywall and insulation to prevent mold growth.
- Inspect and clean all appliances, freezers, stoves and refrigerators that have been in contact with floodwater.
- Have heating and ventilation professionals check heating and cooling systems for mold contamination.
- Inspect for mold growth throughout the house, including attics, basements and crawlspaces.
- Cleaning procedures - First use a detergent to clean the item. Then, disinfect the cleaned surfaces with a bleach solution. Use 4 to 6 ounces of bleach per gallon of water. The bleach

solution should stay in contact with the affected surface for several minutes before rinsing with clean water. It may be necessary to repeat this process several times for items that were grossly contaminated. **Persons with respiratory health concerns (e.g., asthma, emphysema) should not perform the clean up.** Children and pets should not be allowed in these areas. When using a bleach solution, open windows to provide goo ventilation**. Boots and rubber gloves should be worn at all times.** In cases where rigorous splashing of contaminated water may occur, a dust mask and eye protection should be worn.

For more information on mold go the Department of Health and Family Services website at http://www.dhfs.state.wi.us/eh/. Click on **Human Health Hazards**, click on **Mold**.

General recommendations for food items that should be destroyed and cannot be reconditioned or salvaged in private homes and food service establishments following natural disasters

- **Produce** such as lettuce, celery, cabbage, etc., that has been under floodwater or exposed to contaminants.
- Potentially hazardous **food under refrigeration** if temperatures have reached 50^{o} F or greater for more than 1 hour. These may include meats, butter, cheese, milk, milk products, fish and shellfish.
- **Heat-damaged food** items that were charred or were in the immediate proximity to a fire. Extreme heat can cook contents of canned goods and adversely affect the contents.
- **Foods subjected to direct contact with non-potable water:** Paper, or cellophane wrapped goods can collect filth or split at the seams making it virtually impossible to remove dirt or to properly sanitize. These may include coffee, tea, flour, meal, cereals, grains, sugar, or nuts in bags or open containers. Also, consider items such as candies, breads, cakes and packaged foods like chewing gum and mints.
- **Screw top, crimped-cap and similar containers** including soft drinks, beer, wine, liquor bottles should be discarded.
- **Frozen foods** with internal core product temperatures higher than 10^{o} F or foods intended to be frozen cannot be salvaged.
- **All eggs**, shell whole, uncracked, while stored exposed or in cardboard containers, shall be discarded.
- **Foods in glass containers** and bottled foods with cork stoppers shall be destroyed whether or not the original seal has been broken. No type of closure used on glass food containers has been found safe for submersion in floodwaters.
- **Smoke damage to foods** is the most difficult to assess. Insoluble tars, adhesives in wall coverings and flooring, plastics, their by-products, and other toxics may be suspended in the smoke and are a major health concern. All meats exposed to smoke shall be disposed of whether wrapped in cellophane, aluminum foil, or paper. Look for soot or ash on/under

containers, lids, or tops. Oil products such as butter readily absorb smoke with a resultant bad taste and odor. All friction-type closures and cellophane wrapped products affected by smoke are not salvageable. Produce wrapped in cellophane is a perishable product and should be discarded.

- **All meats**, beef, pork, poultry, fish, shellfish, etc. (except canned) cannot be salvaged for human consumption. Discuss with DATCP or USDA what might be used for animal rendering.
- **Miscellaneous foods**, such as bakery, ice cream, condiments, etc. should be discarded.
- **Spices**, subject to high temperatures or water contamination should be discarded.

REMEMBER:
All water damaged goods should be considered contaminated!.

Consider the effects of chemicals used in fire fighting, the effects of explosions and bottle damage, and the effects of insecticides, rodenticides and household cleaning compounds.

The food service operator is advised to maintain a detailed log of all materials and food items discarded or removed for the purpose of verifying loss. The operator often needs this information for insurance and tax purposes, health official investigations, and possibly to support testimony in a court of law.

Guidelines for the re-opening of food service establishments following disasters.

