



your body matters



Teacher Notes E: Food hygiene and infection

Nourishing Body & Mind for a Healthy Life

A Primary Health and Wellbeing Curriculum Pack

Revised Version 2023



Teacher Notes E: Food hygiene and infection

Associated lesson plans		
Primary Stage	Lesson	Title
3	3.5	Keeping Well and Preventing Illness
4	4.3 (1)	Being Careful with Food
4	4.3 (2)	Being careful with Food: Bugs in Food
6	6.3	Food Hygiene
Useful websites / additional resources	<p>https://www.food.gov.uk/consumer-advice/food-hygiene <i>Food Standards Agency - food hygiene and safety.</i></p> <p>https://www.youtube.com/watch?v=N9hCY-MldMA <i>NHS 24 - how to wash your hands</i></p> <p>https://www.foodstandards.gov.scot/consumers/food-safety <i>Food standards Scotland - food safety information (food handling, cross contamination and food poisoning)</i></p> <p>https://www.food.gov.uk/consumer-advice/food-poisoning <i>Food Standards Agency information on food poisoning</i></p> <p>https://www.bbc.co.uk/bitesize/guides/z77v3k7/revision/1 <i>BBC Bitesize information on campylobacter, E. coli, listeria, salmonella and staphylococcus aureus bacteria that cause food poisoning, as well as the conditions that allow bacterial growth.</i></p> <p>https://www.foodstandards.gov.scot/education-resources/happy-hands <i>Learning about the importance of washing our hands correctly and the reasons why.</i></p>	

matters

What is the difference between bacteria and viruses?

Bacteria are single celled living organisms that thrive in many different types of environments. Most bacteria cause no harm to people and indeed many are essential for life. Some bacteria live in our gut and help to digest food and some live harmlessly in foods like yoghurt. However, there are a few types of bacteria that can cause food poisoning, an illness caused by eating contaminated food.

A virus is the smallest of all micro-organisms. They require other living things to support them to survive such as people, plants, or animals. They attach themselves to other living cells and invade them. There is a wide variety of virus; some that cause illness by directly invading cells in the body (e.g., influenza or chicken pox); and some that cause illness indirectly by invading cells in our food (e.g., shellfish) and can cause food poisoning.

How do we become infected?

The spreading of bacteria and viruses is called transmission and involves the following stages:

1. Escape from the host (the source of infection)
2. Transport to the new host
3. Entry to the new host
4. Escape from the new host

There are several potential routes of transmission including:

1. Person to person contact: e.g., shaking hands with someone who has a cold and has just wiped a dripping nose. Breathing in the infected particles emitted by a cough/sneeze of an infected person.
2. Food: can be contaminated at any point during the "farm to fork" process.
3. Water: drinking contaminated water.
4. Insects: responsible for spreading many diseases e.g., malaria.
5. Non-living organisms: e.g., towels, bedding, toys. Touching contaminated objects and transferring organisms to mouth, nose or eyes.

Infection and symptoms; what is the link?

We may not always know that a bacterium or virus has infected us because there may not be a significant amount of the bacteria or virus transmitted to the body to cause any damage or to put the body under stress. In these instances, the body's immune system will eliminate the infection without us being aware of it. If, however, the body is infected by a virulent strain of a bacteria or virus and the challenge of eliminating infection proves too difficult for the initial responses of the

immune system, a secondary response will be stimulated, and the body will begin to use methods of elimination that make us feel unwell.

The secondary immune responses often manifest 'symptoms of infection' by the effects that they have on the body. Symptoms indicate that the immune response is fighting infection. There are a variety of symptoms that can occur depending on the site of infection, type of bacteria or virus causing the infection and the virulence of the bacteria or virus. The table below illustrates some of the symptoms that can be experienced in the event of infection. Other less specific symptoms of infection can also be experienced, such as tiredness or general fatigue, these other symptoms help the body to realise that it is infected; it can then divert energy to the site of infection to eliminate the bacterium or virus.

Symptom of illness	Physiological reason for response
Temperature	Heats the body up to kill off the germ/virus which cannot survive in hot conditions.
Swollen glands	Indicates the body is producing immune cells to fight infection.
Vomiting	Vomiting gets rid of the germ/virus by expelling it from the body.
Diarrhoea	Diarrhoea gets rid of the germ/virus by expelling it from the body.
Runny nose	Mucus, the substance that comes out of the nose when it runs, helps to trap germs/viruses to stop further entry into the body. Mucus contains infection fighting substances to fight off the illness.
Redness	Redness near the site of damage or infection usually means that the infection/ damage is near the surface of the skin and the immune cells sent to heal the area are irritating it.
Swelling	After discovering an infection (or site of damage) the body increases blood flow and fluids to the site, carrying with it essential nutrients and cells to help heal the area. The increase in fluids is the cause of swelling and stretches the skin making it feel sore to the touch.
Mucus	Mucus is a substance produced by the body to trap bacteria and viruses before they get into our system. Once trapped in mucus, bacteria and viruses are expelled i.e., through the nose or mouth.

