

The CDC (2010) estimates that “48 million people (1 in 6 Americans) get sick, 128,000 are hospitalized, and 3,000 die each year from foodborne diseases” in the U.S. One foodborne pathogen, norovirus, accounts for \$2 billion in healthcare costs and lost productivity annually (CDC, 2013). Most cases of foodborne illness go unreported since the discomfort is often attributed to 24-hour flu, which has symptoms similar to those experienced in foodborne illness.

Only laboratory tests can identify the exact bacteria, mold, or virus that causes digestive tract distress, which is usually a combination of nausea, vomiting, cramps, diarrhea, and a general feeling of unease.

Individuals at highest risk for life-threatening consequences from foodborne illness include pregnant women, unborn and newborn infants and toddlers, the elderly, and those with compromised immune systems from a serious illness such as cancer or AIDS.

Proper food care and storage, sanitary conditions during preparation, and cooking to the recommended temperature will eliminate the possibility of foodborne illness. Practice the following recommendations to ensure safe food for everyone.

AT THE STORE

1. Keep packages of raw meat, raw poultry, and raw fish separate from other foods, particularly foods eaten raw, such as fruit.
2. Use plastic bags to keep raw meat, raw poultry, or raw fish from dripping on other foods.



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3. Make sure packaged precooked foods are in intact packaging with no signs of leakage or leakage from another damaged package.
4. Buy products labeled “keep refrigerated” only if they are stored in a refrigerated case.
5. Buy unpackaged deli meat or poultry only if there is no contact with other food.
6. Buy frozen foods only if they appear frozen to the touch.
7. Report problems with packaging, products, storage, or sanitation to store management. If the problem is not corrected, notify local health authorities.

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8. Shop for eggs, milk, meat, and poultry last. Pack in ice chest if time from store to home will be longer than one hour, especially in hot weather.

YOUR REFRIGERATOR

9. Keep your refrigerator clean using a solution of warm water and baking soda.
10. Use a thermometer to ensure that refrigerator temperature is between 32°F and 40°F. Refrigerator freezer compartments should register about 0°F.
11. Keep raw meat, raw poultry, and raw fish separate from other foods. Use plates, plastic bags, or covered containers to keep meat and poultry juices from dripping on other foods or refrigerator surfaces. It is best to store these raw foods at the bottom of the refrigerator.
12. Refrigerate products with “keep refrigerated” labels.
13. If refrigerator fails, keep door closed and hold food at 40°F, or cook within two hours.

YOUR FREEZER

14. Maintain temperature at 0°F for best food quality.
15. Use freezer wrap, freezer bags, or aluminum foil over commercial wrap for freezer package.
16. If the freezer fails, keep door closed. Food can stay frozen for a couple of days if the freezer is full. Refreeze meat or poultry still containing ice crystals. Discard any food that is above 40°F. If freezer compartment of your refrigerator fails, keep door closed and find other cold storage within two hours, or cook and serve food.

WASH UP

17. Scrub hands with soap and comfortably warm water for 20 seconds and rinse with clean water



before beginning food preparation and after handling raw meat, raw poultry, raw fish, raw eggs, touching animals, blowing your nose, using the bathroom, or changing diapers.

18. Wash hands, counter, equipment, cutting utensils, and boards after handling raw meat or raw poultry. For an additional measure of cleanliness, sanitize cutting boards and utensils with a mixture of 1 teaspoon of chlorine bleach and 1 quart of warm water before using board and utensils on another food. This prevents cross contamination.
19. Wear clean plastic gloves over bandaged skin cuts, particularly when handling cooked products.

BEFORE YOU COOK

20. Thaw foods only in refrigerator, under cold water changed every 30 minutes, or in a microwave following the manufacturer's instructions. Cook thawed food promptly.
21. Stuff meats just before cooking; better yet, bake stuffing in a separate baking dish or pan. Avoid buying fresh, pre-stuffed whole poultry.
22. Don't taste raw or partially cooked meat, poultry, eggs, fish, or shellfish, or foods with raw ingredients (including raw cookie dough).

23. Marinate raw products in the refrigerator, not on counter. Do not reuse marinade.
24. Do not save and reuse breading or other coating mixes used to prepare meats and vegetables.