Due to the unpredictable, sporadic occurrence of natural disasters (e.g., tornadoes, blizzards, floods) or accidental catastrophes (e.g., explosions, fires, chemical poisonings) or contamination of water, and/or food supplies, the LHD and DPH may become involved with emergency procedures especially regarding reestablishing a safe, adequate, and available food and water supply. In any disaster or accident situation, your own safety should be considered. High water, gas leaks, fallen electrical lines, damaged buildings, falling rubble, collected sewage and similar conditions are potentially very dangerous; therefore safety precautions should be observed.

Local and regional sanitarians may be called upon to evaluate the sanitary conditions for food service establishments following such disasters or accidents. To insure that conditions are safe as well as sanitary before reopening food service establishments, the sanitarian should evaluate the following:

Re-inspection for food service establishments

- No food service or food handling operation should be permitted to operate until the premises are determined to be safe and fit for human occupancy by the local Fire Marshall and state or local building inspector. Written verification of such determination shall be obtained.
- No food service activity shall take place until the entire premises, including all equipment, have been thoroughly cleaned, disinfected and dried. The environment of exposed food, the

kitchen and all related areas shall comply with all applicable sections of Wisconsin Administrative Code HSS 196 Restaurants.

- Dining furnishings shall be appropriately cleaned and disinfected.
- A safe water supply shall be confirmed (written laboratory results, bacterial, chemical, if applicable) and approved prior to re-establishment. The interior water system should be activated and allowed to flush before being used as a potable supply for coffee makers, ice machines, dishwashing, etc.
- All plumbing, heating, electrical and gas powered equipment shall be tested and in good working order before re-establishment (including toilet room fixtures, all water sources and drains). Electrical inspector may be called to verify (in writing) safety.
- Ice machines shall be thoroughly disassembled, cleaned, flushed and sanitized before being allowed to be reconnected to the interior water supply.

References related to natural disasters and disaster relief:

Wisconsin Division of Public Health - For online information on flooding and water damage:
http://dhfs.wisconsin.gov/dph_emsip/InjuryPrevention/Disaster/flooding.htm

CDC. National Center for Environmental Health List of Brochures.
http://cdc.gov/nceh/publications/brochures.htm

CDC Website - information related to floods, tornadoes, hurricanes, etc.
http://www.cdc.gov/nceh/ehserv/ehsa/hottopics/weather.htm

USDA Website - information on disaster assistance
http://www.usda.gov/news/disaster/

APPENDIX J

Outbreak Investigation at a Recreational or Educational Camp

Definition of recreational or educational camp:

"A premises, including temporary and permanent structures, which is operated as an overnight living quarters where both food and lodging or facilities for food and lodging are provided for children or adults, or both children and adults, for a period which includes 4 or more consecutive nights of lodging, for a planned program of recreation or education, and is offered free of charge or for payment of a fee by a person or by the state or local unit of government.") HSS 175.03 (3)

Camp exposures

Individuals who attend recreational or educational camps may be at increased risk of gastrointestinal illness associated with food or water or skin infections associated with exposure to contaminated recreational water (e.g. "swimmers itch"). Food temperature abuse, improper sanitation of eating utensils, poor personal hygiene, inadequately trained food workers, contaminated recreational water, or inadequate maintenance of septic systems and wells may contribute to increases in illness among campers.

Camp outbreak investigation

This section contains steps in addition to those found in Section IV, *Steps in Investigating an Outbreak* that apply to the investigation of foodborne or waterborne outbreaks at recreational or educational camps only.

Planning a detailed epidemiologic investigation

a) Assure stool culture kits, ova and parasite kits, and sterile bottles for collecting water samples are readily available. If samples are collected from a chlorinated water source (pool, spas, and drinking water), the sterile bottles should contain sodium thiosulfate to neutralize the chlorine.
b) Arrange for an on-site inspection of the camp by the sanitarian and/or the public health nurse as soon as possible after being notified of the possible outbreak.
c) Obtain a map of the camp and identify the following:
    - Specific camping areas including tent and cabin sites and common areas such as toilets, dining areas, swimming areas and other recreational areas
    - Location of wells and septic areas
    - List of campers and staff assigned to each tent or cabin
    - Plot ill cases on the map to identify a possible cluster of illness
d) Obtain the previous biological tests of the potable water supply if a well is utilized.
e) Consider collecting a water sample from the well(s) and test for total coliforms.
f) Obtain a schedule of recreational activities at the camp including overnight camping trips that may have occurred at locations other than the camp.

