FOODBORNE DISEASE BASIC EPIDEMIOLOGY INFORMATION

BETC participants are expected to read the sections of this document that are ***bold and italicized***.

BETC participants are NOT expected to know information from hyperlinks within a bold and italicized section.

What is foodborne disease?

Foodborne disease is caused by consuming contaminated foods or beverages. Many different disease-causing microbes, or pathogens, can contaminate foods, so there are many different foodborne infections. In addition, poisonous chemicals, or other harmful substances can cause foodborne diseases if they are present in food.

See Causes of Acute Foodborne Gastroenteritis for a list of disease agents, incubation times, and predominant symptoms.

More than 250 different foodborne diseases have been described. Most of these diseases are infections, caused by a variety of bacteria, viruses, and parasites that can be foodborne. ***Other diseases are poisonings, caused by harmful toxins or chemicals that have contaminated the food***, for example, Staphylococcus toxin that has formed in a food or poisonous mushrooms.

These different diseases have many different symptoms, so there is no one "syndrome" that is foodborne illness. However, the microbe or toxin enters the body through the gastrointestinal tract, and often causes the first symptoms there, so ***nausea, vomiting, abdominal cramps and diarrhea are common symptoms in many foodborne diseases***.

Many microbes can spread in more than one way, so we cannot always know that a disease is foodborne. The distinction matters, because public health authorities need to know how a particular disease is spreading to take the appropriate steps to stop it. For example, Escherichia coli O157:H7 infections can spread through contaminated food, contaminated drinking water, contaminated swimming water, and from toddler to toddler at a day care center. Depending on which means of spread caused a case, the measures to stop other cases from occurring could range from removing contaminated food from stores, chlorinating a swimming pool, or closing a child day care center.

What are foodborne disease outbreaks and why do they occur?

"Foodborne disease outbreak" means the occurrence of two or more cases of a

similar illness resulting from the ingestion of a common food.

An outbreak of foodborne illness occurs when a group of people consume the same contaminated food and two or more of them come down with the same illness. It may be a group that ate a meal together somewhere, or it may be a group of people who do not know each other at all, but who all happened to buy and eat the same contaminated item from a grocery store or restaurant. For an outbreak to occur, something must have happened to contaminate a batch of food that was eaten by a the group of people. Often, a combination of events contributes to the outbreak. A contaminated food may be left out a room temperature for many hours, allowing the bacteria to multiply to high numbers, and then be insufficiently cooked to kill the bacteria.

Many outbreaks are local in nature. They are recognized when a group of people realize that they all became ill after a common meal, and someone calls the local health department. This classic local outbreak might follow a catered meal at a reception, a pot-luck supper, or eating a meal at an understaffed restaurant on a particularly busy day. However, outbreaks are increasingly being recognized that are more widespread, that affect persons in many different places, and that are spread out over several weeks. For example, a recent outbreak of salmonellosis was traced to persons eating a breakfast cereal produced at a factory in Minnesota, and marketed under several different brand names in many different states. No one county or state had very many cases and the cases did not know each other. The outbreaks was recognized because it was caused by an unusual strain of *Salmonella*, and because state public health laboratories that type *Salmonella* strains noticed a sudden increase in this one rare strain. In another recent outbreak, a particular peanut snack food caused the same illness in Israel, Europe and North America. Again, this was recognized as an increase in infections caused by a rare strain of *Salmonella*.

The vast majority of reported cases of foodborne illness are not part of recognized outbreaks, but occurs as individual or "sporadic" cases. It may be that many of these cases are actually part of unrecognized widespread or diffuse outbreaks. Detecting and investigating such widespread outbreaks is a major challenge to our public health system. This is the reason that new and more sophisticated laboratory methods are being used at state and federal (CDC) public health department laboratories.

Why do public health officials investigate outbreaks?

A foodborne outbreak is an indication that something needs to be improved in our food safety system.

Public health practioners investigate outbreaks to control them, and also to learn how similar outbreaks can be prevented in the future.