Pus	Pus is produced as a side-effect of the immune fight in an infected area. Toxins are sometimes produced during the immune response and these toxins are then pushed to the surface of the skin to be expelled as pus.
Tears	Tears contain chemicals that help to fight off infection by killing the bacteria and viruses that could enter the body through the soft tissue of the eye.
Sweat	Sweat is produced by the body to cool the skin down and help to expel heat when we are warm/hot. Sweat also contains chemicals that can kill off bacteria and viruses and help to prevent them from entering the body through the pores in our skin.
Decay	Decay is a term most used in reference to damage of the teeth by plaque bacteria.
Pain	When we cut or injure ourselves chemicals are released from the injured area which help the body to identify where the injury has occurred. The body can then send immune cells to prevent infection and help to heal the injury. The experience of pain also helps us to protect the injured area and to prevent further damage i.e., limping on a twisted ankle, holding a cut hand close to the body.

Ways to help prevent illness

There are many different things that we can do to help prevent illness from bacteria and viruses:

- Wash your hands regularly, particularly after going to the toilet and before handling food.
- Turn away from other people and cover your mouth with tissues when you cough or sneeze.
- Dispose of tissues immediately after use and wash your hands with soap and warm water.
- Use liquid soap; bar soap is not recommended as it harbors micro-organisms.
- Wash towels, dish cloths and dish towels frequently and allow to dry before using again.
- Wash work tops before and after food preparation

Why is hand hygiene important?

The most common way germs spread is by people's hands. Washing our hands properly with soap and warm water is the single most important thing we can do to help reduce the spread of infections. Hands should be washed:

Before activities like:	After activities like
<ol style="list-style-type: none">1. Preparing food2. Eating food3. Before touching a sick or injured person or the elderly4. Before visiting a hospital ward	<ol style="list-style-type: none">1. Using the toilet2. Handling rubbish3. Changing a nappy4. Touching animals or animal waste5. Gardening - even if you wear gloves6. Handling raw foods, particularly meat, fish and poultry7. Touching a sick or injured person8. Blowing your nose, coughing or sneezing9. After visiting a hospital ward



Food spoiling

Many foods contain natural bacteria. Usually, bacteria found on foods are in small quantities and are harmless. On fresh food and produce, most bacteria do not affect the taste, appearance or smell of food. However, many raw and processed food produce e.g., fruit, vegetables, meat or pre-prepared meals, provide bacteria with the conditions that they need to multiply.

Bacteria multiply quickly in moist, warm conditions where they have access to energy (food) and oxygen. The presence of salt and sugar in foods will make the surroundings more conducive to bacterial multiplication. To release energy from food to multiply, a bacterium must break down the food. This causes a change in appearance and smell of the food that is commonly known as 'spoiling' e.g., red meat may turn brown, fleshy fruit may brown or discolour, vegetables may soften.

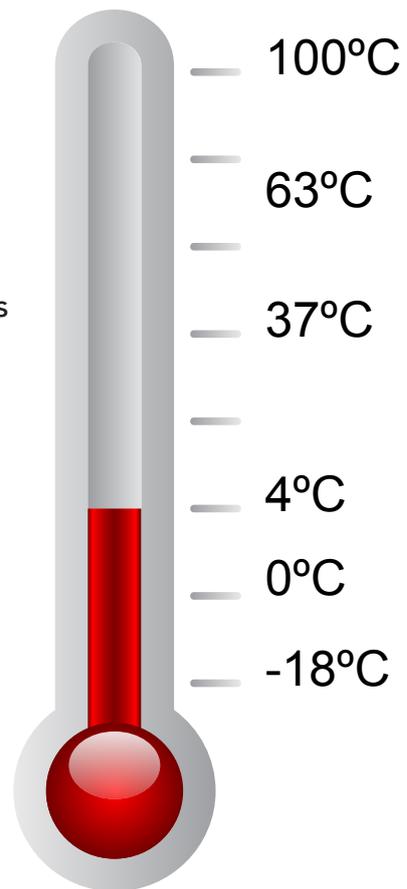
Food storage

To prevent spoiling and food poisoning and to ensure that we preserve our food and prevent waste, food must be stored properly. There are three main rules for safe food storage, food should be stored:

