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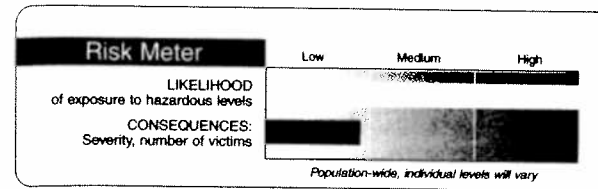
National Rifle Association
www.nra.org
 11250 Waples Mill Road
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Brady Center to Prevent Gun Violence
 The Brady Campaign to Prevent Gun Violence
www.bradycenter.org
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 Washington, DC 20005
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Open Society Institute: Center on Crime, Communities, and Culture
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11. FOODBORNE ILLNESS



YOU ARE MORE LIKELY to be affected by foodborne illness than by almost any other risk in this book. Approximately 76 million Americans, roughly one in four, suffer food poisoning each year. The consequence for the vast majority of those victims is a few hours or a day or two of an uncomfortable stomach. But foodborne illness kills approximately 5,000 Americans a year.

You probably have heard of a few of these diseases—salmonella, *E. coli*, botulism—but more than 200 foodborne diseases have been identified. Most are caused by bacteria, viruses, or parasites. You may not have heard of the most common cause of foodborne illness, the *Caliciviruses* (also known as the Norwalk-like viruses, since they were first discovered through an outbreak in Norwalk, Ohio, in 1972). *Campylobacter*, *Salmonella*, and *Clostridium perfringens* are three common infectious bacteria. But the pathogens that cause the most infections are not necessarily the most deadly. Two of the top foodborne killers are the parasite *Toxoplasma gondii* and the bacteria *Listeria monocytogenes*.

THE HAZARD

No matter which of the various agents spread these diseases, they **have** several things in common. They are carried by food that isn't handled carefully, washed properly, or cooked thoroughly. Most of them cause similar symptoms—diarrhea (sometimes bloody), stomach cramps, vomiting, and fever. And the most severe effects from all these diseases are experienced by the very young and the very old or anyone else with a compromised immune system who is less able to fight off internal infection.

THE RANGE OF CONSEQUENCES AND THE SOURCES OF EXPOSURE

The Centers for Disease Control and Prevention (CDC) report that foodborne illness sends 325,000 people to the hospital annually. But like the 76 million cases and 5,000 deaths a year, this number is an estimate. It's impossible to know exactly how many cases, hospitalizations, and deaths occur, for several reasons. Many people who suffer from food poisoning have only mild symptoms and don't seek medical attention. Also, many pathogens that spread through food also spread through water, so it's hard to know how many cases are strictly food-related. And most important, experience teaches us that at any given time germs are out there that we haven't yet identified. Many of the pathogens of most concern today, like *Campylobacter jejuni* and *E. coli* O157:H, weren't even known as causes of foodborne illness just a couple of decades ago.

Plenty of uncertainty remains even within these estimates. Of these 76 million total estimated cases of food poisoning, only 14 million come from known causes. Of the 325,000 hospitalizations, only 60,000 come from known causes. And of the estimated 5,000 deaths, only 1,800 come from known causes. It is unsettling, but the causes of the rest are simply unknown.

The Main Culprits

Here are the main foodborne illnesses, their symptoms, and their main sources:

Norwalk-like viruses cause an estimated 9.2 million cases of foodborne illness each year, 20,000 hospitalizations, and 124 deaths. Outbreaks are usually associated with raw oysters and clams or poor sanitation among food handlers. Interestingly, the contaminated seafood, known as "filter feeders," apparently pick up the virus from human waste dumped into the ocean. The marine bivalves don't become sick themselves but pass the virus back to us in a form that makes us sick. Symptoms include diarrhea, cramps, vomiting, headache, and low-grade fever, and last one to five days.

Campylobacter is the most common bacterial cause of diarrheal illness in the United States. It's estimated to affect about 2 million people each year, send 10,500 of them to the hospital, and kill 1000. It causes diarrhea, cramping, abdominal pain, and fever two to five days after exposure and lasts about a week. Rare cases—about 1 in every 1,000—go into the bloodstream and lead to a temporary but severe paralysis called

Guillain-Barré syndrome. The main source of *Campylobacter* is poultry, since birds are a common carrier. Half of the raw chicken in the United States, in fact, carries *Campylobacter*, according to the CDC.

Salmonella affects 1.3 million Americans a year, sends nearly 15,600 to the hospital, and kills approximately 550 people. Victims suffer diarrhea, abdominal pain, and fever beginning 12 to 72 hours after eating the contaminated food. The disease usually lasts 4 to 7 days. One of the main sources is infected eggs. Even eggs that have been disinfected on the outside can harbor *Salmonella* inside the shell.