Two activities are critical when an outbreak occurs. First, emergency action is needed to keep the immediate danger from spreading, and second, a detailed objective scientific investigation is needed to learn what went wrong, so that future similar events can be

prevented***. Much of what we know about foodborne disease and its prevention comes from detailed investigation of outbreaks. This is often how a new pathogen is identified, and this is how the critical information linking a pathogen to a specific food and animal reservoir is first gathered. The full investigation can require a team with multiple talents, including the epidemiologist, microbiologist, Public Health Environmentalist, and Public Health Nurse.***

What are the most common foodborne diseases?

The most commonly recognized foodborne infections are those caused by the bacteria *Campylobacter*, *Salmonella*, and *E. coli* O157:H7, and by a group of viruses called calicivirus, also known as the Norwalk and Norwalk-like viruses.

Campylobacter is a bacterial pathogen that causes fever, diarrhea, and abdominal cramps. It is the most commonly identified bacterial cause of diarrheal illness in the world. These bacteria live in the intestines of healthy birds, and most raw poultry meat has *Campylobacter* on it. Eating undercooked chicken, or other food that has been contaminated with juices dripping from raw chicken is the most frequent source of this infection.

Salmonella is also a bacterium that is widespread in the intestines of birds, reptiles and mammals. It can spread to humans via a variety of different foods of animal origin. The illness it causes, salmonellosis, typically includes fever, diarrhea and abdominal cramps. In persons with poor underlying health or weakened immune systems, it can invade the bloodstream and cause life-threatening infections.

E. coli O157:H7 is a bacterial pathogen that has a reservoir in cattle and other similar animals. Human illness typically follows consumption of food or water that has been contaminated with microscopic amounts of cow feces. The illness it causes is often a severe and bloody diarrhea and painful abdominal cramps, without much fever. In 3% to 5% of cases, a complication called hemolytic uremic syndrome (HUS) can occur several weeks after the initial symptoms. This severe complication includes temporary anemia, profuse bleeding, and kidney failure.

Calicivirus, or Norwalk-like virus is an extremely common cause of foodborne illness, though it is rarely diagnosed, because the laboratory test is not widely available. It causes an acute gastrointestinal illness, usually with more vomiting than diarrhea, that resolves within two days. Unlike many foodborne pathogens that have animal reservoirs, it is believed that Norwalk-like viruses spread primarily from one infected person to another. Infected kitchen workers can contaminate a salad or sandwich as they prepare it, if they have the virus on their hands. Infected fishermen have contaminated oysters as they harvested them.

Some common diseases are occasionally foodborne, even though they are usually transmitted by other routes. These include infections caused by *Shigella*, hepatitis A, and the parasites *Giardia lamblia* and *Cryptosporidia*. Even strep throats have been

transmitted occasionally through food.

In addition to disease caused by direct infection, some foodborne diseases are caused by the presence of a toxin in the food that was produced by a microbe in the food. For example, the bacterium *Staphylococcus aureus* can grow in some foods and produce a toxin that causes intense vomiting. The rare but deadly disease botulism occurs when the bacterium *Clostridium botulinum* grows and produces a powerful paralytic toxin in foods. These toxins can produce illness even if the microbes that produced them are no longer there.

Other toxins and poisonous chemicals can cause foodborne illness. People can become ill if a pesticide is inadvertently added to a food, or if naturally poisonous substances are used to prepare a meal. Every year, people become ill after mistaking poisonous mushrooms for safe species, or after eating poisonous reef fishes.

Information on bacterial growth and control of foodborne illness organisms is posted under Food Microbiology on the BETC Training web page.

How are outbreaks of foodborne disease detected?