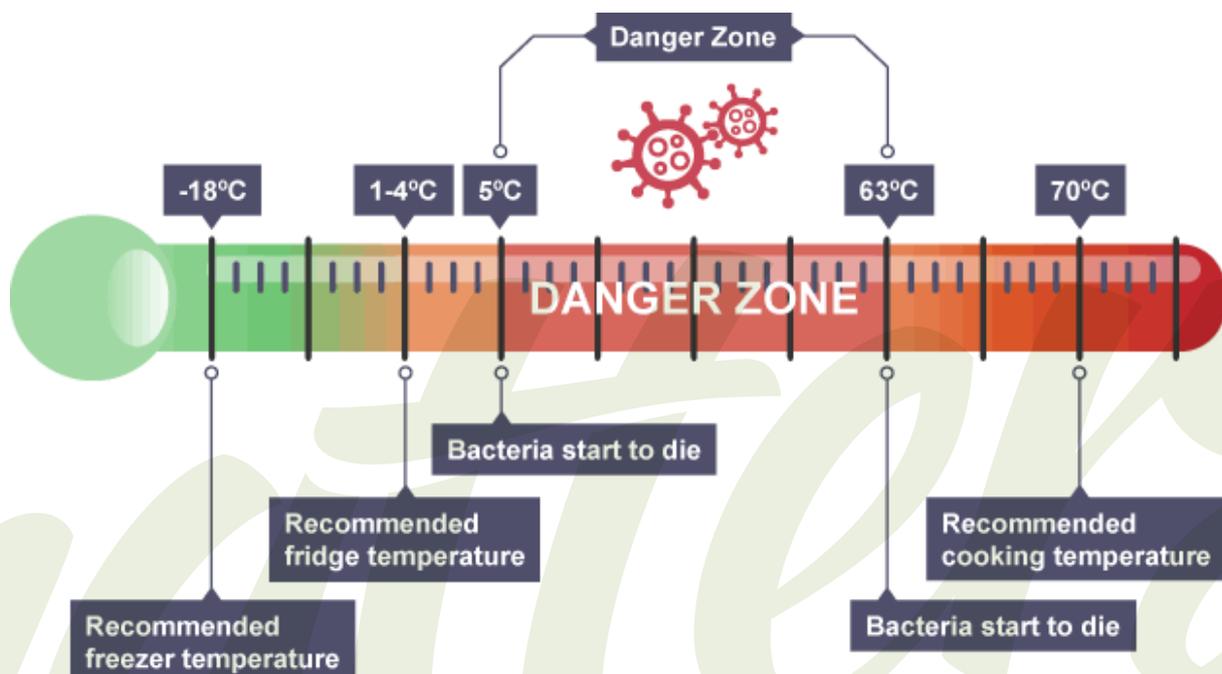
- In the correct place
- At the correct temperature
- For the correct length of time

Bacteria multiply quickly in moist and warm conditions, therefore temperature control is an effective way to slow down and limit bacterial multiplication. This is the basic principle of chilling and freezing food. The diagram below shows what happens to germs at different temperatures.

- At 100°C all bacteria are dead
- Above 63°C the spread of bacteria begins to slow down as conditions get hotter
- Between 4°C and 63°C bacteria begin to slow down as conditions get hotter.
- Bacteria are at their most comfortable at the ideal temperature of 37°C. This is the same temperature as our own bodies.
- Our stomachs make an excellent home for bacteria. The stomach is like an incubator which keeps a newborn baby's temperature at the correct level.
- A refrigerator works at 4°C keeping food chilled but not frozen.
- Bacteria do not react to chilly temperatures and remain inactive.
- Below 0°C bacteria become dormant.
- At an even lower temperature of -18°C the deep freeze preserves food safely as the bacteria are inactive due to the extreme cold.



It is important that food is always stored correctly and that storage instructions are followed (see Teacher notes C "Food Labelling" for more information on standard storage instructions).



What is food poisoning?

Food poisoning is a generic term for an infection acquired through ingestion of food containing or infected by a bacteria or virus. Table 1 provides some examples of bacterial causes of food poisoning.

Table 1.

Name of Bacteria or Virus	Risky Foods	Symptoms	Comments
Campylobacter	Found in raw and uncooked meats (particularly poultry). Undercooked chicken liver, liver pâté, unpasteurised milk, untreated water, mushrooms and shellfish (occasionally)	Nausea, diarrhoea, vomiting abdominal pain, high fever	Most common cause of bacterial food poisoning
Escherichia coli (E. coli)	Found in raw or undercooked meat and poultry or related products like gravy, raw seafood products, unpasteurised milk or products made from it like cheese and contaminated water	Nausea, diarrhoea, vomiting abdominal pain, high fever and kidney failure	Most strains are harmless, but some strains can cause serious illness. E. coli normally lives in the intestines of people and animals.

