Food Safety

For safe and wholesome foods

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Food poisoning

- Illness from consuming food that contains a harmful substance, harmful microorganisms or their toxins.
- Common symptoms:
  - stomach aches
  - vomiting
  - diarrhoea
  - fever
- Can result in long-term diseases and death.
- Often caused by food that looks, smells and tastes normal.
Types of hazard in food

- Food can be contaminated by:
  - Chemical hazard
  - Physical hazard
  - Biological hazard
Chemical hazards

- Chemicals in the home include those used:
  - to clean kitchen surfaces and equipment
  - as pesticides.

- Chemicals can be very harmful if they are:
  - spilt on or near food
  - mistaken for food or drink.
Chemical hazards: Natural toxins

- Toxins are poisonous substances produced by some micro-organisms, plants and animals.

- Most toxins that cause food poisoning are tasteless and remain toxic even after cooking.
Physical hazards

- Foreign matter can:
  - physically injure people
  - introduce harmful bacteria into food.

- Examples of foreign matter include:
  - dead insects
  - hair
  - jewellery
  - glass
  - pieces of metal.
Biological hazards

- The microorganisms that can make us sick include:
  - Viruses (rotavirus, norwalk virus..)
  - Bacteria (Salmonella, E. coli, Listeria…)
  - Parasites (Toxoplasma gondii, Trichinella spiralis..)
  - Mould (Aspergillus flavus..)

- Microorganisms such as viruses and bacteria are the most common causes of food poisoning.
**Salmonella**

- **Sources** – intestines of people and carriers, animals and animal food, raw meat and poultry, raw milk, raw eggs.

- **Common food vehicles** – undercooked or contaminated cooked meat, raw milk and eggs.

- **Incubation period** – 6- to 72 hrs to produce endotoxin in intestine.

- **Symptom** – Abdominal pain, diarrhoea, vomit, fever.
Clostridium botulinum

- Sources – Fish intestine, soil, and vegetables.

- Common food vehicles – Low acid processed food contaminated after canning or vacuum packaging.

- Incubation period – 2 hrs to 5 days. Heat resistant neurotoxin produced in foods.

- Symptom – Difficulties in swallowing, talking and breathing. Double vision and paralysis.

- Characteristics – Sporeformer. Spores and exotoxin will survive under normal cooking Temp.
Escherichia coli O157:H7

- Sources – Animal intestine, soil, and water.
- Common food vehicles – Undercooked or raw meat, vegetables, unpasteurized milk and apple juice, contaminated water.
- Incubation period – 2 to 5 days.
- Symptom – watery or bloody diarrhea, nausea, vomiting, cramps, fever.
- Characteristics – Hemolytic Uremic Syndrome (HUS): Acute kidney failure in children
Staphylococcus aureus

- Sources – Human nose, mouth, skin, hands, spots, boils, septic cuts, etc.
- Common food vehicles – Dairy products, cold cooked meat and poultry, etc.
- Incubation period – 1 to 7 hrs. Exotoxin produced in foods.
- Symptom – Abdominal pain, diarrhea, vomiting, subnormal temperature.
- Characteristics – Heat resistant toxin, salt tolerant.
Bacillus cereus

- Sources – Dust and soil.
- Common food vehicles – Cereals, corn flour, steamed rice, spices, etc.
- Incubation period – 1 to 5 hrs. Exotoxin produced in foods.
- Symptom – Abdominal pain, diarrhea, vomiting, subnormal temperature.
- Characteristics – Sporeformer. Spores and exotoxin will survive under normal cooking Temp.
## Foodborne illness causing agents

<table>
<thead>
<tr>
<th>Microorganism</th>
<th>Source</th>
<th>Symptoms</th>
<th>Onset Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norwalk-like viruses</td>
<td>Feces, vomitus, Contaminated foods</td>
<td>Nausea, vomit, diarrhea, abdominal cramps, headache</td>
<td>12-48 hrs</td>
</tr>
<tr>
<td><strong>Campylobacter Jejuni</strong></td>
<td>Raw or undercooked poultry, water, milk, feces</td>
<td>Diarrhea, abdominal cramps, fever, nausea</td>
<td>2-5 days</td>
</tr>
<tr>
<td>Salomonella spp.</td>
<td>Poultry and egg, milk, beef, fruits</td>
<td>diarrhea, fever, cramps</td>
<td>12-36 hrs</td>
</tr>
<tr>
<td><strong>E. Coli O157:H7</strong></td>
<td>Ground beef, fruits, vegetables, milk, water</td>
<td>Watery or bloody diarrhea, nausea, cramps Hemolytic Uremic Syndrome</td>
<td>2-5 days</td>
</tr>
<tr>
<td>Clostridium botulinum</td>
<td>Raw fish and meat, Fruits and vegetables</td>
<td>Paralysis, diarrhea</td>
<td>12-36 hrs</td>
</tr>
<tr>
<td><strong>Staphylococcus aureus</strong></td>
<td>Human nose, throat, ears, skin Septic wounds, Animals and raw milk</td>
<td>Vomiting, Abdominal pain, Low temperature</td>
<td>1-7 hrs</td>
</tr>
</tbody>
</table>
Transmission