The initial clue that an outbreak is occurring can come in various ways. It may be when a person realizes that several other people who were all together at an event have become ill and he or she calls the local health department. It may be when a physician realizes she has seen more than the usual number of patients with the same illness. It may be when a county health department gets an unusually large number of reports of illness. The hardest outbreaks to detect are those that are spread over a large geographic area, with only a few cases in each state. These outbreaks can be detected by combining surveillance reports at the regional or national level and looking for increases in infections of a specific type. This is why state public health laboratories determine the serotype of *Salmonella* bacteria isolated from people. New "DNA fingerprinting" technologies can make detecting outbreaks easier too. For example, the new molecular subtyping network, PulseNet, allows state laboratories and CDC to compare strains of *E. coli* O157:H7 and an increasing number of other pathogens from all across the United States to detect widespread outbreaks.

After an apparent cluster of cases is detected, it is important to determine whether these cases represent a real increase above the expected number of cases and whether they really might be related. Sometimes a cluster of reported cases is caused by something other than an actual outbreak of illness. For example, if the person responsible for reporting has just returned from a vacation and is clearing up a backlog of cases by reporting them all at once, the sudden surge of reports is just a false cluster.

How is a foodborne disease outbreak investigated?

Once an outbreak is strongly suspected, an investigation begins. ***A search is made for more cases among persons who may have been exposed. The symptoms and time***

of onset, and location of possible cases is determined, and a "case definition" is developed that describes these typical cases. The outbreak is systematically described by time, place, and person. A graph is drawn of the number of people who fell ill on each successive day to show pictorially when it occurred. A map of where the ill people live, work, or eat may be helpful to show where it occurred. Calculating the distribution of cases by age and sex shows who is affected. If the causative microbe is not known, samples of stool or blood are collected from ill people and sent to the public health laboratory to make the diagnosis.

To identify the food or other source of the outbreak, the investigators first interview a few persons with the most typical cases about exposures they may have had in the few days before they got sick. In this way, certain potential exposures may be excluded while others that are mentioned repeatedly emerge as possibilities. Combined with other information, such as the likely sources for the specific microbe involved, these hypotheses are then tested in a formal epidemiologic investigation. The investigators conduct systematic interviews about a list of possible exposures with the ill persons, and with a comparable group people who are not ill. ***By comparing how often an exposure is reported by ill people and by well people, investigators can measure the association of the exposure with illness. Using probability statistics, the probability of no association is directly calculated.***

For example, imagine that an outbreak has occurred after a catered event. Initial investigation suggested that Hollandaise sauce was eaten by at least some of the attendees, so it is on the list of possible hypotheses. Now, we interview 20 persons who attended the affair, 10 of whom became ill and 10 who remained well. Each ill or well person is interviewed about whether or not they ate the Hollandaise sauce, as well as various other food items. If half the people ate the sauce, but the sauce was not associated with the illness, then we would expect each person to have a 50/50 chance of reporting that they ate it, regardless of whether they were ill or not. Suppose, however, that we find that all 10 ill people but none of the well persons reported eating Hollandaise sauce at the event? This would be very unlikely to occur by chance alone if eating the Hollandaise sauce were not somehow related to the risk of illness. In fact, it would be about as unlikely as getting heads ten times in a row by flipping a coin (That is 50% multiplied by itself 10 times over, or a chance of just under 1 in 1000). So the epidemiologist concludes that eating the Hollandaise sauce was very likely to be associated with the risk of illness. ***Note that the investigator can draw a conclusion as to the likely source even though there is no food left to test in a laboratory.*** The association is even stronger if she can show that those who ate second helpings of Hollandaise were even more likely to become ill, or that persons who ate leftover Hollandaise sauce that went home in doggie bags also became ill.

Once a food item is statistically implicated in this manner, further investigation into its ingredients and preparation, and microbiologic culture of leftover ingredients or the food itself (if available) may provide additional information about the nature of contamination. Perhaps the Hollandaise sauce was made using raw eggs. The source of the raw eggs can be determined, and it may even be possible to trace them back to the

farm and show that chickens on the farm are carrying the same strain of *Salmonella* in their ovaries. If so, the eggs from that farm can be pasteurized to prevent them from causing other outbreaks.

