FOOD-BORNE DISEASE

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PLAN

I. Food-borne diseases
II. Epidemiology
III. Diagnosis

I. FOOD-BORNE DISEASES

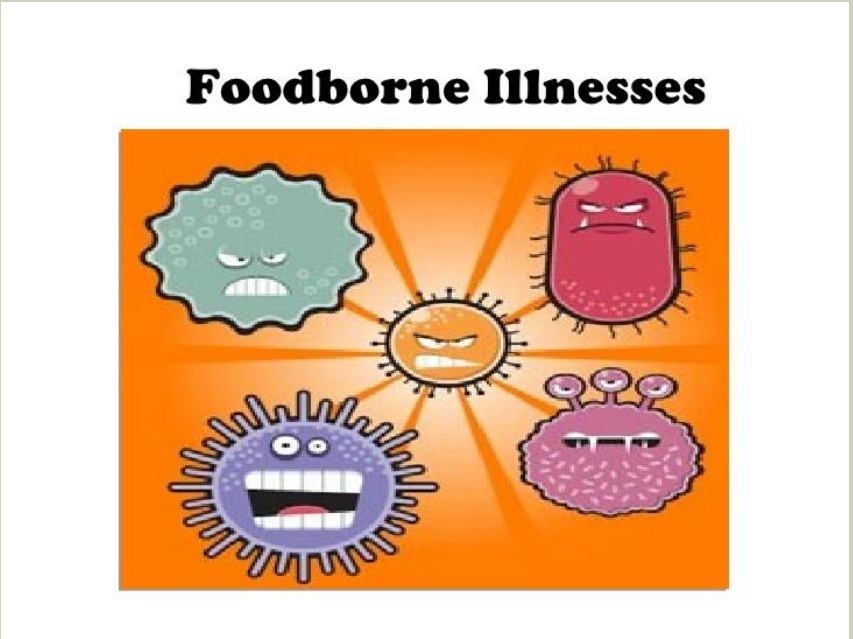
- Infectious diseases spread through food or beverages are a common, distressing, and sometimes life-threatening problem for millions of people in the United States and around the world. The Centers for Disease Control and Prevention (CDC) estimates that each year in the United States, 1 in 6 Americans (or 48 million people) gets sick, 128,000 are hospitalized, and 3,000 die of foodborne diseases.

I. FOOD-BORNE DISEASES

- There are more than 250 known foodborne diseases. They can be caused by bacteria, viruses, or parasites. Natural and manufactured chemicals in food products also can make people sick. Some diseases are caused by toxins from the disease-causing microbe, others by the human body's reactions to the microbe itself.

I. FOOD-BORNE DISEASES

- To better understand the epidemiology (study of disease origin and cause in a community) of foodborne diseases in the United States, 10 states across the country collect annual data on the occurrence of new cases of the most common causes of bacterial and parasitic infections through the Foodborne Diseases Active Surveillance Network, a CDC-sponsored program known as FoodNet.

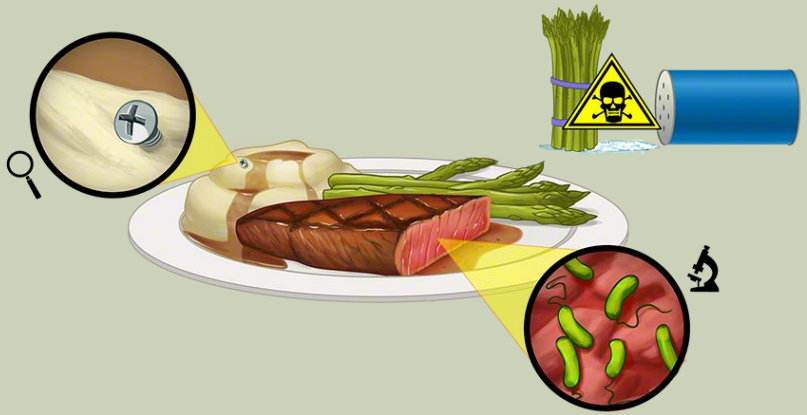


I. FOOD-BORNE DISEASES

- Foodborne disease is a pervasive problem caused by consumption of contaminated food and drink. More than 200 pathogens are associated with foodborne disease. An estimated 76 million cases occur annually (one in every four Americans), resulting in 300,000 hospitalizations and 5,000 deaths. Fewer cases are documented because of underreporting. International travel and food importation have further expanded the problem. The onset of foodborne disease is generally acute, with resolution of an uncomplicated illness in 72 hours for most episodes. Proper food handling and preparation, personal hygiene, and improved methods of decontamination of consumer products could significantly reduce the extent of morbidity and mortality of this common problem.