- Contamination can occur at several points along the food chain
  - On the farm or in the field
  - At the slaughter plant
  - During processing
  - At the point of sale
  - At home
## Risk in the produce processing

<table>
<thead>
<tr>
<th>Event</th>
<th>Contamination Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Production and harvest</strong></td>
<td>Irrigation water, manure, poor filed sanitation</td>
</tr>
<tr>
<td>- Growing, picking, bundling</td>
<td></td>
</tr>
<tr>
<td><strong>Initial Processing</strong></td>
<td>Washing water, handling</td>
</tr>
<tr>
<td>- Washing, waxing, sorting, packaging</td>
<td></td>
</tr>
<tr>
<td><strong>Distribution</strong></td>
<td>Ice, transportation vehicle</td>
</tr>
<tr>
<td>- Transportation</td>
<td></td>
</tr>
<tr>
<td><strong>Final Processing</strong></td>
<td>Washing water, handling, cross-contamination</td>
</tr>
<tr>
<td>- Slicing, squeezing, shredding, peeling, canning</td>
<td></td>
</tr>
</tbody>
</table>
Factors contributing to food poisoning outbreaks 1980 - 1995

- Inadequate cooking: 27%
- Temperature control: 20%
- Contaminated equipment: 19%
- Unsafe food source: 19%
- Poor personal hygiene: 9%
- Other: 6%

Source: Crerar, S.K. et al 1996
The food poisoning time bomb

Food stored in Temperature Danger Zone 5 to 60 degrees centigrade
As TIME Increases
Food becomes unsafe

SAFE
SAFE
SAFE
SAFE
UNSAFE

Food becomes contaminated
Strategies to prevent food poisoning

To ensure food does not become contaminated:
1. Keep hands and nails clean
2. Keep the kitchen clean
3. Handle food safely.

To kill or slow down the growth of microorganisms:
4. Cook high-risk foods thoroughly
5. Keep hot food hot and cold food cold.
Keeping hands and nails clean

We need to:

- wash hands and nails thoroughly with warm, running water and soap
- dry hands thoroughly
- cover cuts and infections on hands.
Washing hands and nails thoroughly with warm, running water and soap

We should wash our hands:

- before eating, preparing or handling food
- between handling raw meat, poultry and seafood, and handling cooked food or food that will be eaten raw
- after coughing and sneezing, using a handkerchief etc
- after going to the toilet
- after handling rubbish
- after touching animals
- after handling chemicals (e.g. cleaning products).
Transfer of microorganisms by hands

- Hands contaminated with bacteria by touching:
  - Ears
  - Hair
  - Eyes
  - Nose
  - Mouth
  - Dirty clothes
  - Jewellery

- Hands contaminated by touching:
  - Infections
  - Cuts
  - Sores
  - Pimples

- Hands contaminated while visiting toilet

- Contaminated food

- Contaminated equipment and surfaces

- Food Poisoning
Keeping the kitchen clean

When cleaning plates and equipment, we need to:
- scrape and rinse off surface food
- wash in clean, soapy water
- rinse in clean water
- air dry where possible
- if drying immediately, use only a clean, dry towel.
Keeping the kitchen clean:
Pest control and animals

We need to:

- stop pests such as cockroaches and mice coming into the area where food is kept
- discourage pests by not leaving food or dirty dishes out on the benches
- keep animals out of the kitchen.
Handling food safely

We need to:

- avoid preparing food when sick or feeling unwell
- keep raw meats, poultry and seafood separated from cooked food and food to be eaten raw
- protect food in the refrigerator by placing in covered containers or covering with plastic wrap
- use clean equipment, plates or containers to prevent contamination of cooked food (or food that will be eaten raw) with traces of raw food
We need to:

- use clean equipment, rather than hands, to pick up food
- wear clean clothes or a clean apron
- wash fruit and vegetables to be eaten raw under running water.
Cooking high-risk foods thoroughly

We need to cook thoroughly food such as:

- mince
- burger patties
- sausages
- rolled roasts
- stuffed meats
- rabbit
- seafood
- poultry
Keeping hot food hot and cold food cold

Avoid keeping food in the temperature danger zone of 5°C - 60°C

Bacteria die

Bacteria grow

Bacteria stop growing
Avoid keeping food in the temperature danger zone of 5°C - 60°C.

We need to:

- keep cooked food at 60°C or above until served
- refrigerate or freeze food that is to be prepared well in advance and reheat until steaming hot before serving
- cook or reheat packaged food strictly in accordance with any directions on the label.
Keeping cold food cold

Avoid keeping food in the temperature danger zone of 5°C - 60°C.

We need to:

- take cold groceries home to the refrigerator quickly as possible
- keep chilled and frozen food cold if it will be a long time before it can be placed in a refrigerator or freezer
- store cold food at 4°C or less
- keep cold food in the refrigerator as much as possible
- thaw frozen food in the refrigerator or microwave
- store and handle cold food according to any directions on the label
- check the temperature of the refrigerator regularly.
Summary:
Preventing food poisoning in the home

**We need to:**
1. keep hands and nails clean
2. keep the kitchen clean
3. handle food safely
4. cook high-risk foods thoroughly
5. keep hot food hot and cold food cold.