Some might think that the best investigation method would be just to culture all the leftover foods in the kitchen, and conclude that the one that is positive is the one that caused the outbreak. The trouble is that this can be misleading, because it happens after the fact. What if the Hollandaise sauce is all gone, but the spoon that was in the sauce got placed in potato salad that was not served at the function? Now, cultures of the potato salad yield a pathogen, and the unwary tester might call that the source of the outbreak, even though the potato salad had nothing to do with it. This means that laboratory testing without epidemiologic investigation can lead to the wrong conclusion.

Even without isolating microbes from food, a well-conducted epidemiologic investigation can guide immediate efforts to control the outbreak. A strong and consistent statistical association between illness and a particular food item that explains the distribution of the outbreak in time, place and person should be acted upon immediately to stop further illness from occurring.

An outbreak ends when the critical exposure stops. This may happen because all the contaminated food is eaten or recalled, because a restaurant is closed or a food processor shuts down or changes its procedures, or an infected food handler is no longer infectious or is no longer working with food. An investigation that clarifies the nature and mechanism of contamination can provide critical information even if the outbreak is over. Understanding the contamination event well enough to prevent it can guide the decision to resume usual operations, and lead to more general prevention measures that reduce the risk of similar outbreaks happening elsewhere.

What happens in the body after the microbes that produce illness are swallowed?

After they are swallowed, there is a delay, called the incubation period, before the symptoms of illness begin. This delay may range from hours to days, depending on the organism, and on how many of them were swallowed. During the incubation period, the microbes pass through the stomach into the intestine, attach to the cells lining the intestinal walls, and begin to multiply there. Some types of microbes stay in the intestine, some produce a toxin that is absorbed into the bloodstream, and some can directly invade the deeper body tissues. The symptoms produced depend greatly on the type of microbe. Numerous organisms cause similar symptoms, especially diarrhea, abdominal cramps, and nausea. There is so much overlap that it is rarely possible to say which microbe is likely to be causing a given illness unless laboratory tests are done to identify the microbe, or unless the illness is part of a recognized outbreak.

How are foodborne diseases diagnosed?

The infection is usually diagnosed by specific laboratory tests that identify the causative organism. Bacteria such as *Campylobacter*, *Salmonella*, *E. coli* O157 are found by

culturing stool samples in the laboratory and identifying the bacteria that grow on the agar or other culture medium. Parasites can be identified by examining stools under the microscope. Viruses are more difficult to identify, as they are too small to see under a light microscope and are difficult to culture. Viruses are usually identified by testing stool samples for genetic markers that indicate a specific virus is present.

Many foodborne infections are not identified by routine laboratory procedures and require specialized, experimental, and/or expensive tests that are not generally available. If the diagnosis is to be made, the patient has to seek medical attention, the physician must decide to order diagnostic tests, and the laboratory must use the appropriate procedures. Because many ill persons to not seek attention, and of those that do, many are not tested, many cases of foodborne illness go undiagnosed. For example, CDC estimates that 38 cases of salmonellosis actually occur for every case that is actually diagnosed and reported to public health authorities.

How does the health department track foodborne diseases?

Routine monitoring of important diseases by the health department is called disease surveillance. Each state decides which diseases are to be under surveillance in that state. In most states, including Alabama, diagnosed cases of salmonellosis, *E. coli* O157:H7 and other serious infections are routinely reported to the health department. The county reports them to the state health department, which reports them to CDC. Tens of thousands of cases of these "notifiable conditions" are reported every year. A complete list of all notifiable diseases in Alabama is posted on the Epidemiology web page.

However, most foodborne infections go undiagnosed and unreported, either because the ill person does not see a doctor, or the doctor does not make a specific diagnosis. Also, infections with some microbes are not reportable in the first place.

To get more information about infections that might be diagnosed but not reported, CDC developed a special surveillance system called FoodNet. FoodNet provides the best available information about specific foodborne infections in the United States, and summarizes them in an annual report.