I. FOOD-BORNE DISEASES

- Foodborne illness is tracked in the United States through a system called FoodNet, a joint effort of the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA). Data are collected annually from ten different monitoring sites throughout the country (representing 15% of the population) and compiled by the Centers for Disease Control and Prevention (CDC). Only documented cases are used for reporting. The target organisms include *Campylobacter*spp., *Salmonella* spp., *Shigella* spp., *Listeria* spp., Shiga toxin-producing *Escherichia coli* O157:H7 (STEC O157), non-O157 STEC, *Vibrio* spp., *Yersinia* spp.,*Cryptosporidium* spp., and *Cyclospora* spp. The hemolytic-uremic syndrome (HUS) is also tracked.



II. EPIDEMIOLOGY

- Foodborne disease can be caused by bacteria, parasites, toxins, and viruses. Despite efforts to investigate foodborne disease, less than 50% of all outbreak causes are identified, usually because of limited diagnostic capabilities. Viruses are likely the most common cause of foodborne disease but are seldom investigated and confirmed because of the short duration and self-limited nature of the illness. In addition, the inherent difficulty of laboratory investigation and subsequent cost of viral studies lead to a lack of clinician investigation and therefore overall underreporting. Bacteria are the most common documented cause.

II. EPIDEMIOLOGY

- Cultural and demographic factors, as well as increased mobility, have resulted in major epidemiologic shifts in foodborne disease during recent decades.[2] Previous outbreaks of foodborne disease were smaller and limited in scope, more often originated in the home, and were associated with *Staphylococcus* or *Clostridium* sp p. Family picnics or dinners and home-canned foods were the typical sources for the outbreaks. Today, many more people dine outside the home and travel more extensively. As a result, more than 80% of foodborne disease cases occur from exposures outside the home.

II. EPIDEMIOLOGY

- Technology has provided the means for mass production and distribution of food. Therefore, foodborne disease often occurs on a massive scale, whereby hundreds or thousands are exposed and may become ill. Mobility and travel have resulted in exposure to foods abroad, where regulation of food safety and food products for sale may vary. When traveling, the axiom “boil it, peel it, cook it, or forget it” remains true in many areas of the world. Travelers bringing home unique foods as gifts may unwittingly expose family members and friends to unexpected illness. International ships discharging their bilge in ports are another possible means of disseminating pathogens.

II. EPIDEMIOLOGY

- Food importation has steadily increased to meet the demand for seasonal and nonseasonal foods. Conditions of production and harvest may be unsupervised or uncontrolled, with resultant importation of contaminated foods. Raw manure is frequently used as fertilizer, causing contamination of fresh produce. If improperly cleaned, the fertilized produce may cause illness when consumed.

II. EPIDEMIOLOGY

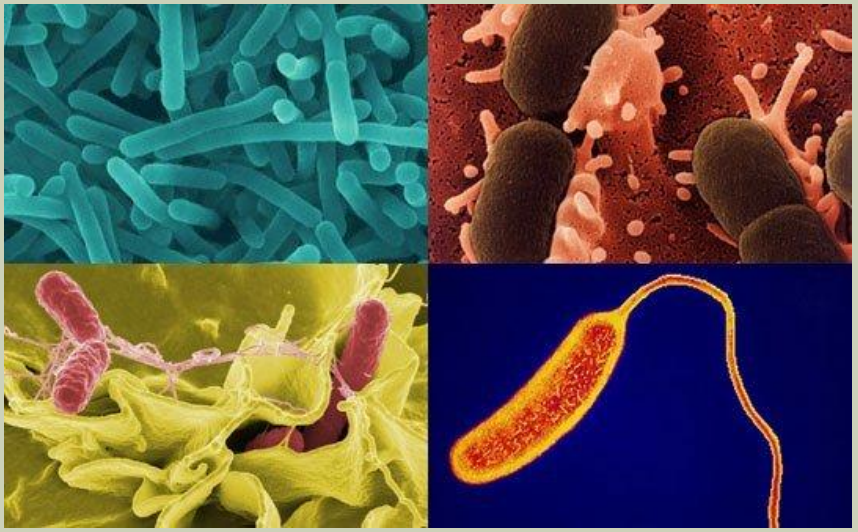
- Unique ethnic food preferences and preparation have been associated with several food-related illnesses. One example is the African American tradition of eating chitterlings (cooked swine intestines) during the Christmas holiday season. This food has been associated with an outbreak of *Yersinia enterocolitica* infection in infants. Fresh cheese made from unpasteurized milk has been associated with episodes of listeriosis in Hispanic neighborhoods.