Establishing the existence of an outbreak

a) Interview the camp health supervisor regarding the occurrence, signs and symptoms and the severity of the illness among the campers and the staff.
b) Check the health and treatment records kept at each camp.

Formulate a tentative hypothesis

Formulate a tentative hypothesis to explain the likely cause, source and distribution of the illness. The hypothesis will be based on the data currently known regarding the symptoms and possible incubation periods of various pathogens, and common exposures of ill individuals. The hypothesis may change when additional data are collected.

Example:

The LHD receives a call from a staff worker at a recreational camp. The staff reported at least 15 campers and staff become ill within a 12-hour period. Symptoms included severe abdominal cramps and diarrhea. The 15 ill individuals attended an outdoor barbecue two days before the onset of the illness. The staff person reported the campers prepared a chicken barbecue and the chicken may have been undercooked.

> **Tentative hypothesis:** Foodborne outbreak from undercooked chicken, with the likely cause being *Campylobacter* or *Salmonella*.

Part of the investigation included a review of the health care records that indicated that none of the 15 ill individuals had a fever when seen at the camp health center. A further review of the activity schedule at the camp indicated that the ill individuals were part of a group that had taken a wilderness hike 4 days before the onset of illness. The counselor allowed them to swim in a pond that is 100 feet from a farm field that had recently been fertilized. The day before the campers swam in the pond the area received over an inch of rain.

> **Revised tentative hypothesis:** Exposure to contaminated recreational water, with the likely cause being *E. coli* O157:H7.

Put control measures into operation

Control measures are based on the available data and the tentative hypothesis of the cause of the illness. To determine effective control measures it must be determined who, when and where individuals may have traveled, how the illness was transmitted and what was the etiologic agent.

Using the example above, when the tentative hypothesis of undercooked chicken being the cause of the illnesses, it would have been appropriate to advise anyone with active diarrhea not be allowed to prepare meals and that the preparation of dinners be closely supervised by staff and assure the meat is thoroughly cooked. When the hypothesis changed the control measures may include suspending any recreational water activities until laboratory tests indicate the water is safe.

Confirm or refute hypothesis (See *IV. Steps in an outbreak investigations)*

APPENDIX K

Statement Regarding Fee Exempt Testing

M E M O R A N D U M

TO: All Wisconsin Local Health Departments

FROM: Dr. Jeffrey P. Davis, Chief Medical Officer and State Epidemiologist
Bureau of Communicable Diseases and Preparedness

DATE: January 3, 2005

SUBJECT: **FEE EXEMPT TESTING IN CONJUNCTION WITH FOOD AND WATERBORNE DISEASE OUTBREAKS**

During investigations of food and waterborne outbreaks, the Wisconsin Division of Public Health offers fee exempt testing of clinical and environmental specimens to all local health departments as part of an ongoing program to prevent and control communicable diseases in the community. With fee exempt testing, we allow a local health department rather broad latitude to order the number and type of tests each agency feels is necessary for their investigations, with a few guidelines:

- Testing should be for the purposes of protecting the health of the community and of vulnerable populations within it, and not primarily for the benefit of individuals.
- Testing should be for diseases of serious public health consequence, and for which the LHD has an active program of intervention and control to prevent the spread of disease.
- All testing should be approved by the BCDP except for those tests listed below.

Tests that may be requested fee exempt without prior approval or restriction include stool samples for routine bacterial or parasitic testing such as *Salmonella*, *Shigella*, *Campylobacter*, *E. coli* O157:H7, *Giardia*, *Cryptosporidium*. The Communicable Disease Epidemiology Section /BCDP should be consulted about any test or disease agent not listed, and the number of specimens it is necessary to test.

APPENDIX L

"Tips Toward a Safer Kitchen"

"Tips toward a safer kitchen"

- Keep your refrigerator at 41° F (5° C) or less. A temperature of 41° F or less slows the growth of most bacteria. The fewer bacteria there are, the less likely you are to get sick from them.