GET COOKING

25. Use a microwave temperature probe, if available. Cover raw meat or poultry to microwave. Check temperature in at least three of the thickest areas.
26. Use a revolving microwave tray or rotate foods manually during cooking to ensure more even heating. Let food stand for recommended time before serving.
27. Use a meat thermometer to judge safe internal temperature of meat and poultry: 160°F or above for meat, 180°F or above for poultry. Check temperature periodically rather than leaving the thermometer in the meat. The thermometer acts as a cooking nail and will almost always register higher right around the thermometer when it is left in place. Do not place thermometer near a bone, near the edge of the pan, or in fat when checking the temperature.
28. When using smokers or slow cookers, start with fresh or defrosted foods rather than frozen ones, and chunks of meat rather than roasts or large cuts. Be sure the recipe includes a liquid. Check internal temperature in three spots to be sure food reaches 165°F.
29. Avoid interrupted cooking. Never partially cook products to finish grilling or roasting later.
30. Roast meat or poultry in oven temperatures at 325°F or above. For example, avoid cooking without a heat source—such as preheating the oven, putting in the roast, and turning off the oven. Never use exceptionally low temperatures such as 200°F for a long period. Use cooking bags rather than paper grocery bags, which may be made of recycled paper and release toxic vapors when heated.

SERVE IT SAFELY

32. Serve cooked foods with clean utensils on clean plates. For example, never place barbecued chicken on the platter that held raw chicken. Cross contamination can easily occur.
33. Keep hot foods above 140°F.
34. In environmental temperatures of 90°F or warmer, hold cooked foods no longer than one hour before reheating, refrigerating, or freezing. Foods should be held no longer than two hours in environmental temperatures below 90°F.

CARING FOR LEFTOVERS

35. Remove stuffing before cooling or freezing meat or poultry.
36. Refrigerate or freeze cooked leftovers in small, covered, shallow containers (no more than 3 inches deep) within two hours after cooking. Leave a 1-inch airspace around containers for quick chilling.
37. Cover and reheat leftovers thoroughly before serving. Bring sauces, soups, gravies, and “wet” foods to a rolling boil; all others should be heated to 165°F.
38. Date packages of refrigerated leftovers and use within a safe period: one to two days for foods such as fish, poultry, and meat, and three days for casseroles and cooked vegetables.
39. Don’t taste leftovers to determine safety. Sniff and look for signs of mold if storage period is unknown.
40. When in doubt, throw it out. Discard outdated, unsafe, or questionable leftovers in garbage disposal or in tightly wrapped packages that cannot be consumed by people or animals. The possibility of foodborne illness is never worth the cost of replacing it or simply selecting something else to eat.

FOODBORNE ILLNESSES

***E. coli* toxicity**

Examples of foods involved: Ground beef products, unpasteurized milk, and plant foods.

What causes it: *E. coli* 0157:H7. This is a very toxic strain of *E. coli* that can cause serious and potentially fatal diseases. *E. coli* 0157:H7 is sometimes present in the intestines of food animals.

Symptoms: Severe abdominal cramps and watery diarrhea. Potential complications include hemorrhagic colitis, which results in bloody diarrhea, vomiting, and nausea. Hemorrhagic colitis can also result in hemolytic uremic syndrome, which is characterized by severe anemia and renal (kidney) failure. These complications can be fatal, especially in young children and those with a compromised immune system.

Characteristics of illness: Transmitted through inadvertent contact with fecal matter during processing of animal foods or because of improper food handling. Plant food can become contaminated from fertilization with raw manure, irrigation with contaminated water, or contamination by human contact.

Onset: Usually within 3 to 9 days.

Duration: 2 to 9 days, although complications may prolong illness.

Preventive measures: *E. coli* 0157:H7 can be effectively controlled by thorough cooking. Cook ground meats (beef, pork, veal, lamb) to an internal temperature of at least 160°F, ground poultry to 165°F, non-ground meat cuts such as roasts to an internal temperature of at least 145°F, non-ground pork to 160°F, and poultry to 180°F. Reheat food to 165°F. Avoid unprocessed fruit and vegetable juices and unpasteurized milk and milk products. Wash fruits and vegetables thoroughly using clean water.

Listeriosis

Examples of foods involved: Dairy products, including soft cheeses; raw and undercooked meat, poultry, and seafood; and produce.

What causes it: *Listeria* bacteria are found in soil and water. Vegetables can become contaminated from the soil or from manure used as fertilizer. Animals can carry the bacteria without appearing ill and can contaminate foods of animal origin such as meats and dairy products. Most people do not get listeriosis. However, pregnant women and newborns, older adults, and people with weakened immune systems caused by cancer treatments, AIDS, diabetes, kidney disease, etc., are at risk for becoming seriously ill from eating foods that contain *Listeria*.

Symptoms: Fever, muscle aches, and sometimes gastrointestinal symptoms such as nausea or diarrhea. If infection spreads to the nervous system, symptoms such as headache, stiff neck, confusion, loss of balance, or convulsions can occur. Infected pregnant women may experience only a mild, flu-like illness; however, infections during pregnancy can lead to miscarriage or stillbirth, premature delivery, or infection of the newborn.

Characteristics of illness: *Listeria* has been found in a variety of raw foods, such as uncooked meats and vegetables, as well as in processed foods that become contaminated after processing, such as soft cheeses and cold cuts at the deli counter. Unpasteurized (raw) milk or foods made from unpasteurized milk may contain *Listeria*. *Listeria* is killed by pasteurization and cooking; however, in certain ready-to-eat foods such as hot dogs and deli meats, contamination may occur after cooking but before packaging.

