Foodborne illnesses

Diarrhoeal diseases are linked to the deaths of an estimated 2 million people annually – mostly children – and most of these illnesses, including foodborne illness, are attributed to contaminated food or water. On the other hand, effective handwashing may eliminate nearly half of all these illnesses.

What are foodborne illnesses?

When certain disease-causing bacteria or pathogens contaminate food, they can cause foodborne illness, often called “food poisoning”. Foods that are contaminated may not look, taste or smell any different from foods that are safe to eat. Salmonella, *Campylobacter*, *Listeria* and *Escherichia coli* (E. coli) are the most common bacteria causing foodborne illness. Unfortunately, some foodborne bacteria such as *Bacillus cereus* produce toxins that are heat-resistant, which means they cannot be destroyed by cooking. The virus that most commonly causes gastrointestinal illness is the Norovirus which can be transmitted through contaminated food or water, as well as contaminated surfaces such as sinks, tables, handrails etc. Foodborne illness can be serious or even fatal.

How do foodborne bacteria grow?

Foodborne bacteria are often naturally present in food, and in the right conditions, a single bacterium can grow into more than two million bacteria in just seven hours. These bacteria multiply rapidly on foods with lots of protein or carbohydrates when the food temperature is between 5–60 °C which is often known as the ‘food danger zone’. Therefore, most foodborne illnesses events are reported during food preparation in summer. Some foodborne bacteria can grow inside the refrigerator in ready-to-eat food, and *Listeria monocytogenes* is one of them. The *Staphylococci* bacteria grow in food, where they produce toxins. Thus, staphylococcal food poisoning does not result from ingesting the bacteria, but rather from ingesting the toxins made by the bacteria that are already present in the contaminated food.

Which food is preferred by foodborne bacteria?

Bacteria grow and multiply on some types of food more easily than on others. The types of foods which bacteria prefer include:

- meat
- poultry
- dairy products
- eggs
- seafood
- cooked rice
- prepared fruit and
- potato salads.
These foods are more likely to be infected by foodborne bacteria but other foods can also be infected or cross-contaminated by them if appropriate food safety measures are not taken during preparation, storage, transportation and handling of ready-to-eat foods.

**Who are at risk?**

Some people are at a higher risk for developing foodborne illness. These include pregnant women, young children, older adults, and people with weakened immune systems.

**How foodborne illnesses occur?**

Foodborne illnesses follow within 1–3 days after consumption of contaminated food during a party or festival. It often occurs in clusters where persons serve themselves rather than being served by a single server.

The following conditions may be responsible for a foodborne illness:
- not cooking food thoroughly (particularly meat and meat products);
- not storing food that needs to be chilled at below 5 °C correctly;
- keeping cooked food unrefrigerated for more than an hour;
- eating food that has been touched by someone with diarrhoea and vomiting; and
- cross-contamination, such as placing cooked food on a plate that had raw meat.

**What are the clinical symptoms?**

Foodborne illnesses causes some combination of nausea, vomiting, and diarrhoea that may or may not be bloody, sometimes with other symptoms. After eating tainted food, abdominal cramps, diarrhoea, and vomiting can start as early as one hour or within three days depending on the foodborne pathogen, type of toxin and level of food contamination.

**Which are common causes of foodborne illnesses and what are the risk factors and possible clinical symptoms?**

Salmonella is the most common cause of foodborne illness and meat, egg and seafood are its common sources. The important causes of foodborne illness in details are presented in Table 1;

**What are common tips for preventing foodborne illnesses?**

A few simple actions can cut the likelihood of foodborne illness drastically! Please follow WHO’s Five keys to safer food;

1. **Keep clean**
   - Thoroughly wash raw fruits and vegetables with tap water.
   - Keep clean hands, kitchen and chopping board all the time.

2. **Separate raw and cooked food**
   - Do not mix raw food and ready-to-eat food.
   - Do not mix raw meat, fish and raw vegetables.

3. **Cook thoroughly**
   - Thoroughly cook all meat, poultry and seafood, especially shellfish.
   - Reheat all leftovers until they are steaming hot.
4. **Keep food at safe temperatures**
   - Refrigerate cooked food within two hours of preparation.
   - Never defrost food at room temperature. Defrost frozen food in the refrigerator, cold water or in the microwave.

5. **Use safe water and raw materials**
   - Use safe drinking water for food preparation.
   - Check use-by dates and labels while buying packed food.