In addition to tracking the number of reported cases of individual infections, states also collect information about foodborne outbreaks, and report a summary of that information to CDC. About 400-500 foodborne outbreaks investigated by local and state health departments are reported each year. This includes information about many diseases that are not notifiable and thus are not under individual surveillance, so it provides some useful general information about foodborne diseases.

What foods are most associated with foodborne illness?

Raw foods of animal origin are the most likely to be contaminated; that is, raw meat and poultry, raw eggs, unpasteurized milk, and raw shellfish. Because filter-feeding shellfish strain microbes from the sea over many months, they are particularly likely to be

contaminated if there are any pathogens in the seawater. ***Foods that mingle the products of many individual animals, such as bulk raw milk, pooled raw eggs, or ground beef, are particularly hazardous because a pathogen present in any one of the animals may contaminate the whole batch.*** A single hamburger may contain meat from hundreds of animals. A single restaurant omelet may contain eggs from hundreds of chickens. A glass of raw milk may contain milk from hundreds of cows. A broiler chicken carcass can be exposed to the drippings and juices of many thousands of other birds that went through the same cold water tank after slaughter.

Fruits and vegetables consumed raw are a particular concern. Washing can decrease but not eliminate contamination, so the consumers can do little to protect themselves. Recently, a number of outbreaks have been traced to fresh fruits and vegetables that were processed under less than sanitary conditions. These outbreaks show that the quality of the water used for washing and chilling the produce after it is harvested is critical. Using water that is not clean can contaminate many boxes of produce. Fresh manure used to fertilize vegetables can also contaminate them. Alfalfa sprouts and other raw sprouts pose a particular challenge, as the conditions under which they are sprouted are ideal for growing microbes as well as sprouts, and because they are eaten without further cooking. That means that a few bacteria present on the seeds can grow to high numbers of pathogens on the sprouts. Unpasteurized fruit juice can also be contaminated if there are pathogens in or on the fruit that is used to make it.

Are the types of foodborne diseases changing?

The spectrum of foodborne diseases is constantly changing. A century ago, typhoid fever, tuberculosis and cholera were common foodborne diseases. Improvements in food safety, such as pasteurization of milk, safe canning, and disinfection of water supplies have conquered those diseases. Today other foodborne infections have taken their place, including some that have only recently been discovered. For example, in 1996, the parasite *Cyclospora* suddenly appeared as a cause of diarrheal illness related to Guatemalan raspberries. These berries had just started to be grown commercially in Guatemala, and somehow became contaminated in the field there with this unusual parasite. In 1998, a new strain of the bacterium *Vibrio parahemolyticus* contaminated oyster beds in Galveston Bay and caused an epidemic of diarrheal illness in persons eating the oysters raw. The affected oyster beds were near the shipping lanes, which suggested that the bacterium arrived in the ballast water of freighters and tankers coming into the harbor from distant ports. Newly recognized microbes emerge as public health problems for several reasons: microbes can easily spread around the world, new microbes can evolve, the environment and ecology are changing, food production practices and consumption habits change, and because better laboratory tests can now identify microbes that were previously unrecognized.

In the last 15 years, ***several important diseases of unknown cause have turned out to be complications of foodborne infections.*** For example, we now know that the Guillain-Barre syndrome can be caused by *Campylobacter* infection, and that the most common cause of acute kidney failure in children, hemolytic uremic syndrome, is caused by infection

with *E. coli* O157:H7 and related bacteria. In the future, other diseases whose origins are currently unknown may turn out be related to foodborne infections.

CONCLUSION

Foodborne diseases are largely preventable, though there is no simple one-step prevention measure like a vaccine. Instead, measures are needed to prevent or limit contamination all the way from farm to table. A variety of good agricultural and manufacturing practices can reduce the spread of microbes among animals and prevent the contamination of foods. Careful review of the whole food production process can identify the principal hazards, and the control points where contamination can be prevented, limited, or eliminated. A formal method for evaluating the control of risk in foods exists is called the Hazard Analysis Critical Control Point, or HACCP system. This was first developed by NASA to make sure that the food eaten by astronauts was safe. HACCP safety principles are now being applied to an increasing spectrum of foods, including meat, poultry, and seafood.