Clostridium perfringens bacteria sickens a quarter of a million Americans a year, but sends fewer than 50 to the hospital and causes fewer than 10 deaths. Symptoms include intense abdominal cramps and diarrhea, which begin 8 to 22 hours after consumption of contaminated food. The illness usually disappears within 24 hours but can persist for up to 2 weeks. *Clostridium p.* is thought to be the most common pathogenic bacterium known and most often causes illness in people who eat meat that either hasn't been heated long enough or becomes contaminated after it's been cooked.

The parasite *Giardia lamblia* is the fifth most common cause of foodborne illness in the United States, causing 200,000 cases a year and sending 500 people to the hospital. Fortunately, it is estimated to cause only 1 death per year. It is usually carried in water, but poor sanitation by food handlers can transfer it to any food. Vegetables eaten raw are commonly implicated in foodborne *Giardia* cases.

Escherichia coli bacteria in their various pathogenic forms cause roughly 173,000 cases of disease annually, 2,800 hospitalizations, and 80 deaths. The majority of these cases come from one strain, *E. coli* O157:H. Undercooked ground beef is the usual culprit, since the germ lives in the intestines of cattle and spreads to meat in the human food chain through unsanitary slaughtering and processing procedures. *E. coli*, especially *E. coli* O157:H, causes bloody diarrhea and cramps but usually no fever. The disease lasts five to ten days. In 2 to 7 percent of cases, exposure to *E. coli* can lead to kidney failure and hemolytic uremic syndrome, usually in children under five and the elderly. This syndrome is the cause of most *E. coli* deaths.

Listeria monocytogenes bacteria produce listeriosis, the symptoms of which include fever, muscle aches, and sometimes gastrointestinal cramps and diarrhea. Only 2,500 or so listeriosis cases occur each year, but this serious disease sends nearly everyone who gets it to the hospital and kills 1 patient in 5. People with AIDS are 300 times more likely to get it. Pregnant women are 20 times more likely to get listeriosis than

other healthy adults. Most cases are treatable but a few can lead to meningitis, and the bacteria can pass to the fetus and cause severe damage or miscarriage. *Listeria* lives in soil and water. Vegetables fed with manure can carry it. So can animal and dairy products. It has also been found in soft cheeses and uncooked cold cuts, which is why pregnant women are warned to avoid these foods.

Toxoplasma gondii is a parasite that makes an estimated 113,000 Americans sick each year. About 2 in 10 get sick enough to require hospitalization, and *T. gondii* kills 375 people a year. It is present in cattle, sheep, chicken, and pigs, and can be carried by house cats. Most people are infected from eating undercooked meat, but inadequate sanitation after handling cat litter can also transfer the parasite to food. Consumed by pregnant mothers, *T. gondii* can be especially harmful to the fetus. It's also particularly dangerous to people with weakened immune systems. People with healthy immune systems rarely suffer any symptoms.

Shigella bacteria is spread by people who don't wash their hands thoroughly while handling food. Foodborne carriers have been known to include tuna, chicken, potato, egg, shrimp, and macaroni salads; raw vegetables; dairy products; and poultry. The CDC estimates that there are 90,000 illnesses, 1,250 hospitalizations, and 14 deaths from *Shigella* exposure each year.

REDUCING YOUR RISK

Foods can become contaminated with bacteria, viruses, or parasites in many ways. Most have to do with inadequate sanitation in processing or preparation. Fortunately, you can wipe out most of the microbes on your food with some simple steps. (All these precautions are especially important for people at high risk—the young, the elderly, pregnant women, and those with weakened immune systems, including people receiving chemotherapy or taking steroidal medication. A normal healthy immune system can keep most of these pathogens in check, which is why the vast majority of foodborne illness results in little more than a few hours of mild symptoms.)

Cook everything well. Heat kills nearly all these organisms. Use a meat thermometer to make sure your cooked meats achieve proper temperature.

- Cook roasts and steaks to at least 145°F. Cook ground beef to at least 160°F.

- Cook eggs until the yolks are firm.
- Cook chicken until there is no pink meat left and the juices run clear. Experts recommend 170°F for white meat, 180°F for dark meat.
- Reheat leftovers, including sauces and gravies, to at least 165°F to kill any germs that may have survived the first cooking, or gotten on the food after it was first cooked. Reheat leftovers only once. After that, the risk goes up that they can make you ill because there have been more chances for bacteria to grow in the food. Don't store leftovers in containers that hold large amounts. Divide them into containers that hold just the right portion for the next meal.
- In restaurants, where you can't be sure of the sanitary habits of the people preparing your food, order your food thoroughly cooked. Undercooked animal foods like tuna tartare, raw oysters, a rare T-bone steak, or eggs sunny-side up may all be tasty, but the more raw your food, the greater the risk.