<table>
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<tr>
<th>Foodborne disease</th>
<th>Causative agent</th>
<th>Potential source</th>
<th>Incubation period</th>
<th>Clinical symptoms</th>
<th>Preventive measures</th>
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<tbody>
<tr>
<td>Salmonellosis (non-typhoidal)</td>
<td>Salmonella species (over 2500 different serotypes)</td>
<td>Raw and undercooked eggs, undercooked poultry and meat, contaminated raw fruits and vegetables (such as sprouts and melons), as well as unpasteurized milk and other dairy products</td>
<td>6–72 hours (usually 12–36 hours)</td>
<td>Diarrhoea (sometimes bloody), cramping, abdominal pain, and fever that appear 2–5 days after eating contaminated food</td>
<td>Cook thoroughly foods such as eggs, poultry and ground beef; wash raw fruit and vegetables before peeling, cutting or eating; avoid unpasteurized dairy products and raw/ uncooked foods; clean kitchen surfaces and avoid cross-contamination by not using the same containers for raw and cooked foods</td>
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<td>Haemolytic uraemic syndrome</td>
<td>E. coli O157:H7; Enterohaemorrhagic E. coli (EHEC)</td>
<td>Eating raw or undercooked ground beef or drinking unpasteurized beverages or dairy products</td>
<td>3 to 8 days, but usually 3–4 days</td>
<td>Severe diarrhoea (often bloody diarrhea), abdominal cramps, and vomiting. Usually little or no fever</td>
<td>EHEC is heat-sensitive, cook meat thoroughly; avoid unpasteurized dairy products, juices; keep cooking surfaces clean and prevent cross-contamination</td>
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<td>Shigellosis</td>
<td>Shigella dysenteriae</td>
<td>Most outbreaks result from food, especially salads, prepared and handled by workers with poor personal hygiene</td>
<td>1– 2 days</td>
<td>Diarrhoea (watery or bloody), fever, abdominal cramps</td>
<td>Always wash hands with warm water and soap before handling food and after using the bathroom, changing diapers or having contact with an infected person</td>
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<td>Campylobacteriosis</td>
<td>Campylobacter jejuni</td>
<td>Raw and undercooked poultry and other meats, unpasteurized dairy products and untreated water or contaminated produce</td>
<td>2–5 days</td>
<td>Diarrhoea (frequently with blood in the faeces), abdominal pain, fever, headache, nausea, and/or vomiting</td>
<td>Cook all foods thoroughly as Campylobacter species can be killed by heat, prevent cross-contamination by using separate cutting boards when handling raw and cooked foods, don’t drink raw milk and wash hands frequently</td>
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Table 1: Major foodborne pathogens responsible for foodborne illnesses

From farm to plate, make food safe
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<td>Staphylococcal food poisoning</td>
<td><em>Staphylococcus aureus</em></td>
<td>Salads such as ham, tuna, egg, chicken, potato and macaroni; sandwiches; contaminated milk or cheese; bakery products such as cream-filled pastries</td>
<td>2–8 hours</td>
<td>Nausea, vomiting, stomach cramp, and diarrhoea; sometimes headache and fever</td>
<td>Wash hands with soap and water, do not prepare or serve food if you have wounds or skin infections on your hands or wrists; keep food out of the danger zone by cooling foods immediately</td>
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<td>Clostridial food poisoning, pigbel syndrome</td>
<td><em>Clostridium perfringens</em></td>
<td>Meats, meat products and gravy called &quot;the cafeteria germ&quot; because many outbreaks result from food left for long periods in steam tables or at room temperature</td>
<td>6–24 hours</td>
<td>Intense abdominal cramps nausea, and diarrhoea. Fever and vomiting are not normally symptoms of poisoning by <em>Clostridium perfringens</em> toxins</td>
<td>Keep hot foods hot and cold foods cold! Once food is cooked, it should be held hot, at an internal temperature of 60 °C or above; reheat foods to at least 74 °C; discard all perishable foods left at room temperature longer than two hours</td>
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<td>Listeriosis</td>
<td><em>Listeria monocytogenes</em></td>
<td>Refrigerated, ready-to-eat foods, such as hot dogs and deli meats, unpasteurized milk and dairy products, and raw and undercooked meat, poultry and seafood</td>
<td>3–21 days (up to 70 days in rare case)</td>
<td>Fever, muscle aches, and sometimes gastrointestinal symptoms such as nausea or diarrhoea; symptoms such as headache, stiff neck, confusion, loss of balance, or convulsions can occur in some cases</td>
<td>Cook all foods thoroughly and reheat pre-cooked foods to 74 °C; from separate uncooked meat from foods that are already cooked or ready-to-eat; maintain a clean refrigerator and kitchen area.</td>
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<td>Botulism</td>
<td><em>Clostridium botulinum</em> (types A, B, E and rarely F)</td>
<td>Home-canned foods with a low-acid content, improperly canned commercial foods, home-canned or fermented fish.</td>
<td>12–36 hours</td>
<td>Fatigue, weakness and vertigo, usually followed by blurred vision, dry mouth, drooping eyelids, and difficulty in swallowing and speaking (no fever and no loss of consciousness)</td>
<td>Do not use damaged canned foods or canned foods showing signs of swelling, leakage, punctures, extensive deep rusting, or crushing/denting.</td>
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