For some particularly risky foods, even the most careful hygiene and sanitation are insufficient to prevent contamination, and a definitive microbe-killing step must be included in the process. For example, early in the century, large botulism outbreaks occurred when canned foods were cooked insufficiently to kill the botulism spores. After research was done to find out exactly how much heat was needed to kill the spores, the canning industry and the government regulators went to great lengths to be sure every can was sufficiently cooked. As a result, botulism related to commercial canned foods has disappeared in this country. Similarly the introduction of careful pasteurization of milk eliminated a large number of milk-borne diseases. This occurred after sanitation in dairies had already reached a high level. In the future, other foods can be made much safer by new pasteurizing technologies, such as in-shell pasteurization of eggs, and irradiation of ground beef. Just as with milk, these new technologies should be implemented in addition to good sanitation, not as a replacement for it.

The Food Program database used by most county health departments has a complaint documentation component specific for food complaints. In the event an illness is the reason for the complaint, the software has an input form for questions on what foods were consumed, when the food was consumed, time and date of the onset of illness, how long the illness lasted, and the symptoms. From the information above, you should be able to correlate these questions to the initial information needed to begin an investigation of a foodborne outbreak.

SELF-TEST

Q: From the standard Food Program database food illness complaint form, the reason to ask for the complete list of foods consumed is because:

A. Foodborne illnesses are caused by meat products only, so we need to get a list of them.

B. Drinks and ice are never a suspected agent for foodborne illness.

C. At the initial information gathering stage, the health department often can't immediately say what is or is not a food causing an illness, so we need as complete a list as possible of all foods consumed.

D. Whatever was the most consumed food, by weight, is what caused the illness.

Q. From the standard Food Program database food illness complaint form, the reason to ask for the time and date consumed and then also the onset of symptoms time is:

A. To establish an incubation period.

B. To establish what was done by the ill person in the interim.

C. To establish if the food was out of date

D. To verify if a clerk was in the health department office.

Q. From the standard Food Program database food illness complaint form, the reason to ask for a physician's diagnosis is:

A. A physician's diagnosis may help narrow the possible causative agents

B. As a part of the physician's diagnosis, stool or other clinical specimens may have been taken that could provide a definitive cause of illness.

C. The health department can contact this physician as well as other local health care providers for information on similar symptoms and diagnoses.

D. All of the above.

Q. From the standard Food Program database food illness complaint form, the reason to ask for the symptoms is:

A. In conjunction with the incubation time, this gives an indication of the type of illness agent that might be involved.

B. If vomiting is a symptom, we can exclude meat products from consideration as a cause of illness.

C. If vomiting is a symptom, we can exclude poisonous mushrooms as a cause of illness.

D. To exclude vegetables as a cause of illness.

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Q

You have a report of
(a) 10 individuals who all ate at the same restaurant at lunch (between 12 noon and 12:45 p.m.) on the same day, and
(b) became ill between 1 hour and 5 hours later (between 1:15 pm and 6:00 pm), and
(c) the most drastic symptom was a sudden onset of severe vomiting.

From the reference Causes of Acute Foodborne Gastroenteritis, the most likely causative agent(s) is _____ .

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Q

You have a report that a person
(a) Ate lunch at 12 noon yesterday at a local fast food restaurant.
(b) The meal consisted of a hamburger with tomato, lettuce, onion, pickle, and mustard; fries, large ice tea, and apple pie.
(c) At 5:30 pm yesterday, the person was ill with severe diarrhea, abdominal cramps, fever, and nausea but no vomiting. He has been too sick to eat anything since, so yesterday's noon meal was the last thing consumed.
He has seen a news report about a recall of hamburger meat due to contamination with E. coli O157H:7. So he has called you to report that he believes he has E. coli O157:H7 from the hamburger he ate yesterday. From the reference, Causes of Acute Foodborne Gastroenteritis, is this possible? Why or why not?