You get listeriosis by eating food contaminated with *Listeria*. Babies can be born with listeriosis if their mothers eat contaminated food during pregnancy. Although healthy people may consume contaminated foods without becoming ill, those at increased risk for infection can probably get listeriosis after eating food contaminated with even a few bacteria. People at risk can prevent listeria infection by avoiding certain high-risk foods and by handling food properly.

Onset: 1 day to over 3 weeks.

Duration: 2 to 7 days.

Preventive measures: People at risk for listeriosis and their family members or individuals preparing food for them should:

Reheat until steaming hot the following types of ready-to-eat foods: hot dogs, luncheon meats, cold cuts, fermented and dry sausage, and other deli-style meat and poultry products. Thoroughly reheating food can help kill any bacteria that might be present. If you cannot reheat these foods, do not eat them.

Don't eat soft cheeses such as feta, Brie, Camembert, blue-veined, or Mexican-style cheese. You can eat hard cheeses, processed cheeses, cream cheese, cottage cheese, and yogurt.

Do not drink raw, unpasteurized milk or eat foods made from it, such as unpasteurized cheese. Observe all expiration dates for perishable items that are precooked or ready-to-eat.

Salmonellosis

Examples of foods involved: Poultry, red meats, eggs, dried foods, and dairy products.

What causes it: *Salmonella* bacteria, which are widespread in nature and live and grow in the intestinal tracts of human beings and animals.

Symptoms: Severe headache, followed by vomiting, diarrhea, abdominal cramps, and fever. Infants, the elderly, and people with low resistance are most susceptible. Severe infections cause high fever and may even cause death.

Characteristics of illness: Transmitted by eating contaminated food, or by contact with infected people or carriers of the infection. Also transmitted by insects, rodents, and pets.

Onset: Usually within 12 to 36 hours.

Duration: 2 to 7 days.

Preventive measures: *Salmonella* in food is destroyed by heating the food to 140°F and holding for 10 minutes or to higher temperatures for less time; for instance, 155°F for a few seconds. Refrigeration at 40°F inhibits the increase of *Salmonella* bacteria, but they remain alive in foods in the refrigerator or freezer, and even in dried foods.

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Perfringens

Examples of foods involved: Stews, soups, or gravies made from poultry or red meat.

What causes it: *Clostridium perfringens*, spore-forming bacteria that grow in the absence of oxygen. Temperatures reached in thorough cooking of most foods are sufficient to destroy vegetative cells, but heat-resistant spores can survive.

Symptoms: Nausea without vomiting, diarrhea, and acute inflammation of stomach and intestines.

Characteristics of illness: Transmitted by eating food contaminated with abnormally large numbers of the bacteria.

Onset: Usually within 8 to 20 hours.

Duration: May persist for 24 hours.

Preventive measures: To prevent growth of surviving bacteria in cooked meats, gravies, and meat casseroles that are to be eaten later, cool foods rapidly and refrigerate promptly at 40°F or below, or hold them at about 140°F.

Staphylococcal poisoning (commonly called staph)

Examples of foods involved: Custards, egg salad, potato salad, chicken salad, macaroni salad, ham, salami, and cheese.

What causes it: *Staphylococcus aureus*, a bacteria fairly resistant to heat. Bacteria growing in food produce a toxin that is extremely resistant to heat.

Symptoms: Vomiting, diarrhea, and abdominal cramps. Generally mild and often attributed to other causes.

Characteristics of illness: Transmitted by food handlers who carry the bacteria and by eating food containing the toxin.

Onset: 1 to 6 hours.

Duration: 1 to 3 days.

Preventive measures: Growth of toxin-producing bacteria is inhibited by keeping hot foods above 140°F and cold foods at or below 40°F. Toxin is destroyed by boiling for several hours, or heating the food in a pressure cooker at 240°F for 30 minutes.

Botulism

Examples of foods involved: Home-canned low-acid foods and smoked fish.

What causes it: *Clostridium botulinum*, spore-forming bacteria that grow and produce toxin in the absence of oxygen, such as in a sealed container.

Symptoms: Double vision, inability to swallow, speech difficulty, and progressive respiratory paralysis. Fatality rate is high, about 65% in the United States.

Characteristics of illness: Transmitted by eating food containing the toxin.

Onset: Usually within 12 to 36 hours or longer.

Duration: 3 to 6 days.

Preventive measures: Bacterial spores in food are destroyed by high temperatures obtained only in the pressure cooker. More than 6 hours is needed to kill the spores at boiling temperature (212°F). The toxin is destroyed by boiling for 10 to 20 minutes; time required depends on kind of food.

SOURCES AND RESOURCES

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