Salmonella	Found in raw or undercooked meat and poultry, eggs, unwashed fruit and vegetables and unpasteurised milk	Diarrhoea, vomiting, abdominal pain.	Salmonella is a form of foodborne bacteria that is commonly found in the intestinal tract. It can be transferred from animal to human and human to human
Listeria	Found in unpasteurised milk or products made with it, soft cheeses such as brie and camembert, ready to eat foods such as prepacked sandwiches, pate and cooked sliced meats and unwashed vegetables contaminated with soil	Flu-like symptoms e.g., elevated temperature, aches and pains, nausea or vomiting and diarrhoea. In more serious cases, it can lead to septicaemia or meningitis.	Listeria can be profoundly serious for pregnant women and those with impaired immune systems. Important that all these foods are eaten by their use by date

The symptoms of food poisoning may vary depending on the type of bacteria or virus that has caused the infection. However, the route of transmission of food poisoning is constant for all infections (i.e., ingestion into the stomach and/ or intestines) and the symptoms are usually similar.

When an individual, contracts food poisoning the symptoms usually last between 24-48 hours and most commonly include abdominal pains, diarrhoea, vomiting and nausea. Depending on the type of food poisoning, symptoms can develop within one hour or days after eating contaminated food. Most people get better without the need for treatment, however if symptoms persist it is recommended that the individual contact their doctor. Although symptoms such as diarrhoea and vomiting are most associated with food poisoning, they can also be due to an infection from a source other than food; for example, hand to mouth transmission of sewage matter or pet handling.

If symptoms can be linked to food poisoning from a food retail outlet, a local Environmental Health Officer should be alerted (i.e., if there are outbreaks in

multiple consumers eating food from a retail outlet in a local area). Occasionally, food poisoning can have more serious effects on a person's health, particularly if they are vulnerable to infection. People who fall into this category include, babies, the elderly, and individuals with a condition that weakens the immune system, such as HIV or cancer.

- Food Standards Scotland (2023)

Causes of food poisoning

Food can become contaminated at any point during its production, processing, and cooking. Food poisoning can occur if:

- Food is not cooked or reheated thoroughly (particularly poultry, pork, burgers, sausages, and kebabs)
- Food is not stored correctly
- Cooked food is kept unrefrigerated for more than an hour
- Food has been contaminated by someone who is ill
- Food is eaten after its "use-by" date

Cross contamination is a cause of food poisoning that occurs when harmful bacteria are spread between food, surfaces and equipment. Cross contamination can occur when raw meat is stored above and juices from the meat drip onto other foods below and contaminate it.

How can we avoid food poisoning?

Although it is not possible to eliminate the risk of food poisoning there are many things that we can do to reduce it and avoid becoming ill as a result.

Action	Method
Wash your hands	Wash your hands thoroughly with soap and hot water and dry them before handling food, after handling raw foods including meat, fish, eggs and vegetables, as well as after touching the bin, going to the toilet, blowing your nose, or touching animals, including pets.
Wash worktops	Wash worktops before and after preparing food, particularly after they've been touched by raw meat, including poultry, raw eggs, fish and vegetables. You don't need to use antibacterial sprays: hot soapy water is fine.

Wash dishcloths	Wash dishcloths and tea towels regularly and let them dry before you use them again. Dirty, damp cloths are the perfect place for bacteria to breed.
Use separate chopping boards	Use separate chopping boards for raw food and ready-to-eat food. Raw foods can contain harmful bacteria, that spreads very easily to anything they touch, including other foods, worktops, chopping boards and knives.
Keep raw meat separate	It's especially important to keep raw meat away from ready-to-eat foods such as salad, fruit and bread. This is because these foods won't be cooked before you eat them, so any bacteria that gets on to the foods won't be killed.
Store meat on the bottom shelf	Always cover raw meat and store it on the bottom shelf of the fridge, where it can't touch other foods or drip onto them.
Cook food thoroughly	Cook food thoroughly and check that it's piping hot all the way through. Make sure poultry, pork, burgers, sausages and kebabs are cooked until steaming hot, with no pink meat inside.
Keep your fridge below 5°C	Keep your fridge temperature below 5°C. By keeping food cold, you stop food poisoning bacteria growing.
Cool leftovers quickly	If you have cooked food that you're not going to eat straight away, cool it as quickly as possible (within 90 minutes) and store it in the fridge or freezer. Use any leftovers from the fridge within two days.
Respect 'use-by' dates	Don't eat food that's past its "use-by" date label. These are based on scientific tests that show how quickly harmful bugs can develop in the packaged food.

Information sourced from: <https://www.food.gov.uk/food-safety>