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Q

This same person is the only report of an illness associated with this local fast food restaurant on this day. Is this considered a foodborne illness outbreak? Why or why not?

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More information on investigating outbreaks is posted on the EPIDEMIOLOGY section of the BETC Materials web page.

ANSWERS TO SELF-TEST

Q: From the standard Food Program database food illness complaint form, the reason to ask for the complete list of foods consumed is because:

C. At the initial information gathering stage, the health department can't immediately say what is or is not a food is causing an illness, so we need as complete a list as possible of all foods consumed.

If you have an initial report, or a very few reports, of ill individuals, it is not possible to draw a statistical association with one food item. The complete list is needed at this stage so an attack rate chart can be constructed later if this report turns out to be the initial report of an actual outbreak.

Foodborne illness can be caused by any contaminated food, including vegetables, liquids, and ice. The amount of any one food is not an indicator, though the amount of contaminated food consumed could be *one* reason for the incubation time to vary among individuals, or for the severity of the symptoms to vary among individuals.

Q. From the standard Food Program database food illness complaint form, the reason to ask for the time and date consumed and then also the onset of symptoms time is:

A. To establish an incubation period.

The time between consumption of a contaminated food and the onset of illness is the incubation period. With one report of illness, this information isn't of much use, but if there are other reports of related illnesses, establishing the possibility that an outbreak is occurring, the incubation time offers a very good way for an epidemiologist to begin to narrow down the possible causative agents, even before lab tests are available.

Q. From the standard Food Program database food illness complaint form, the reason to ask for a physician's diagnosis is:

D. All of the above.

Q. From the standard Food Program database food illness complaint form, the reason to ask for the symptoms is:

A. In conjunction with the incubation time, this gives an indication of the type of illness agent that might be involved.

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Q

You have a report of
(a) 10 individuals who all ate at the same restaurant at lunch (between 12 noon and 12:45 p.m.) on the same day, and
(b) became ill between 1 hour and 5 hours later (between 1:15 pm and 6:00 pm), and
(c) the most drastic symptom was a sudden onset of severe vomiting.

A

From the reference Causes of Acute Foodborne Gastroenteritis, the most likely causative agent(s) is Staph enterotoxin or Bacillis cereus. Both have an incubation range that fits this report and have severe vomiting (noted as "++++" or "+++") as a symptom.

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Q

You have a report that a person
(a) Ate lunch at 12 noon yesterday at a local fast food restaurant.
(b) The meal consisted of a hamburger with tomato, lettuce, onion, pickle, and mustard; fries, large ice tea, and apple pie.
(c) At 5:30 pm yesterday, the person was ill with severe diarrhea, abdominal cramps, fever, and nausea but no vomiting. He has been too sick to eat anything since, so yesterday's noon meal was the last thing consumed.
He has seen a news report about a recall of hamburger meat due to contamination with E. coli O157H:7. So he has called you to report that he believes he has E. coli O157:H7 from the hamburger he ate yesterday. From the reference, Causes of Acute Foodborne Gastroenteritis, is this possible? Why or why not?

A

No, because if the meal the person gives as the suspect meal is the actual cause of illness, the incubation time is 5 hours. According to the reference, the *shortest* incubation time for E. coli O157:H7 is 48 hours. With only one report, it is not possible to establish that the meal in question was the cause of the illness. Note; however, this would **not** rule out an illness from an earlier meal, and should this be lab-confirmed as E. coli O157:H7, there are other sources for the bacteria besides hamburger.

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Q

This same person is the only report of an illness associated with this local fast food restaurant on this day. Is this considered a foodborne disease outbreak? Why or why not?

A

No, because the definition of foodborne disease outbreak is **two** or more cases of a similar illness resulting from the ingestion of a common food, such as might occur when a group of people consume the same contaminated food and two or more of them come down with the same illness (symptoms and incubation time).