- Wash your cutting board with soap and hot water after each use. Using a bleach solution (approximately 1-capful to a gallon of water or premixed in a spray bottle) to sanitize your cutting board after washing and rinsing is the best way to prevent bacteria from remaining on your cutting board, especially after preparing raw meats or cutting unwashed vegetables or fruits. Washing with only a damp cloth will not remove bacteria.

- Never allow raw meat, poultry or fish to come in contact with other foods.

- Cook raw animal foods to the following internal temperatures:

Raw shell eggs, fish, pork, whole muscle beef (steaks, prime rib…)	145° F for 15 seconds
Ground beef and other ground meats, injected meats, ratites (ostrich, emu…)	155° F for 15 seconds
Poultry, wild game animals, stuffed meats, or meats containing stuffing	165° F for 15 seconds

- Ground beef can be contaminated with potentially dangerous *E. coli* 0157:H7 bacteria. The Food and Drug Administration (FDA) has recommended the use of a meat thermometer when cooking raw animal foods. Do not rely on the internal color of the meat because some meat may turn prematurely brown before a safe internal temperature is reached.

- Do not eat raw or lightly cooked eggs. Many older cookbooks have recipes that call for raw eggs (e.g., ice cream, mayonnaise and eggnog). These recipes are no longer recommended because of the risk of *Salmonella*. The commercial versions of these products are made with pasteurized eggs and are not a food hazard.

- Discard cracked or dirty eggs.

- Keep eggs refrigerated and eat promptly after cooking. Do not keep eggs, or egg-based foods or sauces warm for more than two hours.

- If cooked food items are being served over an extended period of time, keep cooked food items hot in a crock pot or roaster at a minimum temperature of 135^{o} F or above.

- Use a calibrated food thermometer to monitor temperatures of your cold, hot, and cooked foods.

- Always wash fruits and vegetables thoroughly before cutting or eating.

- Wash hands with soap warm water immediately after handling raw meat, raw eggs, poultry, or fish. Wash for at least 20 seconds before and after handling food, especially raw meat. If you have an infection or cut on your hands, wear rubber or plastic gloves.

- Defrost meat, poultry and fish products in the refrigerator, microwave oven, or under cold water. Follow package directions for thawing foods in the microwave. Cook microwave-defrosted food immediately after thawing

- Use clean cooking utensils, silverware and dishes to prepare and serve all foods. Be especially careful when barbecuing, as one spatula or platter often touches both raw and uncooked meats.

- If possible, use clean utensils instead of hands to prepare food.

- Refrigerate cooked, perishable food as soon as possible within two hours after cooking. Date leftovers so they can be used within two to three days. *"If in doubt, throw it out!"*

- When cooling leftovers in the refrigerator, break large batches or leftovers into smaller quantities (3" to 4" to a container) and leave uncovered in the refrigerator until cooled. Other ideas included using metal instead of plastic containers, pre-chilling containers that you will be storing food in or providing an ice bath to rapidly chill food down to 41^{o} F. Improper cooling is one of the major causes of foodborne illnesses.

- Sanitize your kitchen dishcloths regularly. Wash with a solution of one-teaspoon chlorine bleach to one-quart water, or use a commercial sanitizing agent, following product directions. Cloths used for cleaning utensils should be replaced or disinfected daily. The use of sponges is discouraged since they may harbor bacteria and cannot be easily cleaned or sanitized.

- Clean kitchen counters and other surfaces that come in contact with food using hot water and detergent and a solution of bleach and water. Bleach and commercial disinfectants are best for getting rid of bacteria. Hot water and detergent do a good job, too, but may not kill all strains of bacteria.

- Allow dishes and utensils to air-dry to eliminate re-contamination from hands or towels. When washing dishes by hand, it's best to wash them all within two hours of use -- before bacteria can begin to form.

- Dented cans should be used as soon as possible; better yet, don't buy them. Toxins from the can get into the food. Cans with bulging ends should not be used under any circumstances.

- Do not store onions and potatoes together because gases from onions make potatoes rot.