II. EPIDEMIOLOGY

- Foodborne disease is more likely to affect the extremes of age as well as immunocompromised patients and pregnant women. These groups suffer higher incidence, morbidity, and mortality. The effect of foodborne disease may extend beyond the immediate illness. This has been shown by a Danish study, which demonstrated a greater than threefold risk of dying in the year after contracting a foodborne illness.

II. EPIDEMIOLOGY

- Most foodborne disease has a short duration of illness and a self-limited course. Others may cause a more protracted illness, such as *Cryptosporidium* and *Cyclospora*. However, some foodborne diseases are associated with long-term chronic sequelae. *Salmonella, Shigella, Yersinia*, and *Campylobacter* spp. are linked to reactive arthritis; *Campylobacter* has also been associated with the Guillain-Barré syndrome, and STEC O157:H7 has been linked to renal failure.



II. EPIDEMIOLOGY

- The most commonly identified pathogens are *Campylobacter* spp., *Salmonella* spp., *Shigella* spp., and STEC O157:H7. These organisms have evolved and now have greater cold, heat, and acid tolerance, as well as resistance to multiple antibiotics. Increased drug resistance has been associated with prolonged illness and a greater risk of hospitalization.
- Almost any food can be a source of foodborne disease. Some foods are more commonly associated with particular organisms. *Salmonella* has traditionally been associated with poultry and eggs, *Campylobacter* with chicken and unpasteurized milk, and STEC O157:H7 with ground beef. An outbreak of STEC O157:H7 was associated with steak that had been needle-tenderized, thereby exposing the center of the meat to surface organisms. When the steak was not thoroughly cooked to an adequate internal temperature, the microorganisms survived and illness occurred after consumption.

II. EPIDEMIOLOGY

- Water may be the vector of illness when contaminated with viruses, bacteria, parasites, or chemicals. Crowding, poor sanitation, disruption of water supplies, and natural disasters are closely linked to waterborne illness. Viruses are the most common cause of waterborne illness and include rotaviruses, enteric adenovirus, astrovirus, caliciviruses and hepatitis A virus. Outbreaks of gastroenteritis aboard cruise ships in recent years were a result of noroviruses. *Salmonella* spp., *Shigella*spp., *E . coli*, and *Vibrio* spp. are the predominant bacterial pathogens involved. *Cryptosporidium* spp. and *Giardia lamblia* are the parasitic pathogens most commonly encountered in water-borne illness. Immunocompromised hosts, particularly organ transplant recipients and HIV-infected patients, should exercise extra precaution in situations of potential waterborne illness.

II. EPIDEMIOLOGY

Stop Foodborne Illness

The Voice for Safe Food

- Incubation periods of foodborne disease may offer clues to the cause. Four time frames may be envisioned: very brief, short, intermediate, and long durations of incubation. The very brief category (<8 hours) is generally caused by preformed toxins, which may be found in staphylococcal or bacillus-contaminated food. Short incubation periods (24-48 hours) are more typical of viral causes. Intermediate incubation periods (1-5 days) correlate with many bacterial pathogens. The long-duration incubation group (>5 days) approximates the time course of parasitic infections. These time frames are crude groupings and areas of overlap exist between them. In addition, the inoculum of organisms ingested may influence the incubation period and the rapidity of onset of illness—for example, a large inoculum may cause a shortened time to onset of illness.

III. DIAGNOSIS

- Diagnosis is accomplished through a careful history, physical examination, and laboratory evaluation. The history should include questioning about the suspected time of exposure, recent travel, the food and drink consumed, other people who may have been present and eaten similar foods, and the specific symptoms involved (e.g., nausea, vomiting, diarrhea with or without visible blood, cramping, gas, fever, neurologic symptoms, alteration of mental status). Dietary history may include intake during the last 2 to 3 weeks. The physical examination should focus on vital signs, including orthostatic measurements, skin turgor, mental status, abdominal findings, and stool testing for blood. Fresh stool samples for culture and analysis (<6 hours old) provide the highest yield.

III. DIAGNOSIS

- The clinician must be knowledgeable of the laboratory's assay procedures to facilitate proper sample testing. Specific culture requests for suspected organisms may be necessary, as well as microscopic examination of stool samples for parasites. Three samples on different days will generally provide adequate diagnostic results. Special circumstances may dictate the need to perform special assays for toxins (e.g., botulinum toxin) on gastric aspirates or stool samples. Blood cultures are often useful, particularly if *Salmonella* or*Listeria* is suspected or when evaluation involves high-risk groups and immunocompromised hosts.