Refrigerate meat, poultry, dairy, fruits, and vegetables. Heating kills pathogens, but cooling them slows their growth. That's important, because often it takes quite a lot of them to make you sick. Chicken with only a few *Campylobacter* bacteria on it or an egg with a few *Salmonella* aren't as likely to make you as ill as chicken or eggs that have been left at room temperature, where a single bacterium cell can reproduce into tens of millions of cells in just a few hours. The danger zone for growing bacteria is between 40° and 140°F. The Food and Drug Administration estimates that one quarter of all refrigerators aren't set to a cold enough temperature. Cooling tips include:

- Refrigerate raw foods, prepared foods, or leftovers within two hours. If you can't get restaurant leftovers home and refrigerated within that time, don't take them at all. "Doggy bags" are a common source of foodborne illness.
- Marinate foods in the refrigerator, not at room temperature.
- Don't defrost food in hot water or even on the counter at room temperature. While you're still trying to defrost the inside of a roast, the outside can be breeding bacteria. Defrost food in the refrigerator, in cold water, or in the microwave if you'll be cooking it right away.
- Refrigerate foods for a buffet, like tuna or chicken or egg salad, right up until the time you serve them. Place these foods on chilled trays or on a bed of ice cubes to keep them cold.
- Separate raw foods from cooked or ready-to-eat foods when you refrigerate them. Put things like raw meat or chicken in sealed

plastic bags on the lowest level of the refrigerator to keep juices from dripping. The drips can carry bacteria to other foods.

Wash your food. Wash your hands. Wash your food preparation surfaces and tools. Often. You can wash away many of the microbes on the outside of your food, but your hands can pick up and carry contamination from one food to another. If you handle contaminated chicken and then cook it, the chicken is safe, but your hands can carry the bacteria to the next food you handle. The same thing goes for food preparation surfaces and tools. If the germs from those hamburger patties remain on your cutting board or kitchen counter, it won't matter how well you cook the hamburger if you then slice the onions or tomatoes on the same cutting surface, or use the same knife.

- Wash your food preparation areas—cutting boards, countertops, dishes—with soap and hot water after you handle each food there.
- Harried parents of infants: remember to wash your hands after changing diapers.
- Everyone should be attentive to regular and thorough hand washing with soap and hot water before and after handling food, and especially if you are experiencing diarrhea.

Beware of certain foods. A few foods have been associated with outbreaks of foodborne illness with some frequency. In fact, the FDA and the CDC officially warn people about the risks from eating raw alfalfa, clover, and other sprouts, after repeated outbreaks of *E. coli* and *Salmonella* illness over the past several years were traced back to sprouts. Raw sprouts are a healthful food, but they are grown in a humid environment, ideal for promoting the growth of bacteria. Sprouts can become contaminated through exposure to untreated water, improperly cleaned harvest or processing machines, and inadequate sanitation by workers handling them. Even washing sprouts is sometimes not enough to remove bacteria lodged in the nooks and crannies of the folded shoots.

Other foods that carry higher risk include any beef, poultry, pork, or seafood dish served raw or nearly raw. And as we mentioned, pregnant women are advised by food safety experts to avoid soft cheeses like Brie, Camembert, and blue cheese. They should thoroughly heat ready-to-eat foods like cold cuts and hot dogs, as an extra precaution against listeriosis, which can travel to the fetus. Though we point out that

FDA issues these warnings, it's important to keep in mind that the risk from these foods remains quite low.

FOR MORE INFORMATION

A good online gateway to food safety information is:
www.foodsafety.gov

Food Safety Initiative Program
Centers for Disease Control and Prevention
www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm
1600 Clifton Road
Atlanta, GA 30333
(404) 639-2213

Food and Drug Administration
www.nal.usda.gov/fnic/foodborne/fbindex/index.htm
5600 Fishers Lane
Rockville, MD 20857-0001
Toll-free Food Safety Hotline: (888) SAFEFOOD or (888) 723-3366

Department of Agriculture
Food and Drug Administration
Foodborne Illness Education Information Center
National Agricultural Library
www.nal.usda.gov/fnic/foodborne/fbindex/index.htm
Beltsville, MD 20705-2351
(301) 504-5719

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