- Do not store foods under sinks because cleaning supplies or water may contaminate them.

- Do not save leftover food or milk that a baby does not finish.

- If foods such as sandwich meats feel slimy, it is because they are coated in bacteria. Throw the food out, or if you just bought it, return it to the store and inform the manager.

- Flour bugs might be repulsive, but they probably will not make you sick. Insects such as flies and cockroaches can spread bacteria.

- Accumulated paper and grocery bags can be hangouts for rodents and bugs.

- Do not put things that are handled a lot but not washed (e.g., playing cards) in the same drawer as utensils.

- **Do not cook for others if you are ill!**

Source: Iowa State University, Madison Department of Public Health and the Wisconsin Division of Public Health, Bureau of Environmental and Occupational Health.

APPENDIX M

"Hand Washing"

"Hand Washing"

Why is hand washing important?

Hand washing, when done correctly, is the single most effective way to prevent the spread of communicable diseases. Good hand washing technique is easy to learn and can significantly reduce the spread of infectious diseases among both children and adults.

What types of disease can good hand washing prevent?

1. Diseases spread through fecal-oral transmission. Infections that may be transmitted through this route include salmonellosis, shigellosis, hepatitis A, giardiasis, enterovirus, amebiasis, and campylobacteriosis. Because these diseases are spread through the ingestion of even the tiniest particles of fecal material, hand washing after using the toilet cannot be over-emphasized.
2. Diseases spread through indirect contact with respiratory secretions. Microorganisms that may be transmitted through this route include influenza, streptococcus, respiratory syncytial virus (RSV) and the common cold. Because these diseases may be spread indirectly by hands freshly soiled by respiratory discharges of infected people, illness may be avoided by washing hands after coughing or sneezing and after shaking hands with an individual who has been coughing or sneezing.
3. Diseases may also be spread when hands are contaminated with urine, saliva or other moist body substances. Microorganisms that may be transmitted by one or more of these substances include cytomegalovirus, typhoid, staphylococcal organisms, and Epstein-Barr virus. These organisms may be transmitted from person-to-person or indirectly by contamination of food or on inanimate objects such as toys.

What is good hand washing technique?

There is more to hand washing than you think! By rubbing your hands vigorously with soapy water, you pull the dirt and the oily soils free from your skin. The soap lather suspends both the dirt and germs trapped inside and are then quickly washed away.

Follow these four simple steps in keeping hands clean:

1. Wet your hands with warm running water.
2. Add soap, then rub your hands together, making a soapy lather. Do this away from the running water for at least 15 seconds, being careful not to wash the lather away. Wash the front and back of your hands, as well as between your fingers and under your nails.
3. Rinse your hands well under warm running water. Let the water run back into the sink, not down to your elbows. Turn off the water with a paper towel and dispose in a proper receptacle.
4. Dry hands thoroughly with a clean towel.

What type of soap should be used?

Any type of soap may be used. However, bar soap should be kept in a self draining holder that is cleaned thoroughly before new bars are put out and liquid soap containers (which must be used in day care centers) should be used until empty and cleaned before refilling.

To prevent chapping use a mild soap with warm water; pat rather than rub hands dry; and apply lotion liberally and frequently.

What are some mistakes I should avoid regarding hand washing?

- DON'T use a single damp cloth to wash a group of children's hands.
- DON'T use a standing basin of water to rinse hands.
- DON'T use a common hand towel. Always use disposable towels in day care of food preparation settings.
- DON'T use sponges or non-disposable cleaning clothes unless you launder them on a regular basis, adding chlorine bleach to the wash water. Remember that germs thrive on moist surfaces!

What are some ways to help children with good hand washing technique?

It is important to encourage and help children to wash hands before eating, after playing outdoors or playing with pets, after using the bathroom, and after blowing their noses. Even though hands may appear to be clean, they may carry germs or microorganisms that are capable of causing disease.

Don't assume that children know how to wash their hands properly. Supervision, especially in a day care setting, is an essential element in forming good hand washing habits in children.

Finally, children learn by example! Let them observe good hand washing technique from the adults who care for them.